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Corporate Finance, Governance, and Social Responsibility

Edited by
Ştefan Cristian Gherghina

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Editor

Ştefan Cristian Gherghina

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Editor
Ştefan Cristian Gherghina
Bucharest University of Economic Studies
Bucharest, Romania

Editorial Office
MDPI
St. Alban-Anlage 66
4052 Basel, Switzerland

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Ştefan Cristian Gherghina

Ştefan Cristian Gherghina, PhD. Habil., is a Professor at the Department of Finance, Faculty of Finance and Banking, and a PhD. supervisor at the Finance Doctoral School, Bucharest University of Economic Studies, Romania. His areas of interest focus on corporate finance and governance, quantitative finance, portfolio management, and sustainable development. He authored and co-authored several books and articles published in top journals, and exhibited his studies at many international conferences. He serves as a referee for various leading journals, while also being an Editorial Board Member of the *Economies* and *Journal of Risk and Financial Management*, among other journals indexed by Clarivate Analytics, Web of Science, Social Sciences Citation Index (SSCI); Science Citation Index Expanded (SCIE), Emerging Sources Citation Index (ESCI); and further reputed international databases.

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Editorial

Corporate Finance, Governance, and Social Responsibility

Ștefan Cristian Gherghina

Department of Finance, Bucharest University of Economic Studies, 6 Piata Romana, 010374 Bucharest, Romania; stefan.gherghina@fin.ase.ro

Corporate finance is a branch of finance that focuses on how companies handle their cash flow, raise capital, make investments, and implement accounting systems. It covers crucial topics, including capital planning, capital structure, and working capital administration. Every corporate financial action has financial consequences, as they involve the allocation of money in a certain manner (Damodaran 2014). Corporate finance's primary responsibility is to make sound business decisions that increase shareholder value, while reducing risks and maximizing returns. A corporation's ability to motivate and engage all of its managers and staff in generating wealth will define its level of excellence (Brealey et al. 2011). In line with stakeholder theory (Freeman 1984), managers should consider the demands of all involved parties in a company, not only stockholders.

The degree to which stock ownership and corporate decision making are divided within corporations differs widely. Small, closely held businesses tend to have highly concentrated equity ownership and control, while large, publicly listed businesses have almost entirely separate equity ownership and control (Badertscher et al. 2013). Directors can make regular financial decisions due to the division of ownership and control, but stockholders are not entitled to assume executive roles. As such, an agency relationship, or the connection between shareholders and management, comes to exist when the principal hires the agent to represent his or her interests (Ross et al. 2013). Jensen and Meckling (1976) emphasized the agency costs that occur in the form of welfare losses when managers act against the shareholders' interests.

The theoretical foundation of corporate governance is agency theory (Vernimmen et al. 2005). The institutional framework referred to as corporate governance oversees the distribution and use of power within corporations (Licht 2013). It generally refers to the methods and procedures utilized to ensure sufficient morality, integrity, and transparency in the administration of organizational activities (Turner 2009). Crowther and Seifi (2011) view corporate governance as a symbiotic commitment made by all the constituent components (or stakeholders), including the government, the public, specialists, service providers, and the financial industry. The main goal of corporate governance is to improve business performance by giving managers incentives to improve their operational efficiency, return on assets, and long-term firm growth, while deterring executives from abusing their power over company funds (Guluma 2021). Shareholders must trust senior management to act for the mutual benefit of the business if corporate governance is to be effective. This collective commitment lowers the agency premium, which might reduce the company's cost of capital (Rose 2016). Internal governance (boards, shareholder activism, and executive incentives) aims to resolve disagreements between executives and various shareholder groups, whilst external governance (entry modes, control over a subsidiary, and network governance) addresses the potentially opportunistic behavior of partners outside an organization (Filatotchev and Nakajima 2010). Good governance is critical for financial institutions, notably those in the banking sector, to safeguard the financial system's stability and prevent a credit crisis (Komath et al. 2023). Corporate collapse, whether caused by financial fraud or excessive reward packages, is the result of ineffective corporate governance (Monks and Minow 2011).

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Deteriorating environmental conditions and the frequent social scandals of industry leaders have put businesses under growing pressure to integrate social responsibility into their corporate strategies (Schwoy et al. 2023). According to Hopkins (2007), addressing stakeholders ethically and responsibly is the goal of corporate social responsibility (CSR). CSR can be regarded as an extension of business efforts to increase shareholder wealth, while simultaneously meeting social expectations (Harjoto and Jo 2011). Although external CSR focuses on social and environmental initiatives that advance the position of a company with concern to its external stakeholders, internal CSR refers to practices and policies that are directly related to the wellbeing of company employees and the management team (Yoon and Chung 2018). Cavaco and Crifo (2014) found that responsible company policies regarding clients and suppliers (one facet of business conduct) and toward workers (the human resources component) acted as a complement to financial performance, suggesting reciprocal benefits and less disagreement between these aforementioned parties. Despite the high costs of CSR activities, CSR can indirectly increase the value of the firm and lower financial risk, since it stimulates and encourages ethical conduct, which has a positive impact on the reputation of a company (Xue et al. 2023). Furthermore, strengthening engagement through CSR can support society and generate measurable results for the company, including higher sales and superior financial performance (Shahbaz et al. 2020). As stated by signaling theory (Spence 1973), non-financial disclosures given through various channels can lower the disparity in information between a corporation's management and its owners. Patten and Zhao (2014) noted that when retail companies independently report CSR, a beneficial impact on the company's reputation results, because in doing so, the company may become more appealing to investors who prioritize CSR practices. In view of stakeholder theory, ethical corporations perceive CSR initiatives as a lynchpin of strategic planning to fulfill stakeholder demands; however, the principal–agent theory contends that self-interested managers view CSR disclosure as a means to conceal real earnings statements or other unethical behavior (Guo et al. 2022). However, better CSR statements have been suggested as a way for companies to prevent economic turmoil by increasing social confidence in them (Lins et al. 2017).

This book comprises 27 papers published in the Special Issue entitled "Corporate Finance, Governance, and Social Responsibility", which investigated a variety of practical topics related to corporate finance, financial modeling, corporate governance, and corporate social responsibility. Articles related to corporate finance focused on various approaches to equity investments (Bae et al. 2023), the reasons why corporations choose a zero debt policy (Miglo 2020), the drivers of the capital structure (Kedzior et al. 2020), the connection between the firm capital structure and its operating environment (Tsolas 2021), how investor connections affect a company's performance (Mihail et al. 2021), developing a framework to assess and improve performance (Tudose et al. 2021), the effect of working capital management on firm profitability (Anton and Nucu 2021), the association between derivative use and firm performance (Wen et al. 2021), the relationship between various sustainability measures and the risk of a corporation collapsing (Lääts and Lukason 2022), and capital budgeting practices (Mota and Moreira 2023). Regarding financial modeling, stock market volatility was explored during the coronavirus outbreak (Gherghina et al. 2021). Studies in the field of corporate governance have examined developments in corporate governance from a cross-country perspective (Mihail and Dumitrescu 2021), corporate governance compliance (with board) practices and company value (Aluchna and Kuszewski 2020), the impact of board attributes on bankruptcy risk (Maier and Yurtoglu 2022), company performance (Ararat et al. 2021; Mihail and Micu 2021; Mihail et al. 2022) or firm value (Lourenço et al. 2021), the association between employees' stock option plans and firm performance (Ding and Chea 2021), the relationship between corporate governance and the power of major shareholders (Pourmansouri et al. 2022), corporate governance practices and earnings management (Kjærland et al. 2020), and the link between timely accounting information disclosure infringement and corporate governance characteristics (Lukason and Camacho-Miñano 2020). With respect to CSR, the research was oriented

toward the aspects of corporate finance that are impacted by CSR (Saeed and Sroufe 2021), the impact of CSR on financial performance (Rossi et al. 2021), the association between CSR and risk management (Bozos et al. 2022; Singh and Hong 2023), and the effect of a mandatory disclosure policy regarding CSR reports on forecasts of analysts' earnings (Tseng and Shih 2022).

The collection of papers included in this Special Issue, as a final thought, will serve to enhance our knowledge of corporate finance, governance, and social responsibility on a worldwide scale, and present compelling future research directions.

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Article

Capital Structure Choices in Technology Firms: Empirical Results from Polish Listed Companies

Marcin Kedzior [1,*], Barbara Grabinska [2], Konrad Grabinski [1] and Dorota Kedzior [3]

[1] Financial Accounting Department, College of Economics, Finance and Law, Cracow University of Economics, Rakowicka 27, 31-510 Cracow, Poland; kg@uek.krakow.pl
[2] Finance and Financial Policy Department, College of Economics, Finance and Law, Cracow University of Economics, Rakowicka 27, 31-510 Cracow, Poland; grabinsb@uek.krakow.pl
[3] Corporate Finance Department, College of Economics, Cracow, Finance and Law, University of Economics, Rakowicka 27, 31-510 Cracow, Poland; kedziord@uek.krakow.pl
* Correspondence: kedziorm@uek.krakow.pl; Tel.: +48-12-293-56-94

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Abstract: The main aim of the paper is the identification of capital structure determinants, with a special emphasis on investments in the innovativeness of Polish New Technology-Based Firms (NTBFs). Poland is a unique country in that it is an emerging market that was also promoted in 2018 to the status of a developed country. The study sample consisted of 31 companies listed in the Warsaw Stock Exchange that are classified as high-tech firms and covers the period 2014–2018. The following factors influencing the capital structure were analyzed: internal and external innovativeness and the firm's size, liquidity, intangibility, age, profitability, and growth opportunities. The results of the research provide empirical evidence that liquidity, age, and investments in innovativeness determine capital structure, which provides an additional argument supporting the trade-off theory and the modified version of the pecking order theory. More specifically, the results suggest that companies whose process of investment in innovativeness is based on the external acquisition of technology are able to attract external financing, while the process based on internally generated innovativeness (R&D activity) deters external capital. The results are interesting for policymakers in emerging markets.

Keywords: capital structure; New Technology-Based Firms (NTBFs); internal and external innovativeness; intangibility

1. Introduction

Over one hundred years ago, entrepreneurial activity undertaken in technologically advanced sectors was considered to be a primary source of innovation and economic growth (Schumpeter 1911). Nowadays, economic growth and competitive power are ascribed to the innovativeness of the economy to an even greater degree (Gherghina et al. 2020). From a policymaking perspective, special attention is devoted to high-tech companies and tools supporting innovative activity. Anecdotal evidence implies that the high-tech sector is a crucial driver of economic development. Furthermore, the endogenous growth theory assumes that the long-run growth rate has an endogenous character, and that the human factor plays a vital role (Kopf 2007). The decision of whether to invest more in R&D or to increase public spending on education is crucial in this context. The problem is especially important for EU countries, where, over the last decade, the lower level of investments in R&D and innovativeness has created a gap as compared to the main economic partners like the U.S. or China (Gil et al. 2019). Furthermore, investments in innovativeness create a knowledge-based society, produce intellectual capital, and finally, as (Popescu 2019) suggests, become an integral part of national wealth.

According to the results of the McKinsey Global Survey of Business Executives, on the corporate level, executives believe that innovation is the most required element of growth

(Carden et al. 2005, p. 25). (Hay and Kamshad 1994), at the beginning of the 1990s, designed and performed a questionnaire based on Small and medium—sized enterprises located in the U.K. The results of the study imply that investment in product innovation was, at that time, perceived as the single most crucial strategy, followed by the policy of broadening the product range and geographic expansion.

In recent years small, medium, and young companies active in high tech sectors have attracted special attention in economic literature, as they are deemed to be a major source of innovation and development for the economy. Some authors claim that these firms have a specific business model. (Giraudo et al. 2019), Aghion and Howitt (2005), Hall (2002) stress that these firms are characterized by a specific attitude toward grasping technological innovation. Still, they also suffer from inefficient mechanisms of capital allocations, which are very severe, especially for young firms which lack track record, stable cash flows, and collaterals. (Giraudo et al. 2019) indicate that financial constraints can be especially severe for so-called bank-based economies, like Europe. Howell (2016), who investigates barriers in financing innovative firms in China, stresses that the problem of financial constraints for innovative firms can be especially severe in transitioning economies with a less developed system of financial intermediaries.

From the policymaking point of view, special attention is devoted to so-called New Technology-Based Firms (NTBFs). The term was supposedly coined by Arthur D. Little (Little 1977), who defined NTBFs as an independent venture less than 25 years old that supplies a product or service based on the exploitation of an invention or technological innovation. The issue invoked by many researchers is financial constraints, which are encountered by NTBFs at the early stage of development. So far, most studies have been focused on developed countries like the US, UK, Germany, France, or Ireland, where the institutional market environment is well established and at the same time most developed in terms of technology and science. These countries also represent a long history and have extensive experience in supporting the development of innovative activity. The high-technology firms in these countries have access to the best research centers, the best universities, and are subject to a very competitive market, and therefore their activity is based mostly on internally generated innovation.

However, scant research is devoted to the other emerging or less developed countries whose economies are trying to catch up with the leading innovators. This is especially apparent, as (Vintilă et al. 2017, p. 38) note, for countries from Eastern Europe, which endeavor to line up with Western Europe. The specific NTBFs located in these countries have other distinctive attributes. Firstly, since they are usually in emerging economies, there is no equivalent to the best research centers and access to the best universities. Secondly, there are almost no headquarters and/or research centers of multinational companies, which are usually located in the most developed countries. Thirdly, it is much more difficult for high-tech companies to compete for leading researchers with multinational companies. Fourthly, it is much more challenging to compete with high-tech companies from leading countries due to scarce resources in terms of finance, marketing, patent protection, etc.

As a result, high-tech companies in developing countries often adopt a different strategy in which innovative activity is based in substantial part on the acquisition of external technology and to a minor degree on internally generated innovation. The purchase and implementation of new technology is the preferred and less risky strategy in comparison to the development of in-house produced innovative processes. Therefore, the specificity of the high-tech companies in emerging and developing markets is slightly different in comparison to NTBFs from leading countries. The problem is especially visible within the EU, where the concept of "Two-Speed Europe" is apparent in the economic press. Therefore, as (Vintilă et al. 2018, p. 571) point out, the disparities between the West and East require a deeper understanding of proper public policy.

The main aim of the paper is the identification of determinants of the capital structure of NTBFs in a country that has an emerging economy. The focus of this study is on technological firms (NTBFs) headquartered in Poland, which is a very unique and specific case. Poland was the first CEE economy promoted by FTSE Russel's index provider with the Emerging Market to

Developed Market status. Since 2018, Poland has been classified as one of the 25 most advanced global economies, including the U.S., U.K., Germany, France, Japan, etc. Therefore, Poland is considered a success story in terms of economic development, but at the same time is a country with one of the lowest levels of corporate R&D expenditures within EU countries. This contradiction urges us to investigate deeper the determinants of the capital structure of Polish NTBFs with special attention given to investments in innovativeness. We select companies at a certain stage of development that are listed on the stock exchange, mostly because of the higher quality of accounting information reported in the financial statements as compared to the non-listed companies. We hypothesize that investment in innovation has an inconclusive influence on financial leverage. Therefore, we separated it into two categories: innovation generated internally (R&D projects) and innovation acquired externally. These two types of investments have significant and distinct attributes, which we posit have a differential impact on financial leverage. We provide empirical evidence that the former kind of investment has negative, while the latter one a positive impact on financial leverage. The other hypotheses conjecture the impact of the other firm's attributes like a firm's size, liquidity, intangibility, age, profitability, and growth opportunities.

As far as we know, there is no study related to emerging economies in which investments in innovativeness are separated into externally acquired and internally generated and treated as a potential determinant of capital structure. Our hypotheses are tested on a sample of 102 firm-year observations (34 companies). The study period (2014–2018) ends at the moment when Poland was promoted to a group of countries with Developed Market status, so it can be regarded as a study of a country with the Emerging Market status.

The first section presents a literature review of the most important studies related to the problem of the financial structure of high-tech companies, the theories, and hypothesis development. The second section presents the sample characteristics, research design, and empirical results. The last section concludes with the most important issues resulting from empirical research.

2. Theories of Capital Structure

Over the past several decades a number of capital structure theories have been developed which attempt to explain the creation of structures of economic entities' financing. The classical capital structure theories include *Net Income Theory, Net Operating Income Theory*, and *Traditional Theory*. Net Income Theory is based on the assumption that a firm's value is proportionate to its share of debt in capital structure, so a firm's maximum value is reached in the situation of its maximum indebtedness. Net Operating Income Theory assumes the dependence of a firm's value on the value of operating income; in the situation of determined conditions capital structure does not affect a firm's value. According to Traditional Theory, a proper balance should be maintained between internal and external sources of financing. Therefore, a reasonable level of debt increases a firm's value (Durand 1952). However, the best known classical theories are those created by F. Modigliani and M. Miller (MM). In their famous paper MM argue that a firm's value is not dependent on the capital structure but rather owners' expectations with regard to cash flows (Modigliani and Miller 1958). The conclusions based on the assumption of perfect capital markets were partly rejected in MM's next work, which took into account the issue of taxation (Modigliani and Miller 1963). MM finally admitted that indebtedness has a positive impact on a firm's value thanks to possible tax burden reductions. In the context of determining the capital structures of high-tech companies, MM and the remaining classical theories are of limited practical application (Coleman and Robb 2012; Ullah et al. 2010). High-tech firms, due to high-risk levels, do not heavily rely on debt financing; however, high debt levels have a negative impact on the value of high-tech companies.

The capital structure of high-tech firms can be more affected by the agency costs theory. Its basics were developed by Fama and Miller (1972), and initially by Jensen and Meckling (1976). It assumes the existence of conflicts of interest between owners, lenders, and managers. Managers do not always act with the intention of protecting owners' interests—they often pursue their own interests, which can

be different (Novaes and Zingales 1995). In such a situation owners are forced to exercise additional control over the management's activities, which generates additional costs—agency costs. One of the ways of linking the interests of the above groups is relating the management's compensation to the company's shares. Another situation can occur in which managers implement risky investment projects, generating additional risk for lenders, while only owners benefit from higher profits. Debt can then act as a factor that disciplines the management, enforcing more active operating policies, and more effective investment policies (Kenourgios et al. 2019). In this situation, debt decreases agency costs (Novaes and Zingales 1995). Agency costs tend to be very high in companies with high unique value (Colombo et al. 2014; Sau 2007). The higher the agency costs, the lower the firm's value (Lins 2003).

A possibly significant role in high-tech firms is played by trade-off theory. Its creators are Kraus and Litzenberger (1973). All financing methods have both advantages and drawbacks. Higher debt levels provide an opportunity to deduct interest from taxable income. However, it should be noted that there are other methods of reducing tax burden with the use of non-interest tax shields including effective depreciation policies, or, in a broader sense, tax optimization (DeAngelo and Masulis 1980). It should be stressed that a company can benefit considerably from relatively high tax rates. A company's heavy reliance on indebtedness in its capital structure increases business risk and results in the costs of bankruptcy (Baxter 1967). The higher the bankruptcy costs, the lower a firm's value. Higher debt levels in the balance sheet total originally increase a firm's value, but at a certain point, a firm's value decreases (Adrienn 2014). The costs of bankruptcy are then higher than tax shield positive effects. A practical confirmation of the trade-off theory is the occurrence of the so-called industry effect. The functioning of an enterprise within one industry is dependent on similar factors—economic entities are characterized by similar operating cycles, risk levels, and agency costs, hence their similar share of debt in overall financing. The companies whose share of debt in the structure of financing is below industry average tend to increase it, unlike entities that have a large share of debt in their financing structure and try to lower its level (Kędzior 2012). The industry effect is not identical in all industries. In industries characterized by stiff competition and diversified agency costs, debt levels can vary. Unequal access to advanced technologies has a similar impact on indebtedness (Michaelas et al. 1999). The above factors result in the existence of an optimal industry capital structure, which economic entities seek to achieve in their long-term operations (M'ng et al. 2017).

In the case of innovative companies, it is difficult to estimate the risk of the sources of financing within the framework of trade-off theory. Many threats should be regarded as potential, and their materialization is conditional and not easy to estimate (Sau 2007), hence difficulties in choosing adequate sources of financing. Choices made by high-tech firms with regard to financing are affected by a rapidly changing business environment and the complexity of applied technologies (Li et al. 2006). These entities do not have the ability to offer adequate guarantees to mitigate lenders' risk (Sau 2007). Innovative firms have higher bankruptcy costs (Aghion et al. 2004; Sau 2007), so the share of liabilities in the balance sheet total cannot be dominant. High-tech companies with a relatively high volume of intangible assets are less inclined to borrow funds. On the other hand, high growth companies rely on debt financing to a smaller degree (Castro et al. 2015). Transaction costs in such entities are also high due to risk factors and, generally, limited volumes (Revest and Sapio 2012). Their market value is subject to large fluctuations, especially as their financial standing deteriorates. It results from the fact that their valuation is based on specialized assets as well as large growth potential. Therefore, valuation changes on stock exchanges play a crucial role in high-tech firms (Revest and Sapio 2012).

The financial conditions and capital requirements of high-tech firms depend on the stage of their development (Sau 2007). At the initial stage of development economic entities' cash flows are often negative, so they are not able to repay their debts, and the acquisition of funds is difficult. In their early stages, high-tech firms' biggest problem in product commercialization based on the use of familiar technologies is the acquisition of funds for operating activities (Minola et al. 2013).

The creation of capital structure is greatly affected by the pecking order theory. The theory was created by Donaldson (1961), and then elaborated and modified by Myers and Majluf (1984).

The authors divide sources of financing into external and internal sources. The choice of the sources of financing is mainly determined by their cost which is lower for internal capital. Therefore, companies should finance their operations by relying on retained earnings, followed by debt and, finally, the issue of shares (Stulz 1990). This order is justified by information asymmetry in relationships between companies, banks and external investors. Banks and external investors have more difficulty accessing information about companies than people operating within company structures, so in light of the higher risk of transferring capital, they require higher interest on loans and higher rates of return. Information asymmetry leads to moral hazard and adverse selection. The adverse selection indicates that banks find it difficult to distinguish between effective and ineffective investment projects, which generates additional costs and increases risk. A high level of adverse selection also results from great uncertainty with regard to future return on investment rates as compared with traditionally implemented projects (Carpenter and Petersen 2002). Moral hazard indicates that owners benefit more from implementing risky investment projects than debtors (Aoun and Heshmati 2006). High information asymmetry results, to a considerable degree, from the large development potential of high-tech firms (Castro et al. 2015). High information asymmetry in the technology sector mainly applies to small companies. Therefore, such companies can often be undervalued (Coleman and Robb 2012).

Pecking order theory assumes that the accessibility of information about a high-tech firm has an impact on the choice of capital structure. To avoid problems resulting from the disclosure of internal information to a larger group of stakeholders, high-tech firms give preference to internal sources of financing (Hogan et al. 2017; Scherr et al. 1993). Due to such factors as uncertainty with regard to the ultimate results of innovative investment projects, possible cases of underinvesting and overtrading, difficulties in monitoring R&D activities, and the frequent lack of comprehensive knowledge about technology among investors and banks, access to external financing can be limited (Revest and Sapio 2012). Generally, high reinvestment rates in technology firms force them to seek external sources of financing in the absence of their own funds (Berggren et al. 2000).

The acquisition of external capital implies the necessity of disclosing additional information about planned operating or investment activities. Small and medium-sized high-tech firms are not inclined to disclose such information. Similar opinions are held by Revest and Sapio (2012). Technology firms are unwilling to disclose detailed information about R&D programs due to a very competitive market and the fear of losing competitive advantage. Aoun and Heshmati (2006) also claim that because of the confidential character of business operations high-tech firms have difficulty disclosing comprehensive financial data, and hence face problems with acquiring funds for business activities. As a result, markets do not possess full information, and lenders have limited knowledge about the current operations of high-tech firms (Ullah et al. 2010). Transaction costs and greater flexibility of operations justify reliance on retained earnings as a source of financing (Grinblatt and Titman 2002). A number of empirical research studies point to a negative correlation between profitability and indebtedness (Bhayani 2010a; Korkmaz and Karaca 2014). Therefore, profitable firms rely on debt financing on a limited scale.

Technology firms tend to choose financing through the issue of shares rather than indebtedness. This mainly refers to young firms at an early stage of development (Minola et al. 2013). Innovative firms are characterized by attractive investment possibilities as compared with other business entities, but the costs of the issue of shares should be regarded as high (Aghion et al. 2004; Castro et al. 2015). Larger technology firms have a greater ability to raise funds through the issue of shares (Mac an Bhaird and Lucey 2010). Frequently, young firms without a long credit history and relationships with banks are left with no other option but to issue shares (Carpenter and Petersen 2002). Because of the lack of collateral in the form of tangible assets, innovative companies tend to rely more frequently on share capital. The issue of shares does not have to be secured by tangible assets and does not increase the threat of bankruptcy. High-tech firms can successfully implement R&D programmes if they are able to convince investors to purchase issued shares (Carpenter and Petersen 2002). The idea

of the issue of shares is also justified by technology firms' tendency to implement high returns but also risky investments (Carpenter and Petersen 2002).

Because of the risk of share dilution and takeovers, innovative companies tend to rely on debt financing (Aghion et al. 2004). If the lack of transparency of disclosures is acceptable, high-tech firms can also resort to bank loans (Berggren et al. 2000). As firms grow and gain more experience, the range of information asymmetry reduces, the value of assets (especially tangible assets) increases, and access to bank loans becomes easier (Hogan et al. 2017). High-risk firms may not be granted loans, but they are still able to successfully implement the process of issuing shares.

It seems, however, that pecking order theory turns out to be more useful in large economic entities, which rarely issue shares because of the high values of retained earnings and the possibility of acquiring corporate bonds (Akgül and Sigali 2018). Nevertheless, within a short time horizon, enterprises are likely to create their capital structure based on the pecking order theory. On the other hand, in longer periods of time in which the changeability of cash flows and economic conditions is less severe, companies are likely to rely on trade-off theory (Bontempi 2002). Pecking order theory (POT) is probably more effective in describing the choice of sources of financing in mature companies as compared with high growth entities.

The signaling theory, created by Ross (1977), has a different impact on capital structure creation. Due to information asymmetry, people operating inside and outside of an organization have unequal access to information about a company's financial standing. External stakeholders make intensive efforts to obtain information about a company's future financial condition and future share valuations. Therefore, they seek additional signals concerning an economic entity's actual financial condition. The most reliable signals and those that cannot be easily imitated refer to dividend policies and capital structure decisions (Frankfurter and Wood 2002; Deesomsak et al. 2004). Increased indebtedness should be regarded as a positive signal—it indicates a bank's favorable assessment of an entity's creditworthiness and stable projected financial results and cash flows. It can be assumed that current and projected financial results will not be diluted. On the other hand, the issue of shares is sometimes treated by financial markets as a negative signal. Companies with less optimistic financial result predictions tend to finance their operations through the issue of shares (Leland and Pyle 1977). Managers choose the issue of shares if their current valuation is excessively high. The market's negative response to the issue of shares can be even more severe if investors perceive a company as being characterized by great information asymmetry (Minola et al. 2013). The range of information asymmetry is very high for new investment projects, new areas of activity and new strategies. Over time asymmetry tends to decrease (Harris and Raviv 1988). Information asymmetry relates to new areas and issues—past events of key significance are reflected in the price of shares (Harris and Raviv 1988).

Last but not least important is the financial life cycle theory, which assumes that a firm's capital structure preferences vary with their life cycle (Butzbach and Sarno 2018). The life cycle determined the availability of financial resources and the cost of capital. The theory implies that smaller and younger companies exhibit higher information asymmetry, which in turn increases the cost of capital. We expect that in the case of NTBFs the financial life cycle theory may be of use due to the fact that R&D activity increases information asymmetry and the fact that NTBFs are typically young companies with low or no reputation, and have almost no (or very low) carrying amount of tangible assets.

3. Literature Review and Hypothesis Development

Determinants of capital structure have been at the heart of finance theory for many decades. Still, as Dobusch and Kapeller (2018) indicate, innovation advancements and digital technologies have a big influence on changes in firms' strategic choices, so there is a need to reconsider factors influencing corporate financing decisions, especially in high-tech sectors. The sector is expected to be a crucial factor affecting access to finance, in part because firms in different industries will be seeking to access finance for diverse reasons. High–tech firms very often look for sources of financing for innovative or

R&D activity. Hall (2010) addresses the extent to which innovative firms are fundamentally different from established companies and how it is reflected in their financing.

In terms of methodology, the critical problem concerns the identification and measuring of financial constraints. In other words, the operationalization of this problem may be expressed by the identification determinants of financial leverage, and there is vast literature concerning that problem. However, papers related to the determinants of high-tech companies or NTBFs represent a much narrower field of study. There are at least several significant factors whose impact on financial leverage was empirically investigated and documented. These factors include, among others, the intangibility of assets, R&D intensity, the firm's size, age, liquidity, profitability, intangibility, and institutional setting.

Several researchers identified and documented the fact that access to finance for high-tech companies is constrained. Lee et al. (2015), based on the study of 10,000 UK small and medium-sized companies[1], found that access to finance is much more difficult for innovative firms and that this problem has worsened since the 2008 financial crisis. They investigated the relationship between innovation and access to funding while controlling for firm characteristics (size, age, sector, several personal features of the management), and the likelihood of applying. Their focus was on the change in access to capital for innovative firms caused by the 2008 economic crises. It is important to note that their definition of innovative firms is much broader than in other studies, and extends beyond R&D intensive, high technology industries. The results suggest that there are barriers to obtaining external finance for innovative projects, even controlling for several factors that might have influenced more difficult access to funds. They indicate that there are two kinds of problems in financial systems. The first one is related to structural problems connected with financial constraints for innovative firms. The second problem concerns cyclical issues caused by the financial crisis, which, surprisingly, has had a more severe effect on non-innovative firms' access to finance. They find that innovative firms in the UK show higher demand for external capital but encounter more significant barriers to obtaining financing (restricted supply). In their case, there is a much higher imbalance between demand and supply compared with non-innovative firms.

Brown and Lee (2019) challenged the assumption of innovative firms having problems with access to credit. They concluded, based on the survey of 8000 UK SMEs in the period following the financial crisis of 2008, that there is no difference in access to external finance for high growth SMEs and other companies. The authors focus on the high growth of SME firms but admit that those are particularly likely to be innovative firms, and R&D activity is especially seen as growth-inducing. They find that a vast majority of high growth companies (achieving rapid growth in turnover and employment) rely strongly on debt, not equity finance for investment purposes (the situation is different in the case of working capital purposes). Based on these findings, the authors question the rationale for UK government policy aimed at increasing credit availability for high growth innovative companies.

An important strand of literature concerning the financing of innovative firms is focused on venture capital and other forms of equity financing tailored to financing risky, innovative projects. Economic literature shows that innovative firms are more dependent on equity than debt financing (Brown et al. 2009; Brown et al. 2013; Falato et al. 2018). Still, there is also a growing interest in access to bank financing (the more standard, traditional form of funding).

3.1. Intangibility

Studies exploring the relationship between intangible assets and capital structure are still relatively rare. In the economic literature, tangible assets are widely recognized as an important determinant of financial leverage because of their potential to be treated as collateral. However, investigating the influence of intangibles on the corporate capital structure is of vital importance because in today's economy a large and still increasing part of companies' assets is represented by intangibles. For obvious

[1] SMEs are defined as those with fewer than 250 employees, but excluding those without employees—so SME Employers.

reasons, it should be assumed that this phenomenon is especially evident in the case of high tech companies, where innovation activity is crucial. For that reason, intangible assets account for a substantial part of total assets. However, the situation is more complicated because of the phenomena of underreporting of R&D outlays, which is a visible problem in today's financial reporting on emerging economies.

As Lim et al. (2020) indicate, internally generated intangible assets are reported in balance sheets and other companies' reports. For that reason, it is very difficult to evaluate the impact of intangibles on financial leverage (under accounting rules, most of the internally generated intangible assets are not recognized on the balance sheet).

Peters and Taylor (2017), based on a sample of U.S. firms, estimated that an average firm acquires externally only 19% of intangible capital. Therefore, the vast majority of intangible assets are missing from the balance sheet, so they construct a proxy to measure the value of internally acquired assets by accumulating past intangible investments reported on firms' income statements. They define the stock of international intangible capital as the sum of knowledge capital and organizational capital. Knowledge capital is created in the process of R&D activity, and to measure it, Peters and Taylor (2017) use the perpetual inventory method. The accounting approach is different from externally acquired intangible assets that are capitalized.

Lim et al. (2020) also point out that intangible assets may discourage debt financing because of poor collateralizibility and high valuation risk. However, they come to the conclusions that identifiable intangible assets have the same positive influence on financial leverage as tangible assets, and that they support debt. The study is based on a sample of 469 US public companies between 2002 to 2014. The dataset consists of targets of acquisitions, and in such transactions, there is a disclosure requirement for the acquiring firms to allocate the purchase price paid for the target to two main subsets of tangible and intangible assets. Authors in their research use fair value estimates (not the usually used book value) of both tangible and intangible assets. They divide intangible assets into two categories: identifiable intangible assets (among them technology-related as patents and in-process R&D, marketing-related as trademarks, trade names, customer contracts, customer relationships, and others as non-compete agreements, unproven mineral or gas properties) and unidentifiable intangible assets—goodwill.

Hall (2010) indicates that in the case of high-tech companies, not only are a significant part of results intangible, but "much of it is in the form of human capital embedded in the heads of the employees." It has low salvage value and is also idiosyncratic, which means that when a company goes out of business, it is a signal that its value is low. As Hall stresses, except for certain types of patents, there is little market for distressed intangible assets. This is one more reason for debt financing being poorly suited to the financing of R&D intensive sectors.

Some studies in the economic literature investigate the relationship between one subset of intangible assets—patent counts—and financial leverage. The main limitation of these studies is that there are no objective methods in the valuation of patents.

Mann (2018) calculated that in 2013, 38% of US patenting firms used patent portfolios as collateral for secured debt, so this type of intangible assets contributes significantly to the financing of innovation. Mann (2018) also stressed that 16% of patents produced by American firms have been pledged as collateral at some point. The pledgeability of patents depends on their high level of citation counts and generality. Brown et al. (2009) points out that companies using patents as collateral mainly belong to the high-tech sector and feature low tangibility. Therefore, we posit the following hypothesis:

Hypothesis 1 (H1). *Intangibility has a significant and negative impact on the financial leverage of NTBFs.*

3.2. Investment in Innovativeness

There is ample empirical evidence suggesting that the capital structure of R&D intensive firms exhibits significantly less debt than in the case of other firms. The problem of financial constraints in financing R&D intensive or innovative firms is well pronounced in economic literature. These problems are also referred to in economic literature as structural problems of the financial system in financing R&D or, more broadly, innovations. The reasons for that include higher risk, information asymmetry between financing providers and companies themselves (the main theoretical premise for the difficulties SMEs face when accessing external capital, which are due to the context-specific nature of R&D projects, which makes them very difficult for valuation), and the lack of collateral in the case of firms based mainly on intangible assets (denied finance due to their lack of collateral). Studies typically suggest that all these reasons cause innovative firms to encounter severe obstacles when it comes to acquiring debt financing. Internal finance is usually insufficient to finance rapid growth.

A study by Alderson and Betker (1996) provides evidence that there is a positive relation between liquidation costs and R&D in the corporate sector. Therefore, R&D activity is associated with higher sunk costs than other types of investments.

Guiso (1998) finds evidence for a representative sample of about 1000 Italian manufacturing firms with 50 or more employees. Those which belong to the high-tech sector are more likely to be credit-constrained than low-tech companies. Measurement problems in the proxies for high-tech firms make it difficult to provide a precise estimate of the size of the effect. The author also points out that credit constraints have a highly counter-cyclical pattern with the proportion of firms, with limited access to financing increasing during the downturn.

A very important issue is the relation between intangibility and investment in innovativeness. We distinguish two types of investments in innovativeness, which are measurable in the accounting system: external and internal. The internal one refers to R&D outlays expended in a given period (usually one year) on the firm's own invention. The external one refers to the expenditures on other intangible assets acquired externally, having mainly an innovative character. The last concept—intangibility—refers to the attribute of total assets, which has a cumulative and resource character. Usually, high intangibility is caused by heavy investments in innovativeness over a longer period. However, in some instances, it can be triggered by a low carrying amount of tangible assets. Therefore, from the perspective of a given reporting period, the mutual correlation between intangibility and investments in innovativeness is not necessary. Both concepts: intangibility and investments in innovativeness refer to similar but different concepts.

Firstly, we conjecture that, in a country that is at the stage of development classified as an emerging market, the more a firm invests in an innovative in-house project, the less the bank sector is willing to provide external capital. We argue that in the case of emerging markets, the informational asymmetry gap caused by the R&D project is even higher than in the case of developed markets. Secondly, we hypothesize that the external acquisition of innovation (i.e., technology) does not create informational asymmetry. Therefore, it does not increase the cost of external capital. Quite the opposite, it makes a company a more attractive client for the bank sector, with better prospects for the future. Therefore, we posit that the more a company invests in externally acquired innovation, the more leveraged it will be. Based on the above-mentioned chain of reasoning, we posit the following hypotheses:

Hypothesis 2 (H2). *Internal investments in innovativeness in NTBFs from emerging countries have a significant and negative impact on financial leverage.*

Hypothesis 3 (H3). *External investments in innovativeness in NTBFs from emerging countries have a significant and positive impact on financial leverage.*

3.3. Liquidity

Liquidity is another determinant that has an impact on capital structure and is usually understood as a measure of a firm's capability of debt repayment. High liquidity implies that a company has the potential to pay back debt or shareholders (Ozkan 2001). Low risk of insolvency allows acquiring debt at a lower cost (Morellec 2001). More liquid companies are more prone to undertake riskier projects and finance them via bank loans thanks to a lower risk of solvency problems (Ramli et al. 2019).

According to the pecking order theory, more liquid companies tend to finance their activity mainly by their funds (retained earnings). By doing that, companies avoid taking more costly debt and disclosing confidential information to financial institutions (banks) or investors. Therefore, many researchers hypothesize an inverse relationship between liquidity and financial leverage (Kara and Erdur 2015; Karacaer et al. 2016). Internal financing is preferred over debt, and the surplus of cash flows allows the financing of investment projects. Higher liquidity translates to financial flexibility and opens up possibilities of acquiring debt at a lower cost. Based on our experience, we suppose that in the case of emerging markets liquidity may play an important factor in shaping the capital structure of high-tech companies. Therefore, we conjecture the following hypothesis:

Hypothesis 4 (H4). *The liquidity of NTBFs located in emerging markets has a significant and negative impact on financial leverage.*

3.4. Size

One of the most studied firm parameters is company size. Firm size is likely to influence capital structure in several ways. Larger firms are usually treated as less risky and believed to have fewer constraints in obtaining a bank loan. Risk is higher in the case of small firms, which, due to the lack of scale, cannot diversify the risk and invest in multiple projects (Freel 2007). The financial constraints in financing are well pronounced, especially in the case of small and medium-sized innovative firms (Schneider and Veugelers 2010; Hutton and Lee 2012; Mina et al. 2013; Lee et al. 2015).

At least several important characteristics of a firm's size are invoked in the literature. Bigger companies are able to operationalize more debt in their balance sheets due to more collateral on the asset side (Karacaer et al. 2016; Cai and Ghosh 2003). The size of a company is correlated with its age. In other words, bigger companies are usually the older ones, which means that they are already established in the market, have a deeper knowledge of the market and customer preferences, and have higher credibility, which results in lower operational risk. The financial situation of bigger companies is usually more stable, and the variability of their cash flows and financial risk is lower. Bigger companies may utilize the economies of scale and transfer the cost of short-term financing to their suppliers or clients. Bigger companies tend to engage in international activities, therefore they are more able to diversify their operations and raise funds in foreign capital markets. The cost of external capital is typically lower for bigger companies in comparison to smaller ones. Additionally, bankruptcy costs are lower for bigger companies, and as a result, they are more flexible in terms of managing their liabilities (Demir 2009). Informational asymmetry is lower for bigger companies, which corresponds to a higher quality of financial reporting. Finally, transaction costs necessary to obtain bank loans are usually lower for bigger companies (Hall et al. 2004). All the above factors supposedly make the cost of attracting external capital lower and may imply that the bigger a company, the higher its financial leverage. The study conducted by Nenu et al. (2018), based on the sample of Romanian companies provides empirical evidence supporting this statement. The authors of that study point out that the trade-off theory may explain the research outcome.

In the literature, one can also find the opposite arguments. Bigger companies often accumulated retained earnings for many years, and external capital was not necessary (Kara and Erdur 2015). Bigger companies are also more prone to the problem of moral hazard (Frank and Goyal 2008). Many cases from the past show that bigger companies tend to accept excessive growth, which translates

to lower operational efficiency and, finally, an increased cost of external capital (Ammar et al. 2003). Agency costs are usually higher for bigger companies, which means that monitoring and auditing are more costly (Yildirim et al. 2018). However, higher long-term debt may provide additional incentives to managers for the creation of shareholder value (Izdihar 2019).

External finance is vital for innovative SMEs, as they usually lack the internal sources of financing needed for the commercialization of their innovations (Beck and Demirguc-Kunt 2006; Schneider and Veugelers 2010). The business model of innovative firms is riskier, and the intangible assets account for a bigger part than physical property in their balance sheets, which creates a problem in bank valuation. Intangibles are context-specific, which creates a problem for banks who value them and use them as collateral for lending. Also, Canepa and Stoneman (2008), Czarnitzki (2006), and Freel (2007) suggest that all these structural problems with innovative financing firms are amplified in the case of SMEs. Finally, as Kijkasiwat and Phuensane (2020) documented, bigger companies are more able to benefit from external and internal innovative projects, while the smaller ones only benefit from internal projects.

In the case of NTBFs, an increase in size should result in a decrease in operational and investment risk. However, it is probably at a higher level compared to other firms. Likewise, bankruptcy costs should be lower, yet substantial. The scope of information asymmetry will decrease, agency costs may be lower, but not low. It can be expected that NTBFs' willingness to attract external capital will increase with its size (Berggren et al. 2000). Therefore, we conjecture the following hypothesis:

Hypothesis 5 (H5). *The size of NTBFs located in emerging markets has a significant and positive impact on financial leverage.*

3.5. Age

The next important determinant of capital structure—a firm's age—is especially important in the case of the high-tech sector. Some authors take into account the age of the firm as a determinant in obtaining a bank loan. According to Cowling et al. (2012), the size of the company and its track record influence bankers' decisions to credit an entity, putting small and young firms at a disadvantage. Older companies also have more fixed assets, which can serve as collateral for the long-term credit loan, which also makes the debt more accessible and less costly. The results of empirical studies suggest that the firm's age allows it to curtail limits typical for high-tech companies, especially higher risk. Older firms have lower bankruptcy costs, lower costs of external capital, a broader customer base, more stable financial results over time, and more profitable companies (Malik 2011; Bhayani 2010b).

The firm's age, or the period counted since the IPO on the stock market, is positively correlated with the quality of corporate governance, and, consequently, lowers the agency costs and the cost of the bank loan (Kieschnick and Moussawi 2018). On the other hand, older firms usually accumulated retained earnings from the previous periods and may not strive for capital offered by the bank sector (Mac an Bhaird and Lucey 2010). Younger firms suffer more from agency problems, and this is the reason why access to external capital is hampered (Mac an Bhaird and Lucey 2010). As the firm gains experience and records a more extended credit history, the risk of moral hazard becomes lower.

Younger firms usually suffer from lack of capital, and for this reason, they often apply for external capital to finance their investment projects (Bhayani 2010b; Hall et al. 2004). At the same time, due to the problem of moral hazard, which is a very distinctive feature of young, technological firms, applying for and getting a bank loan is the way through torment (Hogan et al. 2017). Easier access to external capital for NTBFs is possible and can be observed in countries where the financial system is based on a well-developed banking sector. Therefore, we posit the following hypothesis:

Hypothesis 6 (H6). *The age of NTBFs located in emerging markets has a significant and positive impact on financial leverage.*

3.6. Profitability

The next important characteristic of the company—profitability—is an important determinant of capital structure. According to the pecking order theory, a firm first instances its activity from retained earnings. If this source is not sufficient, a company tries to obtain external sources of capital (Myers and Majluf 1984). From this perspective, higher financial leverage does not always imply or correlate with higher profitability.

Another implication may be derived from the trade-off theory, which assumes a state of balance between equity and debt capital, while the cost of debt capital is lower. More profitable companies usually have sufficient financial resources necessary to pursue their investment plans. However, more profitable companies may find a tax shield to be a decisive argument for increasing financial leverage (Bouallegui 2006), which is especially important for companies from countries where the tax rate is high. The theory of free cash flows also posits that more profitable companies should indebt themselves because it provides a self-control mechanism. It forces management to transfer free cash flows as dividends to their shareholders instead of investing in less profitable investment projects (Izdihar 2019).

Highly profitable companies have much easier access to external financing at a much lower cost (Cassar and Holmes 2003). This is also supported by the substitutive theory, which posits that less risky and more profitable companies are much more able to finance their activity from external sources, especially debt. High profitability also minimizes the risk of bankruptcy, and for this reason, the capacity of indebtedness is increased (Ramli et al. 2019). Highly profitable companies, which finance their activity from internal sources, are not required to disclose detailed information on their operations (Li and Islam 2019). Internal sources of finance (retained earnings) and increased indebtedness may be attractive for investors since a firm's shareholding is not diluted (Karacaer et al. 2016). On the basis of the above discussion, it may seem that the impact of profitability on capital structure is ambiguous (Degryse et al. 2012). However, from the perspective of NTBFs, we can suppose that more profitable companies would have much better credit standing and better access to debt. Therefore, we treat the firm's profitability parameter as a control variable.

3.7. Growth Opportunities

Growth opportunities are an important firm characteristic influencing capital structure in the high-tech sector. Most often, high-tech companies tend to use their own equity funds because of innate higher risk and the necessity of more costly supervision of this type of company (Myers 1977). High growth opportunities, on the one hand, create the chance of development, but on the other hand, pave the way for new risk. Usually, enormous growth opportunities accompany low equity values which are necessary to finance important investment projects. Fortunately, these companies, even when dealing with severe financial problems, don't have problems with raising equity capital. Indebtedness may put pressure and discipline on the management and enforce a more efficient decision-making process. The valuation process of high-tech companies is based on their future potential (option), which is heavily burdened with risk. Therefore, the market valuation is under the threat of impairment. This is especially important considering that the asset is in substantial part intangible and, as a result, cannot serve as collateral (Karacaer et al. 2016). Thus, some researchers (Rajan and Zingales 1995) hypothesize an inverse relationship between growth opportunities and financial leverage. This relationship is also implied by the pecking order theory, which posits that a firm tends to finance its activity by internal funds and, afterward, look for external ones. Agency costs theory provides similar implications for high-tech companies. Additional monitoring costs related to management supervision may be substantial, especially when growth opportunities do exist, which supposedly will lead to an increased cost of debt. High-tech companies will be discouraged from taking on more debt in their balance sheet in order to minimize potential conflict between shareholders and creditors (Ramli et al. 2019). The implication of the substitution theory also confirms

that relationship, because high-tech companies are more prone to the risk of financial situation deterioration. Therefore, we treat the firm's growth opportunities as a control variable.

4. Sample Characteristics, Research Design, and Results

The study sample consisted of 31 companies listed on the Warsaw Stock Exchange classified as high-tech firms in sectors like biotechnology, R&D in physics, natural sciences, engineering, biology, medical laboratories, computer software, e-commerce, marketing analysis, etc. We decided to use data derived from firms listed on the stock exchange because of a higher quality of accounting data. These companies, under the scrutiny of stock market institutions and the public, are obliged to meet higher standards of transparency and are audited. Companies may also be classified as NTBFs because the oldest firm in the study period is 17 years old, and the average age is around six years. The initial sample consists of 155 firm-year observations covering the period of 2014–2018. The final sample is limited to only 102 firm-year observations due to the missing data.

Our main object of interest is capital structure, and as a dependent variable, we use the leverage ratio calculated as total liabilities to total assets. As a proxy for the innovation generated internally, we use a ratio of the sum of R&D expenses recorded in the P&L statement and year-to-year change in R&D outlays recorded in the balance sheet, deflated by the total assets. In our opinion, this is the only possible way to measure R&D outlays based on information derived from a financial statement. As the proxy for the innovation acquired externally, we use a year-to-year change of intangibles extracted from the balance sheet, excluding R&D expenses recognized. We also use a set of control variables such as profitability (ROE) and growth opportunities. In order to avoid the influence of outliers, all data were winsorized. Table 1 presents the characteristics of the main variables used in the model.

Table 1. Sample statistics.

Variable	No. of Obs.	Min.	Max.	Mean	Median	St. Dev.	Variance	Skewness	Kurtosis
LEV	155	0.004	1.000	0.448	0.375	0.298	0.089	0.392	2.029
INTANGIBILITY	155	0.000	0.939	0.216	0.121	0.238	0.057	1.125	3.438
INNOV_INT	155	0.000	0.543	0.067	0.003	0.099	0.010	1.795	6.650
INNOV_EXT	155	0.000	1.000	0.091	0.003	0.168	0.028	3.443	3.260
CUR_RATIO	155	0.007	10.000	2.737	1.592	2.862	8.193	1.552	4.329
SIZE	155	4.143	14.952	9.793	9.818	2.093	4.380	−0.131	3.443
AGE	155	0.000	17.000	6.072	6.000	3.934	15.475	0.655	2.957
ROE	155	−1.000	1.000	−0.140	−0.043	0.484	0.234	−0.123	3.026
SALES_TR	117	−1.000	1.000	0.111	0.091	0.656	0.431	−0.177	2.010

Source: our own elaboration based on the data from financial statements.

In order to avoid intercorrelated variables in the model, we performed a correlation analysis, the results of which are presented in Table 2. The highest correlations, however moderate, are between a firm's age and profitability (ROE), financial leverage, and size. The results are logical and correspond to the conclusions of the literature review section. The older a company is, the higher its profitability. Similarly, the older the firm is, the more able it is to indebt itself. Finally, bigger companies tend to be more profitable. The results show that variables INNOV_INT and INNOV_EXT are weakly correlated. The rest of the correlation coefficients of independent variables are at a low or moderate level, so including them in the model is not controversial.

Table 2. Correlation between variables.

Variable	Lev	Size	Age	Roe	CUR_RATIO	SALES_TR	Intangibility	INNOV_INT	INNOV_EXT
LEV	1.000								
INTANGIBILITY	0.134	1.000							
INNOV_INT	−0.254	−0.018	1.000						
INNOV_EXT	0.029	0.071	0.200	1.000					
CUR_RATIO	−0.632	−0.201	0.207	0.022	1.000				
SIZE	−0.119	−0.011	0.333	0.090	0.136	1.000			
AGE	0.388	−0.224	−0.053	−0.107	−0.286	0.291	1.000		
ROE	−0.082	−0.185	0.087	−0.028	0.132	0.384	0.410	1.000	
SALES_TR	0.011	−0.082	0.069	0.213	0.032	0.084	0.028	0.064	1.000

Source: our own elaboration based on the data from financial statements.

To test the hypotheses formulated in the previous section, we used the following model:

$$LEV_{i,t} = INTANGIBILITY_{i,t} + INNOV\_INT_{i,t} + INNOV\_EXT_{i,t} + CUR\_RATIO_{i,t} + SIZE_{i,t} + AGE_{i,t} + ROE_{i,t} + SALES\_TR_{i,} \quad (1)$$

where:

$LEV_{i,t}$—financial leverage (total liabilities/total assets) of the i-company in t-year
$INTANGIBILITY_{i,t}$—the ratio of intangibles to total assets of the i-company in t-year
$INNOV\_INT1_{i,t}$—the ratio of internally generated intangibles to total assets of the i-company in t-year
$INNOV\_EXT2_{i,t}$—the ratio of externally acquired intangibles to total assets of the i-company in t-year
$CUR\_RATIO_{i,t}$—liquidity of the company measured as a current ratio (current asset/current liabilities)
$SIZE_{i,t}$—the size of the i-company in t-year as a logarithm of total assets
$AGE_{i,t}$—age of the i-company in t-year
$ROE_{i,t}$—profitability of the i-company in t-year measured as a return on equity
$SALES\_TR_{i,t}$—sales trend of the i-company in t-year calculated as year-to-year change of sales (sales from the t-year minus sales from the t−1 year, and deflated by the sales from t−1 year)

We ran a regression with a robust option in order to obtain robust coefficients. It allows us to avoid many problems with the specification of the model.

We performed an extensive post-estimation diagnosis to test our model. We tested the model for multicollinearity using the variance inflation factor and detected none. We ran a Shapiro-Wilk test for residuals, and we couldn't reject the null hypothesis which states that they are normally distributed. Finally, we used the Ramsey RESET to test for the specification of the model; results (0.048) are in the borderline and may suggest that there are some problems with the specification of the model. The model is better at detecting influence on the dependent variable and should not be treated as a predictive model. The model detects some critical links between variables and has acceptable predicting power (adj. R = 0.54). First of all, we found a strong influence of the firm's age on financial leverage, which suggests that the older the firm is, the more leveraged it is. The results fit the theory and results of other studies. The second important conclusion is that the more liquid the company is, the less leveraged it is. The implication of that result may be that younger companies that are usually less leveraged tend to maintain a safe cash position and hold more cash within the company. Bigger companies may allow themselves to keep a relatively lower level of liquidity because they are able to raise cash faster if needed through the bank system. Therefore, we provide empirical evidence supporting our fourth and sixth hypotheses.

From our perspective, the most crucial results refer to the variables INNOV_INT and INNOVE_EXT. The p-value of those variables is at a low (10%), yet still statistically significant (see Table 3). Firstly, INNOV_INT has a negative coefficient, which suggests that the more a company invests in an innovative in-house project, the less willing a bank sector is to finance it with debt. This provides empirical evidence supporting our second hypothesis and may be explained by the higher informational asymmetry generated by the R&D project, which probably translates to a higher cost of debt. Secondly, INNOV_EXT has a positive coefficient, which implies that the bank sector is willing to provide more external funds to companies acquiring innovation externally. We ascribe that result to the fact that

external acquisition of technology/invention is perceived to be less risky and the final output more predictable. Again, we provide an argument supporting the third hypothesis. The results must be interpreted with caution, and the hypotheses need to be tested on high-tech companies from other emerging markets.

Table 3. Regression analysis.

Independent Variables	Coefficient	*p*-Value	
INTANGIBILITY	0.126	0.256	
INNOV_INT	−0.334	0.095	*
INNOV_EXT	0.138	0.091	*
CUR_RATIO	−0.045	0.000	***
SIZE	−0.012	0.328	
AGE	0.024	0.000	***
ROE	−0.062	0.361	
SALES_TR	0.011	0.758	
Constant	0.504	0.000	
A number of obs.	102		
R^2	0.55		
Adjusted R^2	0.54		

* significance at 10% level; ** significance at 5% level; *** significance at 1% level. Source: our own elaboration based on the data from financial statements.

Unfortunately, we find no empirical evidence supporting the first and the fifth hypothesis. With regard to the firm's size, this may be explained by the fact that the majority of companies are of moderate size. In the case of the intangibility parameter, we suppose that this parameter would be more important for companies in sectors other than high-tech. In our opinion, this matter needs further investigation.

5. Concluding Remarks

High-tech firms play an increasingly important role in the contemporary economy. Their growth is more dynamic than classical industries. Employment in high-tech industries has increased considerably, while other industries often record reductions in the number of employees. High-tech firms, especially NTBFs, are characterized by high risk, great information asymmetry, high agency and bankruptcy costs, and a great likelihood of deterioration in their financial standing, which makes access to external financing and, in particular, debt financing, more difficult.

The results of empirical studies allow for the verification of the second hypothesis which states that internal investments in innovativeness have a negative impact on the level of indebtedness in NTBFs, while external investments in innovativeness have a positive impact on the level of debt. These results can undoubtedly be attributed to higher information asymmetry and risk in financing new technologies generated internally as compared with innovations purchased on the market, the usefulness of which is well known and proven. It should be noted that internal investments in innovativeness are not always bound to succeed, and their output is very risky. Financial liquidity has an adverse effect on the level of indebtedness in the structure of financing, so companies with high liquidity and availability of their own funds rely on their own resources and, possibly, on debt financing (Hypothesis 4). Due to big market changes and changes in technologies, highly liquid NTBFs give preference to financing based on their own funds. Age has a positive impact on the share of debt in the capital structure (Hypothesis 6). Those NTBFs which are well established on the market and have long credit history and high reliability tend to rely on debt financing. This effect can be limited in NTBFs with excess liquidity. The impact of intangibility turns out to be statistically insignificant. This may result from the fact that the possession of intangible assets is not a necessary, sufficient or decisive factor in determining a decrease in debt financing. The size of NTBFs does not have a positive impact on indebtedness probably due to the fact

that the analyzed sample comprises moderate-sized entities. The impact of profitability and growth potential is also limited. The impact of these factors on debt levels in NTBFs is probably diversified.

Polish NTBFs create their capital structure, which to a certain degree can be explained by the trade-off theory. This view can be justified by the positive impact of age and liquidity on the level of indebtedness, resulting in lower bankruptcy costs. The analyzed NTBF's population also fits the agency theory because of the limited scale of business operations and relatively limited market experience. Pecking order theory applies to the analysis to a smaller degree—an impact of profitability, size, and risk on indebtedness is not visible. Polish NTBFs apply the following order of financing: retained earnings followed by share capital and debt financing.

The obtained results can be useful for high-tech firms, stock market investors, banks and standard setters. Without support offered by the government and various public institutions the development of NTBFs, especially in countries with a low level of innovativeness, can be hindered due to difficulties in acquiring necessary funds for expansion.

This paper attempts to narrow a theoretical gap in the area of capital structure creation and explore the impact of capital structure theory on the level of indebtedness in NTBFs in an emerging economy. We believe that the empirical verification of the impact of internally and externally generated investment in innovativeness, and the verification of the impact of other capital structure factors on NTFBs in emerging markets characterized by low innovativeness, can be regarded as a significant contribution to the research of the determinants of capital structure in NTBFs. In our opinion, there are not many research studies on emerging markets which empirically verify the determinants of NTBF capital structure, hence the need for further analyses.

The major limitations of this work include a relatively short period of research and a small number of analyzed NTBFs. Further analyses should comprise a larger number of countries and observations, as well as a longer period of study. Possibly significant determinants of NTFB capital structure include various corporate governance characteristics and macroeconomic and country-level factors.

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Corporate Governance Characteristics of Private SMEs' Annual Report Submission Violations

Oliver Lukason [1,*] and María-del-Mar Camacho-Miñano [2]

[1] School of Economics and Business Administration, University of Tartu, 51009 Tartu, Estonia
[2] Accounting and Finance Department, Complutense University of Madrid, 28223 Madrid, Spain; mmcamach@ucm.es
* Correspondence: oliver.lukason@ut.ee

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Abstract: Managers are, by law, responsible for the timely disclosure of financial information through annual reports, but despite that, it is usual that they are engaged in the unethical behaviour of not meeting the submission deadlines set in law. This paper sheds light on the afore-given issue by aiming to find out how corporate governance characteristics are associated with annual report deadline violations in private micro-, small- and medium-sized enterprises (SMEs). We use the population of SMEs from Estonia, in total 77,212 unique firms, in logistic regression analysis with the delay of presenting an annual report over the legal deadline as the dependent and relevant corporate governance characteristics as the independent variables. Our results indicate that the presence of woman on the board, higher manager's age, longer tenure and a larger proportion of stock owned by board members lead to less likely violation of the annual report submission deadline, but in turn, the presence of more business ties and existence of a majority owner behave in the opposite way. The likelihood of violation does not depend on board size. We also check the robustness of the obtained results with respect to the severity of delay, firm age and size, which all indicate a varying importance of the explanatory corporate governance characteristics.

Keywords: corporate governance; information disclosure; timeliness of financial reporting; law violation; private firms

1. Introduction

The aim of this paper is to analyse the interconnection between corporate governance characteristics and the violation of the annual report submission deadline in private micro-, small- and medium-sized enterprises (SMEs). According to the theory of upper echelons, managers' experiences, values and responsibilities condition firms' decisions, strategy and even their performance (Hambrick and Mason 1984). One responsibility of the board of directors is the timely submission of firms' compulsory accounting information in order to make it public and accessible for the decision-making of firms' stakeholders. It has been established that board composition is associated with the transparency, correctness and timeliness of financial reporting (Beasley 1996; Abdelsalam and Street 2007; Hermalin and Weisbach 2012).

Prior studies suggest that high levels of corporate governance may reduce managers' earnings manipulations and the tendency to commit fraud, and help to achieve higher levels of information transparency or even condition credit ratings (Ashbaugh-Skaife et al. 2006; Prior et al. 2008; Scholtens and Kang 2013; Liu et al. 2017). However, most of the literature is focused on corporate governance and financial reporting disclosure practices in public and large firms (Carslaw and Kaplan 1991; Abernathy et al. 2014; Lim et al. 2014; Efobi and Okougbo 2014; Spiers 2018; Bae et al. 2018), which could be conditioned by agency problems and disagreeing objectives among shareholders in such firms. Still, reporting disclosure is also relevant for private SMEs

(Clatworthy and Peel 2016). Much of this concern stems from the recognition that small firms serve as an engine of economic growth and innovation around the world (Cowling et al. 2015).

Corporate governance and accounting information disclosure violation, but also their interconnections, are different between public and private firms. In SMEs, board and owners often overlap, and thus, different functions of these two corporate governance levels are consolidated (Gabrielsson and Huse 2005; Brunninge et al. 2007). The incentives to disclose information vary across stakeholders (Berglöf and Pajuste 2005), and even across shareholders. Consequently, the concept of corporate governance of SMEs differs from listed firms (Uhlaner et al. 2007; Voordeckers et al. 2014). Large companies are more concerned about market behaviour than private ones, which in turn are more tax-oriented (Brunninge et al. 2007) and have lower scrutiny as many of them are not audited (Höglund and Sundvik 2019). In this sense, Östberg (2006) posits that disclosure is a form of minority protection that decreases the scope of extracting private benefits by controlling shareholders. Non-audited private SMEs also need to have the information ready for creditors (Collis 2008; Peek et al. 2010). Indeed, small firms may face difficulties in accessing formal financing due to their informational opacity (Ortiz-Molina and Penas 2008). Managers of SMEs can choose, which information to divulge and which to contain, whether to present it timely or not and if it is accurate or biased information (Hoskisson et al. 1994). Thus, opportunistic information disclosure behaviours could appear more likely in SMEs.

The context of this research is Estonia, which is considered to be one of the most advanced digital societies in the world, and consequently, permits full access to SMEs' information. The Estonian legislative system and institutions are harmonized with EU regulations, which increases the comparability of Estonian SMEs with firms with similar sizes from other EU countries. Our dataset is composed of 77,212 Estonian private SMEs, using data procured from the Estonian Business Register (EBR), which contains firms' annual reports (compulsory once per year) and up to date information about firms' boards and owners. With logistic regression analysis, we show which corporate governance characteristics, representing three distinct corporate governance dimensions, increase or decrease the likelihood of violating the legal deadline set for annual report submission.

The paper contributes to the literature by presenting an original conceptual framework for the corporate governance dimensions affecting SMEs' risk behaviour, specifically timely annual report submission violation. Only a few previous studies explore corporate governance variables in the SME context (Spiers 2017). In addition, violation of annual report submission deadlines is a rarely studied topic in the case of SMEs (Lukason and Camacho-Miñano 2019).

We show that corporate governance can be used to explain annual report submission deadline violations in the SME context. Thus, this paper fills the major gap in prior research with respect to how corporate governance can affect firms' behaviour in the SME context (Li et al. 2020). For private SMEs, earlier studies have used a limited number of corporate governance factors (e.g., the number of board members), partly due to the difficulty of accessing such data. In this study, the factual corporate governance information was obtained directly from the business register, not from questionnaires as in most of the studies. Concerning annual reports, the bulk of the literature concentrates on the time of disclosure, not on the violation (Luypaert et al. 2016; Lukason and Camacho-Miñano 2019), which is the approach of this study. In addition, the institutional context has been suggested as an important issue due to the necessity of cross-cultural governance research (Uhlaner et al. 2007). According to La Porta et al. (1999), governance issues differ from one context to another, and Estonia's context is different from the Anglo-Saxon countries, based on which most of the studies have been composed so far.

The paper is structured as follows. First, the literature review section outlines corporate governance dimensions being potentially associated with timely annual report submission violation and outlines the literature-based expectations concerning the interconnections between the latter and specific corporate governance variables. Then, the study's sample, variables and method sections are presented. This is followed by empirical results, robustness tests, and discussion. Finally, the study concludes

this research arguing its main implications and limitations, while suggestions for future research are also provided.

2. Corporate Governance Characteristics and Timely Accounting Information Disclosure Violations in Private SMEs: Development of Research Propositions and Hypotheses

2.1. Conceptual Framework of the Study

The violations of law occur in a firm when its managers do not comply with the legal requirements for either content, forms or time. Information on time is essential to align all firm stakeholders' interests (Singhvi and Desai 1971); generally, the older the information, the less useful it is. In addition, the timely disclosure of information is a way to reduce the information asymmetry between firms' stakeholders (Owusu-Ansah and Leventis 2006; Donnelly and Mulcahy 2008). The latter is possible through transparency, one of the important qualities of governance according to Hermalin and Weisbach (2007).

According to the upper echelons theory, the organization is a reflection of its top managers (Hiebl 2014). Based on the seminal paper by Hambrick and Mason (1984), the characteristics of firm's top managers and their strategic choices help to explain the organization's performance. Consequently, organizational outcomes such as firms' disclosure practices are influenced by the board's characteristics due to the monitoring role of corporate governance. Broadly, corporate governance is the setup of direction and control in companies (Huse 2007), given the separation of these two functions. The regulation of corporate governance originates from the time when ownership and management of businesses first became separated in accordance with the agency theory (Fama and Jensen 1983). Thousands of papers have been published about corporate governance related to multiple aspects of firms from that seminal paper. However, the extant evidence does not provide a clear answer if better corporate governance has a positive influence on information disclosures (Beekes et al. 2016).

As provided in the introduction, most of the studies about corporate governance are focused on large and listed firms but not on SMEs and private companies (Abor and Adjasi 2007; Spiers 2018). For instance, Durst and Henschel (2014, p. 18) even propose a different definition of corporate governance in small companies, where the focus is set on the interplay with relevant stakeholders to achieve a strategic change, rather than focusing only on the routine control function. Corporate governance in privately held firms includes many factors and variables that condition decision-making as to violate or not the disclosure of compulsory information, such as different organizational and/or institutional contexts (Uhlaner et al. 2007).

Clarke and Klettner (2009) and Uhlaner et al. (2007) suggest that directors of small firms are more worried about survival than planning and control as corporate governance imperatives. In this line, Crossan et al. (2015) emphasize that the lack of governance within small companies is a conditioning factor for business failure, while similar opinions are shared by Saxena and Jagota (2015) and Spiers (2017). Thus, an organic interconnection exists between corporate governance and risk behaviour of managers, one example of which is the timely accounting information disclosure violation (later also referred to as TADV).

We posit a theoretical concept in which corporate governance characteristics could condition risk behaviour in firms (see Figure 1). Our central standpoint states that based on the upper echelons' theory, firms' risk behaviour is conditioned by their management. In detail, we rely on three main theoretical streams of corporate governance (see Nicholson and Kiel 2007), that is, agency, stewardship and resource dependence theories, to outline the dimensions relevant to study the interconnection between corporate governance and risk behaviour. First, we rely on agency theory, the central question of which are the nonaligned interests of managers and owners in corporate governance (e.g., Jensen and Meckling 1976). Thus, our first dimension of interest considers the convergence of decision-making in a firm, which we name in the further text as "power concentration". Second, we rely on the resource dependence theory, which postulates that corporate governance channels firms' internal and external resources into performance (e.g., Pfeffer and Salancik 2003). In light of this theory, we focus on a specific type of internal resource, that is, the managers' "experience" dimension. Third, we rely on the stewardship

theory, which considers managers having aligned interests with owners, and thus, behaviour differences of firms are subject to inherent characteristics of managers (e.g., Donaldson and Davis 1991). The third dimension is named the "demographic diversity" of managers. These three dimensions are discussed further as follows, coming to the postulation of research propositions for each of the dimensions. Under each research proposition, specific testable hypotheses are developed. The same approach of using research propositions and specific testable hypotheses has been frequently used in management research (see e.g., Zajac and Westphal 1996). The postulated hypotheses rely on the (most) usual corporate governance characteristics applied to depict these dimensions in the literature.

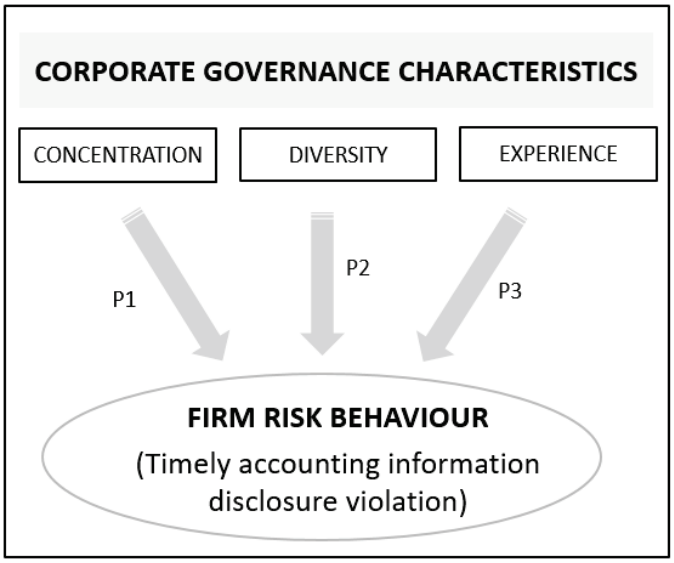

Figure 1. Conceptual framework of the study. Source: Own elaboration.

2.2. Power Concentration and TADV

Although much attention has been paid to the role of boards (Daily et al. 2003), many small firms do not have formal boards but only a unique manager who concentrates on all the functions of the board, while managers and owners are often overlapping. Occasionally, in addition to the founder or owner-manager, there may also be one or two family members on the board, with a unique way of making decisions (Gabrielsson 2007). The varying power concentration among private firms grounds the first dimension that could condition SMEs' decisions concerning timely information disclosure violations. This dimension is relevant, as the agency theory posits that adequate monitoring or control mechanisms need to be established to protect stakeholders from conflicts of interests (Kiel and Nicholson 2003; Parsa et al. 2007), therefore avoiding information asymmetry. In general, more power concentration in a firm's board suggests less pressure for disclosing information as there is less demand for transparency (Carney 2005; Beuselinck and Manigart 2007). Thus, the first proposition (P1) about corporate governance dimensions states that:

P1: Larger power concentration will increase the likelihood of TADV.

In relation to the need for concrete information disclosure policy by firms' decision-makers, there are two corporate governance characteristics that measure the power concentration of decision-making, namely ownership concentration and managerial ownership. The former means whether firms have a high concentration of ownership in one or a few large shareholders that own the majority of shares in the firm. High levels of ownership concentration foster risk-taking (Nguyen 2011). The concentration of ownership and the unification of ownership and control may lead to managers being subjected to less pressure from outside investors who demand accountability and transparency (Carney 2005). In private firms, concentrated ownership means that large shareholders tend to have less interest in disclosing information because they are well informed of what is happening in the firm. In the same

line, Beuselinck and Manigart (2007) argue that private equity firms with majority shareholders are likely to have lower-quality financial reporting systems compared to those with minority shareholders only. Additionally, if decision-making is concentrated, firm risk behaviour can be assimilated with that of the owner. Taking the prior reasoning into account, the first hypothesis (H1a) related to the power concentration proposition is as follows:

Hypothesis 1a. *Ownership concentration will increase the likelihood of TADV.*

The second corporate governance variable to capture power concentration is managerial ownership, focused on the shares owned by their own managers, that is, the involvement of owners in running a firm. Most SMEs are closely held, and owner-managed (Brunninge et al. 2007), and consequently, they do not disclose much information, because they do not need to make it public. Moreover, managers of those firms have much information "in the head" (Uhlaner et al. 2007). Accordingly, we posit the second hypothesis (H1b) concerning the power concentration proposition:

Hypothesis 1b. *Managerial ownership will increase the likelihood of TADV.*

2.3. Demographic Diversity and TADV

As boards of directors monitor the disclosure of business information, their characteristics may condition the policy of business information disclosure (Hambrick 2007; Hiebl 2014). As outlined earlier, the theory of upper echelons is based on the idea that managerial characteristics could affect their choices and that the choices of managers are influenced by their cognitive base and values (Hambrick and Mason 1984). However, psychological factors of managers are very difficult to measure, and thus, demographic variables are considered as good proxies (Hambrick and Mason 1984; Nielsen 2010). In this sense, "managers' unique disclosure styles are associated with observable demographic characteristics of their personal backgrounds" (Bamber et al. 2010, p. 1131). Bamber et al. (2010) note that managers must comply with legal deadlines for submission, in addition to deciding what type of voluntary information may be disclosed.

One of the corporate governance characteristics considered by prior literature to affect the quality of the corporate board's monitoring, and thus, firm's financial performance, is the board's demographic diversity (Campbell and Minguez-Vera 2008; Carter et al. 2010; Shehata et al. 2017) as a way to portray the influence of personal and psychological characteristics of managers. In this sense, greater diversity is beneficial because that variety may influence what information is brought into decision-making processes (Post and Byron 2015), although there is a trade-off between the benefits and costs of diversity on board effectiveness (Bennouri et al. 2018). We argue that certain demographic profiles reduce risk-taking, and thus, are more likely to lead to law-abiding actions. In this line, the second proposition (P2) in relation to the board's demographic diversity is posited as:

P2: Certain demographic characteristics will reduce the likelihood of TADV.

One specific characteristic of demographic diversity in the board is the age of a manager, which reflects well the attitude towards risk and actual risk-taking behaviour (Plöckinger et al. 2016). Thus, the manager's age is related to risk aversion (Jianakoplos and Bernasek 1998) and even to the acceptance of financial fraud (Troy et al. 2011). Younger managers are more inclined towards risky strategies such as law violations. On the contrary, more mature managers are more risk-averse (MacCrimmon and Wehrung 1990). Older CEOs are less involved in dishonest actions (Troy et al. 2011) because maturity has also been associated with higher levels of moral development and stricter interpretations of firm's ethical standards of conduct (Serwinek 1992), therefore resulting in a lower likelihood of engaging in or facilitating unethical behaviours (Ortiz-de-Mandojana et al. 2018). Consequently, for the demographic diversity proposition, the first hypothesis (H2a) is stated as follows:

Hypothesis 2a. *Managerial age will reduce the likelihood of TADV.*

A common measure of demographic diversity is gender. According to prior literature, risk aversion also differs by gender (e.g., Jianakoplos and Bernasek 1998; Ho et al. 2015). The specific corporate governance variable usually applied is the existence of women on the board. From an informational perspective, female directors may contribute to decision-making processes because of their different knowledge, experience, and values (Kanadli et al. 2018). In addition, even in majority male boards, women isolation and minorities have the potential to influence the board's decision-making (Kanadli et al. 2018). Some authors argue that female directors are more likely to be objective and independent (Fondas 2000), and thus, they could follow legal requirements better than male directors because women directors reduce the level of conflicts (Nielsen and Huse 2010). Indeed, their presence enhances board information, perspectives, debate and decision-making (Burke 2000). For example, an equilibrated board tends to mitigate earnings management practices, reinforcing obedience to the law (Saona et al. 2018). Other studies in this line support the idea that women are more ethical than men (Glover et al. 2002; Larkin 2000; Wahn 2003). In this way, earnings quality and voluntary disclosure levels increase when gender diversity exists in boards (Krishnan and Parsons 2008; Liao et al. 2015). Some authors argue that having women in boards influences not only what information is used in decision-making but also how, because females do have different organizational skills than males (Adams and Funk 2012; Post and Byron 2015). Additionally, Ho et al. (2015) found that companies with female CEOs report information more conservatively when companies face high litigation or risks. Relying on the afore-given argumentation, we posit the following hypothesis (H2b) for the demographic diversity proposition:

Hypothesis 2b. *The presence of women on the board will reduce the likelihood of TADV.*

2.4. Experience and TADV

One of the most usual attributes of executives in the risk-taking literature is their experience (May 1995; Hoskisson et al. 2017), as experienced managers are reluctant to make changes and consequently take fewer risks (Hambrick and Fukutomi 1991; Miller and Shamsie 2001). Thus, experienced managers are more risk-averse and violate laws less. They have life and business experiences and perhaps past violation consequences such as prior penalties, which make them not to violate laws. The more experience managers have, the more business problems and more solutions they have had to deal with. Accordingly, the third proposition (P3) can be posited as follows:

P3: More entrepreneurial experience will reduce the likelihood of TADV.

The experience dimension could be measured as the combination of tenure (the board's inside experience) and business ties (the board's outside experience). Board tenure is the time spent on the board of a specific firm and it is expected to increase the director's knowledge of the firm and its business environment (Vafeas 2003) as well as commitment towards the company (Buchanan 1974). The tenure of directors on the same board captures the knowledge of the company's strategy and functioning (Harris and Shimizu 2004). As the boards of SMEs have fewer members, each board member should be fairly well informed on all aspects of the firm. Longer serving CEOs have greater temporal depth, as greater exposure to various events in the past helps to design more effective decisions impacting future outcomes (Ortiz-de-Mandojana et al. 2018). Related to the timely information disclosure violation, a longer board tenure could reduce the occurrence of it, because the longer CEOs have been in the firm, the more experienced they can be on the consequences of a law violation. Concerning other legal requirements, Baatwah et al. (2015) found that longer-tenured CEOs are linked with a timelier completion of the audit report. Similarly, Schrand and Zechman (2012) posit that managers of misreporting and fraudulent firms generally have shorter tenures. Thus, the first hypothesis (H3a) for the experience proposition states as follows:

Hypothesis 3a. *Board tenure will reduce the likelihood of TADV.*

Another proxy of managers' experience is multiple directorships or ties, a corporate governance variable that measures whether board members hold director positions in several firms at the same time. Managers with multiple directorships may be perceived positively since they facilitate the exchange of vital information for firms (Connelly and Slyke 2012) and because they are more likely to understand the business environment of the company (Hillman et al. 2007). Additionally, working in several firms may be conditioned by board members having uncommon skills and strong abilities in both monitoring and advising subordinates (Falato et al. 2014). In addition, the past penalties because of violating the law the board members with many ties have experienced in other firms could also reduce the risk of a new law violation. Thus, relying on the afore-given motivation, we posit the following hypothesis (H3b) for the proposition about experience:

Hypothesis 3b. *Multiple directorships will reduce the likelihood of TADV.*

2.5. Board Size and TADV

Finally, as one of the main characteristics frequently used in the literature of corporate governance from large and/or listed firms is board size (Huse 2000), we assume that it is also relevant in SMEs, although less than in large and/or listed firms. Normally, the board size of SMEs is small, but still, there could be difficulties or conflicts in what information disclosure policy the company should have due to opposite opinions. According to the literature of public firms, the presence of a large number of directors implies a reduction of the board's effectiveness in management control (Yermack 1996; Eisenberg et al. 1998; De Andres et al. 2005; Cheng 2008) and an effective board can also be engaged in better disclosure practices (Willekens et al. 2005).

From another angle, a larger board will bring together a greater depth of intellectual knowledge, and therefore, could improve the quality of strategic decisions. An additional director could bring more human capital to the company, therefore increasing the board's information and specific knowledge about the business and its environment. The latter will increase the firm's efficiency (Adams and Ferreira 2007; De Andres and Vallelado 2008; Linck et al. 2008); and as mentioned before, efficiency in boards conditions its disclosure practices. Consequently, there could be a link between board size and information disclosure, while there are contradictory explanations with respect to whether it will increase or decrease the likelihood of TADV. Thus, we include board size in the analysis as a control variable to shed light on the controversy about its role in association with TADV.

3. Data, Variables and Method

3.1. Study's Data

In this study, we apply firm-level data from Estonia and the population includes 77,212 unique private SMEs, accounting for roughly 50% of all Estonian private SMEs registered at the end of 2014. While we did not include large and/or listed firms in the analysis, some additional contractions were made to the whole population of firms. Namely, we do not include firms having (at least some) corporate owners or foreign individuals as managers/owners, as in case of them we are not able to calculate (all) the variables documented in Section 3.3. In addition, we are not including firms lacking an annual report because of not being obliged to submit it for different reasons (e.g., a firm is too young or in the liquidation procedure). All information obtained is factual and originates from the Estonian Business Register (see also Sections 3.2 and 3.3). The median firm in the analysis is 7.3 years old and a micro firm by size (i.e., total assets 22 thousand euros). Thus, the median firm in the population refers to an older micro firm, which dominates the firms' population in other countries as well. In the case of all firms, we consider the annual report submission delay for the fiscal year of 2014 and corporate governance variables are calculated from the last day firms had to present the annual report (for the vast majority of cases that date is 30 June 2015). The boards and owners of SMEs change infrequently,

thus the usage of a single year is justified. Despite the latter, the TADV behaviour can vary through reporting years, and thus, in order to guarantee the robustness of the results with respect to the year chosen for the analysis (i.e., 2014), we check the results for another fiscal year (i.e., 2015) as well.

3.2. Dependent Variable

The dependent variable is TADV as our aim is to analyse what specific corporate governance factors are associated with this behaviour. For portraying TADV, we code a binary dependent variable (BINARYDELAY), which equals 1 if the company does not present the annual report on time (i.e., exceeding the legal deadline at least by one day) and 0 otherwise.

All Estonian SMEs have to disclose their financial statements (i.e., balance sheet, income statements and explanatory notes) once per year and online. This presentation of the annual report has a legal deadline of six months from the fiscal year end. For the vast majority of firms, the fiscal year end is also the calendar year end, that is, the 31st of December every year. Thus, in the latter circumstance, the deadline for uploading the annual report is the 30th of June the following year.

In order to enhance the context of the violation further, we distinguish between mild and severe delayers in further analysis. Namely, as a mild delay, we consider a delay of up to 365 days (i.e., one year) and a severe delay is over 365 days. Such coding is based on the Estonian legal considerations. Namely, according to the Estonian Commercial Code, this is the minimal date after which the Estonian Business Register can start the deletion procedure of a firm because of not submitting the annual report. We base the severity of the submission delay on this legal consideration to avoid a subjective selection of the relevant break-even time. The usage of two types of violators enables us to study, how non-violators differ from either modest or severe violators, but also, how modest and severe violators differ from each other. It is not rational to distinguish between different types of non-violators, as firms can freely choose when to submit their annual report during the legally allowed half-year period after the end of the fiscal year, and usually, they do it in June.

3.3. Independent Variables

Based on the motivation in the literature review section, we use three dimensions, further splitting them into six independent variables portraying corporate governance characteristics of a firm (see Table 1). The independent variables were calculated mostly based on their formulas in previous studies.

For capturing the ownership concentration, variable MAJORITY is used, which indicates in a binary form, whether there is a majority owner (i.e., having more than 50% of the shares) present. According to the Estonian regulation, an owner having more than 50% has the power to decide upon most of the actions in a firm, thus the usage of that threshold is well-motivated with legislation. Another variable for the concentration dimension is managerial ownership. To portray managerial ownership, the variable BOARDOWNER is used, which is a ratio of shares owned by the board members to the total shares. Thus, this variable directly portrays the overlap between the two levels of corporate governance (i.e., owners and board members). It must be emphasized, that the Estonian SMEs are subject to a two-level corporate governance system, in which the board is subordinate to owners directly, while the board members are legally responsible for all firm's activities.

For the demographic diversity dimension, the manager's age is portrayed with MANAGERAGE, which is calculated as the biological age of the oldest board member. Although in previous studies the mean age of board members has been used as well, it does not suit herewith, as we intend to capture the life experience available on the board, not the average experience. Furthermore, as a large proportion of firms have single-person boards, the usage of mean age would not be a suitable option. The context of gender is captured with the presence of a woman on the board (reflected with a binary variable WOMAN obtaining 1 on that occasion and 0 otherwise). In studies focusing on larger firms, a gender proportion has been used, but that option is not suitable in the case of SMEs, of which the overwhelming majority have only one or two individuals on the board.

Table 1. Variables in the analysis.

Dimension	Variable Coding	Variable Content	Expected Sign
Dependent variable			
TADV dependent variable	BINARYDELAY	Whether a firm violated the annual report submission date at least by 1 day (coded as 1) or not (coded as 0)	
Independent variables			
Concentration dimension's independent variables	MAJORITY (for H1a)	Whether there is a single majority owner (i.e., >50%) in the firm (coded as 1) or not (coded as 0)	+
	BOARDOWNER (for H1b)	Share of the stock the board members hold divided by total stock	+
Diversity dimension's independent variables	MANAGERAGE (for H2a)	Biological age of the oldest board member	-
	WOMAN (for H2b)	Whether there is a woman on the board (coded as 1) or not (coded as 0)	-
Experience dimension's independent variables	TENURE (for H3a)	Tenure length of the longest serving board member in years	-
	TIES (for H3b)	Number of other board memberships the board members hold	-
Control variable	BOARDSIZE	Number of board members	

Source: own elaboration. Note: for robustness tests, BINARYDELAY is recoded to account for mild and severe violators (see also Sections 3.2 and 3.4).

For the experience dimension, business ties are portrayed with the variable TIES, which reflects the number of board memberships in other firms the board members of the firms under question hold. Thus, this variable reflects the scope of ongoing business experience outside the firm under question. Managerial tenure is captured with the variable TENURE, which reflects the time in years the longest-serving board member has been on their position. TENURE could also be used as a ratio of the time the longest-serving board member has been on their position to the firm's age. Still, such a ratio would easily lead to overestimating firm-specific experience in the case of (very) young firms. Finally, the control variable reflecting board size is captured by BOARDSIZE, which reflects the number of board members in the firm.

3.4. Statistical Method

In the case of the base model, binary logistic regression (BLR) will be used with BINARYDELAY as the dependent variable and seven corporate governance variables listed in Table 1 as independent or control variables. The model tested with BLR is as follows:

$$\text{BINARYDELAY} = \beta_0 + \beta_1\text{MAJORITY} + \beta_2\text{BOARDOWNER} + \beta_3\text{MANAGERAGE} + \beta_4\text{WOMAN} + \beta_5\text{TENURE} + \beta_6\text{TIES} + \beta_7\text{BOARDSIZE}$$

We will also run three additional BLRs to check how: (a) non-violators differ from mild violators, (b) non-violators differ from severe violators, (c) mild violators differ from severe violators. The latter BLRs help to disclose, how the results vary when the severity of the violation is incorporated into the analysis.

Moreover, in further analysis, we divide the firm population into two subpopulations based on either the median size or median age, in order to check the robustness of the base results with respect to firm size and age differences. Additional BLRs are run in the subpopulations, which enable us to outline how smaller/larger or younger/older firms differ from the base results. The usage of more categories (e.g., breaking the firm population based on size or age quartiles) is not reasoned, as the ranges of size and age variables are not wide enough to justify the usage of a large number of subpopulations. We do not apply size and/or age as control variables due to (serious) multicollinearity issues, which can emerge from applying them with the chosen independent variables (e.g., with variables MANAGERAGE or TENURE).

It is not rational to use different types of logistic regressions (e.g., multinomial or ordered) herewith, as by keeping BLR as the only method, we can exactly compare the coefficients in different models, and by doing that, outline whether the independent variables behave differently when various contexts (i.e., the severity of delay, firm size or age) are altered. Finally, we run bootstrapping with 100 subsamples in order to study, how the coefficients of independent variables vary in the subpopulations of the whole population.

4. Results and Discussion

In the case of using BINARYDELAY as a factor, Welch robust ANOVA indicates (see the descriptive statistics in Table 2) that the means are different for all six independent variables at $p < 0.001$. Thus, all independent variables could potentially exhibit significance in discriminating between (non-)violators in BLR.

The conducted BLR analysis (see Table 3) testing the model specified in Section 3.4 indicates that at $p < 0.05$ level all six independent variables discriminate between (non-)violators, while the control variable BOARDSIZE is significant only at the $p < 0.1$ level. When the presence of a majority owner (MAJORITY) and board memberships in other firms (TIES) lead to a higher likelihood of violation, then in turn older managers (MANAGERAGE), women on the board (WOMAN), longer tenure (TENURE) and a larger amount of shares owned by the board members (BOARDOWNER) all reduce the likelihood of violation. Thus, H1a, H2a, H2b and H3a are supported in BLR, while H1b and H3b are rejected. Although larger boards could to a certain extent exhibit a lower likelihood of delay, the significance level of that variable does not enable to draw any ultimate conclusions, especially when considering the population size used in this study.

Table 2. Descriptive statistics of corporate governance variables.

Firm Type	Statistic	MAJORITY	BOARDOWNER	MANAGERAGE	WOMAN	TENURE	TIES	BOARDSIZE
Non-violators	N	54,081	54,081	54,081	54,081	54,081	54,081	54,081
	Mean	0.81	0.88	47.30	0.38	8.01	1.41	1.31
	Std. Dev.	0.39	0.28	11.84	0.48	5.22	2.10	0.57
	Median	1.00	1.00	46.44	0.00	6.79	1.00	1.00
	Min.	0.00	0.00	18.73	0.00	0.50	0.00	1.00
	Max.	1.00	1.00	92.56	1.00	20.28	10.00	7.00
Violators	N	23,131	23,131	23,131	23,131	23,131	23,131	23,131
	Mean	0.84	0.87	44.25	0.35	6.88	1.67	1.28
	Std. Dev.	0.37	0.30	11.29	0.48	4.74	2.36	0.54
	Median	1.00	1.00	42.94	0.00	5.59	1.00	1.00
	Min.	0.00	0.00	19.32	0.00	0.50	0.00	1.00
	Max.	1.00	1.00	93.60	1.00	20.24	10.00	7.00
Total	N	77,212	77,212	77,212	77,212	77,212	77,212	77,212
	Mean	0.82	0.88	46.39	0.37	7.67	1.49	1.30
	Std. Dev.	0.39	0.28	11.76	0.48	5.11	2.18	0.56
	Median	1.00	1.00	45.38	0.00	6.34	1.00	1.00
	Min.	0.00	0.00	18.73	0.00	0.50	0.00	1.00
	Max.	1.00	1.00	93.60	1.00	20.28	10.00	7.00

Source: Own elaboration.

According to our expectation, P1 assumes a positive relationship between both variables of the board's power concentration dimension and TADV. However, our results are inconclusive. The ownership concentration variable enables the support of P1, as high levels of ownership concentration can foster risk-taking, in line with Nguyen (2011). Moreover, minority shareholders might not make much pressure as outside investors who demand more transparency (Carney 2005). Conversely, when managers hold a larger proportion of the shares, they are less likely to be engaged in TADV. As the manager-owners of the firm, they are more engaged/committed to decision-making processes, and in this case, they also have a direct responsibility to face law violations. It can be assumed, that although manager-owners have much information "in the head" (Uhlaner et al. 2007), and thus, are not in need to publish annual reports quickly, they are still more worried about the personal reputation loss and legal consequences of violations.

Table 3. Logistic regression model for BINARYDELAY (0—non-violator, 1—violator).

Variable	B	S.E.	Wald	Sig.	Exp(B)	VIF
MAJORITY	0.222	0.025	77.912	0.000	1.249	1.45
BOARDOWNER	−0.160	0.029	31.356	0.000	0.852	1.09
MANAGERAGE	−0.018	0.001	490.339	0.000	0.982	1.36
WOMAN	−0.079	0.017	20.514	0.000	0.924	1.10
TENURE	−0.028	0.002	224.590	0.000	0.973	1.33
TIES	0.064	0.004	295.859	0.000	1.066	1.13
BOARDSIZE	0.035	0.018	3.551	0.060	1.035	1.63
Constant	0.009	0.050	0.033	0.855	1.009	

Source: Own elaboration. Notes: Average variance inflation factor (VIF) 1.30. See the model's general form in Section 3.4.

Related to the proposition P2, certain demographic characteristics should have a negative relationship with TADV, which found proof with the two variables employed. When members of the board are less risk-prone as women, have more life-experience measured as being biologically older, then the probability of TADV is lower. According to prior studies, age and gender are two relevant conditions against risk, that is, older managers and women are more risk-averse than young ones and men (Jianakoplos and Bernasek 1998; Troy et al. 2011; Ho et al. 2015). In addition, female directors are more likely to be objective and independent (Fondas 2000), therefore decreasing risk-taking (Elsaid and Ursel 2011), and thus, also following rules and official requirements to disclose financial information on time. Older managers with experience are less involved in dishonest and unethical behaviours than young ones (Troy et al. 2011; Ortiz-de-Mandojana et al. 2018). This could be due to the fact that old managers have experienced other law violations in their business life, which could have had negative consequences, for instance in the form of fees, penalties, reputation reduction, or decreases of credit ratings. Thus, they do not want to conduct more misbehaviours.

Regarding the third proposition P3 reflecting board experience, firms are supposedly less risk-taking when their managers have more experience, but proof for this was found only by using the TENURE variable. Being engaged in a firm for a longer period makes the managers more capable of consolidating financial information quicker, but also, they might have witnessed the negative consequences of TADV already before. In turn, being a board member in other firms acts in the opposite way. While multiple directorships are related to uncommon skills and strong abilities in both monitoring and advising (Falato et al. 2014; Harris and Shimizu 2004), such individuals could be busy directors who may lack the time needed to execute their monitoring well (Johnson et al. 2013; Jiraporn et al. 2009). However, some empirical research has concluded that "criticisms levelled against these directors may be unfounded" (Harris and Shimizu 2004, p. 791), and perhaps, there are other potential explanations related to this variable.

Our results show that board size is not associated with TADV. This might be because the board size in private firms is very small and many times is made up of the unique owner who is also the unique manager. In addition, when there are more members in private firms' boards, they could also be from the same family, therefore making the same decisions as they are defending the same interests (Zona 2015).

Table 4 extends the base BLR analysis by introducing different types of violators. When violators are broken into two types, that is, mild violators (up to 365 days delay) and severe violators (more than 365 days delay), an interesting feature is that the significances and effect directions of independent variables are not altered, although the magnitude of the effect of specific variables can (largely) vary. It is possible to generalize that when comparing non-violators with a specific type of violator (either mild or severe), in case of all independent variables, the effect is always stronger in the case of severe violators. Many independent variables are not significant when distinguishing between mild and severe violators, namely only two variables (i.e., MANAGERAGE and TENURE) are significant at $p < 0.01$. Thus, violators differ more from non-violators than different violators differ between themselves.

As the effects in the case of mild violators are not as strong, we can suggest that perhaps the decision to follow or not the disclosure regulation in the case of mild violators could be the case of "carelessness". Such managers do not really want to violate the regulation, but for instance, when the composition of the annual report is left "to the last minute", it cannot be prepared on time and perhaps not all board members can accept and sign the report enough quickly. The latter "carelessness" logic is corroborated by prior studies such as Cheng (2008) or Arosa et al. (2013).

Table 4. Additional logistic regression models for the subpopulations of BINARYDELAY in comparison with the base model.

	All Firms (0 Non-Violator; 1 Violator)		Subpopulation 1 (0 Non-Violator; 1 Mild Violator)		Subpopulation 2 (0 Non-Violator; 1 Severe Violator)		Subpopulation 3 (0 Mild Violator; 1 Severe Violator)	
Variable	**B**	**Sig.**	**B**	**Sig.**	**B**	**Sig.**	**B**	**Sig.**
MAJORITY	0.222	0.000	0.214	0.000	0.232	0.000	0.053	0.254
BOARDOWNER	−0.160	0.000	−0.121	0.000	−0.223	0.000	−0.114	0.020
MANAGERAGE	−0.018	0.000	−0.017	0.000	−0.020	0.000	−0.004	0.002
WOMAN	−0.079	0.000	−0.063	0.002	−0.111	0.000	−0.059	0.063
TENURE	−0.028	0.000	−0.010	0.000	−0.072	0.000	−0.064	0.000
TIES	0.064	0.000	0.064	0.000	0.066	0.000	0.005	0.456
BOARDSIZE	0.035	0.060	0.053	0.011	−0.025	0.425	−0.068	0.048
Constant	0.009	0.855	−0.593	0.000	−0.636	0.000	−0.023	0.795

Source: Own elaboration. Note: All firms, 54,081 non-violators and 23,131 violators, SP1 54,081 non-violators and 15,917 mild violators, SP2 54,081 non-violators and 7214 severe violators, SP3 15,917 mild violators and 7214 severe violators. See the model's general form in Section 3.4.

Table 5 provides additional BLR models in case the applied population of firms is broken in two based on either median size or age of firms. Likewise, with the violation context, the BLRs focusing on different size or age groups indicate that the variables are significant and the effects are in the same direction, but the magnitudes of the effects vary. Still, unlike with the violation context, there is more variation with respect to whether smaller/larger size or younger/older age of firms leads to the independent variable having a weaker/stronger effect in distinguishing between (non-)violators.

Table 5. Additional logistic regression models of BINARYDELAY for smaller/larger and younger/older firms in comparison with the base model.

Variable	All Firms		Smaller Firms		Larger Firms		Younger Firms		Older Firms	
	B	**Sig.**	**B**	**Sig.**	**B**	**Sig.**	**B**	**Sig.**	**B**	**Sig.**
MAJORITY	0.222	0.000	0.209	0.000	0.250	0.000	0.115	0.001	0.338	0.000
BOARDOWNER	−0.160	0.000	−0.196	0.000	−0.154	0.000	−0.238	0.000	−0.121	0.004
MANAGERAGE	−0.018	0.000	−0.017	0.000	−0.018	0.000	−0.015	0.000	−0.020	0.000
WOMAN	−0.079	0.000	−0.122	0.000	−0.070	0.010	−0.058	0.013	−0.110	0.000
TENURE	−0.028	0.000	−0.027	0.000	−0.021	0.000	−0.028	0.000	−0.016	0.000
TIES	0.064	0.000	0.057	0.000	0.078	0.000	0.055	0.000	0.071	0.000
BOARDSIZE	0.035	0.060	0.113	0.000	−0.021	0.406	0.019	0.481	0.049	0.051
Constant	0.009	0.855	0.026	0.712	−0.114	0.113	0.109	0.130	−0.196	0.009

Source: Own elaboration. Note: For the distinction of smaller/larger and younger/older firms, the population is broken in two based on median size (natural logarithm of total assets) 9.98 or median age (firm age in years at 30 June 2015) 7.34. See the model's general form in Section 3.4.

When the BLR is run with another fiscal year (i.e., 2015), the results are not altered (see Table A1). Namely, the only variable clearly not significant, likewise with the base model calculated by using the fiscal year 2014, is the control variable BOARDSIZE. In turn, in the case of independent variables, the signs of the coefficients remain the same and absolute values of the coefficients are very similar, like for the base model documented in Table 3. Thus, the results are robust with respect to the year chosen for analysis. Table A1 also shows the bootstrapping results for the year 2014. In a 100-sample bootstrapping, the signs of independent variables' coefficients do not change for the lower and upper 95% confidence intervals, thus the subpopulations of firms are quite similar to the findings obtained

with the base regression model on the whole population documented in Table 3. The bootstrapping result is an expected scenario based on the age and size contexts in Table 5, which also do not indicate the change in variables' signs.

The results of the study are consolidated into Table 6, which in future research can be used as a benchmark for the association of timely accounting disclosure violation and corporate governance attributes in SMEs. As a contribution to the literature, we found that certain demographic attributes in the board make them less likely to be violators of the accounting regulation, while the power concentration and experience on the board can lead to varying violation behaviour, depending on what variable of the specific dimension is considered. In addition, corporate governance characteristics have more pronounced effects on the violation probability when the violation becomes more severe.

Table 6. Summary of the associations found in this study.

Corporate Governance Dimension	Variable	Base Effect on Violation	Context of Size	Context of Age	Context of Violation Length
Power Concentration (Proposition 1 inconclusive)	MAJORITY (H1a accepted)	Increases	Effect stronger in larger firms	Effect stronger in older firms	Effect stronger for severe violators
	BOARDOWNER (H1b rejected)	Decreases	Effect stronger in smaller firms	Effect stronger in younger firms	Effect stronger for severe violators
Demographic Diversity (Proposition 2 true)	MANAGERAGE (H2a accepted)	Decreases	Effect stronger in larger firms	Effect stronger in older firms	Effect stronger for severe violators
	WOMAN (H2b accepted)	Decreases	Effect stronger in smaller firms	Effect stronger in older firms	Effect stronger for severe violators
Entrepreneurial Experience (Proposition 3 inconclusive)	TENURE (H3a accepted)	Decreases	Effect stronger in smaller firms	Effect stronger in younger firms	Effect stronger for severe violators
	TIES (H3b rejected)	Increases	Effect stronger in larger firms	Effect stronger in older firms	Effect stronger for severe violators

Source: Own elaboration. Note: The first column includes the result for the three research propositions (either true, inconclusive or false; inconclusive means one true and one false evidence), while the second column includes the result for the acceptance/rejection of postulated six hypotheses.

5. Conclusions and Future Research

The objective of this research was to analyse the association between corporate governance characteristics and timely accounting information disclosure violations in private SMEs. Relying on an SME population in a developed European economy, namely Estonia, a set of theoretically motivated corporate governance (independent) variables was studied with annual report submission delays (as the dependent variable) in different logistic regression analyses. Evidence was found that certain demographic diversity in the board (as portrayed by women on the board and managers' older age) reduces the likelihood of violation, while variables portraying power concentration (managerial ownership and ownership concentration) and board experience (tenure length and business ties) provided mixed results.

Varying stakeholders can benefit from the results of this study. First, as non-timely disclosure has been proven to be associated with either financial distress or bankruptcy (Altman et al. 2010; Lukason 2013; Luypaert et al. 2016; Lukason and Camacho-Miñano 2019), creditors can account specific corporate governance characteristics in case of lengthy delays. In the latter circumstance, financial information from the past can already be obsolete, and thus, non-financial variables could be of remarkable value to predict distress or bankruptcy. Second, based on the results, state institutions monitoring timely submission have a better understanding, which corporate governance characteristics in association with firm size and age can lead to a law violation with a higher likelihood. The latter enables, for instance, the targeting of likely lengthy violators earlier to guarantee better transparency in the business environment. Last but not least, as the general foundation of this study was risk behaviour more broadly, the findings can provide valuable hints, which corporate governance characteristics could potentially be triggers for other risk behaviour types.

Finally, this paper is not free from limitations, being fully related to future research proposals. First, our paper is focused on one country, Estonia, and thus, our findings could be altered by the peculiarities of this country, for example, the accounting disclosure (violation) legal framework and its implementation. Future research could be conducted in other countries in order to check whether cultural or legal settings have an impact on how corporate governance is linked to accounting disclosure violations. Second, our approach to corporate governance is limited to a certain set of dimensions and variables portraying them, and thus, future research could be enhanced to account more for psychological or personal characteristics such as ethical level, past violation behaviour or past training/education of managers. Third, although the results were validated with another fiscal year, the violations could be studied in a longer time frame, to either detect certain disclosure pattern changes or even consider corporate governance changes, should these occur.

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Appendix A

Table A1. Model composed with another fiscal year 2015 and bootstrapping results for the year 2014.

Variable	B-2014	Sig.-2014	B-2015	Sig.-2015	BS 95% CI Lower	BS 95% CI Higher
MAJORITY	0.222	0.000	0.189	0.000	0.165	0.277
BOARDOWNER	−0.160	0.000	−0.169	0.000	−0.219	−0.089
MANAGERAGE	−0.018	0.000	−0.014	0.000	−0.019	−0.016
WOMAN	−0.079	0.000	−0.066	0.000	−0.124	−0.049
TENURE	−0.028	0.000	−0.014	0.000	−0.032	−0.024
TIES	0.064	0.000	0.053	0.000	0.057	0.074
BOARDSIZE	0.035	0.060	0.010	0.593	−0.001	0.066
Constant	0.009	0.855	−0.337	0.000	−0.069	0.095

Source: Own elaboration. Notes: BS—bootstrapping, CI—confidence interval. BS results were obtained with 100 bootstrap samples for the year 2014 population. B and Sig.—coefficient and *p*-value either for the whole populations from 2014 or 2015.

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Article

Does Corporate Governance Compliance Increase Company Value? Evidence from the Best Practice of the Board

Maria Aluchna [1,*] and Tomasz Kuszewski [2]

[1] Department of Management Theory, Warsaw School of Economics, aleja Niepodleglosci 162, 02-554 Warsaw, Poland
[2] College of Economic Analysis, University of Economics and Human Sciences in Warsaw, ul. Okopowa 59, 01-043 Warsaw, Poland; t.kuszewski@vizja.pl
* Correspondence: maria.aluchna@sgh.waw.pl; Tel.: +48-22-564-86-20

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Abstract: Drawing upon agency theory, we address the limitations of best practice code in the context of emerging governance, emphasizing the role of concentrated ownership. While the code provisions were formulated in developed countries, the transfer of one-size-fits-all guidelines may not address the characteristics and challenges of emerging and post-transition economies. Specifically, we emphasize that provisions of corporate governance codes are aimed at solving the principal–agent conflict between shareholders and managers. These guidelines may remain limited in addressing principal–principal conflicts between majority and minority shareholders and have either a lesser effect on valuation or none at all. Using a unique sample of 155 companies listed on the Warsaw Stock Exchange during the period 2006–2015, with hand-collected data from declarations of conformity, we tested the hypotheses on the link between corporate governance compliance (with board) practice and company value. The period of 2006–2015 was chosen deliberately, due to the relative stability of corporate governance code recommendations over this time. The results of our panel model reveal a negative and statistically significant relation between corporate governance compliance and company value. We contribute to the existing literature providing new evidence on compliance practice in the context of concentrated ownership, and the limited effect of code provisions in addressing structural challenges of corporate governance in emerging post-transition economies and hierarchy-based control systems.

Keywords: corporate governance best practice; corporate governance compliance; company value; Warsaw Stock Exchange

1. Introduction

The adoption of best practice codes has been one of the most influential trends in corporate governance in the last 20 years (Aguilera and Cuervo-Cazura 2004; Zattoni and Cuomo 2008; Cuomo et al. 2016), being noted in both developed and emerging economies. Conceptually, codes of best practice offer self-regulation for companies (Hooghiemstra and van Ees 2011) and aim to resolve the inherent principal–agent conflict, strengthen monitoring tools over management and limit the power of corporate officials (Pritchett 1983). As a result, corporate governance guidelines reduce information asymmetry, empower shareholders, and lower agency costs (Chang 2018). Despite institutional differences across corporate governance regimes, the code provisions remain similar (Cicon et al. 2012; OECD 2015). In practice, the set of recommendations on board work, and the structure of executive remuneration and standards of transparency have been viewed as a systemic response to corporate governance inefficiencies identified during disruptive corporate scandals (Aguilera et al. 2009; Krenn 2015).

Prior studies identify the value added by the adoption of best practice. The positive effects for those companies complying with corporate governance principles relate to increased investor trust and lower risk (Durnev and Kim 2005). With greater transparency, investors are more interested in allocating their funds in company stocks. Compliance also leads to enhanced company reputation, lower cost of capital, better performance, higher return on investment, and higher market valuation (Mazotta and Veltri 2014; Kaspereit et al. 2017). Nevertheless, despite the belief in the positive effect of higher compliance, scholars have addressed limitations in the transfer of Anglo-Saxon corporate governance guidelines to countries having different institutional environments and company characteristics (Chen et al. 2011). The criticism of the one-size fits-all approach indicates the structural differences in ownership structure, cultural norms, and socializing patterns, which may result in problems of code implementation, such as an instrumental approach to adoption (Fotaki et al. 2019), manipulation (Okhmatovskiy and David 2012), and decoupling (Martin 2010; Sobhan 2016). These issues may reduce compliance benefits and limit the effect of higher valuations.

In countries characterized by concentrated ownership and wedge between control and cash-flow rights, the conflicts between majority and minority shareholders become the prime concern of corporate governance (La Porta et al. 1999; Bennedsen and Nielsen 2010; Hamadi and Heinen 2015; Huu Nguyen et al. 2020). While the flexibility of the codes and the universalism of best practice enable the adoption of code guidelines for a concentrated ownership environment, in compliance terms, it remains the decision of powerful blockholders as to whether they constrain themselves in exerting their power over the company and their willingness to share "control of control" (Perezts and Picard 2015). The gap between "formal adoption of structures and their actual daily use" (Perezts and Picard 2015, p. 833) or the lack of congruence between enacted values and espoused values (Fotaki et al. 2019) are more likely to occur in countries with insufficient investor protection, inadequate transparency standards, and weak institutions. These conditions, accompanied with ownership concentration, happen to materialize in developing countries, as well as emerging and post-transition economies (Huu Nguyen et al. 2020). Implementing codes of best practice in the context of what is termed "emerging governance" reveals a different logic, since "arrangements adapt and evolve over time", as a result of "the co-habitation of different institutional, regal and ownership tradition and assumptions from more established governance models" (Mahadeo and Soobaroyen 2016, pp. 739–40).

In this paper, we aim to add to the existing literature on corporate governance compliance in developing and emerging markets (Outa and Waweru 2016; Sarhan and Ntim 2018), in addition to smaller economies (Chang 2018), and to deliver insights on the implementation of best practice codes in a post-transition and post-communist economy (Okhmatovskiy and David 2012; Albu and Girbina 2015). In this light, we pose a question concerning the market valuation effect for the implementation of best practice codes. Drawing upon agency theory, we address the limitations of best practice codes in an emerging governance context, emphasizing the role of concentrated ownership. While the existing literature emphasizes that the prime objective of best practice implementation lies in creating conditions to attract investors to invest funds (Chang 2018), the reality of operating in the context of concentrated ownership may offer different incentives for blockholders (Chen et al. 2011). Compliance per se may be seen in terms of a cost, a loss of power, or a threat from the exposure of internal structure to the scrutiny of the general public. We study the link between compliance practice and company value in relation to ownership concentration and ownership by distinct shareholder types, including financial, individual, industry, CEO, and state.

The contribution of the paper is twofold. Firstly, we provide much-needed evidence on longitudinal compliance practice in an unfavorable environment of insufficient investor protection, concentrated ownership, and a hierarchy-based corporate governance system under a post-communist legacy. We study the scope and dynamics of compliance with best practice in the context of reemerging trust and civic society, yet where institutions and the legal system are still insufficiently effective. Secondly, developing further the approach proposed by Chen et al. (2011) on the limitations of best

practice adoption in emerging markets, we analyze the relations between compliance practices and company value.

The remainder of this paper is organized as follows. First, we outline the concept of corporate governance best practice by recourse to agency theory, which explains the motivation for compliance. We explain practices by listed companies in the context of emerging governance, concentrated ownership, and a hierarchy-based control system. Then, we present prior studies on the relations between corporate governance compliance and company value and performance. This is followed by a presentation of our research design, presenting our study sample, data collection, descriptive statistics, and econometric models. Our analysis is based on a sample of 155 companies listed on the Warsaw Stock Exchange in the years 2006–2015. The period of 2006–2015 was chosen deliberately, due to the relative stability of corporate governance code recommendations. Our findings suggest that implementing new corporate governance practice is an incremental process. Descriptive statistics are consistent with prior studies on emerging and post-transition countries and demonstrate a slow but steady increase in the number of complying companies, though still lagging behind well-established economies (Albu and Girbina 2015; Chang 2018). The results of the constructed models reveal a statistically significant and negative relationship between all three constructed measures of compliance and firm value as measured by Tobin's Q. We discuss implications for theory and practice and formulate suggestions for further research in the final sections.

2. Corporate Governance Best Practice

2.1. Corporate Governance Code in the View of Theory

The existing literature analyzes corporate governance from the perspective of inherent conflicts which exist in the organization context and are explained by agency theory (Fama and Jensen 1983; Shleifer and Vishny 1997). According to agency theory, the conflict between shareholders and managers arises from the separation of ownership and control (Jensen and Meckling 1976), observed predominantly in the context of dispersed ownership structure. The principal–agent conflict, known as the agency conflict of type I, refers to information asymmetry and differences in time horizon and risk diversification opportunities, which characterize the relation between shareholders and managers (Jensen and Meckling 1976). The theory explains that managers may have the tendency of maximizing their own wealth, acting at the cost of shareholders (Fama and Jensen 1983; Shleifer and Vishny 1997).

Given that dispersed ownership, which offers an ideal environment for the emergence of principal–agent conflict, remains in a global context more the exception than the rule (La Porta et al. 1999) more interest in corporate governance studies has been devoted to concentrated ownership (Su et al. 2008; Loyola and Portila 2019). While concentrated ownership provides a natural mechanism for mitigating principal–agent conflict (Coffee 1999; Berglöf and Claessens 2006), it leads to the emergence of the agency conflict type II, which refers to the relations between majority and minority shareholders (Wang and Shailer 2015; Edmans 2014; Khan et al. 2020). Principal–principal conflicts materialize in the majority shareholders' actions related to investment and dividend policy, in order to enjoy private benefits (Gilson and Schwartz 2013) and to extract value from the company at the expense of minority investors (Krivogorsky and Burton 2012; Wang and Shailer 2015). In addition, majority investors tend to appoint their own representatives to the board to limit the access to information and decision-making for minority investors (Shleifer and Vishny 1997).

Agency conflicts are inherent in organizations and remain naturally linked to more complex ownership structures characterized by the presence of shareholders who differ in terms of their type (industry, family, and financial), as well as the size and the time horizon of their investment (Hamadi and Heinen 2015). In reaction to these conflicts, corporate governance offers a set of mechanisms and institutions for reducing potential problems by aligning the interests of managers with the interests of shareholders and by aligning interests of majority and minority shareholders. This alignment can be exerted with monitoring and incentive schemes. Monitoring exercised by internal forces, such as ownership, board

composition, and structure, and by external mechanisms, including markets for corporate control, competitive labor markets, shareholder activism, rating agencies, and media (Aguilera et al. 2015; Elgharbawy and Abdel-Kader 2016) is expected to reduce agency conflicts. Despite ongoing efforts to formulate and enforce principles, "effective corporate governance still remains a puzzle for practice and research" (Fotaki et al. 2019, p. 1).

Best practice codes offer corporate governance principles on oversight and control over the firm (Cuervo 2002; Aguilera and Cuervo-Cazura 2004; Chizema 2008; Tricker 2012). The best practice concept assumes voluntary adoption according to the comply or explain rule, providing flexibility in terms of scope and pace for implementing code recommendations (Tan 2018). It is viewed an example of self-regulation of listed companies (Hooghiemstra and van Ees 2011). The codes address selected dimensions of corporate governance, such as functioning of the board, shareholder rights, transparency, auditing, and remuneration (OECD 2015), and they are designed to provide principles and norms for creating shareholder value (Mallin 2004). The codes offer widely recognized and accepted guidelines for addressing governance inefficiencies (Lipman 2007; Arcot et al. 2010; Tricker 2012) and are often inspired by international organizations, such as the OECD, or regulatory and supervision authorities, such as the European Commission (e.g., the European Commission Communication 284 to the European Council and the European Parliament) or the US Securities and Exchange Commission.

In the conceptual framework of agency theory, the adoption of code provisions is expected to mitigate information asymmetry and reduce conflicts between shareholders and managers. Increasing disclosure and addressing the problems of hidden action, hidden information, and hidden intention compliance lower investment risk and enhance investor trust (Durnev and Kim 2005; (Mazotta and Veltri 2014; Kaspereit et al. 2017). In the context of ownership concentration, majority shareholders may be motivated for compliance by the assumption that their interests are "interchangeably merged with the interests of the corporate entity and whatever is good for the society must be good for the corporation in the long run" (Pritchett 1983, p. 997). This resonates in the commitment to adopt the rules of fairness, an ethical stance which is in the best interests of the company. Blockholders may decide to voluntarily constrain themselves in exerting their power over the company and by their willingness to share "control of control" (Perezts and Picard 2015), driven by the notion that "corporate actions are related to long run corporate benefit and there is no taint of self-dealing or conflict of interests" (Pritchett 1983, p. 997).

Implementing the code is driven by numerous reasons. Firstly, the idea of self-regulation and "soft law" provided by the code assumes that the market monitors compliance. This means that investors express their acceptance of conformity with the code via increasing their holdings of a company's shares, leading to an increase of company value (Gompers et al. 2003; Black et al. 2006; Goncharov et al. 2006; Renders et al. 2010). Consequently, investors penalize non-complying companies through selling their shares (Easterbrook and Fischel 1996).

Secondly, the code principles are formulated according to the needs and interests of institutional investors, for whom high conformity translates into high trust towards the company management (Arcot et al. 2010). Compliance with internationally recognized and easily comparable standards increases transparency and lowers the risk associated with firm operation (Bistrowa and Lace 2012). In a sense, greater compliance is understood as higher protection of shareholder interest.

Thirdly, corporate governance conformity not only aims to develop efficient monitoring and oversight to protect shareholder value, but also aims to legitimize the presence of the firm on the stock market. Competition between companies to attract investors and raise funds for growth generates coercive or normative imitation (Guler et al. 2002). According to the legitimization perspective, companies implement new practices in order to enjoy the benefits of meeting social expectations. "If practices become institutionalized, their adoption brings legitimization to the adopting organization or social system" (Aguilera and Cuervo-Cazura 2004, p. 422). Firms are differently motivated to comply with best practice, and such conformity does not necessarily result in greater efficiency or effectiveness. The declaration of conformity issued by listed companies may either fail to lead to better performance or

higher firm value, or else it may not necessarily be motivated by the strategy of increasing shareholder value. Instead, compliance may be a product of the endogenously determined structure of internal firm governance or result from isomorphic dynamics driven by the firm's legitimization policy (Hermalin and Weisbach 2003).

In sum, according to agency theory, firms operate in an economically rational way and search for practices and organizational solutions that improve performance with respect to resources utilized and effectiveness (Williamson 1981). Thus, the decisions on corporate governance compliance and the implementation of best practice are undertaken for the purpose of obtaining efficiency gains (Aguilera and Cuervo-Cazura 2004). The process of innovation diffusion introduces new solutions, improves company performance, and is driven by technical and rational needs (Zattoni and Cuomo 2008). It is motivated by rational arguments and is expected to improve company efficiency. Thus, well-performing companies which previously met shareholder expectations with respect to financial results, share price, and company value are more responsive to formal requirements and shareholder expectations with respect to the board's functioning, structure, and composition, as well as transparency standards and remuneration policy. Compliance with the code recommendations constitutes a signal for investors that the firm, its executives, and board directors aim at protecting shareholder interests and endeavor to enhance shareholder value (Hermes et al. 2007).

2.2. Corporate Governance Code and Company Value

Studies on corporate governance compliance offer a wide range of qualitative and quantitative analyses revealing the degree, scope, and dynamics of compliance (Seidl et al. 2013; Shrives and Brennan 2015; Okhmatovskiy 2017), in addition to its relation to company performance and value (Stiglbauer and Velte 2014; Rose 2016; Roy and Pay 2017). Conceptually, studies are based on the assumption that companies with poor corporate governance should have lower valuations in comparison to companies with effective corporate governance, since investors do not tolerate higher risk of expropriation without receiving a premium for such investments (Gompers et al. 2003; Goncharov et al. 2006). A positive link between the quality of governance and performance is observed in studies on European (Drobetz et al. 2003; Gompers et al. 2003; Bauer et al. 2004; Goncharov et al. 2006; Renders et al. 2010; Bistrowa and Lace 2012), Japanese (Aman and Nguyen 2007), and American (Bhagat and Bolton 2008) companies.

Specifically, a series of studies analyze the dynamics of compliance with corporate governance codes and the link between the compliance and firm performance. Goncharov et al. (2006) examine the declared degree of compliance for a sample of German DAX30 and MDAX listed firms and find that "the compliance with the Code is value-relevant after controlling for endogeneity bias" (Goncharov et al. 2006, p. 432). Research on a sample of 140 German companies reveals that companies with a higher value of Tobin's Q are more likely to comply with the recommendation on disclosing the remuneration schemes of individual directors (Andres and Theissen 2008). A study on a large sample of 1199 observations on FTSE companies and 33,667 observations of Worldscope firms (Renders et al. 2010) shows that—when controlling for endogeneity by introducing instrumental variables and eliminating the sample selection bias—there is a positive link between the quality of corporate governance (measured by the rating variable) and company performance. The strength of this relationship depends on the quality of the institutional environment, while "improvements in corporate governance ratings over time result in decreasing marginal benefits in terms of performance" (Renders et al. 2010, p. 87). A positive link between company performance measured by return of equity (ROE) and return on assets (ROA) indicators and total corporate governance comply or explain disclosure scores is noted in a sample of Danish firms (Rose 2016). This study indicates a positive effect for two categories: board composition and remuneration policy, while no impact on performance is reported for increasing compliance with the recommendations on risk management and internal controls.

Similar results are shown in a study on the impact of corporate governance quality on stock performance in a sample of 116 firms from 10 Central and Eastern European countries for the period of 2008–2010 (Bistrowa and Lace 2012). Based on the model rating, the firms characterized by the highest

corporate governance quality (top 25%) outperformed companies with the worst corporate governance quality (bottom 25%) by 0.98% on a monthly basis.

Although studies document a positive association between corporate governance compliance and firm value and performance (Goncharov et al. 2006; Renders et al. 2010; Rose 2016), the opposite may also be true (Bhagat and Black 2002). The assumed effect referring to higher company valuation, increased legitimization towards constituencies, and positive ethical spillovers may be constrained by a number of reasons. Firstly, the pricing effect takes place when investors believe in the reliability of information provided by firms to the market. This may not necessarily be the case, as the declaration of conformity is neither verified nor audited. Moreover, companies may choose to comply with provisions which are either relatively easy to follow or which appear useless from an investor standpoint (Goncharov et al. 2006; Sobhan 2016).

Secondly, the voluntary approach to compliance and the absence of enforcement mechanisms may lower the credibility of the conformity statement and may weaken the positive economic consequences (Healy and Palepu 2001; Goncharov et al. 2006). With the given institutional and ownership characteristics in emerging and post-transition economies, codes of best practice aim to resolve the inherent principal–principal conflict and add to the protection of minority investors (Mahadeo and Soobaroyen 2016). In spite of this, "publicly mandated commitment to corporate governance, business ethics and legal compliance" (Adelstein and Clegg 2016) is significantly constrained. Insufficient enforcement mechanisms, combined with institutional skepticism, increases "the declarative and instrumental use of corporate governance structures and their actual daily use" (Perezts and Picard 2015, p. 833). This can lead, as shown in a study on Hungary, to a "disjuncture between formal commitment to code adoption and its effective implementation" (Martin 2010, p. 145). Therefore, the effective implementation of codes of best practice depends on the perceived benefits and costs by majority shareholders.

Thirdly, compliance with the code guidelines may be viewed as explicit information on the corporate governance structure and standards for board functioning and investor protection. The declaration of conformity issued by listed companies may either not lead to better performance or higher firm value or not necessarily be motivated by a strategy of increasing shareholder value. Instead, compliance may be a product of the endogenously determined structure of internal firm governance or result from the isomorphic dynamics driven by company legitimization policy. Research reveals the impact of endogeneity in the process of board formation and monitoring (Hermalin and Weisbach 2003). The legitimacy driven effect should be particularly strong for poorly performing companies, which, by publishing a declaration of corporate governance conformity, intend to compensate shareholders reacting to unsatisfying financial results.

Fourthly, while we acknowledge the contribution of agency theory, we also consider the limitations of the rationale approach to corporate governance compliance. Since legitimacy is crucial for organization survival, as it provides access to resources from the environment (Deephouse 1996; Mizruchi and Fein 1999), companies may be "prone to construct stories about their actions that correspond to socially prescribed dictates about what organization should do" (Mizruchi and Fein 1999, p. 656). In addition, companies may tend to declare adherence with corporate governance principles without any substantive compliance.

Fifthly, legitimacy motivation is observed in many companies, regardless of the country of origin or operation. However, in the context of weaker institutions and insufficient investor protection, this declarative character (Okhmatovskiy 2017), overstatement (Sobhan 2016) or instrumental approach (Fotaki et al. 2019) to compliance may result in no effect on market valuation (Gherghina 2015).

We follow the approach proposed by Chen et al. (2011), who argue that the provisions of corporate governance codes are designed around companies in developed economies. They suggest that best practice "cannot mitigate the negative effect of controlling-shareholder expropriation on corporate performance" (Chen et al. 2011, p. 115). This is caused by two main limitations. Firstly, code provisions are designed to solve type I principal–agent problems between shareholders and managers, while they

do not address conflicts between majority and minority shareholders. Secondly, the core of best practice code lies in the guidelines on board structure and operation, which structurally will not be implemented in a concentrated ownership context since majority shareholders appoint their own representatives to the board (Shleifer and Vishny 1997; Ferrarini and Filippelli 2013; Gaur et al. 2015). Put differently, not only are the code provisions not substantively implemented by boards, but they also fail to respond to the structural problems and challenges of corporate governance in emerging economies. Investors do not observe positive effects with regard to lower asymmetry, lower risk, or more efficient oversight; thus, there is no resulting higher valuation. In sum, recognizing the limitations of corporate governance codes in the context of concentrated ownership, we formulate the following hypotheses:

Hypothesis 1a (H1a). *Formal compliance with board best practice is negatively associated with firm value.*

Hypothesis 1b (H1b). *Minimum compliance with board best practice is negatively associated with firm value.*

Hypothesis 1c (H1c). *Substantive compliance with board best practice is negatively associated with firm value.*

3. Research Design

3.1. Sample and Data Collection

We intended to test the hypothesis regarding the link between compliance with best practice and company value on a unique sample of companies listed on the Warsaw Stock Exchange over a long period, during which corporate governance conformity evolves and gradually becomes institutionalized. We purposefully choose sample companies listed over a 10-year period (2006–2015) that are characterized by their relative stability of corporate governance code recommendations. We constructed a balanced panel to investigate companies which were listed over the whole period of our analysis and reveal similar attributes with regard to corporate governance practice. Over the analyzed period, the numbers of companies listed on the Warsaw Stock Exchange varied due to initial public offerings (POs) and delisting, as reported in Table 1.

Table 1. Number of companies listed on the Warsaw Stock Exchange.

Years	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Listed companies	284	351	374	379	400	426	438	450	471	487
Initial public offerings (IPOs)	38	81	33	13	34	38	19	23	28	30
Delisted firms	9	14	10	8	13	12	7	11	8	13

Source: GPW, www.gpw.pl/statystyki.

We start with 284 firms quoted on the Warsaw Stock Exchange in 2006. We eliminate companies operating in the insurance sector, real estate firms, companies with missing observations and those delisted over the analyzed period. Our final sample consists of a balanced panel with 155 companies and 1550 observations. We collect data on company financial characteristics and performance, company value, and ownership structure from the IQ Capital data base. Prior research emphasizes the essential role of the board for mitigating agency costs, for attaining sufficient quality in corporate governance (Khan et al. 2020). Data on compliance include the conformity—or the lack thereof—of a given company with best practice on the following: the presence of two independent directors, information concerning the identification of independent board members, the presence of an independent board chairman, and the formation of an audit committee and remuneration committee on the supervisory board. Due to the absence of such data in any available database, all information on compliance is collected by hand directly from annual reports of the companies in the sample. The analyses were performed, using STATA16 software.

3.2. Variables

We operationalize our variables, following the research procedures adopted in prior studies. We employ Tobin's Q, defined as market value to book value, as our explained variable (Kim et al. 2015). Compliance with board best practice is our explanatory variable. Due to the essential role of corporate governance, we focus on compliance with recommendation on the supervisory board (Seidl et al. 2013; Huu Nguyen et al. 2020). Specifically, we include information on the presence of independent directors on the board, chairman status, the formation of an audit committee and other committees within the supervisory board, and publication of the compliance statement included in the annual report and its size (length). In order to test for the relationship between conformity to best practices and company value, we introduce three compliance variables: formal compliance (FORMALCOMPL), minimum compliance (MINCOMPL), and substantive compliance (SUBSTCOMPL). FORMALCOMPL is constructed as an arithmetic sum of compliance with the best practice on the presence of two independent directors and the formation of an audit committee and remuneration committee on the supervisory board. MINCOMPL is defined as the minimum level of compliance and is the arithmetic sum of compliance with the best practice on the presence of two independent directors and the formation of audit committee on the supervisory board. SUBSTCOMPL refers to substantive, pragmatic compliance and is the arithmetic sum of compliance with the best practice on the presence of two independent directors with the information of board directors who are independent, the presence of an independent board chairman, and the formation of a separate audit committee and remuneration committee on the supervisory board. SUBSTCOMPL is a measure which depicts compliance in substance, rather than its declarative character. Formally, the amendments of the Accounting Act imposed the obligation to form an audit committee within the supervisory board. According to the act, in the case of supervisory board with the minimum legal size of 5 directors, the whole board can function as the committee. We include additional variables which depict (1) whether a company reports the existence of an audit committee within the board, (2) whether the whole board performs the function of the audit committee, and (3) whether a separate committee within the board is formed.

Finally, we use control variables on ownership structure, company size, and financial performance. We operationalize the variables on ownership structure, following prior studies (Thomsen and Pedersen 2000; Krivogorsky and Burton 2012). Specifically, we use ownership variables on concentration (the largest shareholder), in addition to the shareholders' stakes by selected types (financial, foreign, CEO, and government), to control for the impact of ownership on firm value. In both cases, we measure the potential effect of ownership concentration and shareholder identity, using the variable of the size of the stake owned (Krivogorsky and Burton 2012; Florackis et al. 2015). Finally, we use standard control variables covering the company size (assets and debt) and performance (ROA). The list of variables used in the analysis is provided in Table 2.

Table 2. Summary of variables.

Variable	Description	Type
	Regressand	
ln_Q	Natural logarithm of value of Tobin's Q (market value/book value)	Quantitative, real
	Regressors	
FORMALCOMPL	Formal compliance with best practice on the presence of two independent directors, and the formation of an audit committee and remuneration committee on the supervisory board	Quantitative, real
MINCOMPL	Minimal compliance with best practice on the presence of two independent directors, and the formation of an audit committee on the supervisory board	Quantitative, real

Table 2. *Cont.*

Variable	Description	Type
SUBSTCOMPL	Substantive compliance with best practice on the presence of two independent directors with the information who of board directors are independent the presence of an independent board chairman, and the formation of a separate audit committee and remuneration committee on the supervisory board	Quantitative, real
FILASHA_sq	Square root of percentage of company's shares held by the largest shareholder	Quantitative, real
INSTINV_sq	Square root of percentage of company's shares held by financial investors	Quantitative, real
INDUSTINV_sq	Square root of percentage of company's shares held by industry investors	Quantitative, real
CEOSHA	Percentage of company's shares held by the CEO	Quantitative, real
GOVSHA	Percentage of company's shares held by the government	Quantitative, real
ln_ASSETS	Natural logarithm of the value of assets (current prices, million PLN)	Quantitative, real
ADJ_ROA	Sector-adjusted and time-adjusted return of assets ratio (see note below)	Quantitative, real
DEBT	Debt (current prices, million PLN)	Quantitative, real
DEBT_ON_ASSETS	Debt versus assets	Quantitative, real

Note: The value of return of assets (ROA) variable is the value of the return of assets measure of a company, adjusted by the year of observation and the sector it operates in (Vintila et al. 2014). This measure is calculated with the use of the median value of ROA for each sector and year, as follows: $ADJ\ ROA_{it} = sign(ROA_{it} - median\ ROA_{SE,t}) \cdot \sqrt{|ROA_{it} - median\ ROA_{SE,t}|}$, $i = 1, \ldots, 155$; $t = 2006, \ldots, 2015$, where i—number of the company, $SE \in$ {Industry, Services, Construction, Financial}.

3.3. Descriptive Statistics

We transform some variables (as shown in Table 2) into square root or natural logarithm measures for the purpose of constructing econometric models which allow for economic interpretation. Below we report the process of variables transformation, presenting natural values of our variables (Tables 3–8). Table 3 reveals the distribution of our explained variable, Tobin's Q.

Table 3. Distribution of Tobin's Q—number of companies and untransformed variables.

Value	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
(0;1)	13	24	106	57	49	103	96	75	83	83
(1;2)	48	50	29	67	73	42	47	56	46	37
(2;3)	35	29	11	21	25	6	5	14	17	15
(3;4)	24	24	6	5	3	3	2	4	5	9
>4	35	28	3	5	5	1	5	6	4	11

As reported in Table 3, the distributions of Q are one-modal, yet since 2008, they reveal strong positive asymmetry, which means that, over the analyzed period, there are more years characterized with a low value of Q than a high one. A more balanced distribution of Q is revealed in the first year of the analyzed period, while since 2008, we depict the effects of the financial crisis peaking in 2011. Due to the asymmetric distribution, we analyze the median value of Q, as shown in Table 4.

Table 4. Mean value of Tobin's Q by sector and year, and untransformed variables.

Sector	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Median for industrial companies	2.1	2.0	0.7	1.1	1.4	0.7	0.8	1.2	0.9	0.85
Median for services companies	2.35	1.8	0.8	1.1	1.15	0.75	0.7	0.9	0.9	1.00
Median for construction companies	3.05	2.9	1.45	1.65	1.65	0.7	0.8	0.95	0.9	0.8
Median for financial companies	3.8	4.0	1.3	1.65	1.85	1.35	1.45	1.8	1.7	1.25
Median for all companies	2.5	2.0	0.7	1.2	1.4	0.7	0.8	1.0	0.9	0.9
Arithmetic mean for all companies	3.005	2.597	1.048	1.423	1.546	0.974	1.107	1.369	1.228	1.467

Table 4 reveals variations of Q in the specified sectors of operation. The maximum values of Q were noted in the initial years of the analyzed period, with a strong drop in 2008 and some recovery in 2010–2011, followed by a subsequent decline. The recovery of the median Q value in 2013 is mostly evident for industrial companies. Stagnation is observed for service and construction sectors until the end of the analyzed period. A similar trend is noted for companies operating in the financial sector, yet the values of Tobin's Q remain at the higher level. The differences between the median and arithmetic mean confirm the expectation of the positive asymmetry of Q.

Next, we investigate the variability of Tobin's Q over the analyzed period and across the years under consideration, using the standard deviation and average mean, as presented in Table 5.

Table 5. Variability of Tobin's Q, and untransformed variables.

Standard Deviation	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Overall					1.450					
Between	1.976	1.776	0.913	0.916	1.019	0.803	1.063	1.232	1.167	1.597
Between variation coefficient	0.658	0.684	0.871	0.644	0.659	0.824	0.960	0.900	0.950	1.089
Within					1.131					
Within variation coefficient	0.376	0.436	1.079	0.795	0.732	1.161	1.022	0.826	0.921	0.771

The between variation coefficient, which measures the variability of Tobin's Q, has risen since 2009, suggesting the variability of adaptability and capability to survive amongst listed companies. The within variation coefficient is calculated as the quotient within standard deviation, which remains stable across time, and the arithmetic mean of Tobin's Q for the given years (Table 4).

We test the variables used in the econometric analysis, employing the Shapiro–Wilk normality test (null hypothesis assumes normal distribution of variable) and the Harris–Tzavalis stationarity test for a balanced panel (null hypothesis assumes the variable has unit root). Tests are run for the untransformed variables. The results are given in Table 6.

Table 6. Shapiro–Wilk normality test and Harris–Tzavalis stationarity test for variables, and untransformed variables.

Variable	Shapiro–Wilk Test		Harris–Tzavalis Test	
	Critical Value	Prob > z	Critical Value	*p*-Value
Q	13.584	0	−17.101	0
FORMALCOMPL	8.449	0	−7.050	0
MINCOMPL	6.352	0	−6.482	0
SUBSTCOMPL	9.784	0	−7.448	0
FILASHA	9.294	0	−13.845	0
INSTINV	9.907	0	−8.602	0
INDUSTINV	9.685	0	−14.422	0
CEOSHA	14.573	0	−8.548	0
GOVSHA	13.670	0	−8.515	0
ASSETS	16.367	0	−9.385	0
ADJ_ROA	7.998	0	−21.974	0
DEBT_ON_ASSETS	12.692	0	−14.598	0

None of variables have normal distribution and reveal a stationary distribution over the analyzed period at every level of significance. While the absence of a normal distribution of variables may constitute challenges for econometric modeling, the stationary distribution does not hinder further analysis. Thus, using the logarithm or square root of selected variables before employing them as regressand or regressors means recognizing the non-linearity in the analyzed link between Tobin's Q and selected company attributes. It does not serve as a solution to eliminating non-stationarity of variables. Table 7 presents descriptive statistics of variables used in econometric modeling.

Table 7. Descriptive statistics of variables, and untransformed variables.

Variable	Mean	Median	SD	Min	Max	Skewness	Kurtosis
Q	1.576	1.1	1.449	0	9.5	2.294	9.333
FORMALCOMPL	1.526	1.0	1.348	0	8	0.896	4.280
MINCOMPL	1.154	1.0	0.889	0	3	−0.052	1.730
SUBSTCOMPL	1.449	1.0	1.572	0	9	1.302	4.678
FILASHA	35.706	31.570	21.938	0	99.0	0.413	2.211
INSTINV	26.803	22.760	22.019	0	98.870	0.808	3.089
INDUSTINV	22.984	0	28.894	0	99.8	0.778	2.111
CEOSHA	4.426	0	11.213	0	77.500	3.303	14.826
GOVSHA	2.841	0	11.899	0	84.750	4.740	25.902
ASSETS	1997.9	138.4	7148.6	1.51	70,198.9	5.561	38.663
ADJ_ROA	−0.010	0	0.245	−1.220	0.890	−0.519	4.222
DEBT_ON_ASSETS	0.208	0.177	0.190	0	1.999	2.420	15.894

As shown in Table 7, variables are characterized by asymmetry and kurtosis. Only the distributions of MINCOMPL, FILASHA, INDUSTINV, and ADJ_ROA remain moderately asymmetric, while distributions of other variables are strongly asymmetric (FORMALCOMPL, SUBSTCOMPL, and INSTINV) or extremely asymmetric (Q, CEOSHA, GOVSHA, ASSETS, and DEBT_ON_ASSETS). The strong asymmetry present in the majority of variables may lead to lesser explanatory power of the estimated econometric models and may limit the ability to interpret kurtosis. In addition, the minimal value of Tobin's Q is zero, which was not transformed into a logarithm. However, a value of zero is present in only eight cases from 1550 observations, making it an acceptable number.

We analyze the distribution of compliance variables, specifically formal compliance, minimum compliance, and substantive compliance, as shown in Table 8.

Table 8. Distribution of compliance variables (formal, minimum, and substantive).

Year	FORMALCOMPL			MINCOMPL				SUBSTCOMPL		
	0	1–3	4–8	0	1	2	3	0	1–3	4–8
2006	134	21	0	134	14	6	1	133	18	4
2007	101	54	0	102	34	18	1	101	46	8
2008	63	90	2	64	51	37	3	71	70	14
2009	35	114	6	36	54	61	4	47	89	19
2010	25	122	8	27	51	72	5	36	100	19
2011	19	129	7	21	49	79	6	35	101	19
2012	18	130	7	21	46	82	6	32	103	20
2013	18	134	3	21	39	88	7	32	102	21
2014	17	131	7	20	45	84	6	32	103	30
2015	16	132	7	19	44	85	7	27	107	21

The data presented in Table 8 are indicative of a constant improvement in compliance by the sample companies in all the measured categories over the analyzed period. For each identified variable, the number of companies which do not comply with any code provisions drops significantly—from 133 or 134 firms in 2006 to 16–27 firms in 2015. Interestingly, the highest improvement is noted for the medium value of compliance—formal compliance between 1 and 3 increases from 21 companies in 2006 to 132 companies in 2015. The growth for the high value of compliance end is marginal—formal compliance between 4 and 8 is noted in 0 companies in 2006 and increases to 7 companies in 2015.

Using a Pearson linear correlation coefficient, we report the correlation coefficients of regressand and regressors in Table 9.

Table 9. Correlation coefficients of variables, regressand and regressors.

Variables	ln_Q	(1)	(2))	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Q (1)		1.00											
FORMALCOMPL (2)	−0.11	−0.13	1.00										
MINCOMPL (3)	−0.09	−0.10	0.71	1.00									
SUBSTCOMPL (4)	−0.06	−0.08	0.87	0.50	1.00								
FILASHA (5)		−0.09	0.13	0.19	0.16	1.00							
FILASHA_sq	−0.11	−0.12	0.16	0.21	0.18								
INSTINV (6)		0.02	0.03	0.10	0.03	−0.12	1.00						
INSTINV_sq	0.10	0.04	0.04	0.10	0.03	−0.12							
INDUSTINV (7)		−0.04	0.12	0.09	0.16	0.54	−0.16	1.00					
INDUSTINV_sq	−0.04	−0.06	0.12	0.09	0.16	0.46	−0.10						
CEOSHA (8)	−0.17	−0.09	0.11	0.05	0.07	0.04	−0.02	−0.21	1.00				
GOVSHA (9)	−0.04	−0.07	−0.01	0.01	0.03	0.19	−0.05	−0.04	−0.09	1.00			
ASSETS (10)		0.04	0.18	0.19	0.26	0.24	0.24	0.17	−0.09	0.26	1.00		
ln_ASSETS	−0.13	0.03	0.17	0.26	0.26	0.40	0.27	0.18	−0.13	0.37			
ADJ_ROA (11)	0.35	0.28	0.04	0.05	0.01	0.03	0.17	0.03	−0.03	0.03	0.13	1.00	
DEBT_ON_ASSETS (12)	−0.06	−0.05	0.06	0.01	0.05	0.08	−0.01	0.03	0.08	−0.05	0.04	−0.24	1.00

Table 9 presents the correlation matrix for both untransformed and transformed variables (with the use of logarithm and square root measures). In rows with two lines, the upper line represents the value of the untransformed variable, while the bottom line shows the value of transformed variables. The column "ln_Q" presents the coefficient of linear correlation between regressand and regressors. The correlation matrix illustrates the strength and directions of the analyzed relations between variables, similar to linear correlation. It shows the relations in which the value of a given variable increases or decreases by a stable unit in line with the value change of another variable within a given time (year).

With the non-linear relations, the Pearson linear correlation coefficient may incorrectly suggest a magnitude which may be stronger than initially anticipated. The statistical test indicates that all correlation coefficients higher than 0.04 may be viewed as statistically different from zero. As reported in Table 8, changes in ln_Q are correlated with ROA, assets, CEO ownership and ownership concentration. A weaker link is noted for compliance measures. With low correlation coefficients, we do not identify the multicollinearity problem.

3.4. Econometric Modeling

We test our hypotheses on the links between firm value and compliance with board best practice, with the use of the following econometric model:

$$Q = f\left(Compliance,\ FILASHA_{SQ},\ INSTIN_{SQ},\ INDUSTIN_{SQ},\ CEOSHA,\ GOVSHA,\ \ln\_ASSETS,\ ADJ\_ROA,\ DEBT\_ON\_ASSETS\right)$$

where *Compliance* is FORMALCOMPL, MINCOMPL, and SUBSTCOMPL.

We test the formulated hypotheses with the use of panel analysis (Cameron and Trivedi 2005, 2010). Constructing the econometric models, we address three main issues. Firstly, we consider the problem of heteroskedasticity with the parallel variability of random variables between units and time period, which requires the adoption of a method for estimating parameters robust enough for standard estimates errors. We acknowledge heteroskedasticity and calculate the values of robust errors with the use of a Wald test in all models. Secondly, we run a Hausman test to determine the type of the model to be constructed. For each model, the significance level equals zero, indicating a rejection of the null hypothesis and acceptance of the alternative hypothesis to choose the fixed effects model. Thus, we decide to run fixed effects for all A–C models, meaning that the individual effects which differentiate the reactions of the companies under analysis are represented by an intercept, which remains stable over time.

Considering the heteroskedasticity of the random variable we use a dedicated version of the Hausman test (rhausman test). Next, for A–C models, we employ an F-test to determine the statistical significance of the entire set of regressors. In each of the models, we reject the null hypothesis, suggesting that there is no variable that impacts the changes in the value of the regressand in the models. We also run the Shapiro–Wilk test, which assumes a normal distribution of the random variable. This hypothesis is rejected. Finally, to test for multicollinearity of regressors, we determine the variance inflation factor (VIF) for each regressor in a given model. A VIF below 2, as is revealed in the A–C models, eliminates multicollinearity. The VIF coefficients, overall and between, are close to zero, signifying that the A–C models only explain the time changes of Tobin's Q value. These tests support the supposition that the changes of each explanatory variable have a statistically significant impact on the value of explained variable.

The results of the tests and models under discussion are reported in Table 10.

Table 10. Estimation results for dependent ln_Q.

Regressors	Model A	Model AS (Std.)	Model B	Model BS (Std.)	Model BC	Model C	Model CS (Std.)
FORMALCOMPL [L1]	−0.089 (0.025) ***	−0.147 [1.349]					
SUBSTCOMPL [L1]			−0.082 (0.025) ***	−0.159 [1.572]			
dec_SUBSTCOMPL [L1]					−0.035 (0.026)		
MINCOMPL [L1]						−0.157 (0.033) ***	−0.171 [0.889]
INDNED [L1]					−0.129 (0.025) ***		
FILASHA_sq	−0.061 (0.024) **	−0.149 [1.980]	−0.063 (0.024) **	−0.153 [1.980]	−0.060 (0.025) **	−0.060 (0.024) **	−0.146 [1.980]
INSTINV_sq	−0.031 (0.017) *	−0.091 [2.467]	−0.031 (0.016) *	−0.096 [2.467]	−0.031 (0.020)	−0.028 (0.014) *	−0.087 [2.467]
INDUSTINV_sq	−0.035 (0.012) ***	−0.156 [3.614]	−0.037 (0.012) ***	−0.163 [3.614]	−0.036 (0.011) ***	−0.036 (0.011) ***	−0.161 [3.614]
CEOSHA	−0.014 (0.004) ***	−0.189 [11.213]	−0.014 (0.004) ***	−0.197 [11.213]	−0.014 (0.004) ***	0.013 (0.004) ***	−0.183 [11.213]
GOVSHA	−0.007 (0.003) **	−0.101 [11.899]	−0.007 (0.003) **	−0.100 [11.899]	−0.007 (0.003) **	−0.008 (0.003) **	−0.112 [11.899]
ln_ASSETS	−0.210 (0.096) **	−0.514 [1.991]	−0.209 (0.097) **	−0.512 [1.991]	−0.203 (0.098) **	−0.207 (0.096) **	−0.506 [1.991]
ADJ_ROA	0.759 (0.105) ***	0.229 [0.245]	0.751 (0.104) ***	0.226 [0.245]	0.742 (0.104) ***	0.759 (0.105) ***	0.228 [0.245]
DEBT_ON_ASSETS	0.350 (0.205) *	0.082 [0.190]	0.332 (0.204) *	0.077 [0.190]	0.341 (0.203) *	0.335 (0.202) *	0.083 [0.190]
INTERCEPT	1.898 (0.567) ***		1.908 (0.574) ***		1.908 (0.583) ***	1.916 (0.563) ***	
N (observations)	1387		1387		1387	1387	

Table 10. *Cont.*

Regressors	Model A	Model AS (Std.)	Model B	Model BS (Std.)	Model BC	Model C	Model CS (Std.)
n (companies)	155		155		155	155	
Max VIF	1.61		1.67		1.95	1.65	
R_sq within	0.172		0.170		0.181	0.183	
R_sq between	0.003		0.003		0.007	0.005	
R_sq overall	0.006		0.005		0.004	0.003	
F test	13.19		13.08		15.68	16.37	
Prob > F	0		0		0	0	
Shapiro–Wilk test z	11.81		11.84		5.16	11.80	
Prob > z	0		0		0	0	
Hausman chi^2 test	78.26		62.17		116.35	67.04	
Prob > chi^2	0		0		0	0	

Notes: The symbol of L1 by the regressor name indicates the variable value lagged by 1 year. The robust standard error for each coefficient in models A, B, and C is reported in parentheses; *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$, where the p-value is called the observed level of significance. The significance test for the coefficients is the t-statistics test. Models AS, BS, and CS are models estimated for standardized variables, with standard deviations for values of non-standardized variables presented in parentheses.

As shown in Table 10, for each A–C model, a given set of regressors differs only by one variable on compliance. We use a compliance variable lagged by 1 period (year) to examine the effect on the company market valuation after the publication of the conformity declaration and the information on compliance practice. The results indicate a negative correlation between compliance with board best practice and Tobin's Q. The negative association is noted for all three measures of compliance, i.e., formal compliance (FORMALCOMPL), minimum compliance (MINCOMPL), and substantive compliance (SUBSTCOMPL). This means that from the perspective of our hypotheses we find support for H1, which assumes a negative association between compliance with best practice code and firm value. We also find support for H2, as we observe a negative and statistically significant relation between the minimum level of compliance with code provisions and Q. Finally, for H3, our results reveal a negative relation between company value and SUBSTCOMPL, which measures the most substantive scope of compliance. Hence, we find support for H3, as well.

In addition, we tested A–C models for endogeneity. Based on prior studies, we identify ln_ASSETS as the potential endogeneity driver and we proceed as follows. We estimate fixed-effect models with the same set of regressors, using two approaches: the least-squares method (LS) and instrumental variables method (IV). In the latter model, we use the lagged value of ln_ASSETS as the instrument. We estimate both models for 2007–2015, in order to ensure full comparability. We use a Hausman test, comparing LS model (null hypothesis) with the IV model. The rejection of the null hypothesis would suggest selection of the IV model and would indicate that the ln_ASSETS variable may cause endogeneity problems. We find no reason to reject the null hypothesis, which implies that we should choose the LS model and that we do not note endogeneity issues. For models A–C, we do not reject the null hypothesis, so fixed effect models estimated with the use of the least squared method offer the most appropriate approach. Thus, there is no need to adopt instrumental variables, and the variable of ln_ASSETS does not cause an endogeneity problem. As a consequence, it follows that the use of other estimation methods is not appropriate.

We address the question concerning the changes in the values of regressors that have the strongest impact on changes in the regressand. For this purpose, we estimate the equivalents for the A–C models with standardized variables. The coefficients in models with standardized variables show how the regressand changes within its own standard deviation if the regressor values change by one standard deviation. Table 10 shows the values of standardized coefficients and values of standard deviation of regressors for models AS, BS, and CS in dedicated columns. Models estimated with standardized variables reveal that the signs of the regression parameters and the values of t-statistics of regression parameters do not change, so the statistical significance of the relations does not change

either. Other values of the statistical verification for our models remain stable, as well. The value of ln_Q ranges between −2.303 and 2.251, with the standard deviation equal to 0.815. It shows that ln_ASSETS and ADJ_ROAs have the strongest impact on a change in the regressand value, followed by CEOSHA, FILASHA, and compliance. DEBT_ON_ASSETS reveals the lowest impact on the change of ln_Q.

Finally, we run an additional BC model with the measure of decomposed substantive compliance (dec_SUBSTCOMPL). We observe that, in the A–C models, the variable for independent directors is the main explanatory component, since WSE-listed companies do not report numerous aspects included in the substantive compliance measure (e.g., independent chair, the identification of independent directors, and the formation of a separate audit committee). Thus, in the BC model for decomposed substantive compliance (dec_SUBSTCOMPL) we exclude the variable of INDNED from compliance. As presented in Table 10, for the BC model, the decomposed substantive compliance (dec_SUBSTCOMPL) remains statistically insignificant, while INDNED is statistically significant. While this approach offers a deeper insight into compliance practice, it has two limitations: Firstly, dec_UBSTCOMPL and INDNED are strongly correlated; secondly, neither are more strongly correlated with the variable ln_Q than SUBSTCOMPL. This means that introducing two variables instead of one measure, being the sum of the two variables, may increase parameter estimation error and consequently render the regressors statistically insignificant. Importantly, the decomposition of SUBSTCOMPL into INDNED and dec_UBSTCOMPL changed neither the signs of the estimated parameters of other regressors nor the statistical characteristics of the estimated models reported with the F test, Shapiro–Wilk test, and Hausman test.

3.5. Robustness Tests

We run robustness tests to check the stability of our models. For this purpose, we construct models with an additional control variable—board size (BOARDSIZE)—which represents the number of non-executive directors on the supervisory board. The results for the three models, AR, BR, and CR, are presented in Table 11.

Table 11. Estimation results of robustness tests.

Regressors	Model AR	Model BR	Model CR
FORMALCOMPL [L1]	−0.089 (0.025) ***		
SUBSTCOMPL [L1]		−0.083 (0.025) ***	
MINCOMPL [L1]			−0.157 (0.033) ***
FILASHA_sq	−0.060 (0.024) **	−0.062 (0.024) **	−0.060 (0.024) **
INSTINV_sq	−0.031 (0.020)	−0.032 (0.020) *	−0.029 (0.020) *
INDUSTINV_sq	−0.036 (0.012) ***	−0.037 (0.012) ***	−0.036 (0.011) ***
CEOSHA	−0.013 (0.003) ***	−0.014 (0.003) ***	0.013 (0.004) ***

Table 11. *Cont.*

Regressors	Model AR	Model BR	Model CR
GOVSHA	−0.007 (0.003) **	−0.007 (0.003) **	−0.008 (0.003) **
ln_ASSETS	−0.211 (0.096) **	−0.210 (0.097) **	−0.208 (0.096) **
DEBT_ON_ASSETS	0.350 (0.205) *	0.333 (0.206) **	0.3569 (0.202) **
ADJ_ROA	0.761 (0.106) ***	0.753 (0.104) *	0.761 (0.104) *
BOARDSIZE	0.015 (0.025)	0.014 (0.025)	0.017 (0.025)
INTERCEPT	1.808 (0.554) ***	1.821 (0.562) ***	1.815 (0.552) ***
N (observations)	1387	1387	1387
n (companies)	155	155	155
Max VIF	2.49	2.51	2.53
R_sq within R_sq between R_sq overall	0.172 0.002 0.007	0.171 0.003 0.006	0.183 0.005 0.006
F test Prob > F	11.96 0	11.85 0	14.76 0
Shapiro–Wilk test z Prob > z	5.120 0	5.060 0	5.220 0
Hausman chi2 test Prob > chi2	106.390 0	97.790 0	79.090 0

Notes: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.

As shown in Table 11, the variable of board size does not change the stability of our models. All parameter signs and statistical significances remain stable.

4. Discussion

The objective of this article was to provide an empirical verification of the relationship between corporate governance compliance and company value. With the application of the framework offered by agency theory (Jensen and Meckling 1976; Fama and Jensen 1983), the study tests the main assumption that greater compliance has a positive effect on the market valuation of complying companies. Codes of corporate governance best practice are based on fundamental principles of justice, fairness, and equality (Zattoni and Cuomo 2008) and recommend conformity with a set of provisions of board work, practices of executive compensation, policies of risk management, and standards of transparency (Aguilera et al. 2015). Along with the criticism of a one-size-fits-all approach with national adjustments, codes of best practice reveal conditions in which participants of a community reach a mutual understanding. The concept of flexibility and a voluntary approach to codes of best practice provide space for a dialog to reach consent, in which certain norms and behavior are seen as right or wrong. According to the comply-or-explain rule (Tan 2018), companies are obliged to report

their scope of conformity, which facilitates understanding of both the determinants and performance effects of compliance.

Prior studies indicate the positive effect of compliance related to enhanced investor trust, lower capital cost, and reduced information asymmetry, and they reveal a positive relation between corporate governance conformity and company performance and value (Mazotta and Veltri 2014; Rose 2016; Kaspereit et al. 2017). However, some researchers argue that the impact of corporate governance codes and compliance may be limited in different institutional settings, in particular in the context of concentrated ownership, insufficient investor protection, and emerging governance (Sobhan 2016; Okhmatovskiy 2017). The main focus of corporate governance codes is devoted to solving principal–agent conflicts between shareholders and managers, rather than giving sufficient attention to principal–principal conflicts between majority and minority shareholders (Chen et al. 2011). Thus, in countries of concentrated ownership and emerging governance, the code provisions and compliance with best practice may not result in a higher performance effect (Gherghina 2015) or may even be detrimental to company value (when regarded merely as an extra cost) or fail to elicit investor trust.

We tested the hypotheses of the relationship between compliance and company value compliance, using a unique sample of conformity with board best practice by 155 companies listed on the Warsaw Stock Exchange over a 10-year period. Specifically, we assume that formal compliance with board best practice is negatively associated with firm value (H1) and a that minimum compliance with board best practice is negatively associated with firm value (H2). We hypothesize that investors do not appreciate substantive compliance either and that conformity with board best practice is negatively associated with firm value (H3).

The results of the panel analysis provide support for hypotheses H1 and H2, showing a negative association between formal compliance and firm value and minimum compliance and firm value. In line with our assumption in H3, we obtain partial support for the negative association between substantive compliance and Q. The negative correlation between company value and compliance remains statistically significant for the general measure of substantive compliance (SUBSTCOMPL) and statistically insignificant for decomposed substantive compliance (dec_SUBSTCOMPL), for which we exclude the variable on independent directors (INDNED). We interpret these findings as evidence for a mismatch between code provisions and corporate governance challenges, relating to concentrated ownership and principal–principal conflicts (Chen et al. 2011). Consistent with findings by Bhagat and Black (2002), we do not observe a positive market valuation effect for complying companies. Investors appear not to find compliance with board best practice a convincing solution to possible tensions between majority and minority shareholders (Healy and Palepu 2001; Goncharov et al. 2006), questioning the efficient implementation of board guidelines (Martin 2010).

5. Conclusions

The goal of this study was to test for the link between compliance and company value in a specific context of concentrated ownership and post-transition corporate governance. The results show a negative correlation between compliance with the code provisions on board practice and company value, as measured by Tobin's Q, suggesting that investors do not find the adoption of board practice a plausible solution for the principal–principal conflict in an environment of concentrated ownership.

The study adds to the debate on corporate governance compliance, in general, and its effects on market valuation in emerging and post-transition countries, in particular. For practitioners and policymakers, the results of our analysis deliver important insights into the limitations of code provisions, which are transmitted across countries with differing institutional environments and ownership structures, and results in different agency problems.

We acknowledge the limitations of our research—we focused on board best practice and in one country. Further research should address a wide scope of code provisions and cover a larger sample of companies from different economies. Adding variables to cover the institutional environment, such as

measures of investor protection or rule of law, would aid in understanding the effect of the regulatory context on the efficiency of corporate governance provisions.

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Corporate Governance and Earnings Management in a Nordic Perspective: Evidence from the Oslo Stock Exchange

Frode Kjærland *, Ane Tolnes Haugdal, Anna Søndergaard and Anne Vågslid

NTNU Business School, Norwegian University of Science and Technology, NO-7491 Trondheim, Norway; ane.haugdal@ntnu.no (A.T.H.); anna.soendergaard@gmail.com (A.S.); annevaagslid@hotmail.com (A.V.)
* Correspondence: frode.kjarland@ntnu.no

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Abstract: The purpose of the study is to examine the relation between Nordic corporate governance practices and earnings management. We find that the presence of employee representation on the board and the presence of an audit committee are both practices that reduce the occurrence of earnings management. Moreover, we find that both board independence and share ownership by directors positively affect earnings management, while board activity and directors as majority shareholders show an insignificant relation to earnings management. We contribute to the existing literature on corporate governance and earnings management by providing valuable insight into the Nordic corporate governance approach and its potential in mitigating earnings management.

Keywords: accrual earnings management; corporate governance; Nordic model

1. Introduction

In response to recent accounting scandals in both the US and Europe there has been an increased concern regarding the effectiveness of corporate governance practices. Undoubtedly, the concerns are justified. The case of Enron Corporation in 2001 is a well-known example of the destroying consequences of weak corporate governance. The scandal created an international attention on how to systematically implement improved corporate governance practices to prevent fraud and questionable managing of earnings. Immediate responses were proposed reforms of corporate governance through legislation and improved listing standards (Coffee 2002). This included the US Sarbanes Oxley Act (SOX) in 2002 and the UK Higgs Report and the Smith Report in 2003[1]. The motivation behind our study is thus the implicit assertion that earnings management and weak corporate governance practices are positively related.

The concept of corporate governance is not new. Its need aroused with the separation of ownership and control in public companies (Berle and Means 1932), which, according to Jensen and Meckling (1976), resulted in agency problems. Consequently, the responsibility to present credible financial information and protect shareholders' interests fell on the corporate governance system (Fama and Jensen 1983). As information asymmetry between preparers and users of financial information makes opportunism possible (Beatty and Harris 1999), the guardian role of the board become obvious.

The extent of earnings management could implicate how well the corporate governance practices are in protecting shareholder's interests, since corporate governance has the potential to reduce or even eliminate fraudulent behavior (Man and Wong 2013). This study addresses the triangular

[1] Regarding Norway; the result was the establishment of the Norwegian Corporate Governance Board (NUES) in 2004.

interaction between a company's shareholders, board of directors and management in a Nordic setting. Many prior studies on corporate governance and earnings management have come from countries within a two-tier or one-tier model of corporate governance, such as the US, the UK, Italy. Egypt, Malaysia and China (Al-Jaifi 2017; Beasley 1996; Campa and Donnelly 2014; Karmel and Elbanna 2012; Klein 2002; Liu and Lu 2007; Marchini et al. 2018; Peasnell et al. 2000; Xie et al. 2003) which differentiate from the Nordic corporate governance model in several ways. Lekvall et al. (2014) claim that two key distinctive features of Nordic corporate governance are the powers vested with a shareholder majority to effectively control the company and the entirely nonexecutive board. Norwegian boards are characterized by a high shareholder concentration. Accordingly, instead of turning to the market for corporate control, major owners generally take an active part in the governance of the company. The system thus provides dominating shareholders the motivation to take long-term responsibility for the company. Moreover, Norwegian Public Limited Companies (ASA) are comprised exclusively of nonexecutive officers, except for employee representatives. An important implication of this is the distinction the duties and responsibilities of a strategically and monitoring board and a mere executive management function. Lekvall et al. (2014) argues that although these features may not seem individually unique, together they make a comprehensive system. Its success is shown by the competitiveness of Nordic companies on international markets. In 2013, *The Economist* described the Nordic corporate governance model as "The next supermodel", pointing to Nordic countries clustering at the top of global league tables of everything from economic competitiveness to happiness (The Economist 2013; Lourenco et al. 2018).

Although Nordic countries have been declared role models for their corporate governance systems (The Economist 2013), there have been limited studies exploring the relationship between corporate governance and earnings management in countries within the Nordic model of corporate governance. The aim of this paper is to fill these gaps and provide valuable insight for users of financial statements beyond the Nordic countries. We do find as a contribution that the presence of employee representation on the board reduce earnings management. Moreover, board independence seem positively related to earnings management, contradictory to the findings of other well-known studies (Beasley 1996; Dechow et al. 1996; Peasnell et al. 2000; Klein 2002). We also find the same regarding share ownership by directors, thus indicating that large proportions of minority shareholders on the board could give the directors incentives to pursue higher-risk strategies to generate larger financial returns.

The findings will be of interest for countries following the same triangular interaction between a company's shareholders, board of directors and management. In addition, the study aims to provide increased attention to the potential benefits the Nordic corporate governance approach has on improving earnings quality by mitigating earnings management.

The remainder of this paper is organized as follows. Section 2 provides a review of previous literature and the hypothesis development. The data and methodology are presented in Section 3, while Section 4 presents the empirical results. Finally, Section 5 conclude the paper's findings, included the limitations of the study.

2. Review of Literature and Hypothesis Development

Earnings are the summary measure of firm performance produced under the accrual basis of accounting (Dechow 1994). Healy and Wahlen (1999) provides a commonly cited definition of earnings management:

Earnings management occurs when managers intentionally use judgements in financial reporting and in structuring financial transactions to alter financial reports to mislead some stakeholders about the underlying economic performance of the firm or to influence contractual outcomes that depend on reported accounting numbers.

As the definition points out, firms have two options to manage earnings. First, earnings can be managed through deviations from normal business activities (Xu et al. 2007). The firm could, for example, boost reported profit by cutting down on research and development, selling

assets it would otherwise keep and cutting down on employee development. Deviating from normal business practices to manipulate reported income is defined as real earnings management (Roychowdhury 2006). Second, a firm can alter the level of accruals to obtain the desired level of earnings. Using management judgements in financial reporting is defined as accrual-based earnings management (Healy and Wahlen 1999). Real changes in investment and operating activities are costlier than mere accounting manipulation. It is therefore reasonable to assume that firms have a lower threshold to manipulate earnings through accruals rather than real activities. This study focuses on accrual earnings management only.

Many motivations for earnings management have been examined in the literature. The managerial motives are mixed and include motivations such as maximizing firm value (Beneish 2001), management buyouts (DeAngelo 1986), initial public offerings (IPO's) (Teoh et al. 1998) and meeting the expectations of financial analysts, management, investors and social and political pressure (Payne and Robb 2000; Kasznik 1999; Li and Thibodeau 2019). The essence of earnings manipulation is derived from the flexibility given to management in disclosing their reported earnings (Busirin et al. 2015).

Accounting information is traditionally considered to have a dual role as both informer and steward (Ronen and Yaari 2008). The informative role arises because of investors' need to predict future cash flows and assess the risk of investments. This study will focus on the stewardship role of accounting. The stewardship role of accounting comes from the separation of ownership and management in public firms, resulting in agency problems that could lead to divergence between the interest of shareholders and managers (Jensen and Meckling 1976; Gjesdal 1981). A following control difficulty is information asymmetry. Information asymmetry exists when managers have a more complete set of information about the company than the shareholders, leading to agency costs as the managers have opportunities to promote their own self-interest at the shareholders' expense (Beatty and Harris 1999). Prior studies have found a positive relationship between agency costs and the latitude of earnings management (Beatty and Harris 1999; Man 2019). Corporate governance is thus necessary to align and coordinate the interest of the upper management with those of the shareholders to mitigate the occurrence of earnings management. Fama and Jensen (1983) argue that the board of directors is the highest internal control mechanism responsible for monitoring the actions of top management. Monks and Minow (2008) underline that as the body who governs the firm, it is the board of directors' duty to ensure that the company is run in the long-term interests of the shareholders. While there is no generally accepted definition of corporate governance, it may be defined as a system "consisting of all the people, processes and activities to help ensure stewardship over a company's assets" (Messier et al. 2008).

There is mixed evidence on the effect corporate governance practices has on earnings management. Board characteristics that have been frequently investigated in earnings management literature, such as board independence, board activity and the presence of an audit committee will be included in this study (see Table 1). In addition, directors' share ownership, majority shareholding by directors and the presence of employee representatives will be examined as key elements of the Nordic corporate governance model (see Table 1). Following are some prominent studies reviewed in this regard.

2.1. Board Independence

NUES (2018) recommend that most of the shareholder-elected members of the board should be independent of the company's executive personnel and material business contacts, while at least two of the shareholder-elected members should be independent of the company's main shareholders. Independent directors are chosen in the interest of shareholders, adding value due to their impartial monitoring of business ethics (Rosenstein and Wyatt 1990). Independent board members are associated with effective monitoring (Fama 1980), while nonindependent board members are considered an obstacle to efficient monitoring (Ronen and Yaari 2008). It is assumed that effective monitoring controls earnings management, as suggested in studies investigating board independence and earnings management (Dechow et al. 1996; Beasley 1996; Klein 2002; Peasnell et al. 2005). Haldar et al. (2018)

and Van den Berghe and Baelden (2005) do however point to other important aspects of directors' independence. They argue that the quality of independent directors depends on other factors specific to the directors' character, the firm and its environment. In accordance with prior earnings management literature, the following hypothesis is tested:

Hypothesis 1 (**H1**). *There is a negative relation between board independence and earnings management*.

2.2. Employee Representatives

As stated in the Public Companies Act, the main rule regarding employee representation in Norway is that one third of the directors can be elected by and among the employees. NUES (2018) do not mention any specific recommendations regarding employee representatives since they are considered ordinary members of the board with the same authority and responsibility as the shareholder-elected board members. Literature and prior studies on employee representatives and earnings management is however rare. In Fauver and Fuerst (2006) study on German companies, they argue that employee representatives contribute as informed monitors with detailed operational knowledge that is valuable in board decision-making and supervising. They further conclude that the presence of employee representatives on the board is negatively and significantly related to earnings management. Other studies on monitoring and earnings management have found that better monitoring quality by directors could ultimately help to reduce agency costs induced by either managers or large shareholders (Gul et al. 2002; Peasnell et al. 2005). The importance of operational knowledge is supported in a Chinese study conducted by Chen et al. (2015). They found that the quality of managerial oversight by directors depends significantly on the quality and completeness of the information they receive, stating that directors' monitoring is more effective in a richer information environment. Accordingly, the second hypothesis is:

Hypothesis 2 (**H2**). *There is a negative relation between the presence of employee representatives and earnings management*.

2.3. Share Ownership by Directors

It is difficult to state a clear theoretical prediction about the effect of share ownership by directors on earnings management. From an opportunistic point of view, share ownership by directors could weaken their independence and their effectiveness in monitoring financial reporting (Lin and Hwang 2010). On the other hand, managers of firms with low director ownership are expected to exploit the latitude of accounting standards to ease financial constraints, indicating that higher share ownership by directors will reduce the occurrence of earnings management (Gul et al. 2002). It is also found that directors' shareholdings are associated with smaller increases in information asymmetry (Kanagaretnam et al. 2007), which in turn could reduce agency costs and better prevent the occurrence of earnings management (Beatty and Harris 1999; Man 2019). The theoretical assumptions will also vary depending on the ownership structure. According to NUES (2018), long-term share ownership by directors contributes to create an increased common financial interest between the shareholders and the members of the board. With a majority shareholding in the company, and thus a longer-term ownership perspective, an investor is incentivized to prioritize the company's strategic growth. Further, NUES (2018) emphasize that a short-term ownership perspective may work against the best interest of the company and its shareholders. Prior studies on share ownership by directors and earnings management reflects the inconsistent assumptions. Peasnell et al. (2005) found a positive, though not significant, relation between share ownership by directors and earnings management, while Gul et al. (2002) reported a significantly negative relation. In their meta-analysis, Lin and Hwang (2010) documented no significant relationship. Based on the theoretical predictions and the existing literature, the following two hypotheses have been made:

Hypothesis 3 (**H3**). *There is a relation between share ownership by directors and earnings management.*

Hypothesis 4 (**H4**). *There is a negative relation between the percentage of directors as majority shareholders and earnings management.*

2.4. Board Activity

The board activity is measured by the board meeting frequency and is often considered an indicator of the effort put in by the directors. It is generally believed that an active board is more effective in monitoring the management (Ronen and Yaari 2008). Lipton and Lorsch (1992) stress that a widely shared problem among directors is too little time to carry out their duties, pointing out that more frequent board meetings will make directors more willing to perform their duties in line with shareholders' interests. The literature on board activity and earnings management consists of contradictory conclusions. Vafeas (1999) and Xie et al. (2003) find that more frequent board meetings lower the degree of earnings management, while other studies show either a positive relation between board meeting frequency and earnings management (Daghsni et al. 2016) or no relation between them at all (Ahmed 2007). Based on the contradictory literature, the fifth hypothesis is:

Hypothesis 5 (**H5**). *There is a relation between board meeting frequency and earnings management.*

Table 1. Presentation and description of the corporate governance variables along with the expected impact on earnings management.

Variable	Predicted Sign	Definition
Board Independence	–	The percentage of independent shareholder-elected board members
Employee representatives:	–	dummy variable assigned the value 1 if the board has employee representatives, 0 otherwise
Share ownership by directors	+/–	Number of directors who directly or indirectly holds shares in the company.
Directors as majority shareholders	–	The percentage of directors as majority shareholders
Board activity	+/–	The number of board meetings held during the period
Audit committee	–	Dummy variable that equal 1 if the company has an audit committee, 0 otherwise

2.5. Audit Committee

The Public Companies Act and the Stock Exchange Regulations stipulates whether Norwegian public companies are required to establish an audit committee or not. The members of the audit committee are elected by and among the board members and at least one of the members of the committee must be independent with regards to NUES' (2018) recommendations (Lekvall et al. 2014). According to the Public Companies Act, the audit committee's primary mission is to prepare the supervision of the financial reporting process and monitor the systems for internal control and risk management. The committee should further meet regularly with the firm's external auditor and internal financial managers to produce balanced and accurate reports. Accordingly, audit committees complement existing internal governance practices by improving the monitoring function and reduce agency conflicts (Cai et al. 2015). Prior studies have found a significant relation between earnings management and audit committee practices (Bedard et al. 2004; Wan Mohammad et al. 2016). Klein (2002) found that the existence of an audit committee will reduce earnings management. Similarly,

Dechow et al. (1996) and Purat Nelson and Devi (2013) found that firms manipulating earnings were less likely to have an audit committee. The last hypothesis is formulated as follows:

Hypothesis 6 (H6). *There is a negative relation between the presence of an audit committee and earnings management.*

3. Data and Methodology

3.1. Data And Sample Selection

Our initial dataset consisted of quarterly financial statements from 168 companies listed on the Oslo Stock Exchange in the period 2014 to 2017. Due to difficulties in defining abnormal accruals in the financial service industry, 16 bank and insurance companies were eliminated from the sample. In addition, there is an exclusion of 18 companies that had not been listed for the entire period, 83 firms due to lack of data and 2 firms due to mergers and acquisitions in the period (see Table 2). The financial data was collected through the Thomson Reuters Eikon database, while the corporate governance data was collected from companies' annual reports. If the reports lacked data, it was retrieved directly from the companies through e-mails and phone calls.

Table 2. Sample selection of the companies in the study.

Sample Selection	
Companies listed on the Oslo Stock Exchange 12.31.17	168
– Companies in the financial service industry	16
– Not-continuously listed companies in the period	18
– Companies lost due to lack of data	83
– Companies lost due to mergers and acquisitions	2
= Companies included in the sample	**49**
Initial firm-quarter observations for 2014 to 2017	2688
– Companies in the financial service industry	256
– Not-continuously listed companies in the period	288
– Companies lost due to lack of data	1328
– Companies lost due to mergers and acquisitions	32
= Final sample	**784**

In Das et al.'s (2009) study on quarterly earnings patterns and earnings management, they find that firms performing poorly in interim quarters may attempt to increase earnings in the fourth quarter to achieve a desired annual earnings target. Accordingly, this study used data from quarterly reports in the analyses to catch more of the fluctuations in earnings. Further, interim reports are often unaudited, which allows greater managerial discretion and require less detailed disclosure than annual financial statements (Jeter and Shivakumar 1999). Using quarterly financial data in the analysis could thus increase the likelihood of detecting earnings management.

3.2. Measurement of Earnings Management

In the existing earnings management literature, a commonly used approach for detecting earnings management is by examining accruals. The literature distinguishes between two widely used approaches in defining total accruals: the balance sheet-based approach (Healy 1985; Jones 1991) and the cash flow-based approach (Vinten et al. 2005). The cash flow approach measures accruals directly from the statement of cash flows which mitigate the danger of measurement errors. Consequently, this study used the cash flow approach to define total accruals. The cash flow approach measures total accruals as the difference between the earnings of an entity and its cash flow generated from operating activities. Thus, to calculate total accruals using the cash flow approach the following formula has been used:

$$TA_{it} = NI_{it} - CFO_{it}$$

where TA_{it} = total accruals for company i in quarter t, NI_{it} = net income for company i in quarter t and CFO_{it} = cash flow from operating activities for company i in quarter t.

Total accruals consist of a discretionary component and a nondiscretionary component. Nondiscretionary accruals represent changes in a company's underlying performance, while discretionary accruals represent changes due to management's accounting decisions (Ronen and Yaari 2008). When estimating earnings management, it is the discretionary accruals that are of interest. A fundamental issue is however the challenge of separating the discretionary and nondiscretionary components of earnings (Elgers et al. 2003), since they cannot be directly observed. Several methods have been developed to estimate the discretionary component of accruals. A widely used approach is to benefit regression techniques, where total accruals are regressed on variables that are proxies for normal accruals. Discretionary accruals were thus the unexplained component of total accruals.

Several widely used regression techniques have their origin in the original Jones model from 1991. This study used 2 modified versions of the original model; the Modified Jones model proposed by Dechow et al. (1995) and a performance-matched model introduced by Kothari et al. (2005). The Modified Jones model was designed to eliminate the assumed tendency of the Jones model to measure discretionary accruals with error when discretion was exercised over revenues (Dechow et al. 1995). The modification made from the original Jones model is that changes in revenues are adjusted for the changes in receivables in the event period. When applying the Modified Jones model, the nondiscretionary and the discretionary components of total accruals can be calculated by the following equation (Dechow et al. 1995):

$$\frac{TA_{it}}{A_{it-1}} = \beta_0 + \beta_1 \frac{1}{A_{it-1}} + \beta_2 \frac{\Delta REV_{it} - \Delta REC_{it}}{A_{it-1}} + \beta_3 \frac{PPE_{it}}{A_{it-1}} + \varepsilon_{it}. \quad (1)$$

where

TA_{it} = total accruals deflated by lagged total assets for company i in quarter t
A_{it-1} = lagged total assets for company i in quarter t
ΔREV_{it} = changes in total sales deflated by lagged total assets for company i in quarter t
ΔREC_{it} = changes in account receivables deflated by total assets for company i in quarter t
PPE_{it} = net value of property, plant and equipment deflated by lagged total assets for company i in quarter t

Kothari et al.'s (2005) performance matched model is an extended version of the Modified Jones model, where return on assets (ROA) is added as an additional variable. The following equation is used:

$$\frac{TA_{it}}{A_{it-1}} = \beta_0 + \beta_1 \frac{1}{A_{it-1}} + \beta_2 \frac{\Delta REV_{it} - \Delta REC_{it}}{A_{it-1}} + \beta_3 \frac{PPE_{it}}{A_{it-1}} + \beta_4 \frac{ROA_{it}}{A_{it-1}} + \varepsilon_{it} \quad (2)$$

where

ROA_{it} = net income after tax deflated by lagged total assets for company i in quarter t

Kothari et al. (2005) claim that economic intuition, empirical evidence and extant models of accruals suggest that accruals are correlated with a firm's present and past performance. Hence, to control for performance on discretionary accruals, ROA is added as a control variable. Further, because of the nonlinear relationship between accruals and performance, Kothari et al. (2005) argue that a performance matched approach is better specified to test discretionary accruals than by using a linear regression-based approach.

In both models the variables are deflated by lagged total assets to control for firm size effect (Healy 1985; DeAngelo 1986) and to mitigate heteroscedasticity in the residuals (White 1980). Further, nondiscretionary accruals are estimated using ordinary least squares (OLS). The prediction from the

OLS estimation in model (1) and model (2) represents nondiscretionary accruals while the residuals represents discretionary accruals. Discretionary accruals can be both positive and negative. In the analysis, the study used the absolute value of discretionary accruals as a proxy for earnings management (as a normal procedure—see Hribar and Nichols (2007) for elaboration). Higher levels of discretionary accruals indicate greater levels of earnings management.

The Modified Jones model (1) showed an explanatory power of 0.1139 (Table A1), while the Kothari model (2) showed an explanatory power of 0.4334 (Table A2). The higher the explanatory power, the closer the estimated regression equation fits the sample data (Brooks 2019). Hence, the measure of discretionary accruals following the Kothari model (2) was used as the dependent variable for the further corporate governance analysis.

3.3. Corporate Governance

After estimating the extent of discretionary accruals, the relation between earnings management and the corporate governance practices was investigated. In the regression, the corporate governance practices represented the following independent variables:

Board independence: referred to the percentage of shareholder-elected directors that were evaluated as independent with respect to the company's executive management, material business contacts and main shareholders.

Employee representatives: referred to the presence of employee representatives or not. The variable was calculated as a dummy variable assigned the value 1 if the board has employee representatives, 0 otherwise.

Share ownership by directors: referred to the percentage of directors who directly or indirectly holds shares in the company. The variable was calculated by scaling the total number of directors who holds shares by total board size.

Directors as majority shareholders: referred to the percentage of directors who directly or indirectly is listed amongst the company's 20 largest shareholders. The variable was calculated by scaling the total number of directors who are majority shareholders by total board size.

Board activity: referred to the total number of meetings held during a year, scaled by quarter. The variable was calculated using the natural logarithm of total board meetings[2].

Audit committee: referred to the presence of an audit committee or not. The variable was calculated as a dummy variable assigned the value 1 if the firm has an audit committee, 0 otherwise.

Earnings management decisions can also be influenced by factors other than the explanatory variables included in this analysis. To control for this and for any spurious relations between board characteristics and earnings management, the control variables firm size, return on assets and return on equity were included.

Firm size: the natural logarithm of total assets was used as a proxy for firm size.

Return on assets: net income divided by total assets was used as a measure for firm performance.

Return on equity: total equity divided by total assets was used as a measure for firm profitability.

To test the hypotheses', the following equation was used:

$$\begin{aligned} absDA_{it} = \beta_0 + \beta_1(BISE_{it}) + \beta_2(DER_{it}) + \beta_3(SOD_{it}) + \beta_4(MJS_{it}) + \beta_5(BA_{it}) \\ +\beta_6(AC_{it}) + \beta_7(FS_{it}) + \beta_8(ROA_{it}) + \beta_9(ROE_{it}) + \varepsilon_{it} \end{aligned} \quad (3)$$

$absDA_{it}$ = absolute value of discretionary accruals for company i in quarter t

$BISE_{it}$ = board independence for company i in quarter t

DER_{it} = dummy variable that equal 1 if the company has employee representatives on the board, 0 otherwise

[2] The natural logarithm is used to correct for heteroscedasticity (Benoit 2011).

SODit = share ownership by directors for company i in quarter t
MJS_{it} = directors as majority shareholders for company i in quarter t
BA_{it} = board activity for company i in quarter t
AC_{it} = dummy variable that equal 1 if the company has an audit committee, 0 otherwise
FS_{it} = firm size for company i in quarter t
ROA_{it} = return on assets for company i in quarter t
ROE_{it} = return on equity for company i in quarter t

Our study used panel data, featured by exploring the cross-section and time-series data simultaneously. A Hausman test (Table A3), showed that fixed effects estimator was a better fit for the model than the random effects estimator[3]. Moreover, Equation (3) using OLS was estimated. Additional analysis of the residuals from this estimation displayed significant heteroscedasticity. Consequently, the regression using robust standard errors was estimated. In regression estimates, multicollinearity due to a significant linear relationship between the explanatory variables can affect the estimation of the coefficients of the variables, leading to imprecise results. To test the severity of multicollinearity in the data, a correlation matrix and the Variance Inflation Factor (VIF) method was used. According to Brooks (2019), severe multicollinearity is indicated if the correlation between 2 variables exceeds 0.80 and the VIF index exceed 5. The VIF for each explanatory variable was under 5, with a total mean of 1.6. Supported by the correlation matrix, multicollinearity was not a problem to the model. The correlation matrix and VIF index for the variables are reported in the Appendix A (Tables A4 and A5).

4. Empirical Results

4.1. Descriptive Statistics

Table 3 reports descriptive statistics for the sample firms. The absolute value of discretionary accruals has a small mean of 0.03 with a standard deviation of 0.04. The percentage of board independence spans from 0.00 to 1.00, indicating that the sample consists of firms with both 100 percent independent boards and zero percent independent boards. On average the presence of independent shareholder-elected board members is 70 percent. The number of board meetings held by the board of directors is on average 0.95 per quarter[4], while the minimum and maximum number of meetings per quarter is respectively 0.00 and 2.20[5]. Further, the descriptive statistics show that the sample consists of firms with both 100 percent share ownership by directors and zero percent share ownership by directors. The mean of share ownership by directors is 63 percent. With respect to the percentage of directors as majority shareholders, the average is 22 percent. The mean of the dummy variable for employee representatives on the board is 0.46, indicating that 46 percent of the sample firms have boards with presence of employee representatives. The dummy variable referring to the presence of an audit committee shows that 92 percent of the sample firms have an audit committee. Finally, the remaining variables included in the model were control variables for different firm characteristics and were not central to our study.

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[3] The dummy variables concerning employee representation and audit committee are not considered time-invariant explanatory variables. They will therefore not be absorbed by the intercept in the fixed effects model.
[4] This is equivalent to an average $e^{0.95} \approx 2.59$ per quarter.
[5] This is equivalent to a minimum value of $e^{0.00} \approx 1$ per quarter and a maximum value of $e^{2.20} \approx 9$ per quarter.

Table 3. Descriptive statistics for the sample firms.

				Quantiles				
	n	**Mean**	**S.D.**	**Min**	**0.25**	**Mdn**	**0.75**	**Max**
Discretionary accruals	784	0.03	0.04	0.00	0.01	0.02	0.04	0.44
Board independence	784	0.70	0.20	0.00	0.60	0.71	0.80	1.00
Employee representatives	784	0.46	0.50	0.00	0.00	0.00	1.00	1.00
Share ownership by directors	784	0.63	0.22	0.00	0.50	0.63	0.80	1.00
Directors as majority shareholders	784	0.22	0.21	0.00	0.00	0.20	0.33	1.00
Board activity	784	0.95	0.37	0.00	0.69	0.92	1.18	2.20
Audit Committee	784	0.92	0.27	0.00	1.00	1.00	1.00	1.00

4.2. Regression Results

Table 4 reports the results of the multivariate regression analysis on the panel data. The R-square is the coefficient of determination, and the value of 0.204 indicates that 20.4 percent of the variation in discretionary accruals is explained by the regression equation.

If we exclude the corporate governance variables (see Table A6 in the Appendix A), the results vary little to nothing compared to the results in Table 4. The difference between the two models is seen in the quality of the model, where Table 4 shows an r-squared of 0.204 compared to 0.148 in Table A6. This implies that model (3), as shown in Table 4 with the corporate governance variables, has a substantially bigger r-squared, and thus explains more of the variation in the absolute discretionary accruals.

4.2.1. Results Hypothesis 1—Board Independence

The panel regression analysis provides a significantly positive relation between the proportion of independent board members and earnings management, providing evidence that the occurrence of earnings management increases in line with the percentage of board independence. Thus, the results do not coincide with the hypothesis, nor the results of Beasley (1996), Dechow et al. (1996), Peasnell et al. (2005) and Klein (2002). Nevertheless, the result is of interest. The previously mentioned studies are all recognized and well-established in the earnings management literature, yet one could argue that firms, legislations and codes of best practices have changed since the studies were conducted. However, our finding is not strong, so our following comments could be related to the mere absence of a significant result of the hypothesis. Recent changes may imply that the current recommendations regarding independence could benefit from a reconsideration considering today's business environment and the experiences made during the recent decades. Moreover, looking beyond the earnings management literature, the findings may support Van den Berghe and Baelden (2005) argument that it may not be sufficient for good corporate governance to implement a formal standard on board independence alone. They argue that "soft" elements like character, attitude and independence of mind are equally important elements to the concept of independence[6]. Accordingly, as stated in the report of the Conference Board on Corporate Governance Best Practices, "directors must not only be independent according to evolving legislative and stock exchange listing standards, but also independent in thought and action—qualitative independent" (Brancato and Plath 2003).

[6] This argument was also brought to concern by Åse Aulie Michelet on NUES' 2017 annual debate for good corporate governance practices, arguing that for directors to truly be independent they must be able to promote and defend their own opinions (Bjørklund 2017).

4.2.2. Results Hypothesis 2—Employee Representatives

The regression results indicate that employee representation has a direct negative effect on earnings management, as expected in the hypothesis. The finding may be due to several causes. In line with Fauver and Fuerst (2006) analysis on German companies, the result could imply that employee representation provides a credible channel for information to the board of directors. Supported by the findings of Chen et al. (2015), this could improve the quality of managerial monitoring and board decision-making since employee representation provides a richer information environment. Moreover, one could argue that the operational information provided by the employee representatives helps to decrease the control issue of information asymmetry. In line with the findings of Gul et al. (2002), Peasnell et al. (2005) and Beatty and Harris (1999), the assumed increased monitoring quality and decreased information asymmetry brought to the board by employee representation is seemingly effective in mitigating agency costs and earnings management.

Table 4. Regression results of model (3).

Variables	Dependent Variable: Discretionary Accruals (absDA)
Board Independence (BISE)	0.025 *
	(0.014)
Employee Representatives (DER)	−0.011 **
	(0.004)
Share ownership by directors (SOD)	0.020 *
	(0.012)
Directors as majority shareholders (MJS)	−0.012
	(0.020)
Board Activity (BA)	0.016
	(0.009)
Audit Committee (AC)	−0.071 *
	(0.038)
Firm Size (FS)	−0.014 **
	(0.006)
Return on assets (ROA)	−0.100 ***
	(0.037)
Return on equity (ROE)	−0.015 ***
	(0.002)
Constant	0.178 ***
	(0.043)
Observations	784
Number of Identifications	49
R-squared	0.204

Notes: The equation used to test the hypotheses': $\text{absDA}_{it} = \beta_0 + \beta_1(\text{BISE}_{it}) + \beta_2(\text{DER}_{it}) + \beta_3(\text{SOD}_{it}) + \beta_4(\text{MJS}_{it}) + \beta_5(\text{BA}_{it}) + \beta_6(\text{AC}_{it}) + \beta_7(\text{FS}_{it}) + \beta_8(\text{ROA}_{it}) + \beta_9(\text{ROE}_{it}) + \varepsilon_{it}$(3). ***, ** and * indicate the significance level at 1%, 5% and 10%, respectively (two-tailed). All numbers reported in NOK million. Robust standard errors in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

4.2.3. Results Hypothesis 3 and 4—Share Ownership by Directors

The regression analysis shows a significantly positive relationship between share ownership by directors and earnings management, suggesting a direct positive effect between increasing the percentage of directors who owns shares in the company and the latitude of earnings management. The finding is not in line with the hypothesis, nor the results of Gul et al. (2002). As suggested by Kanagaretnam et al. (2007), directors' shareholdings are associated with smaller increases in information asymmetry, which in turn has the potential to reduce agency costs and thus mitigate the occurrence of earnings management. With respect to the finding, one could therefore argue that there may be other elements of importance when evaluating the effect of directors' shareholdings on earnings management. Supported by Lin and Hwang (2010), the result may provide evidence that directors who own shares in the company are subject to weakened independence and weakened

effectiveness in impartial monitoring, leading to increased agency problems and earnings management. The result is fairly congruent with the findings of Peasnell et al. (2005), who found a positive, though not significant relationship between directors' shareholding and earnings management. It would also be of importance to include the fourth hypothesis in this analysis to more thoroughly assess the assumption. For the fourth hypothesis, the analysis finds a negative, though not significant relation between majority shareholding by directors and earnings management. Even though the result does not support a direct negative effect on earnings management, its implications are of interest. It could imply that majority share ownership gives directors an incentive to prioritize the company's strategic growth. If so, this would help to reduce agency problems related to dissimilar financial interests between the shareholders and the members of the board. The sample data shows that the mean of share ownership by directors and the mean of majority shareholding by directors are respectively 63 percent and 22 percent of the total board size. This implicates that on average 65 percent of the directors who own shares in the company are considered minority share owners with a greater likelihood of a short-term ownership perspective. Given a short-term ownership perspective, they have greater incentives to pursue higher-risk strategies to generate larger financial returns. Combined, these assumptions could implicate that companies with large proportions of minority shareholders on the board manage earnings more frequently. Given these findings, the results corroborate NUES (2018) recommendations regarding directors' long-term and short-term shareholdings.

4.2.4. Results Hypothesis 5—Board Activity

The results of the panel regression suggest a positive, though insignificant relation between board activity and earnings management. This implies that board meeting frequency does not seem to have a direct effect on earnings management, in contradiction to what was expected in the hypothesis and the results of Vafeas (1999), Xie et al. (2003) and Daghsni et al. (2016). The result is however in line with previous studies conducted by Ahmed (2007) and Ahmed (2007). It is worth noticing that the p-value of 0.103 is close to a 10 percent significant level.

4.2.5. Results Hypothesis 6—Audit Committee

Further, the regression analysis points out that an audit committee who supervises the financial reporting and disclosure negatively affects the occurrence of earnings management. This is in line with the hypothesis and the studies conducted by Klein (2002) and Dechow et al. (1996). The finding implies that the audit committee's role in board matters contributes to create trust by securing internal control of financial reporting and that the firm complies with laws and regulations. In addition, one could argue that the regular contact they have with the firm's external auditor could be effective in reducing agency conflicts as they weigh divergent views to produce a more balanced and accurate financial report.

Finally, the control variables behave as expected and are consistent with other earnings management studies (Iqbal et al. 2015; Daghsni et al. 2016). Firm size is found to be negatively related with earnings management, indicating that the occurrence of earnings management is decreasing in line with the size of the firm. The results further show that ROA and ROE negatively affects earnings management, suggesting that earnings management decreases as firm performance and profitability increases. In addition, all control variables are significant.

4.3. More Discussion

We do acknowledge the potential of endogeneity issues in our analysis, as e. g. omitted variables. We are also aware of the important role of firm size in this kind of research, and thus can affect the independent and dependent variables simultaneously—see Coles and Li (2020) for a comprehensive discussion. Moreover, we observe that robustness tests can weaken our findings to some degree, however our main message of the analysis remains.

5. Conclusions

Cited as the next supermodel for corporate governance (The Economist 2013), it is of interest to examine corporate governance practices within the Nordic model of corporate governance. The purpose of this study was to provide insight to better assess the relation between Nordic corporate governance practices and earnings management, and potentially highlight the benefits of the model. The robust multivariate regression analysis under the fixed effect estimator has been used for estimation, while the absolute value of discretionary accruals is used as a proxy for earnings management (Hribar and Nichols 2007).

The presence of employee representation on the board and the presence of an audit committee are both practices that seem to reduce the occurrence of earnings management. The negative relation between the presence of an audit committee and earnings management is already well-established in the earnings management literature (Klein 2002; Dechow et al. 1996), while the findings of employee representation is to some extent new insight. Our findings may suggest that employee representatives provide a credible channel for information, contributing to a richer information environment. This can mitigate agency costs and earnings management and could imply that there are other important aspects of independence that should be taken into consideration to improve the quality of the directors. As for the results regarding share ownership by directors, the findings indicate that large proportions of minority shareholders on the board could give the directors incentives to pursue higher-risk strategies to generate larger financial returns. Finally, board activity and directors as majority shareholders both presented insignificant relations to earnings management. Still, their implications on earnings management may be of interest.

The contribution of this study is not without limitations. First, by using discretionary accruals as a measurement for earnings management one relies solely on proxy measures. Hence, one cannot exclude the possibility that the findings are subject to more natural accounting explanations than earnings management. Second, the relatively small sample size could affect the accuracy of the estimations. Third, our model is not without econometric challenges, and, finally, the corporate governance model may not be enough in capturing the omission of other corporate governance variables. These limitations may constrain the validity of the findings.

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Appendix A

Table A1. The Modified Jones model (1).

Variable	Dependent Variable: Total Accruals
$1/A_{it-1}$	−4.014 ***(0.398)
$\Delta REV_{it} - \Delta REC_{it}$	−0.07(0.037)
PPE_{it}	−0.021 ***(0.07)
Constant	−0.013 ***(0.003)
Observations	784
R-squared	0.117

Notes: The equation for the Modified Jones model developed by Dechow et al. (1995): $\frac{TA_{it}}{A_{it-1}} = \beta_0 + \beta_1 \frac{1}{A_{it-1}} + \beta_2 \frac{\Delta REV_{it} - \Delta REC_{it}}{A_{it-1}} + \beta_3 \frac{PPE_{it}}{A_{it-1}} + \varepsilon_{it}$(1). Standard errors in parentheses, *** $p < 0.01$.

Table A2. The performance matched model (2).

Variables	Dependent Variable: Total Accruals
$1/A_{it-1}$	−0.213
	(0.366)
$\Delta REV_{it} - \Delta REC_{it}$	−0.123 ***
	(0.030)
PPE_{it}	−0.012 **
	(0.006)
ROA^{it}	0.615 ***
	(0.029)
Constant	−0.016 ***
	(0.003)
Observations	784
R-squared	0.436

Notes: The equation for the performance matched model by Kothari et al. (2005): $\frac{TA_{it}}{A_{it-1}} = \beta_0 + \beta_1 \frac{1}{A_{it-1}} + \beta_2 \frac{\Delta REV_{it} - \Delta REC_{it}}{A_{it-1}} + \beta_3 \frac{PPE_{it}}{A_{it-1}} + \beta_4 \frac{ROA_{it}}{A_{it-1}} + \varepsilon_{it}$(2). Standard errors in parentheses, *** $p < 0.01$, ** $p < 0.05$.

Table A3. Hausman test model (3).

Test Summary	Chi-sq. Statistic	Chi-Sq. d.f.	*p*-Value
	143.00	9	0.0000

Notes: Test of H_0: difference in coefficients is not systematic. The random effects estimator is chosen if the *p*-value is > 0.05, and the fixed effect estimator is chosen otherwise.

Table A4. Correlation matrix.

	Abs_DA	BISE	DER	SOD	MJS	BA	AC	FS	ROA	ROE
Abs_DA	1.00									
BISE	−0.02	1.00								
DER	−0.19	0.30	1.00							
SOD	0.03	−0.09	−0.09	1.00						
MJS	−0.01	−0.65	−0.46	0.33	1.00					
BA	−0.04	0.01	0.08	0.08	0.07	1.00				
AC	−0.39	0.11	0.28	−0.28	−0.17	0.11	1.00			
FS	−0.42	0.20	0.41	−0.01	−0.21	0.10	0.51	1.00		
ROA	−0.44	−0.03	0.21	−0.17	−0.08	−0.01	0.36	0.30	1.00	
ROE	−0.21	0.02	0.14	−0.11	−0.10	−0.07	0.10	0.13	0.49	1.00

Notes: According to Brooks (2019) a correlation between two variables that exceeds 0.80 indicates severe multicollinearity. The variables are defined as: abs_DA = absolute value of discretionary accruals, BISE = board independence, DER = employee representatives, SOD = share ownership by directors, MJS = directors as majority shareholders, BA = board activity, AC = audit committee, FS = firm size, ROA = return on assets, ROE = return on equity.

Table A5. Variation inflation factors (VIF).

Variable	VIF	1/VIF
abs_DA	1.47	0.6792
BISE	1.84	0.5438
DER	1.50	0.6686
SOD	1.33	0.7507
MJS	2.42	0.4127
BA	1.07	0.9389
AC	1.65	0.6060
FS	1.70	0.5885
ROA	1.70	0.5870
ROE	1.35	0.7424
Mean VIF	***1.60***	

Notes: According to Brooks (2019) a VIF index over five indicates severe multicollinearity. The variables are defined as: abs_DA = absolute value of discretionary accruals, BISE = board independence, DER = employee representatives, SOD = share ownership by directors, MJS = directors as majority shareholders, BA = board activity, AC = audit committee, FS = firm size, ROA = return on assets, ROE = return on equity.

Table A6. Regression results of model (3) without corporate governance variables.

Variables	Dependent Variable: Discretionary Accruals (absDA)
Firm size (FS)	−0.02 ***
	(0.003)
Return on assets (ROA)	−0.111 ***
	(0.021)
Return on equity (ROE)	−0.011 *
	(0.006)
Constant	0.206 ***
	(0.030)
Observations	784
Number of Identifications	49
R-squared	0.148

Notes: The equation used to test the robustness: $\text{absDA}_{it} = \beta_0 + \beta_1(\text{FS}_{it}) + \beta_2(\text{ROA}_{it}) + \beta_3(\text{ROE}_{it}) + \varepsilon_{it}(3)$. *** and * indicate the significance level at 1% and 10%, respectively (two-tailed). All numbers reported in NOK million. Robust standard errors in parentheses, *** $p < 0.01$, * $p < 0.1$

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Zero-Debt Policy under Asymmetric Information, Flexibility and Free Cash Flow Considerations

Anton Miglo

Department of Accountancy, Finance and Economics, Birmingham City Business School, Birmingham City University, Birmingham B5 5JU, UK; anton.miglo@bcu.ac.uk

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Abstract: We build a model of debt for firms with investment projects, for which flexibility and free cash flow problems are important issues. We focus on the factors that lead the firm to select the zero-debt policy. Our model provides an explanation of the so-called "zero-leverage puzzle". It also helps to explain why zero-debt firms often pay higher dividends when compared to other firms. In addition, the model generates new empirical predictions that have not yet been tested. For example, it predicts that firms with zero-debt policy should be influenced by free cash flow considerations more than by bankruptcy cost considerations. Additionally, the choice of zero-debt policy can be used by high-quality firms to signal their quality. This is in contrast to most traditional signalling literature where debt serves as a signal of quality. The model can explain why the probability of selecting the zero-debt policy is positively correlated with profitability and investment size and negatively correlated with the tax rate. It also predicts that firms that are farther away from their target capital structures are less likely to select the zero-debt policy when compared to firms that are close to their target levels.

Keywords: zero-debt policy; flexibility; capital structure; tax shield; free cash flow problem; debt overhang; dividend policy

JEL Codes: D82; G32; L11; L26; M13

1. Introduction

A firm's capital structure is one of the top issues in corporate finance theory. Over the years, financial economists have formulated and tested various theories, including trade-off theory, pecking-order theory, and market timing. Despite the tireless efforts, they remain some of the most contraversial topics in economics.

In recent years, zero-debt policy research has been an increasingly growing area of interest.[1] Strebulaev and Yang (2013) call it the "zero-leverage puzzle". The standard trade-off theory of capital structure predicts that a firm's capital structure is the result of trade-off between the tax advantage of debt and its expected bankruptcy cost. However, this theory seems to fail to explain situations when debt is totally absent. Pecking-order theory (Myers and Majluf 1984) predicts that, under asymmetric information, firms should use internal funds before debt and debt before equity. This implies that zero-debt policy can only be adopted by financially unconstrained firms with large amounts of free cash. However, this is usually not the case (see, for example, Leary and Roberts 2005). Trade-off theory also predicts that firms should instantaneously adjust their capital structure toward their target capital structure. However, Leary and Roberts (2005) find that firms restructure their leverage infrequently.

[1] See, for example, Strebulaev and Yang (2013), Dang (2013), Bessler et al. (2013), Sundaresan et al. (2015), and Byoun and Xu (2013).

Another interesting aspect of zero-debt firms is their dividend policy. Strebulaev and Yang (2013) find that many of these firms are dividend payers and that they pay higher dividends than other firms. Dang (2013) finds that, among zero-debt firms, there are two different groups: firms that pay dividends (consistent with Strebulaev and Yang 2013) and firms that do not. Dang (2013) argues that the latter group consists of young, unprofitable, and financially constrained firms. Strebulaev and Yang (2013) discuss the high dividends of zero-debt firms and find them quite puzzling from the points of view of traditional theories. For example, from the pecking-order theory point of view firms that are subject to asymmetric information (financially constrained firms seem to be fitting into this group) should keep their cash reserves and use them for future investments. Additionally, if firms were looking for flexibility, they would not pay dividends. In this article, we shed some new light on this issue.

As an example, consider the situation of Apple in 2012–2014. During these years Apple had no debt.[2] The company's earnings had been steadily growing between 2005–2012 and many analysts and managers, including its new CEO Tim Cook, spoke about its excessive liquidity problems (Ximénez and Sanz 2014). On 15 March 2012, CNBC confirmed that Tim Cook admitted "the company's board of directors was actively involved in deciding what to do about the excess cash." Secondly the company continued its growth plans and constantly faced numerous investment opportunites (Ximénez and Sanz 2014). Cook mentioned that "priorities included making as many investments as possible in research and development." At the same time, the company started to pay dividends. Furthermore, the level of dividends was quite high (Lazonick 2017; Ximénez and Sanz 2014). A few factors are worth mentioning. As a large corporation, Apple was facing different types of agency problems, including ones arising from the ownership-management conflicts.[3] The famous founder and CEO of Apple Steve Jobs, who owned a large fraction of Apple's shares, died in 2011.[4] One can assume that the company was facing a larger extent of potential agency problems, since the separation between ownership and management increased as compared to the previous period. To summarize the above discussion: Apple in 2012–2104 was a company that had no debt, paid large dividends, and faced free-cash flow and flexibility challenges.

We build a model of capital structure that contains both flexibility and free cash flow problems. Maintaining flexibility is an important incentive for firms in order to adopt a zero-leverage policy (see, for example, Dang 2013) and the free cash flow problem is one of the key factors in, for example, Byoun et al. (2013). We consider a firm with an investment project that is facing future uncertainty regarding earnings and investment size. Firms can be of three different types. If a firm does not have any financing constraints or free cash flow problems, then the first-best strategy for overcoming a potential debt overhang is to issue long-term debt. The firm would not loose any potential earnings from profitable investment opportinities in the second stage of the project.[5] Another group of firms are ones that are totally constrained, in that they are not able to raise any external financing. These firms will use internal funds for financing and will not pay any dividends (keep internal cash for future investments). This is consistent with the zero-debt policy of the non-payers group in Dang (2013) . However, our main focus is on the third group of firms, namely those that are partially constrained. These firms are able to raise short-term debt for financing. These firms will be dealing with potential flexibility or debt overhang problems when financing their future investment needs. In addition, firms are facing a free cash flow problem. Managerial teams can be involved in empire-building or an overinvestment problem, so a firm's owners should take this into account when making capital structure and dividend decisions. These firms face a trade-off between the advantages of debt,

[2] See, for example, https://www.macrotrends.net/stocks/charts/AAPL/apple/debt-equity-ratio.
[3] See, for example, https://www.investopedia.com/ask/answers/041015/how-do-modern-corporations-deal-agency-problems.asp.
[4] https://en.wikipedia.org/wiki/Steve_Jobs.
[5] Hart and Moore (1994) show that long-term debt has its advantages in dealing with the debt overhang problem.

including tax shield and the disciplinary advantage of limiting the free cash flow problem (Jensen 1986) and the disadvantages of debt that are related to the debt overhang problem (Myers 1977).

Our model predicts that firms that can potentially adopt the zero-debt policy are firms for which the free-cash flow problem is relatively more important than potential bankruptcy costs. These firms are more likely to pay large dividends in order to avoid free cash flow problems that are related to a manager's overinvestment and these firms are more likely to adopt a zero-debt policy. It forces them to use more internal funds in order to finance their investments and mitigate potential free cash flow problems that are related to the accumulation of uninvested (retained) earnings. Additionally, we find that the probability of adopting the zero-debt policy increases with the expected profitability of a firm's projects, the expected size of investments and their risk, and it decreases with tax rates. These observations are consistent with recent empirical findings (see, for example, Lotfaliei 2018). On the other hand, firms that face relatively small bankruptcy costs and a high likelihood of overinvestment by managers are not likely to adopt the zero-debt policy. They are likely to issue debt in order to provide discipline for the manager and benefit from its tax advantage. Our analysis also suggests that the choice of the zero-leverage policy can be used by high-qulaity firms to signal their quality. This is in contrast to most traditional signalling literature, such as Leland and Pyle (1977), for example, where debt serves as a signal of quality. The model also predicts that the zero-leverage policy is likely to be counter-cyclical and the positive debt policy is likely to be procyclical. It is consistent with the results of Dang (2013), Bernanke and Gertler (1989), and Kiyotaki and Moore (1997).

With regard to dividend policy, we find that zero-debt firms usually pay dividends and, in most cases, they pay higher dividends than other firms, which is consistent with Strebulaev and Yang (2013). In addition, the model generates some new predictions that have not been tested yet. For example, we find that high dividends cannot be used alone by high-quality firms as a signal of quality. This is consistent with previous literature on the dividend signalling (see, for example, Brav et al. 2005). We find that the dividend decision, together with the capital structure decision, can be used to signal a firm's quality. For example, a separating equilibrium may exist where the high-quality firm uses zero-debt policy and pays high dividends and the low-quality firm uses positive debt policy and pays a smaller dividend. The low-quality firm will not mimick the high-quality firm, since the potential benefits from mitigating the debt overhang problem are not as valuable for this firm as they are for a high-growth firm, since it has a smaller expected investment project size and lower expected payoffs in the second stage of the project. Accordingly, unlike the high-growth firm, these benefits for the low-growth firm can be outweighed by tax shield losses. Bessler et al. (2013) find that zero-debt firms have positive abnormal return as compared to their peers, which is consistent with our result.

The model also predicts that the likelihood of selecting the zero-debt policy is different for different types of firms. Underleveraged firms that are far from their target capital structures are less likely to drop the zero-debt policy when compared to firms that are close to their target levels. A similar result was found in Leary and Roberts (2005), who used an adjustment cost argument (see also Warr et al. 2012). Note that the adjustment cost approach has been questioned in recent literature (see, for example, Lambrinoudakis 2016).

Lotfaliei (2018) extends trade-off theory by including a real option to wait before issuing debt. This can induce a zero leverage, even when standard trade-off theory predicts that these firms should have leverage. The real option's effect is similar to that of bankruptcy costs. The value of firms with no debt include the option whose value is derived from future debt benefits and reduced bankruptcy costs. This article proposes a model that determines the optimal timing for the aquisition and sale of debt and finds support for its predictions through simulations and empirical analysis. Unlike our paper, it does not reach any closed solutions or propositions regarding the zero-debt policy. Most of their

results are obtained via simulations using different numerical assumptions and shapes of different functions, in particular the non-convexity of debt costs, which are crucial for their results.[6]

Our paper is one of the first that analyzes debt policy under the debt overhang and free cash problems simultaneously. Hart and Moore (1994) analyze a model with long-term debt, where managers have both an incentive to overinvest (similar to the free cash flow problem) and underinvest (debt overhang). They argue that a company with high debt will find it hard to raise capital, since new security holders will have low priority relative to existing creditors. Conversely, they show that, for a company with low debt, there is an optimal debt-equity ratio and mix of senior and junior debt if management undertakes unprofitable as well as profitable investments. In contrast to our paper, the zero-debt policy only emerges for risk-free high profitable firms, which is not consistent with recent empirical evidence. Hirth and Uhrig-Homburg (2010) examine the effect of overinvestment and underinvestment problems on a firm's cash flow and capital structure decisions in a continuous-time framework. In contrast to our paper, the overinvestment problem is modelled as an asset substitution problem. They show that stockholder–bondholder agency conflicts cause investment thresholds to be U-shaped in leverage and decreasing in liquidity. The paper shows that an interior solution for liquidity and capital structure optimally trades off tax benefits and agency costs of debt. The zero-debt policy does not emerge in equilibrium.

The rest of the paper is organized, as follows. Section 2 contains a literature review. Section 3 presents the model and its main results. Section 4 analyzes the factors that affect the probability of selecting/dropping the zero-debt policy and it also provides a comparative static analysis regarding zero-debt firms and dividend-paying/non-paying firms. Section 5 presents a variation of the model with asymmetric information. Section 6 presents the model's implications and its consistency with empirical evidence. Section 7 discusses the model's robustness and extensions and Section 8 concludes.

2. Literature Review

2.1. Debt Overhang

The debt overhang problem occurs when firms do not invest in projects with positive net present values (NPVs). Equityholders may pass up profitable investments, because the firm's existing debtholders capture most of benefits from the project (Myers 1977). This is because the NPV of a project is sometimes different for shareholders and creditors. A firm will choose projects with the highest earnings for shareholders if the managers act in the interest of the shareholders. The problem is that projects with positive NPVs (for the firm as a whole) sometimes have low payoffs to the shareholders if the firm's debt is large enough. Debt has priority over equity in cases when earnings are not sufficient for satisfying every claimholder.

Some notable papers include the following. Gertner and Scharfstein (1991) show that, conditional on ex-post financial distress, making a fixed promised debt payment due earlier (i.e., shorter-term) raises the market value of the debt and, thus, the firm's market leverage, leading to more debt overhang. Diamond (1991) argues that firms build their reputaion in order to raise their credit rating and improve their ability to issue debt. Similar to our paper, it focuses on financially constrained firms that are not able to issue long-term debt. However, zero-debt policy is not considered in this paper. In contrast, our model includes both debt overhang and free cash flow considerations. Diamond and He (2014) compare short-term debt and long-term debt with regard to potential debt overhang problems.[7]

Overall theoretical literature on debt overhang has failed to recognize opportunities to combine debt overhang and free cash flow ideas in order to generate zero-debt results. The closest paper, in this sense, to ours is Berkovich and Kim (1990). They combine the underinvestment (debt overhang)

[6] See also Haddad and Lotfaliei (2019).
[7] For more theoretical discussions regarding debt overhang, see Miglo (2016a).

and overinvestment problems in order to generate predictions regarding debt covenants and debt seniority. However, in their article, overinvestment has the form of an asset substitution problem (Jensen and Meckling 1976) and not a free cash flow problem (as in our paper) and the zero-debt policy is not explained.

Flexibility Theory of Capital Structure

We cover flexibility theory in a separate subsection of the debt overhang section, since there is still debate regarding whether or not this theory represents a separate theoretical idea from the debt overhang idea. Firms in the development stage need financial flexibility. There is a lot of uncertainty, because they consider a lot of investment projects, including their financing strategies, which requires a lot of flexibility. Having too much debt in capital structure will not help here (similar to a debt overhang problem). In addition, firms in the development stage likely do not have a favorable track record (i.e., credit ratings) of borrowing (Diamond 1991) and they are most likely to be turned down for credit when they need it most. Mature firms, for the most part, generate positive earnings and have more financial flexibility than developing firms. Accordingly, these firms rely more on debt financing for funding their investments, as they face less financing constraints, in that they expect to repay their debt with future earnings.

Flexibility theory finds a lot of support in empirical studies (Byoun 2011) and manager surveys (Graham and Harvey 2001). Gamba and Triantis (2008) develop a theoretical model that analyzes optimal capital structure policy for a firm that values flexibility in the presence of personal taxes and transaction costs. Among recent papers, note Sundaresan et al. (2015), who analyze a growing firm that represents a collection of growth options and assets in place. The firm trades off tax benefits with the potential financial distress and endogenous debt overhang costs over its life cycle. The authors argue that the firm consistently chooses conservative leverage in order to mitigate the debt-overhang effect on exercising decisions for future growth options.

Like debt overhang literature, flexibility theory literature does not provide a good understanding of facts that are related to the zero-debt policy. The importance of financial flexibility, as compared to major theories of capital structure, remains an open question. More work that compares flexibility theory with other theories is expected.

2.2. Free Cash Flow Theory

Grossman and Hart (1982) and Jensen (1986) argue that the use of debt financing can be used in order to mitigate the tendency for "empire-building". Jensen (1986, 1989) argued that debt financing is an effective way to resolve agency problems between managers and investors: It would limit managerial discretion by minimizing the "free cash-flow" available to managers and, thus, provide protection to investors. Sometimes in literature, this idea is referred to as "debt and discipline" theory.[8]

As we know, using debt as a major source of financing incurs substantial costs of financial distress. Firms may face direct bankruptcy costs or indirect costs in the form of debt-overhang or asset substitution. In order to reduce the risk of financial distress, it may be desirable to have the firm rely partly on equity financing.

DeMarzo and Fishman (2007) consider a dynamic model where a firm's manager can divert the firm's cash flow. It is shown that an optimal mechanism can be implemented by combining equity, long-term debt, and a line of credit. Zhang (2009) analyzes the effect of a firm's capital structure on managerial incentives and controlling the free cash flow agency problem and compares it to incentives that are provided by compensation contracts. It was found that debt and executive stock options act as

[8] A related result is the costly state-verification theory (see Townsend 1979; Gale and Hellwig 1985). It considers an environment where a firm's earnings are unobservable by investors, the verification of earnings is costly, and managers can report earnings at their discretion (ex-post moral hazard).

substitutes in attenuating a firm's free cash flow problem. Edmans (2011) suggests that the option to terminate a manager minimizes the investors' losses early if the manager is unskilled. It also deters a skilled manager from undertaking efficient long-term projects that risk low short-term earnings. This paper demonstrates how risky debt can overcome this tension.

Our paper adds the dividend policy choice and the debt overhang problem to a typical free cash flow model. In such an environment, firms can select between debt as a disciplinary device to mitigate the free cash flow problem as in traditional literature and another policy that includes zero debt and high dividends.[9]

2.3. Signalling under Asymmetric Information

Information asymmetries are characterized by one entity having more information than another. Insiders may have private (exclusive) information about a firm that is unavailable to outsiders. Not knowing for sure what the firm is worth, outside investors will not be willing to pay much for its newly issued equity. Therefore, if the firm is actually good, then its equity will be underpriced. Because of this, a good firm should always rely on retained earnings in order to finance new projects. These ideas were put forth by Myers (1984) and Myers and Majluf (1984). High-quality firms will use internal funds first and, in their absence, will issue debt and only as a last resort will issue equity (so called pecking order). Risky debt also suffers from asymmetric information problems (for example, in the form of higher interest rates for firms), but not to the same degree as equity underpricing.

The empirical evidence regarding whether firms follow the pecking order is mixed, as mentioned in Miglo (2011). The negative reaction to equity issues, or, in general, to leverage reducing transactions, usually finds empirical support. The evidence regarding the link between the extent of asymmetric information and capital structure choice and regarding the pecking order is mixed.

The signalling theory of capital structure offers models in which capital structure serves as a signal of private information (Ross 1977; Leland and Pyle 1977). Usually, in these models, the market reaction on debt issues is positive. Empirical evidence is mixed regarding the predictions of signaling theory.

Finally, consider the signalling theory of dividends. It suggests that, if a company announces a decrease/increase in dividend payouts, it can be interpreted as a signal of negative/positive future prospects of the company.

Bhattacharya's (1979) model assumes that external investors do not have full information regarding a company's expected cash flows. The findings claim that the dividends contain information about present and prospective cash flows and, for that reason, they can be used by managers as signals to help close the information gap. Miller and Rock (1985) consider both dividend and investment policies. They argue that a struggling company may raise dividend payments to a level where investors would assume that the firm is financially good and, consequently, pay a higher amount for its shares. A stronger company might have to compete by raising its dividends beyond what the struggling company can match. The Williams (1987) model helps to explain why some companies aim to both raise capital and distribute dividends at the same time. It also suggests that firms with more "valuable" internal information tend to distribute higher dividends.

Lee and Ryan (2002) analyse dividend signalling theory and the relationship between earnings and dividends. They conclude that free cash flow and recent performance mostly influence the dividend payment strategy. Benartzi et al. (1997) argue that dividends do not signal future performance, but reflect past performance. Recent empirical literature finds mixed evidence regarding signalling theories of dividends (Brav et al. 2005).

All of the above presented studies try to answer the question of whether dividends have any signalling power and affect the share price. In spite of numerous articles and studies, the issue of

[9] High payout policy is often considered to be an alternative tool for disciplining managers (Easterbrook 1984; Brav et al. 2005), but usually not in combination with zero-debt policy.

whether dividend announcements contain information is still unclear and no consensus has been reached. Our paper contrbutes to this literature by suggesting that dividends can be used, together with capital structure, in order to signal a firm's quality.

3. The Model and Basic Results

3.1. Model Description

Debt overhang/Flexibility theory suggest that, if a firm has too much debt, then it will be harder for them to obtain loans when necessary (Myers 1977). Therefore, firms preserve debt capacity or hold back on issuing debt, because they want to maintain flexibility. Firms maintain excess debt capacity or larger cash balances than warranted by current needs, in order to meet unexpected future requirements. While maintaining financial flexibility has value to firms, it also has a cost; excess debt capacity implies that a firm is giving up some value (e.g., tax benefit of debt) and it has a higher cost of capital.

Free cash flow theory (Jensen 1986) suggests that managers have a tendency to overinvest if the threat of bankruptcy is not high enough (empire-building). This moral hazard problem can be mitigated if the firm uses debt as a disciplinary device. If a manager spends funds inefficiently, then the firm will not be able to generate enough cash to cover their existing debt and the probability of bankruptcy will increase. In this case, the probability of losing a job for managers increases (Hoskisson et al. 2017). As an alternative to issuing debt, the firm can increase dividends to shareholders. This will also reduce the amount of available free cash (Brav et al. 2005).

Some basic ideas can be illustrated by the following model. Consider a firm that exists for two periods $T = 1, 2$. Initially, the firm has cash K. The firm also has an investment project. The project requires an amount of investment I and it can generate cash flows, as follows. First, it brings an amount C_1, which can later be invested (second stage) with the average rate of return r. I and K are known, while C_1 is risky. It is uniformly distributed between 0 and $\overline{C_1}$.[10] We also assume that $\overline{C_1}/2 > I$ and $r > 0$, which implies that both stages of the project have a positive net present value. The firm belongs to the shareholders who we will call the entrepreneur. The entrepreneur is responsible for making capital structure and dividend decisions. In order to finance the initial investment I, the firm can either use internal funds (E) or issue debt (D), $I = E + D$.[11]

Debt that is issued to finance the project should be paid back at $T = 2$. Let F be the face value of the debt (including principal and interest), due to, at the time, that the investment in the second stage of the project must be made ($T = 2$).[12] The firm is financially constrained and it is not able to issue a long-term debt, i.e., debt due upon the completion of the second stage of the project. Hence, the firm is facing a potential debt overhang or flexibility loss problem. A high amount of debt limits the firm's investment capacity. If $F > C$ (C denotes available cash before the second stage of the investment project), then the firm will not be able to make any investments and, if $F < C$, the firm can make a full or partial investment in the second stage of the project.[13] A disadvantage of having low debt is that it can reduce, for example, the amount of tax shield, and ultimately increase the cost of capital and, respectively, reduce the value of the firm. This approach is consistent with Graham (2000) and Strebulaev and Yang (2013), who suggest that zero-debt firms seemingly do not use any substitutes for debt that provide similar advantages as leases for example. Let F^* be the maximal amount of debt that

[10] In Section 7, we discuss the model's robustness with regard to this assumption as well as other assumptions.
[11] Later, we discuss other strategies.
[12] Throughtout the model's solution F and not D is used as the main variable in our model to describe the amount of debt. Technically, F is a better variable, since it includes the interest amount and does not affect any results while simplifying the solution presentation. Obviously, in equilibrium, D and F are connected with each other.
[13] Miglo (2016b) considers a similar idea. However, it does not have the free cash flow or asymmetric information considerations.

the firm can issue.[14] We assume that $F^* \leq \overline{C_1}$. This allows for us to model a large spectrum of possible financing strategies from 100% internal funds to 100% debt.[15]

In addition, the firm faces a free cash flow problem. During the first stage of the project (before C_1 becomes known), the firm's managerial team (call it the manager) has an opportunity to invest the firm's funds in an "inefficient" project that does not increase the firm's value, but instead can provide private benefits for the manager. The manager cannot be perfecty monitored by the entrepreneur (in the spirit of Grossman and Hart 1982 or Jensen 1986). We assume that, if the manager decides to invest an amount X of the firm's available cash in an "inefficient" project, he gets aX, $0 \leq a \leq 1$. The firm gets nothing and it just loses an amount X in this case. The manager is also bankruptcy averse. When deciding whether to make an inefficient investment, the manager faces a trade-off between receiving private benefits and reducing disutility from increasing the bankruptcy risk of the firm. When investing in an "inefficient" project, the manager consequently increases the chances of the firm going bankrupt. If this is the case, the manager's disutility is $-B$, $B \geq 0$ (job loss, reputation loss, family values, etc.).[16]

When choosing the amount of debt, the firm faces a trade-off between the flexibility, free cash flow, and cost of capital minimization problems. When debt equals F, the value that is created by minimizing the cost of capital (in absolute values for shareholders; analogous, for example, to the present value of the tax shield) equals Ft, $0 \leq t \leq 1$ for any $F \leq F^*$.[17] Everybody is risk-neutral and the risk-free interest rate is zero. Figure 1 presents the timing of events.

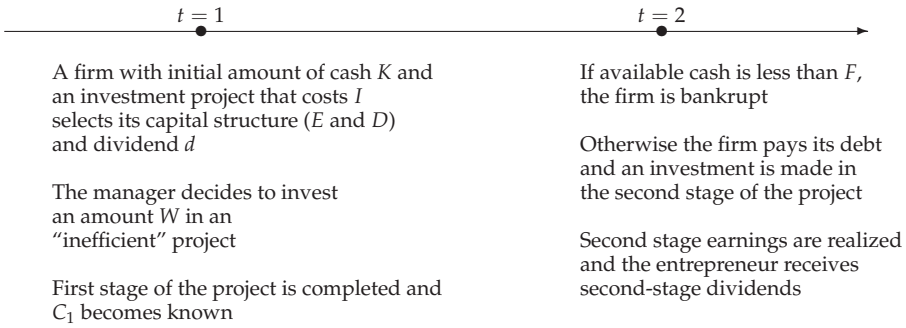

Figure 1. The sequence of events.

3.2. No Free Cash Flow Problem and No Financial Constraints

Let us first consider a perfect market case when the firm does not face any free cash flow problems and no financial constraints exist. More specifically, we assume that the manager is totally honest and does not make any inefficient investments in private projects and that the firm can issue long-term debt.[18] This assumption assures that a debt overhang problem does not arise. Consequently, the firm will not lose any potential earnings from the second stage of the project given that $r > 0$, because the firm can invest the full amount of available cash in the second stage of the project. Under these conditions, the amount of debt issued by the firm as well as its dividend policy is

[14] The assumption about the existence of F^* is quite natural. One can assume that, if the amount of debt raised by the firm goes beyond some threshold, then the debt becomes very costly/impossible to bear. It can be related to expected bankruptcy costs, credit rating problems, relationship with banks, etc. Note that this assumption is technically not crucial, but it helps to generate some interesting comparative static results.

[15] These assumptions will be discussed in Section 7.

[16] Corporate bankruptcy costs are not considered. It complicates mathematics without adding significantly new intuitions.

[17] See Grinblatt and Sheridan (2001) for an example of calculations for the present value of tax shield.

[18] Hart and Moore (1994) formally show how the use of long-term debt can mitigate managerial incentives for ineffcient investments.

irrelevant (Modigliani and Miller 1958). If taxes are introduced in the model, then the optimal policy is to select $F = F^*$. This policy minimizes the cost of capital and maximizes the investment return. The creditors will be happy to provide a long-term loan with a face value F, such that

$$D = F - \frac{F^2}{2\overline{C_1}(1+r)} \tag{1}$$

Indeed, even if the firm paid the highest possible dividend $K - (I - D)$ at $T = 1$, the expected payment to the creditors (recall that C_1 is uniformly distributed) equals

$$\frac{\overline{C_1}(1+r) - F}{\overline{C_1}(1+r)}F + \frac{F^2}{2\overline{C_1}(1+r)} \tag{2}$$

Here, $\frac{\overline{C_1}(1+r)-F}{\overline{C_1}(1+r)}$ is the probability that $C_1(1+r) \geq F$ and that debt can be paid in totallity. Respectively, $\frac{F}{\overline{C_1}(1+r)}$ is the probability that $C_1(1+r) < F$ and $\frac{F}{2}$ is the average amount that the creditors will receive when $C_1(1+r) < F$. One can see that (1) equals (2). The firm's expected value is

$$d + K - (I - D) - d + \frac{\overline{C_1}(1+r) - F}{\overline{C_1}(1+r)}\left(\frac{\overline{C_1}(1+r) + F}{2} - F\right) \tag{3}$$

Here, d is the dividend paid to the entrepreneur at $T = 1$; $K - (I - D) - d$ is the amount of retained earnings at the beginning of $T = 2$ and $\frac{\overline{C_1}(1+r)+F}{2}$ is the average value of $C_1(1+r)$ for the case when $C_1(1+r) \geq F$. While using (2), we can write (3) as

$$K - I + \frac{\overline{C_1}}{2}(1+r) \tag{4}$$

Therefore, without taxes, both the capital structure and dividend policy are irrelevant, because (4) does not depend on D, F or d. If $t > 0$, the optimal debt is $F = F^*$ and the firm's value equals $K - I + \frac{\overline{C_1}}{2}(1+r) + F^*t$. Now, consider the case with a free cash flow problem and financial constraints.

3.3. Financially Constraint Firm with Free Cash Flow Problem

3.3.1. Manager's Decision at the End of $T = 1$

Consider the manager's decision at the end of $T = 1$. Let C_0 be the amount of retained earnings (after the firm pays dividends) at $T = 1$ and R be the amount of cash that will be left if the manager withdraws W, $W + R = C_0$. Three cases are possible. (1) $R \geq F$. In this case, the firm can pay back its debt and the manager's utility is $aW = a(C_0 - R)$. Because it is decreasing in R, the optimal $R = F$ and the manager's expected utility $E(U)$ is $a(C_0 - F)$ (2).

$$C_0 \geq F > R \tag{5}$$

When making a decision, the manager does not know the value of C_1. Depending on the future realization of C_1, two situations may exist. 1. $C_1 \geq F - R$. In this case, the firm can pay back its debt and the manager's utility is $a(C_0 - R)$. 2. $C_1 < F - R$. In this case, the firm will be bankrupt at the end of $T = 2$ and the manager's overall utility is $a(C_0 - R) - B$. The probability that $C_1 \geq F - R$ equals $\frac{\overline{C_1}-F+R}{\overline{C_1}}$ and the probability that $C_1 < F - R$ equals $\frac{F-R}{\overline{C_1}}$. Hence, the expected value of the manager's utility $E(U)$ equals

$$a(C_0 - R) - \frac{(F - R)}{\overline{C_1}}B \tag{6}$$

The manager's choice of W and respectively R is determined by maximizing $E(U)$. Note that (6) is linear in R, so $R = 0$ if $a > \frac{B}{\overline{C_1}}$ and otherwise R should be maximized (if $a = \frac{B}{\overline{C_1}}$, the manager is indifferent between his options. For simplicity, we assume that, in this case, the manager will not bankrupt the firm).

It follows from the above analysis (note that, in both cases, $C_0 \geq F$) that if $a \leq \frac{B}{\overline{C_1}}$, the optimal $R = F$. Otherwise, the optimal $R = 0$.

(3) $C_0 < F$. Similarly to the analysis in the previous case, we find that the expected value of the manager's utility equals $a(C_0 - R) - \frac{F-R}{\overline{C_1}}B$. We have $R = 0$ if $a > \frac{B}{\overline{C_1}}$ and $R = C_0$ otherwise.

This leads to the following lemma.

Lemma 1. *(1) $C_0 \geq F$. Then $R = 0$ if $a > \frac{B}{\overline{C_1}}$ and $R = F$ otherwise. (2) $C_0 < F$. Then $R = 0$ if $a > \frac{B}{\overline{C_1}}$ and $R = C_0$ otherwise.*

Proof. Follows from the the above analysis. □

The interpretation of Lemma 1 is following. If the bankruptcy cost is more important for the manager than private benefits from overinvestments (i.e., B is relatively higher than a), the optimal decision for the manager is to keep cash in the firm. Otherwise, the manager will make a lot of inefficient investments and receive a large amount of private benefits.

3.3.2. Entrepreneur's Dividend Decision at $T = 1$

Although the capital structure and dividend decisions are made simultaneously (e.g., during the shareholder meeting), we will first calculate the optimal dividend policy for any arbitrarily chosen capital structure and then we will analyze the optimal capital structure choice. We have $R_0 = d + C_0$, where

$$R_0 = K - (I - D) \tag{7}$$

is the amount of funds available after the firm's capital structure was determined, including the amount of retained earnings used to finance the initial stage of the project $(I - D)$.

Proposition 1. *(1) If $a \geq \frac{B}{\overline{C_1}}$, $d = R_0$; (2) if $a < \frac{B}{\overline{C_1}}$, $d = R_0 - F$ when $R_0 > F$ and $F < \frac{2\overline{C_1}r}{1+r}$; $d = R_0$ when $R_0 > F > \frac{2\overline{C_1}r}{1+r}$ or when $F > R_0$ and $F > \frac{R_0}{2} + \frac{\overline{C_1}r}{1+r}$; and $d = 0$ otherwise.*

Proof. Two cases are possible.

(1) $a < B/\overline{C_1}$. In turn, three situations may exist. 1. $R_0 - d \geq F$. As follows from Lemma 1, the manager will "steal" $R_0 - d - F$, so the remaining amount of retained earnings F will be used in order to pay back debt at $T = 2$. The firm can invest the full amount that is required for the second stage of the project and the firm's value equals

$$d + \frac{\overline{C_1}}{2}(1 + r) + Ft \tag{8}$$

Because (8) is increasing in d, the optimal $d = R_0 - F$. The firm's value equals $R_0 - F + \frac{\overline{C_1}}{2}(1 + r) + Ft$.

2. $F < R_0 < F + d$. Because $C_0 = R_0 - d < F$, Lemma 1 implies that, in this case, $R = C_0 = R_0 - d$. The firm is not able to make a full amount of investment for the second stage of the project. If $C_1 \geq F - (R_0 - d)$, then the firm can still make a partial investment. Because of the probability that $C_1 \geq F - R_0 + d$ equals $\frac{\overline{C_1} - F + R_0 - d}{\overline{C_1}}$, the firm's expected value equals:

$$d + \frac{\overline{C_1} - F + R_0 - d}{\overline{C_1}}(R_0 - d + \frac{\overline{C_1} + F - R_0 + d}{2} - F)(1 + r) + Ft \tag{9}$$

Because (9) is convex in d, possible solutions are either $d = R_0 - F$ or $d = R_0$. According to (9), if $d = R_0 - F$, the firm's expected value equals $R_0 - F + \frac{\overline{C_1}}{2}(1+r) + Ft$. If $d = R_0$, $E(V) = R_0 + \frac{(\overline{C_1}-F)^2}{2\overline{C_1}}(1+r) + Ft$. Proposition 1, for the case $a < \frac{B}{\overline{C_1}}$ and $F < R_0$, follows from the comparison of the above expressions, i.e., $d = R_0 - F$ is better if $F < \frac{2\overline{C_1}r}{1+r}$ and, otherwise, $d = R_0$ is the best strategy.

3. $R_0 < F$. Note that, in this case, $R_0 - d < F$. Additionally, note that Lemma 1 implies $R = C_0$. Similarly to the previous case, we find that the firm's expected value is as in (9). This time, the possible solutions are either $d = 0$ or $d = R_0$. According to (9), if $d = 0$,

$$E(V) = \frac{(\overline{C_1} - (F - R_0))^2}{2\overline{C_1}}(1+r) + Ft \tag{10}$$

If $d = R_0$,

$$E(V) = R_0 + \frac{(\overline{C_1} - F)^2}{2\overline{C_1}}(1+r) + Ft \tag{11}$$

The comparison of (10) and (11) reveals that the latter is greater if

$$F > \frac{R_0}{2} + \frac{\overline{C_1}r}{1+r}$$

(2) $a \geq B/\overline{C_1}$. Note that, according to Lemma 1, in this case $R = 0$ and also that $C_1 - F \leq C_1$. The latter implies that, as long as $F > 0$, a full investment in the second stage is not possible. Two cases are possible. 1. $C_1 \geq F$. In this case, the firm can make a partial investment and the firm's value equals $d + (C_1 - F)(1+r) + Ft$. 2. $C_1 < F$. In this case, the firm is not able to make any investments in the second stage of the project and the firm's value to the entrepreneur is $d + Ft$. □

Next, we need to calculate the expected change in the firm's value. The probability that $C_1 > F$ equals $(\overline{C_1} - F)/\overline{C_1}$ and the average amount of investment needs is $(F + \overline{C_1})/2$. Hence, the expected firm's value $E(V)$ equals

$$d + \frac{(\overline{C_1} - F)}{\overline{C_1}}(\frac{F + \overline{C_1}}{2} - F)(1+r) + Ft \tag{12}$$

Because (12) is increasing in d, the optimal solution is $d = R_0$.

The interpretation of Proposition 1 is as follows. If the entrepreneur expects the manager to overinvest, then he will pay a high dividend. Otherwise, some funds can be kept inside the firm.

3.3.3. Entrepreneur's Capital Structure Decision at $T = 1$

Proposition 2. *When $a \geq \frac{B}{\overline{C_1}}$, $F = 0$ if $r \geq \frac{3}{2}t$ or $r < \frac{3}{2}t$ and $F^* < \frac{2\overline{C_1}(r-t)}{r}$. Otherwise, $F = F^*$.*

Proof. Let $a \geq B/\overline{C_1}$. In this case, as follows from Proposition 1, $d = K - (I - D)$ and $R = 0$. The firm's value equals $K - I + D + \frac{\overline{C_1}-F}{\overline{C_1}}(\frac{F+\overline{C_1}}{2} - F)(1+r) + Ft$. The creditors will be paid in full when $C_1 > F$ and they will receive C_1 otherwise. Therefore: $D = \frac{\overline{C_1}-F}{\overline{C_1}}F + \frac{F}{\overline{C_1}}F/2 = F - \frac{F^2}{2\overline{C_1}}$. Hence, the firm's value equals

$$K - I + F - \frac{F^2}{2\overline{C_1}} + \frac{\overline{C_1} - F}{\overline{C_1}}(\frac{F + \overline{C_1}}{2} - F)(1+r) + Ft \tag{13}$$

Because (13) is convex, the possible solutions are either $F = 0$ or $F = F^*$. According to (13), if $F = 0$,

$$E(V) = K - I + \frac{\overline{C_1}(1+r)}{2} \tag{14}$$

If $F = F^*$, $E(V) = K - I + F^* - \frac{F^2}{2\overline{C_1}} + \frac{(\overline{C_1} - F^*)^2}{2\overline{C_1}}(1+r) + F^*t = K - I - F^*r + \frac{(F^*)^2}{2\overline{C_1}}r + \frac{\overline{C_1}(1+r)}{2} + F^*t$. Proposition 2 follows from the comparison of this expression with (14), i.e., it follows that $F = 0$ if

$$F^* \leq \frac{2\overline{C_1}(r-t)}{r} \tag{15}$$

and $F = F^*$ otherwise. Note that the right side of (15) is greater than $\overline{C_1}$ if

$$r \geq \frac{3}{2}t \tag{16}$$

In this case, $F = 0$, because $F^* \leq \overline{C_1} \leq \frac{2\overline{C_1}(r-t)}{r}$. □

Proposition 3. *If $a < \frac{B}{\overline{C_1}}$ and t is sufficiently small, the optimal amount of debt increases with $\overline{C_1}$ and r.*

Proof. See Appendix A. □

Two points from the proof of Proposition 3 are discussed below. First, if

$$R_0 \leq F \tag{17}$$

the optimal amount of debt is either $F = \frac{2\overline{C_1}r}{1+r}$ or $F = F^*$. Also in this case $d = 0$.

Second, we present an example (for simplicity, we consider the case $K = I$, $r < 1$ and t is marginally small) of the link between optimal debt and $\overline{C_1}$. Let $C^* = \frac{(1+r)F^*}{2r}$. Subsequently, we find that $F = F^*$ if $\overline{C_1} > C^*$; and, $F = \frac{2\overline{C_1}r}{1+r}$ if $\overline{C_1} < C^*$.

The results of Proposition 3 regarding $\overline{C_1}$ and r are interesting and opposite to the results of Proposition 2. In the case that the manager is less likely "to steal" money from the firm ($a < \frac{B}{\overline{C_1}}$), the entrepreneur may be interested to keep cash for the second period and, hence, use more debt to finance the first stage of the project. The higher the expected size of the potential investment in the second stage the higher the amount of debt that is issued by the firm. For example, it follows from Figure 2 that =m when $\overline{C_1}$ is high, the firm uses as much debt as possible (F^*). Otherwise, it is a trade-off between the advatages and disadvatges of debt. If $\overline{C_1}$ is really small, then the firm will issue a smaller amount of debt.

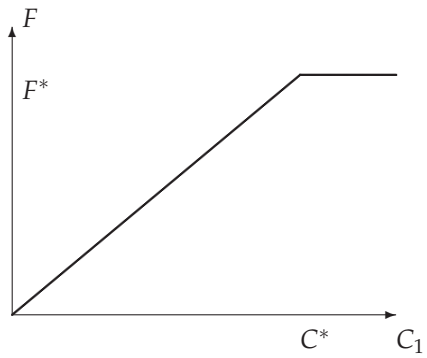

Figure 2. $\overline{C_1}$ and debt.

Our focus is on firms with the zero-leverage policy and factors that lead to this policy. The comparative static analysis reveals the following.

4. Comparative Statics

Corollary 1. *An increase in the expected performance of a firm's projects increases its chances of selecting the zero-debt policy. An increase in the uncertainty about future projects/size of investments also increases the chances of selecting this policy. An increase in the tax rate decreases the chances of selecting the zero-debt policy.*

An increase in r in (15) increases the chances that $D = 0$. It is the potential return that the firm earns on its projects that provides the value to flexibility. Other things remaining equal, firms operating in businesses where projects earn substantially higher returns than their hurdle rates should value flexibility more than those that operate in stable businesses where the excess returns are small.

An increase in $\overline{C_1}$ in (15) also increases the chances that $D = 0$. If flexibility is viewed as an option, then its value will increase when there is greater uncertainty regarding future projects; thus, firms with predictable capital expenditures should value flexibility less.

An increase in t in (15) increases the chances that $F = F^*$. Debt should be high when a firm has high profit and uses leverage to reduce taxes, or when potential bankruptcy costs are relatively low and the cost of debt remains relatively low, regardless of the level of debt or when the cost of equity remains significantly higher relative to the cost of debt (for example, due to the situation in the stock market) when debt is low. Those firms should value flexibility less.

Corollary 2. *Non-dividend-paying firms are as follows: (1) managers do not steal money; (2) debt is relatively high; and, (3) free cash is relatively small.*

The only case when firms do not pay dividends is when $a < B/\overline{C_1}$ and condition (17) holds. The former means that, in this case, the manager steals less funds from the company when compared to the case when $a \geq B/\overline{C_1}$. The latter means that $R_0 = K - I + D$ is relatively small. Other things being equal, it implies that free cash (K) should be relatively small in order for (17) to hold. Finally, these firms take maximal debt and benefit from its tax advantages.

Corollary 3. *Dividend paying zero-leverage firms (ZLPD) differ from dividend paying non-zero leverage firms (NZPD) in that: (1) for ZLPD free-cash flow problems are more important than bankruptcy costs; and, (2) ZLPD pay higher dividends.*

With regard to the first point note that, for ZLPD, we have $a \geq B/\overline{C_1}$. With regard to the second point note that ZLPD pay the entire amount of retained earnings available as dividends. For NZPD, different cases can emerge. In most cases, they keep some cash inside the firm. Hence, on average, ZLPD pays higher dividends than NZPD.

So far, our focus has been on the role of r, t and $\overline{C_1}$. Now, consider the role of F^* for zero-debt policy decisions. Consider two firms with F_1^* and F_2^*, such that

$$F_1^* < F_2^* \tag{18}$$

Condition (15) predicts that Firm 2 is less likely to select the zero-leverage policy than Firm 1.

Corollary 4. *The firm with F_2^* is less likely to select the zero-debt policy than the firm with F_1^*.*

The proof follows directly from (15) and that $F_1^* < F_2^*$.

One can assume that F^* is connected to the term target debt ratio. This term is usually used in literature with regard to traditional static trade-off theory. In our model, as was argued in Section 3.2, this is an optimal amount of debt for a firm that does not face any free cash flow or flexibility problems, etc. In this case, Corollary 4 has an interesting empirical interpretation. If both firms have no debt initially (by the time the decisions should be made), condition (18) means that Firm 1 is closer to its target ratio than Firm 2. Therefore, Corollary 4 means that the firm that is farther from its target debt level is less likely to select the zero-debt policy.

5. Asymmetric Information about Firm's Investment Opportunities/Performance

Now, suppose that information regarding the firm's performance is asymmetric. More specifically, let us assume that there are two types of firms. The maximal profit for the stage 1 investment for type 1 equals $\overline{C_1}$ and, for type 2, it equals $\overline{C_2}$, $\overline{C_1} < \overline{C_2}$.

5.1. Separating Equilibrium

An equilibrium is defined as a situation where no firm type has an incentive to deviate. A separating equilibrium is one where firms select different strategies. We will also check that the off-equilibrium beliefs of market participants survive the intuitive criterion of Cho and Kreps (1987). This condition means that the market off-equilibrium beliefs are reasonable in the sense that, if, for any firm type, its maximal payoff from deviation is not greater than its equilibrium payoff, then the market should place a probability of 0 on possible deviations of this type. The above definitions are consistent with the standard perfect bayesian equilibrium definition (see, for instance, Fudenberg and Tirole 1991) with the addition of an intuitive criterion, which is quite common in these types of games (see, for instance, Nachman and Noe 1994).

The idea is that a firm with better growth opportunities (higher $\overline{C_1}$) may select the zero-debt policy as a signal of growth. Indeed, low-growth opportunity firms may find it unprofitable to mimick this strategy, because it limits its investment opportunities in the second stage and no gain is achieved from reaching lower interest rates. In contrast, if the high-growth firm selects a positive debt strategy, then it will be mimicked by the low-qaulity firm, because of the opportunities in obtaining a loan with a lower interest rate.

Proposition 4. *There is no separating equilibrium where firms select different levels of debt and pay the same amount of dividends; there is no separating equilibrium where firms selects the same level of debt and pay different amounts of dividends.*

Proof. See Appendix A. □

For the first part, the idea is simply that, in this case, the low-quality firm will be able to either mimick the high-quality firm and obtain a low interest rate (in case the high-quality firm has positive debt) or increase dividends if the high-quality firm does not issue debt and, thus, could not pay a high dividend. As follows from (7), the firm that issued more debt will be able to save more internal funds and, therefore, pay a higher dividend. For the second part, if firms use the same amount of debt, then they should have similar preferences for dividends, as follows from Propositions 1–3. Therefore, one of the firms will eventually deviate by selecting a dividend amount different from its equilibrium value.

Proposition 5. *There exists a separating equilibrium where type 2 selects $F_2 = 0$ and $d_2 > 0$ and type 1 selects $F_1 > 0$ and $d_1 \neq d_2$. A separating equilibrium, where type 2 selects $F_2 > 0$ and type 1 selects F_1 such that $F_2 > F_1$ does not exist.*

Proof. See Appendix A. □

To illustrate the proposition, suppose

$$a > \frac{B}{\overline{C_1}} > \frac{B}{\overline{C_2}} \tag{19}$$

$$\frac{2\overline{C_1}(r-t)}{r} < F^* < \frac{2\overline{C_2}(r-t)}{r} \tag{20}$$

Additionally, suppose that type 2 selects $F_2 = 0$ and $d_2 = K - I$ and Type 1 selects $F_1 = F^*$ and $d_1 = K - I + F^*$. Note that (19) implies that the strategies of the firms correspond to the optimal symmetric information strategies described by Propositions 1 and 2. Equilibrium payoffs are: type 2 – $K - I + \frac{\overline{C_2}(1+r)}{2}$; type 1 –

$$K - I + F^* - \frac{(F^*)^2}{2\overline{C_1}} + \frac{(\overline{C_1} - F^*)^2}{2\overline{C_1}}(1+r) + F^*t \tag{21}$$

If type 2 deviates and mimicks type 1, then it will have to borrow with a higher interest rate that correpsonds to type 1: $D = F^* - \frac{(F^*)^2}{2\overline{C_1}}$. Hence, its profit will be $K - I + F^* - \frac{(F^*)^2}{2\overline{C_1}} + \frac{(\overline{C_2} - F^*)^2}{2\overline{C_2}}(1 + r) + F^*t$. This is less than $K - I + F^* - \frac{(F^*)^2}{2\overline{C_2}} + \frac{(\overline{C_2} - F^*)^2}{2\overline{C_2}}(1 + r) + F^*t$, which is, in turn, less than $K - I + \frac{\overline{C_2}(1+r)}{2}$, because $F^* < \frac{2\overline{C_2}(r-t)}{r}$. If type 1 deviates, its payoff is $K - I + \frac{\overline{C_1}(1+r)}{2}$, which is smaller than $K - I + F^* - \frac{(F^*)^2}{2\overline{C_1}} + \frac{(\overline{C_1} - F^*)^2}{2\overline{C_1}}(1 + r) + F^*t$ because $\frac{2\overline{C_1}(r-t)}{r} < F^*$. Accordingly, this equilibrium exists.

Proposition 5 implies that the high-quality firm selects zero-debt policy and a high level of dividend in order to efffectively signal its quality.

5.2. Pooling Equilibrium

Next, we analyze the pooling equilibria. We define a pooling equilbrium as one where both types of firms select the same strategy. If multiple pooling equiliria exist, then we will use the mispricing criterion to evaluate which one is most likely to exist. We use the standard concept of mispricing that can be found, for example, in Nachman and Noe (1994). The magnitude of mispricing in a given equilibrium is equal to that of undervalued type(s). The overvaluation of overvalued type(s) does not matter.

Proposition 6. *Pooling with $F = 0$ exists if $a > \frac{B}{\overline{C_1}} > \frac{B}{\overline{C_2}}$ and $F^* < \frac{2\overline{C_1}(r-t)}{r} < \frac{2\overline{C_2}(r-t)}{r}$. Pooling with $F > 0$ exists if $\frac{2\overline{C_1}(r-t)}{r} < \frac{2\overline{C_2}(r-t)}{r} < F^*$ and x is sufficiently large.*

Proof. See Appendix A. □

In Proposition 6, we find that pooling with no debt exists as long as the conditions of optimality for the zero-debt policy under symmetric information ($F^* < \frac{2\overline{C_1}(r-t)}{r} < \frac{2\overline{C_2}(r-t)}{r}$) hold for both types. This is because there is no adverse selection game with the value of debt (interest rate) for the low-quality type, since no type issues any debt in equilibrium. An equilibrium with positive debt only exists if the fraction of high-quality firms is sufficiently high. Respectively, the interest rate is sufficiently low and the high-quality types do not have an incentive to deviate to the zero-debt policy.

6. Model Implications

Our paper contributes to what Strebulaev and Yang (2013) called the zero-leverage puzzle. The zero-debt phenomena and its extent are quite puzzling from the point of view of the main capital structure theories, as was previously discussed. Our article argues that a combination of debt overhang and free cash flow considerations may lead a partially constrained firm (that can only issue short-term debt) to optimally select zero-debt policy (Proposition 2). In contrast to Lotfaliei (2018), our paper does not rely on numerical simulations. Our model predicts that, for firms using the zero-debt policy, free cash flow considerations are more important than bankruptcy costs. The importance of free cash problems for zero-debt firms is consistent with Byoun et al. (2013).

The model also generates many predictions regarding the features of firms while using the zero-leverage policy (Corollary 1). The likelihood of adopting the zero-leverage policy is positively correlated with a firm's projects profitability (respectively, the likelihood of dropping

this policy is negatively correlated with it). This result is consistent with Strebulaev and Yang (2013), Byoun et al. (2013), Bessler et al. (2013), and Ebrahimi (2018). This is consistent with the second group of zero-debt firms (which pay dividends) in Dang (2013). Remember that, in our model, zero-debt firms pay dividends. Below, we will discuss other opportunities for generating zero-debt results with some changes in model assumptions.

Additionally, the likelihood of adopting the zero-leverage policy is positively correlated with the expected investment size. This is consistent with Strebulaev and Yang (2013) and Dang (2013), in that the zero-debt policy is likely to be adopted by firms with more growth opportunities. This is also consistent with Bessler et al. (2013), where zero-debt policy likelihood increases with the market-book ratio. The latter is often seen in literature as a measure of growth opportunities. The probability of choosing the zero-leverage policy also increases with risk. This result is consistent with Strebulaev and Yang (2013), Dang (2013), and Bessler et al. (2013). In Bessler et al. (2013), for example, there is a positive correlation between asset volatility and zero-debt policy. Finally, the likelihood of adopting rhe zero-leverage policy is negatively correlated with the tax rate. This result is consistent with Strebulaev and Yang (2013), Dang (2013), and Bessler et al. (2013) .

Firms that are farther from their target debt levels are less likely to select the zero-leverage policy when compared to firms that are closer to their target debt levels (Corollary 4). In our model, this is because, if they are farther from their target ratio, the move towards the target ratio can bring about a high tax shield other things being equal.

These firms also have higher cash balances. This follows from Proposition 1, because a higher K implies a positive dividend. Firms with zero debt pay higher taxes. This approach is consistent with Graham (2000) and Strebulaev and Yang (2013), who suggest that there is no substitute for the debt advantage (even leases for example). Additionally, firms that pay dividends replace interest expenses. The total payments are relatively flat. Firms that pay higher dividends pay less interest, because they have zero debt. In addition, as was mentioned previously, Corollary 2 predicts that firms that do not pay dividends should have lower cash balances.

Corollary 3 implies that zero-leverage dividend paying firms pay a significantly higher dividend than non-zero-leverage firms. This is consistent with Strebulaev and Yang (2013). Additionally, the reason why zero-debt firms do not issue debt is not because they want to retain high flexibility with high cash. On the contrary, they pay dividends and reduce cash. This is consistent with Byoun et al. (2013) and Strebulaev and Yang (2013). Non-dividend-paying firms never have zero-leverage. This is implied by Corollary 2. The only firms for which $d = 0$ are the ones that correspond to case 1 in Propostion 3 and these firms have high debt. This is consistent with the spirit of Strebulaev and Yang (2013), in that dividends are substitutes for interests, so the total payoff is stable accross all firms. If we had some firms that do not pay dividends also have zero-debt (respectively, zero interest) that would contradict the results in Strebulaev and Yang (2013).

Consistent with Dang (2013), firms do not issue debt when economic conditions worsen (Proposition 8). In the same spirit, debt is procyclical (Proposition 9). This is consitent with, for example, our model in that it may mean an increase in B (bankruptcy cost). As follows from (13), the likelihood of adopting the zero-debt policy decreases. As implied by Proposition 8, zero-debt is more likely when x decreases, meaning that the average quality of firms in the economy decreases.

If we consider Case 1 in Proposition 3 and supppose that the entrepreneur becomes risk-averse, then a negative component in (22) can be added. If this component is large enough, the resulting solution will imply a zero-debt policy. This situation is not a focus of our analysis, but it can be interpreted as another group of companies using the zero-leverage policy. This, for example, could be firms for whom the free cash flow problem is not very important (for example, firms where managers have high stakes of equity or family firms) and, in contrast, increasing the risk and bankruptcy costs can be costly, because, for example, the entrepreneur is not well diversified. Subsequently, the case when

$a < B/\overline{C_1}$ is consistent with ZLNP firms in Dang (2013), family firms in Strebulaev and Yang (2013), and constrained firms in Bessler et al. (2013).[19]

7. Model Extensions and Robustness

Different first stage earnings distribution. One interpretation of the results in our model (based on (13)) is that the likelihood of adopting the zero-debt policy is positively correlated with the average earnings from stage one (and, respectively, the average investment opportunity for stage two) as well as the risk of earnings at stage one and the risk of the investment size. This is because $\overline{C_1}/2$ is the average amount of earnings (so it increases with $\overline{C_1}$) and the risk increases with $\overline{C_1}$ as well (the risk can, for example, be measured by the variance of project earnings, which is equal to $\overline{C_1}^2/12$ because $\overline{C_1}$ is uniformly distributed). Hence, in our model, the average return and risk are positively correlated. A lower $\overline{C_1}$ automatically implies a lower average level of earnings and a lower risk, and a higher $\overline{C_1}$ means a higher average and higher risk. One can extend the model and assume, for example, that C_1 is distributed uniformly between say $C_{1\,\min} \neq 0$ and $C_{1\,\max}$. Subsequently, there may be a situation where the average level of earnings increases, but the risk decreases. Our results show that the results hold. Condition (13) becomes: $F = 0$ if

$$F^* < \frac{(C_a + \Delta)r - 2\Delta t}{r}$$

and $F = F^*$ otherwise, where $\Delta = \frac{C_{1\,\max} - C_{1\,\min}}{2}$. One can see that, if $\Delta = C_a$, and respectively $C_a = \overline{C_1}/2$ this becomes (13). Otherwise, most qualitative predictions remain the same, but calculations become much more complicated. The likelihood of adopting the zero-debt policy increases with average performance (C_a) and with risk, because $C_a > \Delta$ but it decreases with t, which is consistent with Corollary 1.

Another comment relates to the fact that we have a uniform distribution for the project's earnings. Note three points here. First, this assumption is not uncommon in theoretical literature that is related to capital structure and debt maturity or debt overhang (see, among others, Collins and Gbur 1991) and the reason being probably that it works very well with risk-neutral investors, because it directs the focus on market imperfections and not long calculations that are related to risk aversion. Secondly, note that the normal distribution becomes uniform when some parameters change, so, by continuity, the conclusions should hold if the value of the parameters are sufficiently close. Thirdly, and most importantly, note that the crucial part of our argument is the convexity of the expected return function in, for example, (13). This convexity may hold for some other types of distributions.

Outside equity. Most firms analyzed by empirical literature that are related to zero-debt policy face the choice between internal funds and debt. In our case, if external equity is possible, then it will not

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[19] The following cases are consistent with the spirit of our results (we discussed the Apple 2012 case previously). As we mentioned, this company had a lot of cash at that time, had no debt, and paid relatively high dividends.

SEI Investments Company is a financial services company that is headquartered in Oaks, Pennsylvania, United States, with offices in Indianapolis, Toronto, London, Dublin, The Netherlands, Hong Kong, South Africa, and Dubai (see https://en.wikipedia.org/wiki/SEI_Investments_Company) SEI manages, advises or administers $809 billion in hedge funds, private equity, mutual funds, and other managed assets. This includes $307 billion in assets under management and $497 billion in client assets under administration. The company has no debt and it pays steady dividends (https://seic.com/investor-relations). In addition to its large amounts of cash available, the company has had agency problems that are related to some of its managers. Note the case of Allen Stanford, for example, (https://www.businessreport.com/article/stanford-group-money). Another example is the multinational corporation Amdocs that specializes in software and services for communications, media and financial service providers, and digital enterprises. The company is quite successful and consistently pays stable dividends (https://en.wikipedia.org/wiki/Amdocs). Additionally, it constantly penetrates new markets, develops new projects etc. Accordingly, one can assume that, on one hand, the company needs flexibility, since it is often involved in important investments projects. Additionally, the moral hazard and agency problems seem to be quite important, since the company often creates new legal entities, replaces management, creates joint ventures with other companies, etc. For more examples of companies with no debt that pay dividends, see https://www.investopedia.com/articles/investing/032116/10-companies-no-debt-doxnhtcpayx.asp.

be enforceable, because the manager will steal all non-invested funds (zero-risk of bankruptcy), so all initial funds should be invested and there is no room for outside equity. If managers are honest, then a first-best can easily be implemented with outside equity (similar to long-term debt).[20] Quantitatively though, some conditions may change. It is definitely an interesting direction for future research. Note that most existing theoretical literature related to zero-debt policy often considers it separately from outside equity. One of the reasons for this seems to be that the basic ideas that are related to issuing debt (debt overhang, flexibility, etc.) are quite different for equity issues (see, for example, Byoun et al. 2013).

Issuing equity is possible at $T = 2$. If the firm can issue equity (or junior debt) at $T = 2$ it helps to rollover previously issued debt and, thus, avoid a debt overhang problem. So a first-best could be achieved. An interesting extension for further research is to make the possiblity of issuing equity or junior debt at $T = 2$ conditional on some results in the first period (credit rating, profitability, etc.). Intuitively, a possible scenario is that the firm selects the zero-debt policy in order to improve its opportunities of issuing equity at $T = 2$.

Issuing debt is impossible at $T = 1$. One can consider what could happen if issuing debt is impossible at $T = 1$. This type of firm is often mentioned in empirical literature and it is often found to be young, not-profitable, without a credit rating etc. Accordingly, in the model, we can, for example, assume that $K < I$ and allow partial investment at $T = 1$, i.e., the firm can invest an amount K in the first stage and generate some earnings at $T = 2$. The main model predictions do not change much, because the firm that can issue debt at $T = 1$ in most cases will select the maximal possible I at $T = 1$. To see this, consider formula (12). Because $\frac{C_1}{2} > I$, this is increasing in I. As for severally constrained firms, since $\frac{C_1}{2} > I$, they will invest as much as they can at $T = 1$., i.e., K. Hence, no dividends will be paid at $T = 1$. This group of zero-leverage firms are non-payers (Dang 2013; Bessler et al. 2013).

Different types of moral hazard. In our model, the manager trades-off private benefits from "inefficient" investments and the cost incurred in the case of the firm's bankruptcy. The manager's objective function can be made more complicated by including, for example, some bonuses from good investments. However, our calculations show that, since these bonuses will be strongly correlated with the non-bankruptcy event for the firm, not many things will be qualitatively different in this settings while calculations become much more complex.

The distribution of types. In Sections 4 and 6, which deal with asymmetric information, we use two types of firms to illustrate the main ideas. This is also very typical in literature. A natural question though is whether the results stand if one considers a case with multiple types.[21] Our analysis shows that most of the conclusions remain the same: under asymmetric information, the zero-debt policy can be used by a high-quality firm in order to signal its qulaity. However, in the case of multiple types, one may have a semi-separating or even pooling equilibrium, where only the type with the highest cost (speaking about Section 4) will be indifferent between the zero-debt policy and positive debt policy and all other types select zero-debt. In Section 5, our analysis shows that the results may hold even in a multiple types environment, although more research is required. The main implication of our analysis holds. In particular, our results show that there is no semi-separating equlibrium where the average quality of types that choose zero-debt policy is higher than those that choose positive debt, which is consistent with our basic model.

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[20] We have analyzed a model's variation that included the possibility of using debt-based crowdfunding. Under debt-based crowdfunding, the firm promises to return the inital investments from funders with interest. We found that the main results of the model are not affected. Some slight differences exist. For example, when debt is risk-free (which can be the case without demand uncertainty) debt-based crowdfunding can be used as a signalling tool along with reward-based crowdfunding. However, in a more realistic scenario when demand is uncertain and debt is risky, the main result stands, which favors reward-based crowdfunding. The same holds when modelling moral hazard.

[21] Proofs are available upon demand. Note that the calculations become much longer and technically more complicated, which is very typical for multiple type games with asymmetric information.

Different signal for C_1 and investment at $T = 2$. In our model, the investment technology is that all of the earnings from period 1 can be invested in stage 2. One can consider an extension where firms receive two separate signals at the beginning of $T = 2$: one is about first-period earnings and one is about the cost of second stage investments. As far as we can see, the calculations become much more complicated without adding any new ideas.

Different values for r. Uncertainty regarding r does not matter in the model, since there is no long-term debt and everybody is risk-neutral, so only the average return counts in the second stage. The model's analysis for large values of r does not seem to be very practical, so it is omitted for brevity. A possible extension is to assume that firms own private information about r and not C_1. As far as we can see, it should generate similar predictions to the ones in the paper.

8. Summary and Conclusions

We build a model of debt for firms with investment projects for which flexibility and free cash flow problems are important issues. We focus on the factors that lead firms to select the zero-debt policy. Our model provides an explanation of the so-called "zero-leverage puzzle" (Strebulaev and Yang 2013). It also helps to explain why zero-debt firms often pay higher dividends when compared to other firms. In addition, the model generates new empirical predictions that have not yet been tested. For example, it predicts that firms with the zero-leverage policy paying dividends should be influnced by free cash flow considerations more than by bankruptcy cost considerations. The choice of zero-leverage policy can also be used by high-quality firms to signal their quality. This is in contrast to most traditional signalling literature, such as Leland and Pyle (1977), for example, where debt serves as a signal of quality. The model can explain why the probability of selecting the zero-debt policy is positively correlated with profitability and investment size and negatively correlated with the tax rate. It also predicts that firms that are farther away from their target capital structure are more likely to drop the zero-debt policy, while firms that are close to their target level are more likely to continue the policy.

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Appendix A

Proof of Proposition 3. For shortness we consider the case $K = I$ and $r < 1$.[22] □

Let $a \leq B/\overline{C_1}$. We have $R_0 = d + C_0$, where $R_0 = I - (I - D) = D$. Hence,

$$R_0 = D \leq F \tag{A1}$$

When debt is risk-free, its face value equals the real value: $R_0 = D = F$. When debt is risky, $R_0 = D < F$. Therefore Proposition 1 for the case $a \leq \frac{B}{\overline{C_1}}$ becomes: $d = R_0 - F$ when $F > \frac{R_0}{2} + \frac{\overline{C_1}r}{1+r}$; and $d = 0$ otherwise.

Two situations may exist. Case 1.

$$F \leq \frac{R_0}{2} + \frac{\overline{C_1}r}{1+r} \tag{A2}$$

[22] The proofs for other cases are available upon demand.

It follows from Proposition 1 that in this case $d = 0$. The firm's value equals (see the proof of the previous proposition for this case):

$$E(V) = \frac{(\overline{C_1} - (F - R_0))^2}{2\overline{C_1}}(1 + r) + Ft \tag{A3}$$

The creditors will be paid in full when $C_1 > F - R_0$ and they will receive $C_1 + R_0$ otherwise. Therefore: $D = \frac{\overline{C_1} - (F - R_0)}{\overline{C_1}}F + \frac{(F - R_0)}{\overline{C_1}}(\frac{F - R_0}{2} + R_0) = F - \frac{F^2}{2\overline{C_1}} - \frac{R_0^2}{2\overline{C_1}} + \frac{FR_0}{\overline{C_1}}$. Hence, $R_0 = D = F - \frac{F^2}{2\overline{C_1}} - \frac{R_0^2}{2\overline{C_1}} + \frac{FR_0}{\overline{C_1}}$. Solving for R_0 we find:

$$R_0 = F - \overline{C_1} \pm \overline{C_1}$$

The smallest root here does not work since $F \leq F^* \leq \overline{C_1}$ and $R_0 \geq 0$. Substituting the largest root into (A3) we get:

$$E(V) = \frac{\overline{C_1}(1 + r)}{2} + Ft \tag{A4}$$

Condition (A2) can be written as $F \leq \frac{R_0}{2} + \frac{\overline{C_1}r}{1+r} = \frac{F - \overline{C_1} + \overline{C_1}}{2} + \frac{\overline{C_1}r}{1+r}$ or

$$F \leq \frac{2\overline{C_1}r}{1 + r} \tag{A5}$$

Since (A4) increases in F, the optimal

$$F = \frac{2\overline{C_1}r}{1 + r} \tag{A6}$$

if $\frac{2\overline{C_1}r}{1+r} < F^*$ or $F = F^*$ if the opposite is true. In the former case the firm's value equals

$$E(V) = \frac{\overline{C_1}(1 + r)}{2} + \frac{2\overline{C_1}r}{1 + r}t \tag{A7}$$

In the latter case

$$E(V) = \frac{\overline{C_1}(1 + r)}{2} + F^*t \tag{A8}$$

Case 2.

$$F > \frac{R_0}{2} + \frac{\overline{C_1}r}{1 + r} \tag{A9}$$

It follows from Proposition 1 that, in this case, $d = R_0$. The firm's value equals (see the proof of previous proposition for this case):

$$E(V) = R_0 + \frac{(\overline{C_1} - F)^2}{2\overline{C_1}}(1 + r) + Ft \tag{A10}$$

The creditors will be paid in full when $C_1 > F$ and they will receive C_1 otherwise. Therefore: $D = \frac{\overline{C_1} - F}{\overline{C_1}}F + \frac{F}{\overline{C_1}}\frac{F}{2} = F - \frac{F^2}{2\overline{C_1}}$. Hence, $d = R_0 = D = F - \frac{F^2}{2\overline{C_1}}$. The firm's vallue then equals:

$$E(V) = F - \frac{F^2}{2\overline{C_1}} + \frac{(\overline{C_1} - F)^2}{2\overline{C_1}}(1 + r) + Ft = -Fr + \frac{F^2 r}{2\overline{C_1}} + \frac{\overline{C_1}(1 + r)}{2} + Ft \tag{A11}$$

The condition (A9) can be written as $F > \frac{R_0}{2} + \frac{\overline{C_1}r}{1+r} = \frac{F}{2} - \frac{F^2}{4\overline{C_1}} + \frac{\overline{C_1}r}{1+r}$ or $F > -\overline{C_1} + 2\overline{C_1}\sqrt{\frac{1}{4} + \frac{r}{1+r}} = \overline{C_1}(\sqrt{\frac{1+5r}{1+r}} - 1)$. If $\overline{C_1}(\sqrt{\frac{1+5r}{1+r}} - 1) > F^*$, this case is impossible. Otherwise, since (A11) is convex, possible solutions are: $F = \overline{C_1}(\sqrt{\frac{1+5r}{1+r}} - 1)$ and $F = F^*$. In the former

case $E(V) = -\overline{C_1}(\sqrt{\frac{1+5r}{1+r}} - 1)r + \frac{\overline{C_1}^2(\sqrt{\frac{1+5r}{1+r}}-1)^2 r}{2\overline{C_1}} + \frac{\overline{C_1}(1+r)}{2} + \overline{C_1}(\sqrt{\frac{1+5r}{1+r}} - 1)t$. In the latter case $E(V) = -F^*r + \frac{(F^*)^2 r}{2\overline{C_1}} + \frac{\overline{C_1}(1+r)}{2} + F^*t$.

Because (A4) is greater than (A11), case 1 provides better value for the firm as long as condition (A5) holds. It implies that $F = \overline{C_1}(\sqrt{\frac{1+5r}{1+r}} - 1)$ is never optimal because $\sqrt{\frac{1+5r}{1+r}} - 1 < \frac{2r}{1+r}$. Therefore, if $\overline{C_1} \geq \frac{F^*(1+r)}{2r}$, optimal $F = F^*$ (case 1). If $\overline{C_1} < \frac{F^*(1+r)}{2r}$, $F = \frac{2\overline{C_1}r}{1+r}$ (case 1) or $F = F^*$ (case 2). The comparison of the firm's values for both cases leads to the following. $F = \frac{2\overline{C_1}r}{1+r}$ if $t < r(1 - \frac{F^*(1+r)+2\overline{C_1}r}{2\overline{C_1}(1+r)})$ and $F = F^*$ otherwise.

Proof of Proposition 4. For shortness consider only the case when $a \geq \frac{B}{\overline{C_1}} \geq \frac{B}{\overline{C_2}}$.[23] Part 1. Several cases may exist. 1. Type 2 selects F_2 and Type 1 selects $F_1 > F_2$. Here in turn several cases are possible. In all cases we assume that off-equilibrium market beliefs are that the firm is type 1 which will minimize the value of debt. It is based on Brennan and Kraus (1987). □

(1) $\frac{2\overline{C_1}(r-t)}{r} < F^* < \frac{2\overline{C_2}(r-t)}{r}$ or $\frac{2\overline{C_1}(r-t)}{r} < \frac{2\overline{C_2}(r-t)}{r} < F^*$

In this case, a possible scenario is that $F_1 = F^*$. Any other strategy is not optimal for type 1 based on Proposition 2 and it will therefore deviate. Additionally, type 1 will pay dividend $K - I + D = K - I + F^* - \frac{(F^*)^2}{2\overline{C_1}} = D_1$. Type 2, however, will not be able to pay this amount as dividend. The maximal amount for type 2 is $K - I + F_2 - \frac{(F_2)^2}{2\overline{C_2}}$ which is less than D_1 because $F_1 = F^* > F_2$. Hence, this situation is impossible.

(2) $F^* < \frac{2\overline{C_1}(r-t)}{r} < \frac{2\overline{C_2}(r-t)}{r}$

In this case, a possible scenario is that $F_1 = 0$. Any other strategy is not optimal for type 1 based on Proposition 2 and it will therefore deviate. However, this contradicts the assumption that $F_1 > F_2$.

2. Type 2 selects F_2 and Type 1 selects $F_1 < F_2$.

(1) $F^* < \frac{2\overline{C_1}(r-t)}{r} < \frac{2\overline{C_2}(r-t)}{r}$

In this case, a possible scenario is that $F_1 = 0$. Any other strategy is not optimal for type 1 based on Proposition 2 and it will therefore deviate. Additionally, type 1 will pay dividend $K - I$. If type 2 selects $F_2 > 0$, this is not an optimal strategy by Proposition 2, and it will deviate to $F_2 = 0$.

(2) $\frac{2\overline{C_1}(r-t)}{r} < F^*$

In this case, a possible scenario according to Proposition 2 is $F_1 = F^*$, but this contradicts $F_1 < F_2$. Accordingly, this equilibrium is impossible.

Part 2. An equilibrium, where type 1 selects $F = 0$ and $d = 0$ and Type 2 selects $F = 0$ and $d > 0$ is impossible. Because debt is not issued, the fact that firms pay different dividends does not affect any payoffs if either firm deviates so asymmetric information does not matter. The optimal d for type 1 will be $d > 0$. Similarly, an equilibrium where type 1 selects $F = 0$ and $d > 0$ and type 2 selects $F = 0$ and $d = 0$ does not exist because type 2 would prefer $d > 0$. Consider other cases. Again for brevity we only consider the case when $a > \frac{B}{\overline{C_1}} > \frac{B}{\overline{C_2}}$.

2. Type 1 selects $F > 0$ and $d_1 = 0$ is not optimal for type 1 and it will deviate by paying a higher dividend.

3. Both types 1 select $F > 0$ and $d > 0$. An quilibrium candidate is the case $\frac{2\overline{C_1}(r-t)}{r} < \frac{2\overline{C_2}(r-t)}{r} < F^*$ and $F = F^*$.

Equilibrium payoffs: type 2 – $F^* - \frac{(F^*)^2}{2\overline{C_2}} + \frac{(\overline{C_2}-F^*)^2}{2\overline{C_2}}(1+r) + F^*t$; type 1 - $F^* - \frac{(F^*)^2}{2\overline{C_1}} + \frac{(\overline{C_1}-F^*)^2}{2\overline{C_1}}(1+r) + F^*t$. If type 1 deviates, its payoff is $F^* - \frac{(F^*)^2}{2\overline{C_2}} + \frac{(\overline{C_1}-F^*)^2}{2\overline{C_1}}(1+r) + F^*t$ which is greater than its equilibrium payoff. So this equilibrium does not exist.

[23] Proofs for other cases are available upon request.

Proof of Proposition 5. The following example provides the proof of the first part. □

Let $a > \frac{B}{\overline{C_1}} > \frac{B}{\overline{C_2}}$; $\frac{2\overline{C_1}(r-t)}{r} < F^* < \frac{2\overline{C_2}(r-t)}{r}$. Consider the following situation: $F_2 = 0$, $d_2 = K - I$, $F_1 = F^*$, and $d_1 = K - I + K - I + F^* - \frac{(F^*)^2}{2\overline{C_1}}$. Off-equilibrium market beliefs are that the firm is type 1, which will minimize the value of debt. It is based on Brennan and Kraus (1987). Equilibrium payoffs are: type 2 – $K - I + \frac{\overline{C_2}(1+r)}{2}$; type 1 –

$$K - I + F^* - \frac{(F^*)^2}{2\overline{C_1}} + \frac{(\overline{C_1} - F^*)^2}{2\overline{C_1}}(1+r) + F^*t \tag{A12}$$

If type 2 deviates, it makes $K - I + F^* - \frac{(F^*)^2}{2\overline{C_1}} + \frac{(\overline{C_2}-F^*)^2}{2\overline{C_2}}(1+r) + F^*t$. This is less than $K - I + F^* - \frac{(F^*)^2}{2\overline{C_2}} + \frac{(\overline{C_2}-F^*)^2}{2\overline{C_2}}(1+r) + F^*t$ which is in turn less than $K - I + \frac{\overline{C_2}(1+r)}{2}$ because $F^* < \frac{2\overline{C_2}(r-t)}{r}$. If type 1 deviates, its payoff is $K - I + \frac{\overline{C_1}(1+r)}{2}$ which is smaller than (A12) because $\frac{2\overline{C_1}(r-t)}{r} < F^*$.

In order to prove part 2, consider the following case. Type 1 selects $F_1 = 0$ and Type 2 selects $F^* \geq F_2 > 0$. The only candidate for such an equilibrium is the case $a > \frac{B}{\overline{C_1}}$ and $F^* < \frac{2\overline{C_1}(r-t)}{r}$, i.e., it's the only case when type 1's optimal strategy is $F = 0$. Equilibrium payoffs are: type 1 – $K - I + \frac{\overline{C_1}(1+r)}{2}$; type 2–

$$K - I + F_2 - \frac{(F_2)^2}{2\overline{C_2}} + \frac{(\overline{C_2} - F_2)^2}{2\overline{C_2}}(1+r) + F_2t \tag{A13}$$

If type 2 deviates and selects $F_2 = 0$, it makes $K - I + \frac{\overline{C_2}(1+r)}{2}$, which is greater than $K - I + F^* - \frac{(F^*)^2}{2\overline{C_2}} + \frac{(\overline{C_2}-F^*)^2}{2\overline{C_2}}(1+r) + F^*t$ because $F^* < \frac{2\overline{C_2}(r-t)}{r}$. $F^* - \frac{(F^*)^2}{2\overline{C_2}} + \frac{(\overline{C_2}-F^*)^2}{2\overline{C_2}}(1+r) + F^*t$ is in turn greater than (A13) because of the convexity of the payoff function.

Proof of Proposition 6. For brevity, we consider the case when $a > \frac{B}{\overline{C_1}} > \frac{B}{\overline{C_2}}$.[24] There are several potential candidates for an equilibrium. Again, the off-equilibrium market beliefs are that the firm is type 1. 1. Both types select $F = 0$ and $d = 0$. In this case we should have $\frac{2\overline{C_1}(r-t)}{r} < F^* < \frac{2\overline{C_2}(r-t)}{r}$ or $\frac{2\overline{C_1}(r-t)}{r} < \frac{2\overline{C_2}(r-t)}{r} < F^*$. If $\frac{2\overline{C_1}(r-t)}{r} > F^*$, type 1 would deviate and select $F > 0$ (Proposition 1). However, even if these conditions hold, type 1 would deviate and pay a higher dividend (again based on Proposition 1). Hence, such an equilibrium does not exist.

2. Both types select $F = 0$ and $d > 0$. A possible scenario is $d = K - I$. Otherwise firms will deviate and pay a higher dividend. Also we should have $F^* < \frac{2\overline{C_1}(r-t)}{r} < \frac{2\overline{C_2}(r-t)}{r}$.

Equilibrium payoffs are: type 2 – $K - I + \frac{\overline{C_2}(1+r)}{2}$; type 1 $K - I + \frac{\overline{C_1}(1+r)}{2}$. If type 1 deviates and pays, it makes $K - I + F^* - \frac{(F^*)^2}{2\overline{C_1}} + \frac{(\overline{C_1}-F^*)^2}{2\overline{C_1}}(1+r) + F^*t$. This is less than $K - I + \frac{\overline{C_1}(1+r)}{2}$ because $\frac{2\overline{C_1}(r-t)}{r} < F^*$. So this equilibrium exists.

3. Both types select $F > 0$ and $d > 0$. A potential candidate for an equilibrium is the case $F = F^*$ and $d = R_0$. If $d < R_0$, any undistributed cash will be "stolen" by the manager (Proposition 1). Additionally, $F < F^*$ is not optimal for both types, because of the convexity of the profit function (Proposition 2). Suppose that $F^* < \frac{2\overline{C_2}(r-t)}{r}$. The creditors will be paid in full when $C_1 > F^*$ and will receive C_1 otherwise. The probability that $C_1 > F^*$ equals $\frac{\overline{C_1}-F}{\overline{C_1}}$ for type 1 and $\frac{\overline{C_2}-F}{\overline{C_2}}$ for type 2. Therefore: $D_x = x\frac{\overline{C_2}-F^*}{\overline{C_2}}F^* + \frac{F^*}{\overline{C_2}}\frac{F^*}{2} + (1-x)\frac{\overline{C_1}-F}{\overline{C_1}}F^* + \frac{F^*}{\overline{C_1}}\frac{F^*}{2} = F^* - \frac{(F^*)^2}{2\overline{C_1}}$.The equilibrium payoff of type 2 is

$$K - I + D_x + \frac{(\overline{C_2} - F^*)^2}{2\overline{C_2}}(1+r) + F^*t \tag{A14}$$

[24] Proofs for other cases are available upon request.

If type 2 deviates and selects $F = 0$ and $d = K - I$, it makes $K - I + \frac{\overline{C_2}(1+r)}{2}$, which is greater than $K - I + F^* - \frac{(F^*)^2}{2\overline{C_2}} + \frac{(\overline{C_2}-F^*)^2}{2\overline{C_2}}(1+r) + F^*t$ because $F^* < \frac{2\overline{C_2}(r-t)}{r}$, which is, in turn, greater than (A14), because $D_x < \frac{\overline{C_2}-F^*}{\overline{C_2}}F^* + \frac{F^*}{\overline{C_2}}\frac{F^*}{2} = F^* - \frac{(F^*)^2}{2\overline{C_2}}$.

Now consider $\frac{2\overline{C_1}(r-t)}{r} < \frac{2\overline{C_2}(r-t)}{r} < F^*$. The difference with the previous case is that $K - I + \frac{\overline{C_2}(1+r)}{2}$, which is smaller than $K - I + F^* - \frac{(F^*)^2}{2\overline{C_2}} + \frac{(\overline{C_2}-F^*)^2}{2\overline{C_2}}(1+r) + F^*t$ because $F^* > \frac{2\overline{C_2}(r-t)}{r}$. Hence, two cases are possible. Either there exists x^*, such that $K - I + \frac{\overline{C_2}(1+r)}{2} = K - I + D_{x^*} + \frac{(\overline{C_2}-F^*)^2}{2\overline{C_2}}(1+r) + F^*t$ or $K - I + \frac{\overline{C_2}(1+r)}{2} < K - I + \frac{\overline{C_1}-F}{\overline{C_1}}F^* + \frac{F^*}{\overline{C_1}}\frac{F^*}{2} + \frac{(\overline{C_2}-F^*)^2}{2\overline{C_2}}(1+r) + F^*t$. If the latter is the case, the equilibrium exists for any x, since type 2 does not deviate, even if it is perceived in equilibrium to be type 1 (with positive debt). In the former case, this equilibrium exists for any $x \geq x^*$. Additionally, note that type 1 never deviates because if $\frac{2\overline{C_1}(r-t)}{r} < F^*$, the optimal strategy for this type is $F = F^*$, even under symmetric information. On top of that type 1 benefits from a lower interest rate on the loan compared to the symmetric information case.

4. Both types select $F > 0$ and $d = 0$. If such an equilibrium exists there will also exist another equilibrium with $d > 0$ (follows from Propositions 1 and 2) which is Pareto-improving (both types have a higher payoff). Since $a > \frac{B}{\overline{C_1}} > \frac{B}{\overline{C_2}}$ any cash that is not distributed as dividend will be "stolen" by the manager. □

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The Impact of Working Capital Management on Firm Profitability: Empirical Evidence from the Polish Listed Firms

Sorin Gabriel Anton and Anca Elena Afloarei Nucu *

Finance, Money, and Public Administration Department, Faculty of Economics and Business Administration, Alexandru Ioan Cuza University of Iasi, Carol I Avenue, No. 11, 700505 Iasi, Romania; sorin.anton@uaic.ro
* Correspondence: anca.afloarei.nucu@uaic.ro; Tel.: +40-740079731

Abstract: The purpose of this study is to investigate the relationship between working capital and firm profitability for a sample of 719 Polish listed firms over the period of 2007–2016. The scarcity of empirical evidence for emerging economies and the importance of working capital efficiency motivate the research on the working capital–financial performance relationship. The paper adopts a quantitative approach using different panel data techniques (ordinary least squares, fixed effects, and panel-corrected standard errors models). The empirical results report an inverted U-shape relationship between working capital level and firm profitability, meaning that working capital has a positive effect on the profitability of Polish firms to a break-even point (optimum level). After the break-even point, working capital starts to negatively affect firm profitability. The study brings theoretical and practical contributions. It extends and complements the literature on the field by highlighting new evidence on the non-linear interrelation between working capital management (WCM) and corporate performance in Poland. From the practitioners' perspective, the results highlight the importance of WCM for firm profitability.

Keywords: emerging economy; profitability; working capital management

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1. Introduction

The corporate finance literature recognizes the importance of short-term financial decisions for the firm's profitability. In a global context, the problematics of working capital management represent an ongoing topic because of its importance in ensuring the optimal route for businesses. Being able to act as a buffer of liquidity (Baños-Caballero et al. 2020), working capital plays a valuable role during economic turmoil (Enqvist et al. 2014). In a recent report about all globally listed companies (PWC Annual Report 2019), PWC Global highlights that improving working capital may release €1.3 trillion of cash, which may boost capital investment by 55%. Moreover, the report highlights new challenges for the financial performance of globally listed companies for the last five years: capital expenditure has declined, cash has become more expensive and harder to convert, and working capital has improved only marginally. Given this backdrop, businesses need to have a working capital culture as support for financial performance.

However, empirical evidence on the relationship between working capital and corporate performance is rather mixed. On the one hand, investments in working capital are supposed to have a positive influence on firm profitability because they support growth in terms of sales and earnings (Baños-Caballero et al. 2020; Aktas et al. 2015). Sales are positively influenced by trade credit, improving customer relationships, while holding more inventories secures the business from the perspective of price fluctuations. Moreover, short-term debts used to finance working capital have low-interest rates and are free from inflationary risk (Mahmood et al. 2019). On the other hand, overinvestment in working capital requires financing and, consequently, supplementary costs, and may also generate adverse effects and financial losses for shareholders (Chang 2018; Aktas et al. 2015). Therefore, a rapid increase in the cost of working capital investments relative to the benefits

of holding larger inventories or allowing for trade credit to customers lowers the firm's profitability levels. Recently, a few papers argued that there was a non-linear interrelation between investment in working capital and firm profitability (Mahmood et al. 2019; Tsuruta 2018; Boțoc and Anton 2017; Aktas et al. 2015; Mun and Jang 2015; Baños-Caballero et al. 2014). The non-linear relationship supposes that investments in working capital have a positive influence on corporate profitability until a certain point, called the optimum level of working capital (or the break-even point). Above the optimum, working capital may become a negative determinant of firm performance. The positive and negative combination with a break-even point is called an inverted U-shaped relationship (Mahmood et al. 2019). Taking into account that "entrepreneurial success can refer to the mere fact of continuing to run the business" (Staniewski and Awruk 2019), the trade-off between working capital and firm profitability can be acknowledged as of important significance in the context of entrepreneurial success.

This study seeks to examine the profit creating potential of working capital for a sample of firms from Poland over the period of 2007–2016. The first motivation behind the study is represented by market characteristics. The Polish market was developing dynamically and may have different characteristics than the patterns of mature markets (Mielcarz et al. 2018). Moreover, it is worth to know that according to FTSE Russell Agency, Poland was qualified as a developed country in 2018. Second, Poland's economic outlook motivates the present research. Over the analyzed period, inflation had an upward trend, leading to an increase in interest rates, which impacts the corporate cost of capital. In light of this threat, businesses may focus on the areas under their control, covering working capital. The third motivation behind this paper is the fact that a large body of recent research studies has investigated the impact of working capital on corporate performance from the perspective of developed economies especially the US, the UK, and China (i.e., Dalci et al. 2019; Ren et al. 2019; Laghari and Chengang 2019; Mahmood et al. 2019; Goncalves et al. 2018; Tsuruta 2018; Aktas et al. 2015; Mun and Jang 2015; Enqvist et al. 2014; Baños-Caballero et al. 2014). Specifically, a small number of studies have focused on emerging economies: Uganda (Kabuye et al. 2019), Egypt (Moussa 2018), Vietnam (Le 2019; Nguyen and Nguyen 2018), Malaysia (Yusoff et al. 2018), high-growth firms from emerging Europe (Boțoc and Anton 2017), Pakistan (Habib and Huang 2016), Ghana (Amponsah-Kwatiah and Asiamah 2020), Egypt, Kenya, Nigeria, and South Africa (Ukaegbu 2014). Golas (2020) analyzes the impact of working capital management on firm profitability only for the Polish dairy industry, from the perspective of different elements of working capital. The authors find that inventories and cash conversion cycle relate inversely with Return on Assets (ROA), while days sales outstanding and days payable outstanding have a positive influence on profitability. Therefore, the scarce empirical literature for emerging economies highlights contradictory results. The present paper attempts to fill in this gap in the literature. Therefore, the importance of working capital efficiency and the monetary policy tightening motivate the research on working capital–corporate performance interrelation, to enhance companies' working capital culture.

The analysis is conducted on 719 firms listed on the Warsaw Stock Exchange and different panel data methodologies are employed. The results indicate an inverted U-shaped (concave) relationship between working capital ratio and firm profitability and the findings are robust for different proxies and methodologies, namely a panel model with fixed effects and the panel-corrected standard errors (PCSE) estimation, respectively.

We identify several arguments to assess the nexus between working capital and firm performance on the example of Polish listed firms. Firstly, the Polish stock market is the most developed in Central and Eastern Europe in terms of listed firms and trading volumes. Secondly, being a developing economy, the cost of capital is higher and the capital market is less developed when compared to Western economies, therefore, firms that hold high working capital on their balance sheet are exposed to higher interest charges and, therefore, to bankruptcy risk. On the other hand, similar to other countries in the region, in Poland, the banking sector represents the largest share of the financial system. Both lending

standards and lending terms were tightened since the start of the financial crisis of 2008 and, therefore, the firms may face credit constraints and cannot acquire sufficient credit to invest in working capital (Tsuruta 2019). Moreover, Chen and Kieschnick (2018) demonstrate that the availability of bank credit has a significant impact on firms' working capital policies.

Our study brings new theoretical and practical contributions to the relationship between working capital management and firm profitability. Firstly, the research extends and complements the literature on the field by highlighting new evidence on the non-linear interrelation between working capital management and corporate performance in Poland. The results reveal a concave working capital–firm profitability relationship, meaning that working capital has a positive effect on profit up to a break-even point (optimum level). After the break-even point, working capital starts to negatively affect the firm profitability. The findings highlight that proactive working capital policies are profit-enhancing. Secondly, the study brings relevant corporate policy implications for an emerging economy framework. The results are suitable for use in business practice. In other words, corporate financial executives should avoid greater net investment in working capital and target its optimal level, while internally-generated funds can be oriented towards more profitable investment opportunities. Therefore, corporate managers should focus on maintaining accounts payable, accounts receivable, and inventory turnover at a certain level, to maximize the effects of working capital, for the benefit of the shareholders. From the practitioner's perspective, working capital represents a potential tool to optimize financial performance and also indicates the areas requiring improvement and supervision to ensure financial performance. Policymakers can use this knowledge for profit maximization. We consider that the results push forward the understanding of treasury management, a complex and dynamic domain, oriented towards the highest performance and simplification of all treasury activities (Polak et al. 2018). The research highlights that, above the optimal level, working capital harms business performance. As working capital can be viewed as an adequate forecasting indicator about future economic issues (Michalski 2014), we consider that our research could offer a macroeconomic signal if most of the public firms hold higher levels of working capital.

The remainder of this article is organized as follows: Section 2 presents the relevant literature on the working capital management–firm profitability relationship. Section 3 describes the sample used in the empirical analysis and the considered empirical methods. Section 4 presents the empirical results and robustness checks. Section 5 concludes the paper and offers some policy implications.

2. Literature Review

The academic literature proposes different competing views to explain the relationship between working capital and firm performance. On the one hand, most of the previous studies find a positive relationship between the two measures, based on firms from developed economies—the US (Lyngstadaas 2020), the UK (Goncalves et al. 2018), Finland (Enqvist et al. 2014), or from developing economies—Uganda (Kabuye et al. 2019), Egypt (Moussa 2018), Vietnam (Nguyen and Nguyen 2018), Ghana (Amponsah-Kwatiah and Asiamah 2020). Kabuye et al. (2019) analyze the impact of internal control systems and working capital management on the financial performance of 110 supermarkets from Uganda and find that working capital management is a significant predictor of financial performance. Moussa (2018) examines the impact of working capital management on the performance of 68 industrial firms from Egypt for the period of 2000–2010 and documents a positive relationship between working capital management (measured by the cash conversion cycle) and firm profitability. The author points out that stock markets in less developed economies do not realize the optimum efficiency of their WCM. Nguyen and Nguyen (2018) analyze the relationship between working capital management and corporate profitability and document a positive nexus between working capital management and the performance of Vietnamese listed firms over the period of 2008–2014. Listed manufacturing firms in Ghana exhibit a positive relationship between different components of working capital

and profitability, as reported by Amponsah-Kwatiah and Asiamah (2020). Moreover, Goncalves et al. (2018) confirm that WCM efficiency increases profitability on the example of UK unlisted companies between 2006 and 2014. For the US, effective working capital management is found to be associated with the higher financial performance of listed manufacturing firms, as reported by Lyngstadaas (2020). Enqvist et al. (2014) examine the impact of working capital management on firm profitability in different business cycles, on the example of Finland between 1990 and 2008, and highlight that firms can enhance their profitability by improving working capital efficiency. This first point of view is explained by the fact that working capital offers the firms the opportunity to grow by increasing sales and revenues. There are firms with large exposure to risk connected to small levels of inventory (Michalski 2016). Therefore, in the case of those firms, holding a low level of inventory leads to negative modifications of sale levels and weaker profits (Michalski 2016).

On the other hand, an alternative strand of research reports that WCM negatively influences profitability, using samples for developed economies (Fernandez-Lopez et al. 2020; Ren et al. 2019; Dalci et al. 2019), European Union (Akgun and Karatas 2020), or for developing economies (Pham et al. 2020; Wang et al. 2020; Le 2019; Yusoff et al. 2018; Habib and Huang 2016; Ukaegbu 2014). Fernandez-Lopez et al. (2020) report a negative relationship between different components of working capital and firm performance for a sample of Spanish manufacturing companies during the period of 2010–2016. Dalci et al. (2019) analyze the relationship between cash conversion cycle and profitability over 2006–2013 for 285 German non-financial firms and found that shortening the length of cash conversion cycle has a positive effect on the profitability of small and medium-sized firms, based on different methodologies: pooled ordinary least squares (OLS), fixed effects, random effects, and generalized method of moments (GMM). A negative relationship between working capital and business performance is found by Akgun and Karatas (2020) for a sample of European Union-28 listed firms during the 2008 financial crisis. Moreover, an inverse link between the cash conversion cycle and profitability of Chinese non-state-owned enterprises is found by Ren et al. (2019). Le (2019) reports a negative impact of working capital management on firm valuation, profitability, and risk for a sample of 497 firms from Vietnam over the period of 2007–2016. The same negative relationship for Vietnamese steel companies is also reported by Pham et al. (2020). Yusoff et al. (2018) investigate the relationship between working capital management and firm performance for 100 selected manufacturing companies in Malaysia. The authors show that the inventory conversion period, average collection period, and cash conversion cycle are significantly and negatively correlated with profitability. Improving firm performance by a conservative working capital management policy is also confirmed by Chang (2018), based on a sample of 31,612 companies from 46 countries over the period of 1994–2011. A detrimental influence of a longer cash conversion period on profitability is reported also for India by Shrivastava et al. (2017) based on both classical panel analysis and Bayesian techniques. Habib and Huang (2016) find that positive working capital harms profitability, while a negative working capital affects profitability positively, on the example of Pakistan, by employing panel least squares estimation, panel fixed effect, and panel generalized method of movement. A negative association between WCM and performance of non-financial listed firms in Pakistan is also highlighted by Wang et al. (2020). Using data on Brazilian public companies over the period of 1995–2009, De Almeida and Eid (2014) find that increasing the level of working capital at the beginning of a fiscal year diminishes company value. Moreover, a negative effect of cash conversion cycles on firm profitability, measured as net operating profit, is documented by Ukaegbu (2014), based on a panel of manufacturing firms in Egypt, Kenya, Nigeria, and South Africa for the period of 2005–2009. The second point of view is explained by the fact that higher investments in working capital involve more financing and, therefore, the interest expenses of firms might increase, being more exposed to bankruptcy risk. It is appreciated that an increase in the level of working capital generates higher costs of holding and managing working capital, with a negative effect on firm

value (Michalski 2014). However, the relationship of working capital components with the firm value depends on the risk-sensitivity level of firms (Michalski 2014). Before, during, and after a financial crisis, Michalski (2016) demonstrates that the level of working capital is higher and acts as a hedging instrument against the cost of disruptive productivity.

Recently, the third point of view emerged and focused on the functional form of the relationship between working capital and firm profitability. A few studies report a concave relationship between the two measures, most of them on the example of firms from developed economies (Mahmood et al. 2019; Tsuruta 2018; Aktas et al. 2015; Baños-Caballero et al. 2014) followed by a sample of firms from emerging European countries (Boțoc and Anton 2017) or firms from a certain sector (Mun and Jang 2015). Mahmood et al. (2019) report an inverted U-shaped working capital–profitability relationship using GMM as methodology, for a sample of Chinese companies over the period of 2000–2017. Empirical evidence of inverted U-shaped relationship between working capital and profitability of Chinese listed companies is also reported by Laghari and Chengang (2019), based on the same GMM methodology. Using data from over 100,000 small businesses in Japan, Tsuruta (2018) reports a negative impact of working capital on firm performance in the short run, but positive over longer periods. Altaf and Shah (2018) provide evidence of the inverted U-shape relationship between WCM and firm profitability for a sample of 437 non-financial Indian companies, based on GMM methodology. Boțoc and Anton (2017) report an inverted U-shape relationship between working capital level and firm profitability, based on a panel of high-growth firms from Central, Eastern, and South-Eastern Europe over the period of 2006–2015. The concave relationship between working capital level (measured by the cash conversion cycle) and firm profitability is also reported by Afrifa and Padachi (2016), using panel data regression methods, for a sample of 160 listed firms during the period of 2005–2010. Aktas et al. (2015) document the relationship between WCM and firm performance on a sample of firms from the US over the period of 1982–2011 using fixed-effects regressions. The authors highlight an optimal point of working capital investment, towards which firms may converge to improve their overall performance. Moreover, Mun and Jang (2015) report a concave impact of working capital on firm value, which supports the idea of an optimal working capital level for US firms from a specific industry (restaurants), over the period of 1963–2012, based on static and dynamic panel data methodologies. For a sample of firms from the UK, Baños-Caballero et al. (2014) point out a non-linear relationship between working capital and firm value, meaning that there is an optimal level of working capital that maximizes firm revenues. Additionally, the optimal level depends on the financing constraints, the authors indicating that the optimal working capital level is lower for firms under financial constraints.

As can be noticed, corporate finance literature does not provide a general agreement on how working capital affects firm performance. The divergence can be explained by different measures used for working capital: cash conversion cycle (Dalci et al. 2019; Shrivastava et al. 2017; Ukaegbu 2014), most popular indicator used as proxy, net trade cycle (Baños-Caballero et al. 2014) or other measures (Inventory Turnover Ratio, Working Capital Turnover Ratio). Using these measures, in most of the studies, working capital is expressed as a composite measure (Prasad et al. 2019), but there are also a few studies that have examined the impact of working capital on profit, at the level of individual components of cash conversion cycle or net trade cycle (Enqvist et al. 2014). Moreover, Mahmood et al. (2019) provide several reasons to explain why companies may exhibit a different working capital–profitability: ownership structures, financial flexibility, tax provisions, and leverage. Moreover, the mixed results highlight that the relationship between working capital components and firm profitability may be more complex, and the empirical studies have not found the underlying mechanisms (Peng and Zhou 2019). In a recent paper, Peng and Zhou (2019) propose to consider different discount rates of companies to encounter the inconsistency in the relationship between working capital components and corporate profitability.

Maximization of the business profitability is an effect of working capital management, but also the reverse causality is plausible when firms are profitable, they have more cash to invest in working capital. Moreover, both firm profitability and working capital are determined by multiple factors. From the perspective of potential endogeneity issue, the study of Seth et al. (2020) is probably among the first that evaluates the impact of several exogenous variables on the WCM efficiency and firms' performance. Based on data envelopment analysis and structural equation modeling, the authors find that the following variables have a direct effect on WCM efficiency, and, therefore, on firms' performance: interest coverage, leverage, net fixed asset ratio, and asset turnover ratio. The literature recognizes some relevant channels that moderates the relationship between working capital and firm performance. One relevant channel is corporate governance. Kayani et al. (2019) provide evidence on the collective empirical impact of WCM and corporate governance on financial performance for the US listed firms. The authors recommend considering the collective effects of short-term (WCM) and long-term (corporate governance) indicators, on financial performance. Giroud and Mueller (2011) take into account market competition and highlight, that, weak corporate governance lowers firm value in non-competitive industries. Moreover, the endogeneity problem can be driven by CEO characteristics. The firm's chief executives are more focused on achieving short-term profitability, rather than long-term performance (Kayani et al. 2019).

From the methodology perspective, the empirical findings are, mostly, documented on static panel data methods (regression analysis) and correlation analysis. Recently, some studies use methods, like GMM to control for endogeneity challenges (Dalci et al. 2019; Mahmood et al. 2019; Laghari and Chengang 2019; Altaf and Shah 2018; Boțoc and Anton 2017). Endogeneity is recognized as being a challenge in corporate finance, and thus Li (2016) proposes several methods to deal with it, as follows: GMM, instrumental variables, fixed effects models, lagged dependent variables, and control variables. The current econometric analysis is performed using, behind ordinary least squares, two additional panel data techniques, the fixed-effects, and panel-corrected standard errors models. The justification is represented by the advantages of fixed-effects regression analysis, which takes full account of factors that might influence firm profitability in a certain year, and respectively of panel-corrected standard errors model, which accounts for firm-level heteroscedasticity and contemporaneous correlations across firms. Moreover, the combination of the methods (fixed effects and meaningful control variables) appears to work in mitigating endogeneity issues, according to Li (2016).

The mixed results regarding the effects of working capital indicate that short-term financial decisions should recognize working capital as a determining factor of financial performance. Therefore, the current research assumes the existence of an optimal working capital level for firms in Poland that maximizes their benefits. Figure 1 displays the relationship between the level of working capital (WKCR) and profitability (ROA). We notice a non-linear relationship (inverted U-shape) between WKCR and ROA suggesting that the inclusion of WKCR square in the model is necessary. Specifically, in line with the previous studies (Boțoc and Anton 2017), the authors propose the following hypothesis:

Hypothesis 1. *There is a non-linear relationship between working capital and financial performance, with an optimal working capital level that maximizes firm profitability.*

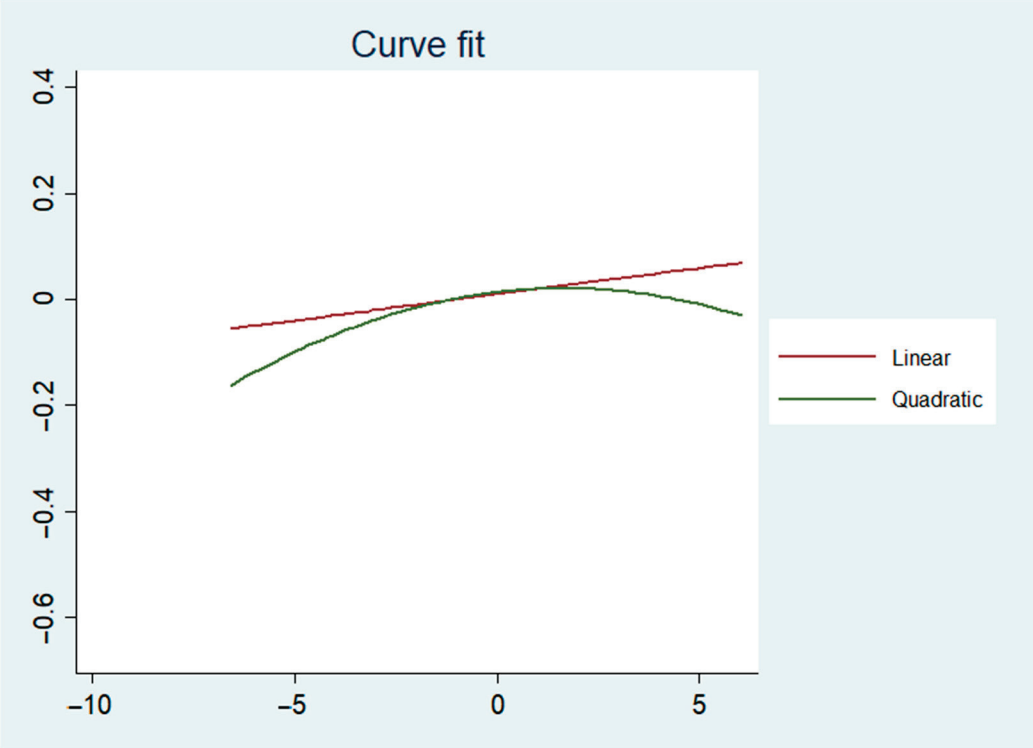

Figure 1. Curve estimation regression models between the level of working capital (WKCR) and profitability (ROA).

3. Data and Methodology

Data were collected from the Amadeus database and the final sample comprised 719 listed firms on the Warsaw Stock Exchange for the period of 2007–2016, which corresponds to 3043 firm-year observations. We exclude from the initial sample financial firms and firms with missing observations for our variables of interest.

In line with previous research (Baños-Caballero et al. 2014), a quadratic model is analyzed. The research is based on the working capital ratio (WKCR), a proxy variable for working capital management, calculated as (Inventories + Debtors − Creditors)/Sales in line with previous studies (Aktas et al. 2015; Boțoc and Anton 2017). Thus, the study employs a variable that indicates the amount of money that the operating cycle implies (Boțoc and Anton 2017), rather than variables that reflect a length of time, such as cash conversion cycle (Dalci et al. 2019; Shrivastava et al. 2017; Ukaegbu 2014) or net trade cycle (Baños-Caballero et al. 2014).

The econometric analysis regresses firm profitability against the working capital ratio (WKCR) and its square ($WKCR^2$). Firm performance is measured by return on assets (ROA), an overall indicator of profitability, calculated as net income to total assets, consistent with the previous studies (Dalci et al. 2019; Enqvist et al. 2014). For the robustness purpose, operating return on assets (OROA) has been considered as an alternative measure for profitability, defined as earnings before interest and taxes (EBIT) to total assets ratio. Supplementary independent variables are also considered in the regression model to account for additional determinants of corporate performance, as follows: debt ratio (DEBTR) calculated as the sum of non-current liabilities and loans over total assets; cash ratio (CASHR) computed as cash and cash equivalents divided to total assets; the one-year growth rate in sales (SALESGR), computed as $(Sales_1 - Sales_0)/Sales_0$, as a proxy for growth opportunities; firm size (SIZE), measured as the logarithm of total assets. The independent variables are described in Table 1.

Table 1. Description of the exogenous variables and the expected sign.

Variables	Notation	Formula	Expected Sign
Working capital ratio	WKCR	(Inventories + Debtors − Creditors)/Sales	+
	$WKCR^2$	[(Inventories + Debtors − Creditors)/Sales]^2	−
Debt ratio	DEBTR	Total liabilities/Total assets	−
Cash ratio	CASHR	(Cash + cash equivalents)/Total assets	+
Sales growth	SALESGR	(Current year sales/previous year sales) − 1	+
Firm size	SIZE	Log of total assets	+

Source: authors' work based on the literature review.

Table 2 displays the descriptive statistics for firm profitability, working capital ratio, and the control variables. Table 2 shows that for Polish firms under the analyzed period, return on assets is, on average, around 1%, while the working capital ratio represents, on average, 19.71% of sales. The value for ROA is comparable with those reported for the German non-financial firms (1.1% reported by Dalci et al. 2019) but considerably lower than those reported for the Finnish firms (8.4% reported by Enqvist et al. 2014) or for the Spanish SMEs (7.9% reported by Garcia-Teruel and Martinez-Solano 2007). The sales of Polish firms on average increased by almost 13% annually and debt represents 23.46% of total assets.

Table 2. Summary statistics.

Variable	Mean	Std. Dev.	Min	Max
ROA	0.0092	0.1416	−0.6743	0.3345
OROA	0.0241	0.1661	−0.8881	0.3996
WKCR	0.1971	1.1071	−6.5923	6.0617
DEBTR	0.2346	0.2001	0.0000	1.1024
CASHR	0.0988	0.1262	0.0002	0.6765
SALESGR	0.1324	0.9540	−0.9781	7.5288
SIZE	17.3198	2.3334	11.9198	23.0975

Note: ROA represents the return on assets; OROA—operating return on assets; WKCR—working capital ratio; DEBTR is the debt ratio; CASHR—cash ratio; SALESGR—sales growth; SIZE—firm size. Source: own calculation.

Table 3 shows correlations among the dependent and independent variables of the econometric model. It can be noticed that the coefficient between ROA and WKCR is positive, while the coefficient between ROA and $WKCR^2$ is negative, which shows that working capital management, above its optimal level, has a less efficient effect on corporate profitability. The results also indicate a negative effect of debt ratio on the working capital level. Growth opportunities relate positively to working capital. The correlation matrix highlights low correlations between independent regressors, therefore the analysis does not suffer because of multicollinearity.

The following econometric specification is used to test the hypothesis regarding the impact of working capital management on firm profitability:

$$ROA_{i,t} = \alpha + \beta_1 WKCR_{i,t} + \beta_2 WKCR^2_{i,t} + \beta_3 DEBTR_{i,t} + \beta_4 CASHR_{i,t} + \beta_5 SALESGR_{i,t} + \mu_{i,t} + \lambda_j + \varepsilon_{i,t} \quad (1)$$

where the dependent variable ROA is the return on assets; the independent variables of interest are $WKCR_{i,t}$, measured as (inventories + debtors − creditors)/sales for the firm i at time t, and its square term ($WKCR^2_{i,t}$) used to test for the non-linearity of our model; as control variables, we employ $DEBTR_{i,t}$ (debt ratio), $CASHR_{i,t}$ (cash ratio) and $SALESGR_{i,t}$ (one-year growth rate in sales); $\mu_{i,t}$ denotes the unobservable firm and time effects; λ_j is an industry unobservable effect; $\varepsilon_{i,t}$ represents the error term.

The study employs three different panel data techniques to estimate Equation (1). Firstly, a pooled ordinary least-squares regression model (OLS) with robust standard errors is estimated to get heteroscedasticity-robust estimators. Secondly, a static panel model with fixed-effects (FE) is defined. The Hausman test was employed to detect the endogenous predictor variables and to choose between fixed-effects or random-effects models. The null hypothesis states that there is no correlation between the error term and the regressors, and, therefore, the preferred model is random effects. In our case, the test rejects the random-effects specification so fixed-effects estimations are employed. Thirdly, in line with Beck and Katz (1995), the research also employs a panel-corrected standard errors (PCSE) to account for firm-level heteroscedasticity and contemporaneous correlations across firms. Following Petersen (2009), the robust standard errors clustered at the firm level were used to simultaneously relax both the assumption of homoscedasticity and the assumption of no autocorrelation in the panel dataset. Time fixed effects are included to control for macroeconomic shocks that might influence firm profitability in a certain year.

Table 3. Correlation matrix.

Variables	ROA	ROI	WKCR	$WKCR^2$	DEBTR	CASHR	SALESGR	SIZE
ROA	1							
OROA	0.7075	1						
WKCR	0.1043	0.1159	1					
$WKCR^2$	−0.1394	−0.1463	−0.0758	1				
DEBTR	−0.2122	−0.1385	−0.0237	0.1279	1			
CASHR	0.1217	0.0653	−0.0236	−0.0245	−0.259	1		
SALESGR	0.0348	0.0752	0.0719	0.0193	−0.0114	0.0295	1	
SIZE	0.1738	0.224	0.0752	−0.0602	0.1361	−0.1667	−0.0417	1

Note: ROA represents return on assets; ROI—return on invested capital; WKCR—working capital ratio; DEBTR is the debt ratio; CASHR—cash ratio; SALESGR—sales growth; SIZE—firm size. Source: own calculation.

4. Discussion

4.1. The Non-Linear Relationship between Working Capital and Firm Profitability

Table 4 presents the firm performance regressions, where columns 1 to 3 report the results derived from Equation (1) for the ordinary least square model (OLS), the fixed effects model (FE), and panel corrected standard errors (PCSE), respectively. The dependent variable is represented by ROA. In line with the hypothesis assumed, the findings confirm the non-linear relationship between firm profitability and working capital. It is observable that the coefficient for the WKCR variable is positive ($\beta_1 > 0$), which indicates a positive working capital-profit nexus, while for its square is negative ($\beta_2 < 0$), which shows a negative working capital–profit relationship.

The positive and negative trends, together with the optimal level, form an inverted U-shaped relationship, which validates the research hypothesis. The findings are statistically significant at conventional levels. Consistent with the results of Baños-Caballero et al. (2014), below the optimal level, working capital has a positive impact on firm profitability, due to an increase in sales and discounts for payments in advance. Above the optimal level, working capital harms firm profitability, because of the opportunity cost, financing cost, and refinancing uncertainties.

The results for the control variables show that the debt ratio and cash ratio are statistically significant determinants of performance. In line with the Pecking Order Theory of capital structure, firm profitability is negatively associated with debt (Aktas et al. 2015; Enqvist et al. 2014). Pecking Order Theory predicts that firms prioritize their sources of financing, from internal financing to equity, considering the cost of resources. This research is contributing to the literature, by providing out-of-sample evidence of the above theory on the example of an emerging market. Moreover, Allini et al. (2018) demonstrate that the most profitable firms are less likely to prefer external financing. Moreover, a change in short-term debt impacts the working capital as stated by De Jong et al. (2011).

Sales growth, which could be an indicator of a firm's business opportunities, and cash ratio are an important factor allowing firms to enjoy improved profitability, as it is highlighted by the positive sign correspondent coefficients (Boțoc and Anton 2017; Garcia-Teruel and Martinez-Solano 2007).

Table 4. The relationship between working capital and firm profitability (measured by ROA).

Independent Variables	Model 1	Model 2	Model 3
	OLS	FE	PCSE
WKCR	0.0117 ***	0.0183 ***	0.0139 ***
	(−0.0036)	(−0.0039)	(−0.0038)
$WKCR^2$	−0.0025 ***	−0.0016 **	−0.0022 ***
	(−0.0006)	(−0.0007)	(−0.0007)
DEBTR	−0.1147 ***	−0.1884 ***	−0.1304 ***
	(−0.0188)	(−0.0221)	(−0.0221)
CASHR	0.0798 **	0.1377 ***	0.0754 **
	(−0.0383)	(−0.0309)	(−0.037)
SALESGR	0.0036	0.0082 ***	0.0046
	(−0.0046)	(−0.0028)	(−0.0041)
Constant	0.0301 ***	0.0428 ***	0.0338 ***
	(−0.0079)	(−0.0066)	(−0.0075)
R-squared	0.0722	0.0739	0.0588
N. of cases	2499	2499	2499

Notes: WKCR and $WKCR^2$ measure working capital. Control variables are DEBTR, CASHR, and SALESGR. ** $p < 0.05$; *** $p < 0.01$. Robust standard errors are reported in brackets. Source: authors' calculations.

4.2. Robustness Checks

The robustness of the effect of WCM on firm performance is evaluated by performing two complementary tests. First, an alternative measure for the dependent variable is employed, namely, operating return on assets (OROA) keeping the econometric approach and the set of independent regressors. The results are displayed in Table 5. Second, an additional independent variable is added in Equation (1), namely firm size, measured as the logarithm of total assets. Table 6 reports these additional results.

Table 5. The relationship between working capital and firm profitability (measured by OROA).

Independent Variables	Model 1	Model 2	Model 3
	OLS	FE	PCSE
WKCR	0.0144 **	0.0134 ***	0.0131 ***
	(−0.0061)	(−0.0041)	(−0.0048)
$WKCR^2$	−0.0033 ***	−0.0004	−0.0021 **
	(−0.0011)	(−0.0007)	(−0.0009)
DEBTR	−0.0815 ***	−0.1387 ***	−0.1139 ***
	(−0.0276)	(−0.0228)	(−0.0302)
CASHR	0.0412	0.0906 ***	0.0478
	(−0.0415)	(−0.032)	(−0.0419)
SALESGR	0.0106 **	0.0128 ***	0.0098 **
	(−0.0043)	(−0.0029)	(−0.0042)
Constant	0.0466 ***	0.0525 ***	0.0492 ***
	(−0.009)	(−0.0069)	(−0.01)
R-squared	0.0525	0.0446	0.0428
N. of cases	2499	2499	2499

Notes: WKCR and $WKCR^2$ measure working capital. Control variables are DEBTR, CASHR, and SALESGR. ** $p < 0.05$; *** $p < 0.01$. Robust standard errors are reported in brackets. Source: authors' calculations.

Table 6. The augmented model of the relationship between working capital and firm profitability (ROA).

Independent Variables	Model 1	Model 2	Model 3
	OLS	FE	PCSE
WKCR	0.0098 ***	0.0146 ***	0.0119 ***
	(−0.0037)	(−0.004)	(−0.0037)
$WKCR^2$	−0.0022 ***	−0.0015 **	−0.0018 ***
	(−0.0006)	(−0.0007)	(−0.0007)
DEBTR	−0.1297 ***	−0.1822 ***	−0.1462 ***
	(−0.0182)	(−0.022)	(−0.0226)
CASHR	0.1102 ***	0.1374 ***	0.1016 ***
	(−0.0377)	(−0.0307)	(−0.0364)
SALESGR	0.0047	0.0057 **	0.0053
	(−0.0045)	(−0.0028)	(−0.004)
SIZE	0.0118 ***	0.0312 ***	0.0136 ***
	(−0.0017)	(−0.0063)	(−0.002)
Constant	−0.1740 ***	−0.5091 ***	−0.2016 ***
	(−0.0306)	(−0.1112)	(−0.0362)
R-squared	0.1134	0.1294	0.0882
N. of cases	2499	2499	2499

Notes: WKCR and WKCR2 measure working capital. Control variables are DEBTR, CASHR, SALESGR, and SIZE. ** $p < 0.05$; *** $p < 0.01$. Robust standard errors are reported in brackets. Source: authors' calculations.

The results displayed in Table 5 indicate that the sign of the coefficients for the WKCR variable and its square do not suffer any modification. The findings confirm the non-linear relation between firm profitability and working capital levels, for all econometric specifications, in line with the baseline results. The coefficient estimates show that firms that hold excessive working capital (above the optimal level) face a decrease in the efficiency in allocating the capital to profitable investments.

Further, we employ the same econometric approach, but we add firm size to the set of control variables. Firm size is a variable that captures firm transparency, market access, and creditworthiness (Tsuruta 2018). Smaller firms face can face financial constraints, because of information asymmetry between borrowers and lenders. Taking into account that, in Poland, the banking sector has the largest part of the financial system, the firms may have problems to obtain enough funds to invest in working capital. Therefore, firm size is expected to be a positive determinant of profitability and the results confirm the expectations. The positive sign of SIZE shows that large size seems to favor the generation of profitability, as confirmed by Garcia-Teruel and Martinez-Solano (2007) for SMEs in Spain. Moreover, the results displayed in Table 6 indicate that the relationship between WKCR and ROA is a concave one, with an optimal working capital level.

Therefore, the findings of all models are consistent with the hypothesis of a concave relationship between working capital management and firm profitability, which implies the existence of an optimal level that maximizes Polish firm performance. Each model with $WKCR^2$ tests the effects of the square term of WKCR on firm performance and confirm the functional form between working capital management and corporate profitability, supported by previous studies (Tsuruta 2018; Boțoc and Anton 2017; Afrifa and Padachi 2016; Aktas et al. 2015; Baños-Caballero et al. 2014).

5. Conclusions

Our paper provides empirical evidence on the working capital-profitability relationship for a sample of 719 listed firms from Poland over the period of 2007–2016. Based on different panel data techniques, the relationship proved to be inverted U-shaped. The empirical results highlight that, at a low level of working capital, increasing sales and discounts on early payments significantly influence positively corporate profitability. However, a

further increase in working capital above its optimum level establishes a negative working capital–profitability trend, which indicates the disadvantages of working capital financing, respectively opportunity cost and high-interest charges. Firm-specific variables were considered. The findings show that the debt ratio and cash ratio are statistically significant determinants of profitability. In line with the Pecking Order Theory of capital structure, firm profitability is negatively associated with debt. Other control variables (sales growth, cash ratio, and firm size) are found to be important determinants of firm profitability. The empirical findings proved to be robust while using an alternative proxy for the dependent variable–operating return on assets (OROA), and when additional firm-related control variables were considered.

The current study brings theoretical and practical implications. For researchers, our results suggest that a quadratic model needs to be tested for any sample of firms. In terms of practical implications, Polish firms exhibit an inverted U-shaped relationship between working capital and corporate performance, meaning that managers should avoid negative effects on firm profitability through lost sales, lost discounts for early payments, or supplementary financing expenses. The results suggest that corporate financial executives should avoid greater net investment in working capital and target its optimal level, while internally-generated funds can be oriented towards more profitable investment opportunities. Reducing unnecessary working capital releases unnecessary cash invested to fund daily operating activities and increases the firm financial flexibility. Therefore, corporate managers should focus on maintaining accounts payable, accounts receivable, and inventory turnover at a certain level, to maximize the effects of working capital for the benefit of the shareholders. Our results highlight the importance of WCM for profit maximization. The results are suitable for use in business practice, highlighting the importance of finding and attaining the optimal level of working capital.

The study is not without limitations. Firstly, the empirical findings are limited to the listed firms from one emerging country (Poland). Moreover, from the endogeneity perspective, most of the financial variables at the firm level are determined in a network of relationships. Future research extending the sample of countries and controlling for macroeconomic factors and endogeneity issues could bring a valuable contribution to the field. New directions of research should include the role of corporate governance and compensation incentives in mediating the relationship between working capital management and firm profitability (Coles and Li 2019; Coles and Li 2020).

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Executive Compensation and Firm Performance in New Zealand: The Role of Employee Stock Option Plans

David K. Ding [1,2,*] and Ya Eem Chea [3]

[1] Lee Kong Chian School of Business, Singapore Management University, Singapore 178899, Singapore
[2] School of Economics and Finance, Massey University, Auckland 0745, New Zealand
[3] Securities and Exchange Commission Ministry of Economy and Finance, Phnom Penh 12107, Cambodia; c_yaeem@secc.gov.kh
* Correspondence: d.ding@massey.ac.nz or davidding@smu.edu.sg

Abstract: We examine the role of employee stock option plans (ESOPs) in mitigating agency problems in New Zealand firms. We find that ESOPs have a significant and positive effect on firm performance relative to their non-ESOP counterparts. This relation appears within a year from the first ESOP announcement, and for two to four years after the announcement. Our results show that ESOPs improve corporate performance by 10 times the cost of the ESOPs' adoption in the first year of issue. The improvement persists for four years after the first issuance. These findings confirm the effectiveness of employee stock option plans for companies issuing ESOPs compared with companies that do not issue ESOPs, and show how much the value creation of ESOPs contributes to these firms.

Keywords: employee stock option plans; executive compensation; firm performance; New Zealand

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1. Introduction

Attempts to determine an effective tool of executive compensation that is aligned with the best interests of shareholders have been a long-standing topic of discussion among academicians, researchers, investors, and corporations. Executive compensation is recognized as a cashless incentive that reduces the agency problem between shareholders and managers. Shleifer and Vishny (1997) suggest that incentive contracts are related to addressing agency problems in the field of corporate governance. Likewise, Jensen and Murphy (1990) show that, on average, chief executive officers (CEOs) are awarded $3.25 for every $1000 increase in shareholder value. The corporate practice of executive incentives develops into various forms, including share-based schemes and employee stock option plans (ESOPs). ESOPs in New Zealand are not yet broadly implemented, or widely analyzed by researchers. About one-third[1] of New Zealand listed firms prefer to adopt ESOPs to reward their employees. To inform about the effectiveness of ESOPs, we address the effectiveness of employee stock option plans among New Zealand firms and how much value ESOPs contribute to their performance.

The extant literature on ESOPs includes the studies of Coughlan and Schmidt (1985), Murphy (1985), Jensen and Murphy (1990), Abowd (1990), and Leonard (1990), who first investigated the relationship between executive compensation and firm performance. Subsequent researchers have examined option grants for top management and showed that ESOPs are an effective tool for aligning the interests of managers with shareholder wealth. For example, for one and a half decades, firms and their shareholders witnessed sharp growth in ESOPs, leading to an increase in CEO pay performance sensitivity, as documented by Hall and Liebman (1997). Langmann (2007) finds that significant abnormal returns on ESOP announcement dates are greater than their associated costs among German firms. Japanese investors earn a two-percent abnormal return during ESOP announcements

[1] From the initial data collection, 59 firms have adopted ESOPs, which is approximately one-third of the sample firms.

(Kato et al. 2005). Ding and Sun (2001) report support for the positive impact of ESOPs on firm performance among Singaporean firms.

Despite the benefits that ESOPs can create for firms, there are some drawbacks since ESOPs may not always be executed appropriately. Overuse of ESOPs and costly adoption are examples of ineffective ESOPs. Tian (2004) discusses grant size impacts of ESOPs and find that an increase in the size of incentive grants may lessen an ESOP's effect on stock price maximization when the total value of the ESOPs exceeds a proportion of the firm's total capital value. Another factor is when the value of ESOPs to companies is lower than the cost of their establishment. Hall and Murphy (2003) find that this happens when managers and directors of a company perceive the expense of ESOPs as the cost of accounting and cash flow consideration rather than the economic cost of the incentive. Therefore, issuing more grants would hurt the company's financial position.

This paper addresses two important questions. The first investigates whether ESOP issuers outperform their non-ESOP counterparts. The second measures the size of the value contribution by firms with ESOPs. We perform our analysis within the context of listed firms on the New Zealand Stock Exchange (NZX). The companies listed on the NZX have mostly established more than one incentive plan to reward their employers for greater achievement. Among those types of incentives, share-based plans or performance-rights schemes are commonly seen in New Zealand firms, followed by stock option incentives. Share-based schemes allow contractors to purchase ordinary shares of the company at a discount rate. Firms deliberately adopt share-based programs to match executive performance to share price. Ideally, share-based compensation may attract management teams, because owning a stake in the company causes them to act more like an owner. As share owners, these skillful teams, possessing human capital resources, will devote themselves to achieve profit maximization and, at the same time, increase the equity value. Morgenson (1998) states that about 13% of the common stocks of the 200 largest US corporations are given to managers as rewards. This form of incentive is referred to as performance-right plans. Some New Zealand companies have recently started to use performance-right plans in lieu of cashless share-ownership plans, as the new plans now set additional specific hurdles for employers to meet. For instance, if this year's revenue increases by 1% with respect to last year, the employees granted the options can exercise their rights to purchase shares at a rate below the market price and make a profit on the same day. In recent years, the plans have become widespread among New Zealand listed companies.

Another cashless incentive form that is being practiced by New Zealand firms is employee stock option plans, which are used to reward both senior and junior level staff. Companies remunerate those who satisfy the criteria officially approved by the Board of Directors. Employee stock option programs provide the holders with the opportunity to make profit only if any difference between the market price and the exercise price is greater than zero. Normally, this is also an incentive to increase the company's share price. As in performance-right plans, some companies may set vesting periods that allow granted employees to exercise a certain number of options. For example, within one year after issuing ESOPs, option holders are able to exercise 25% of their total grants, and another two years they are allowed another 25% of their total grants, and so on until the entire grant has been exercised. Some only allow their employees to exercise the whole package of ESOPs until a scheduled maturity date. For example, for a five-year maturity option, granted employees must exercise the entire grant within a specific period stated in the option contracts, or the option will lapse. In some cases, the ESOP issuing companies allow option owners to exercise options to buy ordinary shares in their companies.

Our findings add to the literature on the role of ESOPs granted to executive teams in increasing firm value, while reducing agency problems. We determine whether ESOPs may have any positive influence on firm operation and check for robustness of the findings. We further analyze the degree of value creation of ESOPs on firm performance. We show that ESOPs improve corporate performance by 10 times the cost of the ESOPs' adoption in the first year of issue. This improvement persists for four years after the first issuance.

These findings confirm the effectiveness of employee stock option plans for companies issuing ESOPs compared with companies that do not issue ESOPs, and how much the value creation of ESOPs contribute to these firms.

This article is organized as follows. The next four sections cover the institutional background of the New Zealand Stock Exchange (NZX), literature review, data and univariate analysis, and research questions and methodology. Section 6 discusses our multivariate results, and robustness checks are provided in Section 7. Section 8 concludes.

2. Institutional Background of the NZX

The NZX was launched in 1974 as a publicly owned company with a half share of the ownership in Link Market Services Limited. It is modelled as a self-regulating organization, making it a market regulator and operator at the same time. This means that the NZX issues rules for its own market operation and practice through its enforced and enhanced regulatory legislation, and in-place policy and guidelines. In the process of regulating, the NZX seeks public opinion and feedback to ensure that the best interests of both shareholders and issuers are considered. The NZX's tasks involve protecting shareholders from unfairness and inequitable actions of the firm, providing timely disclosure information, investigating any market hazards, and ensuring cost compliance effectiveness. Overall, all listed companies are regulated under this market supervision to ensure fairness, transparency, efficiency, and competitiveness.

The NZX currently runs three capital markets: The New Zealand Stock Market, the New Zealand Debt Market, and the New Zealand Alternative Market. The current study considers only stocks that are listed on the main board of the New Zealand stock market. As of 2015, there are 162 listed companies on the main board.[2] The main board trades the stock of larger firms in the New Zealand market. The normal trading hours of the NZX are from 10:00 a.m. to 4:45 p.m., plus one extra hour for each pre-open and pre-close trading hour. The market is open on working days, from Monday to Friday. On average, the trading volumes of the NZX are 34 million shares per day, with a market capitalization of approximately NZ$101 billion per day.[3]

ESOPs are largely used by firms listed on the main board. Emanuel (2005) reveals that most ESOP packages in New Zealand only account for 1–2% of the issuing firm's total outstanding ordinary shares. In 2007, a provision of NZ IFRS-2 imposes new requirements for listed firms to disclose the fair value of the share-based compensation issued to their employees. The fair value is treated as an expense to the companies and must be reported in the annual report available to the public.

3. Literature Review

Coase (1937), Jensen and Meckling (1979), Fama and Jensen (1983a, 1983b) document that agency problems exist when the managers of firms funded by investors develop ill intentions towards both the ownership and control of the firms; this is referred to as power concentration. The arguments of how large an optimal compensation package should be to ensure that managers act in the best interests of their shareholders, rather than their self-interest, is controversial. As illustrated by Ross (1973), Stiglitz (1975), Mirrlees (1976), a manager's risk aversion, the importance of his decisions to the firm, and his ability to pay for cash flow ownership up front determine the optimal incentive contract. Shleifer and Vishny (1997) suggest that a better solution is to grant a manager a highly contingent, long-term incentive contract ex ante to align his interests with those of investors. Murphy (1999) also discusses the relation between CEO pay and firm performance.

[2] The number of listed companies on the main board of the NZX are recently extracted from the NZX main board website in June 2015: https://www.nzx.com/markets/NZSX/securities.

[3] These figures are extracted from the NZX website on 1 July 2015: https://www.nzx.com/markets/NZSX.

3.1. Optimal ESOPs

Among the various forms of managerial incentive contracts, stock options are popular incentives among companies and their shareholders to encourage better performance. Jensen and Murphy (1990) examine the sensitivity of stock options and firm performance and find a positive relation between executive pay and firm wealth. Likewise, Brickley et al. (1985), DeFusco et al. (1990), and Si et al. (2020) demonstrate that there is a positive market reaction to the implementation of ESOPs. Hassan and Hoshino (2007) investigate factors that cause shareholders to vote against CEO pay through shareholder "say-on-pay" voting. They provide evidence that shareholders will be concerned about CEO pay when they are making a loss; however, when the firm performance is above average, shareholders affirm CEO pay, regardless of whether it is high or low. Thus, in a loss position, shareholders will exercise their votes against excessive CEO pay. This could also imply that shareholder participation helps to hold ESOPs at the level of their firm value.

3.2. Benefits of ESOPs

Many scholars agree that companies should reward the performance of management teams with stock option grants. Hall and Liebman (1997) confirm that ESOPs create value for practitioners. Some corporations find that this incentive is quite convenient since it is a cashless approach that allows companies to reduce the cost of compensation for the time being. It saves firms from any monetary cost until the option realizes the cost, or until the holders of the options exercise the grants, so that firms can make use of the time opportunity and the retained cash for extensive investment. Nevertheless, this does not mean that granting longer maturity ESOPs can always lower the cost of executive payoffs, as in some cases of more risk averse and undiversified managers, longer maturity ESOPs are not better than earlier exercisable ESOPs. Earlier exercisable ESOPs will increase these types of manager value, as well as shareholder value, by reducing cost to firms (Hall and Murphy 2002). Hall and Murphy (2002) explain that a cost reduction is derived from a decrease in the right-hand tail of firm payoffs to executives, because their holding on options cuts large firm payoffs when there is a noticeable increase in the stock price of the firm. In the management literature, Kurland (2018) finds that the use of ESOPs benefits the corporation due to enhanced employee engagement and creation of a meaningful work environment.

3.3. Drawbacks of ESOPs

ESOPs can be controversial. Yermack (1997) suggests that stock options are frequently not a strong enough incentive to influence managers to devote their time and effort to reaching the optimal profit for the firm. ESOP rewarding sometimes turns out to encourage the mechanism of self-dealing. He justifies this argument that stock options would be granted to managers just prior to good news announcements, but not granted until after bad news announcements. Additionally, this form of incentive will only motivate managers to act in the short-term interests of shareholders. Evidence from Aboody and Kasznik (2000) shows that managers will exercise options merely for a sake of short-term targets. More recently, Riaz et al. (2017) highlighted potential drawbacks such as the dilution of the value of shares and ownership from the ESOPs are exercised.

3.4. ESOPs and Firm Performance

Hillegeist and Penalva (2004) show a significantly positive relationship between employee stock option grants and firm performance as estimated by Tobin's Q and ROA. Employing stock returns as a proxy for firm performance, DeFusco et al. (1990) find that the use of ESOPs improves share price. Hassan and Hoshino (2007) study 1600 cross-sectional firms listed on the Tokyo stock exchange and find that a release of option grant announcement increases the productivity and market performance of firms. Ding and Sun (2001) suggest a significant positive improvement of firm performance in the Singapore market during announcement of ESOPs.

On the contrary, there are also some researchers who have investigated the failure of stock option grants in promoting better corporate performance. For example, Core and Guay (2001) offer the contradictory explanation that the use of ESOPs fails to motivate executives or encourage a stronger productive workforce in the US markets. They explain that this is because managers make a false decision to grant the options when the economic cost significantly exceeds the cost of the incentive establishment. Meulbroek (2000) suggest that the real cost of ESOPs could be the inevitable deadweight cost to the issuers since financial practice focuses on the ESOP's benefits alone and ignores the existence of its cost. Triki and Ureche-Rangau (2012) provide evidence that a sample of French companies does not support the notion that option grants positively contributes to accounting and market performance.

Popescu and Popescu (2019) suggest that green and sustainable finance that meet the requirements of corporate social responsibility are related to the financial performance of a firm. It can therefore be envisaged that sustainable ESOPs can enhance firm value. Paquette (2010) shows that sustainable ESOPs can create shareholder value.

4. Data and Univariate Analyses

We collect all ESOP data of NZX-listed companies from Datastream, Bloomberg, and NZX Company Research until 2015. We identify companies that first announced and issued ESOPs for executives. Non-ESOP firms are first matched with ESOP firms by industry, then by firm size if a matching industry is not found. Non-ESOP firms with the closest match are selected. The ESOPs are hand-collected from the annual reports disclosed on the NZX Company Research website. We first identify 59 listed companies that first announced their adoption of ESOPs. After excluding financial institutions and firms with pre-existing ESOPs prior to their listing date, 42 companies remain. These are matched with 42 non-ESOP firms, giving us a final sample of 84 companies across six industries. In total, there are 504 firm-year observations.[4] In each firm-year, we categorize each observation into year -1, 0, 1, 2, 3 and 4, relative to each firm's first ESOP announcement. Pooling the 84 firms together allows us to compare the performance of ESOP versus non-ESOP firms.

From the annual reports of ESOP-issuing firms, we extract each ESOP's vesting period, maturity date, exercise price, and the total grants held by executives. The study period is limited to five firm-year observations due to constraints on data availability and the maturity of ESOPs. Vesting period effects are captured to evaluate how influential ESOPs are on firm performance when they are considered. Vesting periods are recorded for each company and grouped into four categories of vesting periods: one, two, three, and other years. The maturity date of ESOPs plays a key role in filtering the intrinsic value of ESOPs. When an ESOP expires at its maturity date, it will no longer have any intrinsic value. Therefore, this drives firm-year observations to drop dramatically over the long horizon. The intrinsic value of ESOPs is calculated by taking the difference between its market and exercise price and then deflating this by the market price. This value will be zero if the market price is lower than the exercise price. The remaining information pertaining to firm-specific characteristics and industry variables are drawn from Datastream and Bloomberg. These include the monthly stock returns and annual ROA, ROE, total assets, total equity, market capitalization, long-term debt, and dividends.

Table 1, Panel A, reports the descriptive statistics of 42 companies with ESOPs and 42 companies without ESOPs for a total of 84 firms. A majority of 48 companies in the sample belong to the services industrial sector. This is followed by the goods industrial sector, with 18 firms. This shows that employee stock option grants are very popular among companies providing service products, and these companies have a large influence on the New Zealand market. Panel B of the table reports the number of ESOP companies

[4] Total firm-year observations account for 84 firms over 6 years for a total of 504 firm-year observations. Two ESOP companies in our sample do not have a perfect match within the same industry. As such, the matching for these two firms is based on firm size across different years. We can confirm that there are no timing overlaps in the sample.

which have set up vesting periods. As shown, a three-year vesting period accounts for approximately 43% of the firms, with others having one-year or two-year vesting periods after their first issuance of ESOPs.

Table 1. Sample data. The table shows the total firm observations in the sample. There are six industries, with the ESOP announcing firms and non-ESOP firms first being reported together in Panel A. Panel B depicts the vesting periods, which are categorized into three periods: 1 year, 2 years, 3 years, and other.

Panel A: Industry Summary					
Industry	**Number of Companies**				
Primary	10				
Investment	2				
Energy	4				
Services	48				
Goods	18				
Property	2				
Total	84				
Panel B: Vesting Periods					
Type of Sample	**Vesting Period**				**Total Sample Size**
	1 Year	**2 Years**	**3 Years**	**Other**	
Companies with Employee Stock Option Plans	10	9	18	5	42
Percentage	23.81%	21.43%	42.86%	11.90%	100.00%

Table 2 describes the means and medians of the three main proxies of firm performance, Tobin's Q, ROA, and ROE. In the table, year −1 is the year prior to the first announcement of ESOPs, year 0 represents the year of the first announcement of ESOPs, and year 1 to year 4 refer to one to four years after the announcement. In addition to significant and positive results in the means and medians of Tobin's Q, the mean differences suggest that the firm performance of ESOP issuers is at its highest level of 1.83 during the year of the first announcement of ESOPs. The medians of the differences show that 70% of the total sample improves for firms with ESOPs compared with their non-ESOP counterparts. This performance decreases slightly in the subsequent years. The reported mean and median differences in Tobin's Q, as a proxy for firm performance, provides initial evidence that firms which first announce ESOPs have greater value than those that do not.

The mean differences in ROE and ROA between firms with and without ESOPs are not statistically significant. Some years have negative mean differences, including the year of their first announcement. These findings are consistent with those of Cheffou (2007) and Triki and Ureche-Rangau (2012), who find that there is no association between the accounting performance and ESOPs; however, ESOPs are positively related with Tobin's Q.

Table 2. Descriptive statistics. This table describes the statistical means and medians of the dependent variables of firm performance (ROA, ROE and Tobin's Q) for the companies with ESOPs and companies without ESOPs. The differences of the means, median, and the t-statistics and *p*-value between both parties are also reported. Year −1 refers to a year prior to the first announcement date of ESOPs; Year 0 is a year of the first announcement; and Year 1 to Year 4 represent a range of years from one year to four years after the announcement. *, ** and *** are 90%, 95% and 99% levels of significance, respectively.

Firm Performance	Year	Companies with ESOPs		Companies without ESOPs		Mean Difference
		Mean	Median	Mean	Median	
Tobin Q	−1	1.73	0.99	1.13	0.73	0.59 *
	0	2.98	1.41	1.15	0.71	1.83 ***
	1	2.36	1.37	1.26	0.67	1.10 ***
	2	2.12	1.26	0.83	0.63	1.29 ***
	3	1.54	0.91	0.94	0.78	0.60 **
	4	2.21	0.89	1.14	0.68	1.07 **
ROA	−1	0.00	0.03	0.05	0.07	−0.05
	0	−0.30	0.05	0.02	0.05	−0.32
	1	0.00	0.05	0.01	0.05	−0.01
	2	0.03	0.04	−0.02	0.04	0.06
	3	0.03	0.05	0.06	0.05	−0.03
	4	0.03	0.04	0.01	0.05	0.02
ROE	−1	0.04	0.06	0.09	0.11	−0.05
	0	−0.30	0.08	0.05	0.08	−0.36
	1	0.02	0.08	0.02	0.09	−0.00
	2	−0.13	0.08	−0.18	0.08	0.04
	3	0.06	0.09	−0.05	0.08	0.10
	4	−0.01	0.08	−0.04	0.08	0.02

5. Research Questions and Methodology

5.1. Research Questions

We investigate two main research questions. The first explores whether ESOPs are an effective incentive to align managers' interests with shareholder wealth in companies initially announcing ESOPs in New Zealand. The effects of the first ESOP announcement may be perceived as good news by investors. Yermack (1997) finds a positive relationship between the long-term incentive ESOP programs for executives and firm performance. This study is similar to those of Aboody and Kasznik (2000) and Core and Guay (2001), who focus on the long-term impacts of ESOPs on firm value. A significantly positive relationship between ESOPs and firm performance would indicate that companies with ESOPs outperform their non-ESOP counterparts. This would imply that ESOPs are an effective incentive tool to mitigate the agency costs between shareholders and managers.

The second research question examines how much value ESOPs add to the firm. According to Aboody (1996) ESOPs' intrinsic value plays a key role in reducing managers' control on the entrenchment of funds, thereby increasing the value of the firm. He reaffirms the existing findings that issuing ESOPs are positively correlated with firm value. We therefore determine the value that ESOPs have created for the firms. We do this by measuring the intrinsic value of ESOPs, which is the ratio of the difference between the market price of the firm's stock and the option's exercise price to the stock price. The advantage of this measure, as opposed to using the traditional Black-Scholes option pricing model (Black and Scholes 1973), is that the Black-Scholes option pricing model cannot capture the value of non-transferable ESOPs.

5.2. Research Method

The question of how effective ESOPs are for issuers remains ambiguous and mixed. In this paper, we address whether ESOPs are an effective tool for mitigating the agency problems and how much value ESOPs contribute to the firm. We employ Tobin's Q as a proxy for firm value. A positive surge in Tobin's Q would be reflective of the effectiveness of ESOPs in mitigating agency costs. After determining that ESOPs add to firm value, we then measure the extent of the value that is added. Robustness checks are performed by using alternative proxies for firm performance, i.e., ROA and ROE, and controlling for the vesting periods.

An ESOP's intrinsic value is estimated right after the first issuing date of the ESOPs by taking the difference between the market price and exercise price, scaled by the same market price:

$$\text{ESOPs Intrinsic Value}_{it} = \frac{\text{Market Price}_{it} - \text{Exercise Price}_{i}}{\text{Market Price}_{it}} \quad (1)$$

where ESOPs Intrinsic Value$_{it}$ is the option's intrinsic value for stock i at time t; Market Price$_{it}$ is the closing price of stock i at time t; and Exercise Price$_i$ is the strike price of the first ESOP adoption of stock i.

Hillegeist and Penalva (2004) employ two proxies for firm performance: Tobin's Q and ROA. They report a positive and significant effect of employee stock option grants on firm value using both measures. Similarly, Aboody and Kasznik (2000) and DeFusco et al. (1990) investigate the relationship using stock returns while ROE is used by Triki and Ureche-Rangau (2012), Cheffou (2007). We employ Tobin's Q as the primary measure of firm performance, while ROA, ROE, and the stock returns serve as robustness checks to validate our findings.

Tobin's Q is estimated by taking the current market capitalization divided by total assets. ROA is the ratio of net income to total assets, and ROE is the ratio of net income to total shareholders' equity. The three proxies are computed as:

$$\text{Tobin's Q} = \frac{\text{Current Market Capitalisation}}{\text{Total Assets}} \quad (2)$$

$$\text{ROA} = \frac{\text{Net Income}}{\text{Total Assets}} \quad (3)$$

$$\text{ROE} = \frac{\text{Net Income}}{\text{Total Shareholders' Equity}} \quad (4)$$

The annualized rate of return is calculated by taking a geometric average of the monthly rate of return. The monthly rate of return is computed as:

$$\text{Month Return}_{it} = \frac{P_{it}}{P_{it-1}} - 1 \quad (5)$$

where P_{it} is the adjusted price of stock i at time t; and P_{it-1} the adjusted price of stock i at time $t-1$. We then annualize the monthly returns by their geometric mean:

$$\text{Annualized Return}_{it} = 12 \times \left([\pi(1 + \text{Month Return}_{it})]^{1/12} - 1\right) \quad (6)$$

where π is a product of Annualized Return$_{it}$.

Following Triki and Ureche-Rangau (2012), we examine the size of executive option grants to test whether the companies overuse ESOPs grants to reward their executives. In lieu of taking the total grant size of ESOPs, we capture the total grant size for executives, since a large amount of grants are issued to reward executives who make important financial decisions in their firms. An executive grant size is the natural logarithm of the total aggregate of ESOP grants. If the grant size is negatively related to firm performance, it can be implied that firms over-reward their managers, and vice versa.

Theoretical arguments emphasize how industry diversification affects firm operation. According to Core and Guay (2001), even after adjusting for industry, firms that reward their employees with ESOPs continue to witness a growth in performance. Therefore, we expect the industry in which companies are operating to have an influence on their overall performance. In our study, we control for industry effects.

We use vesting period dummy variables to determine whether the exercised stock options have any effects on corporate performance. Controlling for vesting period effects allows us to see how strong the effects of ESOPs are on firm performance. As suggested by Aboody (1996), who investigates the vesting effects on the relationship between ESOPs and firm value, we find that a positive relation holds until the first option vesting period before witnessing a negative impact of the option in the latter vesting periods. According to Aboody's interpretation, once the options arrive at the vesting period, they are likely to be exercised. Therefore, the value of ESOPs becomes faint when the options move farther away from the original date of their first granting. If Aboody (1996)'s argument holds true, we would observe stronger effects of ESOPs on firm performance in those years when many companies set vesting periods.

It is common for firms to set vesting periods for exercisable options; for instance, when option holders are allowed to exercise 25% of their total option grants on its first anniversary, and another 25% on its second anniversary, etc. Hall and Murphy (2002) conclude that a short vesting period may be appropriate, and is more common for firms than long vesting periods, due to the offsetting efficiency cost of ESOPs. The effects of ESOPs may appear at the time or because option holders decide to exercise their options. Huddart and Lang (1996) also inspect the effect of early exercisable options that seem to be a key implication for understanding ESOPs and examine the determinants of exercisable activity such as firm vesting schedules.

We expect firm performance, as measured by Tobin's Q, to be affected by firm-specific characteristics such as firm leverage, overinvestment problems, and firm size. As such, we consider them in our model. We first test the question whether ESOPs are an effective incentive for the alignment of managers' interests to shareholder wealth in companies that make their first announcement of ESOPs compared with non-ESOP companies. We investigate whether ESOP firms outperform their non-ESOP counterparts. The following model is tested:

$$\text{Firm Performance} = \beta_0 + \beta_1\ \text{OptDummy} + \beta_2\ \text{Firm Controls} + \beta_3\ \text{Industry Controls} + \beta_4\ \text{Vesting Dummy} + \in_i \quad (7)$$

where firm performance is proxied by Tobin's Q; OptDummy is an option dummy variable, which is equal to one if the firms first announced ESOPs and zero otherwise; Industry Controls are industry dummy variables[5] such as primary, property, energy, services, and goods; Firm Controls are control variables including leverage ratio (long-term debt to total shareholder equity), overinvestment problems, and firm size (natural logarithm of total assets); and Vesting Dummy represents 1-year, 2-year, and 3-year vesting period dummy variables. Lang and Litzenberger (1989), who test the *cash flow signaling hypothesis*, find that firms pay out dividends to reduce agency costs, thereby alleviating *overinvestment* problems. We use a dividend dummy of one if companies pay a dividend and zero otherwise. The idea is that, when firms pay a dividend, there is a greater increase in firm performance as it is likely that firms with excessive cash flows will pay out a dividend to avoid overinvestment problems and, at the same time, lower their agency problems.

Equation (7) is run in three variants. The first model involves running a regression on a single independent variable, the ESOPs dummy. In the second model, we include firm-specific characteristics in the ESOP dummy. In the third model, controls for industry effects are added to the second model. For robustness, we employ ROA and ROE as alternative proxies for firm performance.

[5] Six industrial sectors are tested in this analysis.

We consider an alternative measure of the ESOPs' vesting period effects to see how much value the ESOPs contribute to the firm. We test the following model:

$$\text{Firm Performance} = \beta_0 + \beta_1 \text{ Opt IV} + \beta_2 \text{ Grant Size} + \beta_3 \text{ Firm Controls} + \beta_4 \text{ Industry Controls} + \in_{it} \quad (8)$$

where Tobin's Q is used for firm performance; Opt IV is the ESOPs' intrinsic value; Grant Size is the natural logarithm of a total number of executive option grants; Firm Controls represent firm size, overinvestment problems, and the leverage ratio; and Industry Controls are dummy variables representing the primary, property, energy, services, and goods industrial sectors. For robustness, we employ stock returns in place of Tobin's Q in Equation (8).

6. Multivariate Results

As highlighted earlier in Table 2, firms with ESOPs perform better than non-ESOP firms. The value creation is statistically significant in its cost effectiveness. However, are ESOPs an effective incentive for the alignment of managers' interests with shareholder wealth? Table 3 shows that the performance of ESOP firms increases significantly and positively in years 0, 2 and 3 compared to non-ESOP firms. In Panel A of Table 3, during the year of first announcement of ESOPs, firms with ESOPs witness the highest positive coefficient of 1.83 relative to non-ESOP firms at the 95% significance level. The strength of the ESOP is even higher two years after the announcement, at the 99% significance level. The efficacy of the ESOP only tapers off by the third year. These findings are congruent with the thinking that ESOPs, when granted to corporate executives, are an effective incentive for the alignment of their interests to that of their shareholders. Our results are robust[6] even after controlling for firm-specific characteristics and industry effects, as reported in Table 3, Panels B and C, respectively.

The reported findings are consistent with studies in the US, Germany, Japan, and Singapore, such as those of: (1) Hillegeist and Penalva (2004) and DeFusco et al. (1990), who show that ESOPs in the U.S. add value for corporate practitioners; (2) Langmann (2007), who find that ESOP announcements are associated with positive abnormal returns in Germany; (3) Kato et al. (2005), who report that Japanese investors witness abnormal returns during ESOP announcements; and (4) Ding and Sun (2001), who document increased corporate performance among Singaporean firms that institute ESOPs.

From the firm-specific characteristics results shown in Table 3, Panel B, the leverage ratio has no significant effect on firm value. However, firm size and overinvestment problems indicate some significant results. The firm size result is consistent with the findings of Lang and Stulz (1993). The firm size proxy, the natural logarithm of total assets, is significantly and negatively associated with Tobin's Q. This implies that smaller firms tend to outperform larger ones. The dividend dummy as a proxy for overinvestment problems is significantly and negatively related to firm performance one year after the announcement. The result does not support the cash flow signaling hypothesis of Lang and Litzenberger (1989). After controlling for industry effects, the effect of overinvestment problems remains unchanged while firm size becomes less significant in some years.

After ascertaining that ESOPs are positively associated with firm performance, which answers our first research question, Table 4, Panel A reveals the magnitude of the value created by ESOPs for firms that adopt them. Our results report the findings for five years from a firm's establishment of ESOPs, beginning with year 0. The results show that firms issuing ESOPs enjoy significantly higher values starting from the year of their adoption through to four years later, though the level of significance went from 99% in the first year to 90% by the fourth year. The regression of Tobin's Q on ESOPs' intrinsic value shows a coefficient ranging from 10.54, which is significant at the 99% level in year 0, to 4.66, which is significant at the 90% level in year 4. This trend begins fading away slightly, as do the significance levels. The results imply that the implementation of ESOPs contributes

[6] The findings remain even after four years from the first announcement of ESOPs, albeit declining in value compared with the main result in Table 3, Panel A. The yield in year 4 appears to be driven by firm-characteristics and industry effects.

ten times more value in the initial issuing year of ESOPs and at least four times in year 4 than the cost of adopting the ESOPs. The findings do not change even after controlling for differences in firm characteristics (Table 4, Panel B) and industry effects (Table 4, Panel C).

Table 3. ESOPs and firm performance. This table presents the result of the impact of employee stock option programs on firm performance indicated in six firm-year observations. The first regression is between Tobin's Q and ESOPs dummy, reported in Panel A; the second regression covers the first regression after controlling for Firm-Specific Characteristics, illustrated in Panel B; and Panel C depicts the regression of Tobin's Q on ESOPs dummy after controlling for firm-specific characteristics and Industry Effects. OptDummy is an ESOP dummy variable representing a value of one if the firm first announced ESOPs and zero otherwise; other control variables include log (total assets), leverage ratio and dividend dummy, and five industry dummy variables. T-statistics are shown below each variable and the five bottom lines of the table are adjusted R^2, F-statistics, *p*-value, the number of firms with the first ESOPs announcement and the non-ESOP firm. Year −1 refers to a year prior to the first announcement date of ESOPs; Year 0 is a year of the first announcement; and Year 1 to Year 4 represent the years after the announcement. *, ** and *** are 90%, 95% and 99% levels of significance, respectively.

Panel A: Tobin's Q as a dependent variable and ESOPs dummy as an independent variable

Variable	Year −1	Year 0	Year 1	Year 2	Year 3	Year 4
Constant	1.13 ***	1.15 **	1.26 **	0.83 **	0.94 ***	1.14 *
OptDummy	0.59	1.83 **	1.10	1.29 ***	0.60 *	1.07
Adjusted R-squared:	0.02	0.05	0.02	0.08	0.03	0.02
F-test	2.52	5.58	2.47	7.43	3.68	2.56
p-value	0.12	0.02	0.12	0.01	0.06	0.11
Number of Companies with ESOPs	31	41	40	40	38	38
Number of Companies without ESOPs	31	41	40	40	38	38

Panel B: Tobin's Q as a dependent variable and ESOPs dummy as an independent variable after controlling for firm specific characteristics

Variable	Year −1	Year 0	Year 1	Year 2	Year 3	Year 4
Constant	2.44 ***	3.88 ***	2.71 ***	1.85 ***	1.38 ***	4.20 ***
OptDummy	0.51	1.49 *	0.84	1.31 ***	0.62 *	1.12 *
Leverage Ratio	0.08	−0.02	−0.43	0.07	−0.16	0.38
Dividend Dummy	−0.08	−0.71	−2.18 **	0.52	0.10	0.68
Log (Total Assets)	−0.28 **	−0.48 *	0.10	−0.31 *	−0.10	−0.80 ***
Adjusted R-squared:	0.12	0.13	0.08	0.08	0.02	0.25
F-test	3.15	4.00	2.68	2.75	1.43	7.15
p-value	0.02	0.01	0.04	0.03	0.23	0.00
Number of Companies with ESOPs	31	41	40	40	38	38
Number of Companies without ESOPs	31	41	40	40	38	38

Panel C: Tobin's Q as a dependent variable and ESOPs dummy as an independent variable after controlling for firm-specific characteristics and industry effects

Variable	Year −1	Year 0	Year 1	Year 2	Year 3	Year 4
Constant	3.55 **	4.48	4.78	0.96	1.41	4.37
OptDummy	0.38	1.37 *	0.73	1.34 ***	0.60 *	1.09 *
Property	−1.15	−0.36	−2.70	0.82	−0.08	0.72
Primary	−1.48	−1.97	−3.54	0.10	−0.56	−0.35
Energy	−0.96	−0.52	−2.89	1.01	−0.01	1.34
Services	−0.72	−0.26	−1.99	0.63	−0.03	0.10
Goods	−1.57	−0.52	−1.62	1.52	0.26	−0.14
Leverage Ratio	0.12	0.01	−0.58	0.05	−0.21	0.45
Dividend Dummy	−0.35	−1.20	−2.68 **	0.51	0.06	0.54
Log (Total Assets)	−0.24 *	−0.39	0.25	−0.28	−0.08	−0.83 ***
Adjusted R-squared:	0.11	0.10	0.07	0.06	−0.02	0.21
F-test	1.87	1.98	1.63	1.58	0.87	3.17
p-value	0.08	0.05	0.12	0.14	0.56	0.00
Number of Companies with ESOPs	31	41	40	40	38	38
Number of Companies without ESOPs	31	41	40	40	38	38

Table 4. ESOPs and value creation. This table reports Tobin's Q, a proxy for firm performance and Opt IV, which is a proxy for ESOPs intrinsic value and is a ratio of a difference between the market price and the exercise price of ESOPs, over the market price in Panel A. Grant Size is the natural logarithm of option grants owned by executives in Panel B. Panel C depicts the result of Tobin's Q after controlling for firm-specific characteristics and industry effects. Leverage Ratio is a proxy for firm leverage; Dividend Dummy is a proxy for overinvestment problems, and the natural logarithm of the total assets is a proxy for firm size, as shown in this table. T-statistics are listed under the coefficient of the variables. Industry dummy variables are a proxy for industry effects. The table also describes the adjusted R-square, F-test and *p*-value at the bottom of the table. Year 0 reflects the year of the first ESOPs issuing; and Year 1 to Year 4 represent the years after issuing. *, ** and *** indicate 90%, 95% and 99% levels of significance, respectively.

Panel A: Tobin's Q regressed on ESOP intrinsic values and controlling for firm-specific characteristics					
Variable	**Year 0**	**Year 1**	**Year 2**	**Year 3**	**Year 4**
Constant	4.62 ***	3.06 ***	3.072 **	4.00 ***	8.35 ***
Opt IV	10.54 ***	8.87 ***	5.20 **	4.02 **	4.66 *
Log (Total Assets)	−0.95 *	−0.28	−0.30	−0.45 *	−1.17 ***
Leverage Ratio	0.14	−0.20	−0.17	−0.16	−0.12
Dividend Dummy	0.48	−1.37	−0.58	−0.56	−0.67
Adjusted R-squared:	0.34	0.39	0.12	0.17	0.41
F-test	6.25	7.29	2.26	2.60	5.29
p-value	0.00	0.00	0.08	0.06	0.00
Number of Companies with ESOPs	41	40	38	33	26
Panel B: Tobin's Q regressed on ESOP intrinsic values and grant size and controlling for firm-specific characteristics					
Variable	**Year 0**	**Year 1**	**Year 2**	**Year 3**	**Year 4**
Constant	−3.58	3.55	0.34	−0.22	0.60
Opt IV	9.75 ***	8.99 ***	4.95 **	3.70 *	3.90
Log (Grants Size)	0.63 *	−0.04	0.20	0.30	0.52
Log (Total Assets)	−0.98 **	−0.28	−0.31	−0.44	−1.13 ***
Leverage Ratio	0.20	−0.18	−0.05	−0.07	−0.19
Dividend Dummy	0.75	−1.42	−0.45	−0.40	0.13
Adjusted R-squared:	0.39	0.37	0.09	0.14	0.38
F-test	5.89	5.42	1.68	1.97	3.97
p-value	0.00	0.00	0.17	0.12	0.01
Number of Companies with ESOPs	40	39	37	32	25
Panel C: Tobin's Q regressed on ESOP intrinsic values and grant size, and controlling for firm-specific characteristics and industry effects					
Variable	**Year 0**	**Year 1**	**Year 2**	**Year 3**	**Year 4**
Constant	−6.82	2.32	−6.06	−3.72	2.19
Opt IV	8.35 ***	8.53 ***	4.90 *	3.59 *	3.67
Grant Size	0.64 *	−0.07	0.46	0.48	0.56
Primary	0.98	−0.13	1.43	−0.97	−4.32
Services	4.85	2.28	2.38	0.37	−1.16
Goods	3.82	2.50	4.87	2.14	−0.68
Property	4.45	2.48	0.70	−0.88	-
Energy	5.13	1.77	1.77	-	-
Log (Total Assets)	−0.97 **	−0.28	−0.25	−0.35	−1.22 ***
Leverage Ratio	0.27	−0.23	0.19	−0.01	0.06
Dividend Dummy	−0.68	−1.89	−0.67	−0.50	−0.69
Adjusted R-squared:	0.36	0.32	0.13	0.11	0.38
F-test	3.24	2.80	1.54	1.45	2.82
p-value	0.01	0.02	0.18	0.23	0.04
Number of Companies with ESOPs	40	39	37	32	25

The evidence presented thus far is in line with that of Aboody (1996), Hall and Murphy (2002), Hall and Murphy (2003), and Tian (2004), who measure the value of ESOPs using the Black-Scholes option pricing model. We also investigated the impact of ESOP grant size on the firm performance and find that grant size has no meaningful impact on firm performance other than a weak significance at the 90% level in the year of option grant (Table 4, Panels B and C). We can therefore conclude that ESOPs in New Zealand add value to those issuing them. Firms in New Zealand that adopt ESOPs realize around 10 times larger value than the cost of the ESOPs during the year of issuance.

7. Robustness Checks

To test for the robustness of our findings, we employ ROA and ROE as proxies for firm performance in Equation (7). An analysis of vesting period effects is also considered. Additionally, the rate of stock returns is substituted for Tobin's Q in Equation (8). The results from using ROA and ROE as proxies for firm performance reveal a weaker positive significance, at the 90% level, of the effect of ESOPs on firm performance two years after their first announcement (Table 5, Panels A and B). This is consistent with the findings of Elayan et al. (2003), who also find no statistically significant relation between ROA (ROE) and executive compensation in the New Zealand market, and with Cheffou (2007) and Triki and Ureche-Rangau (2012), who report that ESOP announcements are irrelevant to the long-term accounting performance of French firms. After controlling for the impact of different vesting periods, our results reveal that firms that first announced ESOPs continue to outperform their non-ESOP rivals two and three years after the announcement.

Table 5. ESOPs and ROE/ROA. This table shows the results based on ROE and ROA as an alternative proxy for firm performance, which are reported in panels A and B, respectively. Panel C consists of three sub-tables that report the vesting period effects. Tobin's Q in Panel C1, ROA in Panel C2 and ROE in Panel C3 are the test results after considering vesting period effects. OptDummy is the ESOPs dummy variable. Other control variables involve log (total assets), leverage ratio and dividend dummy, and five industry dummies. The table also reports the t-statistics below each variable and the five bottom lines of the table are adjusted R^2, F-statistics and *p*-value. Year −1 refers to a year prior to the first announcement date of ESOPs; Year 0 is a year of the first announcement; and Year 1 to Year 4 represent the years after the announcement. *, ** and *** are 90%, 95% and 99% levels of significance, respectively.

Panel A: ROE as dependent variable						
Variable	**Year −1**	**Year 0**	**Year 1**	**Year 2**	**Year 3**	**Year 4**
Constant	−0.40 **	−1.39	−1.06 **	−2.30 *	−0.97	−1.24 *
OptDummy	−0.01	−0.18	0.11	0.40 *	0.16	0.04
Property	0.24	0.16	0.21	1.06	−0.37	−0.08
Primary	0.19	0.61	0.35	1.43	0.14	0.16
Energy	0.16	0.15	0.25	1.13	−0.47	−0.27
Services	0.21	0.31	0.42	1.10	−0.18	0.21
Goods	0.26	0.68	0.44	1.35	0.02	0.43
Leverage Ratio	0.00	−0.05	−0.09	0.32 ***	0.01	−0.27
Dividend Dummy	0.27 ***	0.67 **	0.49 ***	0.94 **	0.34	−0.04
Log (Total Assets)	0.01	0.12	0.07 *	0.01	0.16 *	0.24 ***
Adjusted R-squared:	0.44	0.16	0.26	0.38	0.13	0.24
F-test	6.48	2.78	4.16	6.46	2.27	3.56
p-value	0.00	0.01	0.00	0.00	0.03	0.00
Number of Companies with ESOPs	32	42	41	41	38	38
Number of Companies without ESOPs	32	42	41	41	38	38
Panel B: ROA as dependent variable						
Variable	**Year −1**	**Year 0**	**Year 1**	**Year 2**	**Year 3**	**Year 4**
Constant	−0.34 ***	−1.12	−0.64 *	−0.78 **	−0.07	−0.23
OptDummy	−0.02	−0.18	0.06	0.13 *	−0.01	0.03
Property	0.22 *	0.18	0.15	0.33	−0.22	−0.05
Primary	0.18 *	0.52	0.21	0.43	−0.02	0.02
Energy	0.16	0.17	0.17	0.33	−0.22	−0.09
Services	0.19 *	0.26	0.27	0.40	−0.16	0.00
Goods	0.22 **	0.56	0.29	0.43	−0.11	0.04
Leverage Ratio	−0.04 ***	−0.06	−0.04	0.00	−0.01	−0.05
Dividend Dummy	0.20 ***	0.51 *	0.29 ***	0.31 ***	0.16 *	0.07
Log (Total Assets)	0.01	0.09	0.04	0.02	0.03	0.04 ***
Adjusted R-squared:	0.48	0.10	0.22	0.16	0.08	0.18
F-test	7.58	2.08	3.57	2.67	1.68	2.85
p-value	0.00	0.04	0.00	0.01	0.11	0.01
Number of Companies with ESOPs	32	42	41	41	38	38
Number of Companies without ESOPs	32	42	41	41	38	38

After controlling for vesting period effects, Table 6, Panel A shows that the relation between ESOPs and Tobin's Q remains significant and positive two and three years after

the first announcement of ESOP adoption. As expected, the relation between vesting periods and firm performance are largely negative and they are significant in years 2 and 3 to account for when most firms set their vesting periods. In Table 6, Panels B and C, it is shown that the ESOPs dummy variable (OptDummy) is positively related to ROA (ROE) two years after the announcement, when taking into consideration vesting period effects.

Table 6. ESOPs and firm performance with vesting period controls. Year 1 to Year 3 represent the years after the announcement. *, ** and *** are 90%, 95% and 99% levels of significance, respectively.

Panel A: Tobin's Q as dependent variable			
Variable	**Year 1**	**Year 2**	**Year 3**
Constant	5.10	0.60	0.60
OptDummy	0.41	2.77 **	3.59 ***
Property	−3.02	0.73	−0.11
Primary	−3.75	0.13	−0.54
Energy	−2.96	1.00	−0.17
Services	−2.12	0.75	0.00
Goods	−1.76	1.85	0.59
Vesting Period Year 1	−0.03	−2.66 **	−3.63 ***
Vesting Period Year 2	−0.47	−1.64	−2.75 ***
Vesting Period Year 3	0.90	−0.97	−3.41 ***
Leverage Ratio	−0.51	0.12	0.01
Dividend Dummy	−2.94 **	0.50	0.26
Log (Total Assets)	0.25	−0.24	0.03
Adjusted R-squared:	0.04	0.10	0.20
F-test	1.29	1.70	2.61
p-value	0.25	0.09	0.01
Number of Companies with ESOPs	40	40	38
Number of Companies without ESOPs	40	40	38
Panel B: ROE as dependent variable			
Variable	**Year 1**	**Year 2**	**Year 3**
Constant	−0.93 *	−2.51 **	−1.15
OptDummy	−0.28	1.02 *	0.77
Property	0.22	1.15	−0.37
Primary	0.35	1.50	0.14
Energy	0.27	1.19	−0.52
Services	0.39	1.18	−0.18
Goods	0.38	1.43	0.08
Vesting Period Year 1	0.48	−0.59	−0.71
Vesting Period Year 2	0.42	−0.54	−0.52
Vesting Period Year 3	0.38 *	−0.75	−0.73
Leverage Ratio	−0.04	0.34 ***	0.04
Dividend Dummy	0.47 ***	1.03 ***	0.38
Log (Total Assets)	0.05	0.02	0.19 **
Adjusted R-squared:	0.26	0.37	0.12
F-test	3.36	4.88	1.87
p-value	0.00	0.00	0.06
Number of Companies with ESOPs	41	41	38
Number of Companies without ESOPs	41	41	38

Table 6. *Cont.*

Panel A: Tobin's Q as dependent variable			
Variable	**Year 1**	**Year 2**	**Year 3**
Panel C: ROA as dependent variable			
Variable	**Year 1**	**Year 2**	**Year 3**
Constant	−0.59 *	−0.86 **	−0.12
OptDummy	−0.11	0.38 **	0.17
Property	0.16	0.35	−0.22
Primary	0.21	0.46	−0.02
Energy	0.18	0.36	−0.23
Services	0.26	0.43	−0.15
Goods	0.26	0.46	−0.07
Vesting Period Year 1	0.22	−0.29	−0.27
Vesting Period Year 2	0.19	−0.30	−0.15
Vesting Period Year 3	0.16	−0.27	−0.19
Leverage Ratio	−0.02	0.01	0.01
Dividend Dummy	0.29 ***	0.34 ***	0.17 *
Log (Total Assets)	0.03	0.03	0.04
Adjusted R-squared:	0.21	0.15	0.07
F-test	2.76	2.21	1.45
p-value	0.00	0.02	0.17
Number of Companies with ESOPs	41	41	38
Number of Companies without ESOPs	41	41	38

We consider the robustness of our results on the extent of the value enhancement from ESOPs by using an alternative proxy for firm performance, the rate of stock returns. We report the additional findings in Table 7. Panel A of the table presents the results for the rate of return, in place of Tobin's Q, and examine the impact of the ESOP's intrinsic value (Opt IV) in explaining a firm's stock returns. The results reveal that the implementation of the ESOPs culminate in a value addition of 1.23 times the cost of the ESOP during its year of establishment.

In Panels B and C of Table 7, when including grant size into our analysis and controlling for firm characteristics and industry effects, the results remain unchanged. The grant size of ESOPs has the same effect as those reported with Tobin's Q as the dependent variable in Table 4. Similarly, grant size does not have any noteworthy impact on firm performance.

Table 7. ESOPs and stock returns. This table describes the rate of return as a proxy for firm performance, which is used as a further robustness test. The results of a regression of the rate of return on Opt IV as a proxy for the ESOPs intrinsic value are presented in Panel A. Grant Size is the natural logarithm of option grants owned by executives in Panel B. Panel C depicts the result of the rate of return after controlling for firm-specific characteristics and industry effects. Leverage Ratio is a proxy for firm leverage; Dividend Dummy is a proxy for overinvestment problems; and the natural logarithm of total assets is a proxy for firm size, as shown in this table. T-statistics are listed under the coefficients of the variables. Industry dummy variables are a proxy for industry effects. The table also describes the adjusted R-square, F-test and *p*-value at the bottom of the table. Year 0 reflects the year of the first ESOPs issuing; and Year 1 to Year 4 represent the years after the issuing. *, ** and *** indicate 90%, 95% and 99% levels of significance, respectively.

Panel A: Rate of Return regressed on ESOPs intrinsic values after controlling firm-specific characteristics

Variable	Year 0	Year 1	Year 2	Year 3	Year 4
Constant	0.03	−0.29 **	0.01	−0.05	0.23
Opt IV	1.23 ***	0.87 ***	1.06 ***	0.27	0.65 **
Log (Total Assets)	−0.03	0.05	−0.07	0.01	−0.06
Leverage Ratio	0.05	−0.14	0.20	0.00	0.08
Dividend Dummy	0.06	−0.03	0.20	−0.01	0.00
Adjusted R-squared:	0.18	0.28	0.16	−0.11	0.10
F-test	3.24	4.85	2.75	0.23	1.72
p-value	0.02	0.00	0.04	0.92	0.18
Number of Companies with ESOPs	42	41	39	33	26

Panel B: Rate of Return regressed on ESOPs intrinsic values and grant size after controlling firm-specific characteristics

Variable	Year 0	Year 1	Year 2	Year 3	Year 4
Constant	−1.17	−0.63	0.45	1.63	1.21
Opt IV	1.06 **	0.88 ***	1.14 ***	0.36	0.78 **
Log (Grants Size)	0.09 *	0.03	−0.03	−0.12	−0.06
Log (TA)	−0.03	0.03	−0.08	0.01	−0.07 *
Leverage Ratio	0.06*	−0.13	0.20	−0.05	0.10
Dividend Dummy	0.13	0.00	0.17	−0.06	−0.12
Adjusted R-squared:	0.18	0.28	0.14	−0.06	0.10
F-test	3.24	4.85	2.22	0.64	1.56
p-value	0.02	0.00	0.08	0.67	0.22
Number of Companies with ESOPs	42	41	38	32	25

Panel C: Rate of Return with option intrinsic value and grant size after controlling firm-specific characteristics and industry effects

Variable	Year 0	Year 1	Year 2	Year 3	Year 4
Constant	−1.56 *	−0.27	0.72	1.87	1.41
Opt IV	0.96 **	0.98 ***	1.00 **	0.36	0.71 *
Log (Grant Size)	0.11 **	0.03	−0.02	−0.13	−0.06
Primary	0.08	−0.21	−0.52	0.04	−0.16
Services	0.52	−0.42	−0.32	−0.05	−0.17
Goods	0.07	−0.46	−0.39	−0.16	−0.24
Property	0.37	−0.20	−0.07	0.03	-
Energy	0.63	−0.25	−0.11	-	-
Log (Total Assets)	−0.05	0.02	−0.09	0.00	−0.08 *
Leverage Ratio	0.08 **	−0.12	0.20	−0.05	0.13
Dividend Dummy	0.01	0.06	0.25	−0.05	−0.07
Adjusted R-squared:	0.22	0.22	0.02	−0.23	−0.03
F-test	2.11	2.12	1.07	0.35	0.90
p-value	0.06	0.06	0.42	0.95	0.54
Number of Companies with ESOPs	41	40	38	32	25

8. Conclusions

This article addresses two research questions pertaining to ESOPs in New Zealand. The first deals with the effect of employee stock options on firm performance. We determine whether firms that announce their first adoption of ESOPs perform better than their non-ESOP counterparts. The second question pertains to how much value ESOPs create for the adopting firms. We address these questions in the context of publicly listed firms in New Zealand.

The results of the study show that firms that announce their first adoption of ESOPs significantly outperform their non-ESOP counterparts. These findings are robust even after controlling for firm-specific characteristics and industry effects. We take this to mean that companies in New Zealand believe that ESOPs are an effective incentive for the reduction of agency costs between shareholders and managers. Managerial interest is enhanced when they improve firm performance. How much then is the value created from ESOP adoption? Our findings document that ESOPs are very cost effective to the adopting firms. We show that the implementation of ESOPs contributes to an increase in firm valuation of about 10.5 times relative to their cost at the initiation of the ESOP program. In addition, this increase remains at least four times at year 4. The general findings hold even after controlling for differences in firm characteristics and industry effects. We also find that the size of the option grant does not impact the firm's performance. We can therefore infer that ESOP use among listed firms in New Zealand is at their individual optimal level.

For a study of this nature, it is inevitable that there will remain some limitations in the data and empirical design. First, due to the limited sample size, the matching process could result in less-than-ideal matches, which may introduce some bias in the results. However, we believe that the impact is minimal as only two companies are affected. Second, the empirical design does not control for a potential selection bias related to the use of ESOPs among start-ups as a substitute for cash compensation. This may result in some of our findings being attributable to firm characteristics rather than the adoption of ESOPs. Third, panel data regressions should ideally cluster the standard errors by firm to minimize Type II error. As our study is focused on the impact of ESOP adoption on firm performance regardless of the age of the firm, these issues are best left to future research.

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Use of Derivative and Firm Performance: Evidence from the Chinese Shenzhen Stock Exchange

Yantao Wen [1], Yuanfei Kang [1,*], Yafeng Qin [2] and Jeffrey C. Kennedy [1]

[1] School of Management, Massey University, Auckland 0632, New Zealand; Y.Wen@massey.ac.nz (Y.W.); J.C.Kennedy@massey.ac.nz (J.C.K.)
[2] School of Economics and Finance, Massey University, Auckland 0632, New Zealand; Y.Qin@massey.ac.nz
* Correspondence: Y.Kang@massey.ac.nz; Tel.: +64-9-414-0800 (ext. 43409)

Abstract: Financial derivatives have been increasingly used by firms to hedge against financial risks. However, it is still not clear what factors at the firm level lead to firms' derivative use and whether derivative use can generate performance improvement, especially in the context of firms operating in emerging economies. Using the unbalanced panel data consisting of 2529 listed firms from China covering an 11-year period from 2005 to 2015, this study examines these two questions regarding firms' use of financial derivatives. Based on results from the empirical analysis, this study identified operational cash flow, tax shield, R&D investment, and the possibility of bankruptcy, as the firm-level factors that enable firms' decision to invest in financial derivatives. More importantly, empirical findings from this study suggest that a firm's derivative use tends to negatively affect firm performance, rather than improve firm performance. The negative effect of derivative use on firm performance is not consistent between the two groups of the better performer and poorer performer firms. While the poorly performed firms are more likely to use financial derivatives for the purpose of performance improvement, their derivative use tends to further damage, rather than improve, performance. These research findings have theoretical and practical implications.

Keywords: financial derivatives; firm performance; Shenzhen stock exchange of China; state-owned companies; private-owned enterprises

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1. Introduction

Increasing research attention has been paid to the financial instruments of derivative use, due to their increasing popularity with firms. Derivatives refer to the financial investment such as options and futures, which are used to hedge the financial risks from unexpected changes in interest rate, exchange rate, and commodity price. Firms use financial derivatives to hedge their exposure to various sorts of risk in order to increase their firm value. However, the effectiveness of derivative use on risk management and value creation has been debated among researchers. According to Modigliani and Miller in the 1950s, in a perfect market, risk management should not be relevant to a firm's value. In addition, Modigliani and Miller (1958) believe that risk can be actively managed by shareholders through diversifying their investments. Such theory suggests that firms, by simply reducing the variations of their cash flows or firm values, do not create extra value to the shareholders and thus firms should not hedge.

Several academic pioneers have investigated the relationship between hedging by investing in financial derivatives and firm value. Carter et al. (2006) study data from the US airline industry between 1992 and 2003. Allayannis and Ofek (2001) test currency derivatives using a sample of S&P 500 nonfinancial firms from 1993. Guay (1999) collected data from COMPUSTAT on 254 firms from 1990 to 1994 and divided it into derivative users and non-derivative users. These studies, in general, find that using derivatives results in a reduction of the risk and an increase of the firm performance.

The above studies largely focus on firms listed in developed markets where relevant regulations, laws, accounting standards, and enforcements are well established. In contrast to the abundant studies in developed economies, little attention has been paid to developing markets. This has aroused a new question that whether these findings or conclusions also apply to developing/emerging economies. Different from developed markets, the financial markets of emerging countries are less efficient and can be subject to unsound and incomplete laws and regulations. The financial derivative market itself may not be well developed. People's understanding or knowledge of these complicated financial instruments may also be limited. Hence, the effectiveness of the derivatives may be even more debatable than in the developed markets. Moreover, in these kinds of markets, governments sometimes impose administrative controls, which lead to financial markets being distorted towards the direction of government policy. For example, during the Chinese stock market crash in July 2015, the China Securities Regulatory Commission (CSRC) limited stock index futures trading, banned short selling, cut margin ratios, locked up the holdings of large shareholders, and investigated shorting big blocks. In addition, on January 4th, 2016, the CSRC implemented a two-step circuit breaker in the Shenzhen Stock Market, which led to January 7th having a total trading time of only 15 min. After just four days, the CSRC canceled this mechanism. Such practice seems to be suggesting that the financial derivative markets, rather than helping companies in controlling for risks, are particularly dangerous during market turmoil and thus have to be constrained.

This study aims to explore the use of and the effectiveness of using financial derivatives in one of the largest and most important emerging markets—the Chinese stock market. Notably, this study addresses two research questions. The first one is what kind of firms are more likely to use financial derivatives. Put it in another way, what are the common characteristics shared by the firms that have invested in derivative use? The answer to this question is important, as it helps us to have a better understanding of the motivating factors that result in firms' investment in financial derivatives. There has been an abundant number of empirical studies exploring which factors or imperfections cause firms to hedge using derivatives, but the findings remain mixed. For example, Allayannis and Weston (2001), examined the relationship between firm value and the use of foreign currency derivatives by studying 720 large firms from 1990 to 1995. They found that the market value of firms using hedging derivatives is approximately 5% higher than those not using hedging instruments. Similarly, Carter et al. (2006) reported an even higher hedging premium of approximately 10%. Conversely, Guay and Kothari (2003), through studying a sample of nonfinancial derivative users, argue that the use of derivatives is not significantly associated with the value of firms. They argue that this is because the potential premiums on hedging instruments are small compared to cash flows in equity value. Jin and Jorion (2006) used a sample from the United States oil and gas industry to examine the differences between firms using hedging derivatives and those that were not. They found no obvious relationship between using derivatives and a firm's market value. Carter et al. (2006), Froot et al. (1993), and Bartram et al. (2009) examined the relationship between corporate performance and derivative use, and provide evidence that using derivative is unnecessary for avoiding the underinvestment problem, because internal cash and cash equivalent can address this without increasing extra risks.

This study attempts to identify, among our sample companies, which elements or imperfections are contributing to the increasing propensity of companies to hedge using derivatives. Particularly, under the special background of emerging markets such as China, it will be interesting and meaningful to see whether the conclusion would be different from those drawn from the developed markets.

The second question this study explores is how the use of financial derivatives influences corporate performance, which has been relatively missing from the literature on emerging economies. As we discussed before, derivatives could be particularly dangerous or even detrimental if not used properly. Given that financial derivative markets are relatively young and underdeveloped in China, results from our study could provide extra

implication to firms, practitioners as well as market regulators. Furthermore, in Chinese markets, there are two main types of companies: state-owned and privately-owned firms. While enjoying more financial support from the government, the state-owned firms are also subject to government control to a greater extent. By looking at the differences among these two types of companies in their usage of and the effectiveness of derivatives, we may have more findings on how government intervention may affect firms' risk management as well as efficiency.

The main findings of this study are summarized as follows: Firstly, we find that, in the Chinese market, a firms' size, operating cash flow, tax shield, research and development investment, and the possibility of bankruptcy are the main factors that influence a firm's consideration of investing in derivatives. Secondly, the nature of a firm (i.e., whether it is privately-owned or state-owned) is not a deciding factor in derivative investment. Thirdly, derivative usage has a negative influence on the performance of firms, and such a finding is not altered by whether the firms are state-owned or not. Additionally, it is robust when we use different performance measures, and robust when we take into account the lag-in-time effect of derivatives. Fourthly, this study separated our sample into firms with better performance and those with poorer performance. We find that the use of derivatives in poorer firms is the source of the negative effects, because derivatives investment has no significant influence on firms that have the better performance in the sample. This study considers the flawed nature of the Chinese derivatives market, and the fact that it is subject to severe controls. The scarcity of professionals employed in Chinese enterprises who are adept at investing in derivatives may be the main reason for the negative relationship.

The empirical results suggest that derivatives reduce the firm performance, which seems contrary to common beliefs. We conduct further tests to explore this issue by reexamining the relationship between derivative use and firm performance among the top-performing and the bottom-performing firms. The results show that the negative relation only significantly exists among bottom-performing firms but disappears among top-performing firms. Such results suggest that one possible reason for firms' failure to use derivatives successfully might be their lack of expertise and experience. Thus, it seems unlikely for poorly performed firms to improve their situation by adopting financial derivatives.

The structure of this study is as follows: Section 2 presents the literature review, Section 3 outlines the data description and the research methods, Section 4 contains the empirical analysis, and Section 5 makes conclusions.

2. Theoretical Foundation

Financial derivatives have been used by firms as an approach to deal with the financial risks associated with their business transactions, which are generated from unexpected changes in the market. Modigliani and Miller (1958) introduced the classic idea that shareholders can manage risk by themselves through diversifying their investments in a perfect market, where there is no asymmetry of information, no transaction costs, and no taxes and agency costs. This means that hedging at the corporate level is not related to a firm's value under such a situation. Similarly, in 2002, Warrant Buffet, the financial investment guru referred to financial derivatives as 'financial weapons of mass destruction, carrying dangers that, while now latent, are potentially lethal.' Such a statement suggests that, if not used properly, financial derivatives may even cause greater risks and reduce firm values, rather than reduce risk and add value to the firm.

Nevertheless, a tremendous number of enterprises do invest in financial derivatives in order to hedge the risks, which have resulted from frictions in the market. Thus, there is a need to investigate what factors contribute to firms' decisions to invest in financial derivatives and whether firms can benefit from their investment in derivatives.

2.1. Firms Characteristics and Use of Financial Derivatives

Prior research has identified certain firm characteristics as the factors at the firm level that can lead to derivative use. Based on a study of 720 large US companies, Allayannis and Weston (2001) found that companies are more likely to use foreign currency derivatives in order to manage risks if they have a larger size and greater leverage, profitability, investment growth as well as less financial constraints. Furthermore, empirical findings suggest that hedging through investing in financial derivatives is able to relieve underinvestment problems, when firms enjoy growth opportunities and when external financing is expensive (Froot et al. 1993; Jin and Jorion 2006). In addition, tax liability is considered as a factor associated with derivative use. Smith and Stulz (1985) suggested that firms' hedging behavior may be prompted by tax incentives. When the after-tax incomes of firms demonstrate more convex functions, the expected taxes can be reduced by derivatives usage. Similarly, Graham and Rogers (2002) suggest that hedging through financial derivatives at a corporate level is associated with tax incentives, because derivative use can improve debt capacity and increase tax benefits.

The leverage ratio of the firm is also confirmed as an influencing factor (Lau 2016). Leverage ratio would affect a firm's performances, particularly when interest rates change, and thus it can influence a firm's decision whether to invest in financial derivatives as the hedging method. For companies with high leverage ratios, the great default risk is embedded in their fixed repayment obligations and their operational cash flow will encounter increasing volatility. Compared with firms with low operating leverage, firms with high leverage will have to endure growing expected costs associated with the possibility of bankruptcy, financial distress, and a reduced firm value. Hedging by using financial derivatives allows these firms to have more leverage on debt financing and to generate a greater firm value through saving on tax. This is because hedging by using derivatives can preserve internal cash flow and increase a firm's investment success, so that additional cash is generated from derivative use (Carter et al. 2006). In addition, costs associated with bankruptcy risk and potential financial distress can be reduced through hedging by investing in derivatives (Arnold et al. 2014; Smith and Stulz 1985).

Smith and Stulz (1985) believe that companies, whose cash flow or income is greatly affected by foreign exchange risk, prefer to use derivatives. Bartram et al. (2009) examine the automobile industry and notes that the movement of the foreign exchange rate is a significant factor in derivative usage. The risk exposure from the movement of the foreign exchange rate, as one of three main risks (i.e., unexpected movement of interest rate, foreign exchange rate, and commodity prices) for companies, is highly associated with production cost, profits, and sales of firms.

Based on a sample of S&P 500 manufacturing firms from the Compustat database covering a period from 1993 to 2001, Haushalter et al. (2007) tested the hedging effect of cash holding. Findings from this study suggest that cash-holding and derivative use have a substitute relationship, as both cash-holding and hedging derivative use allow enterprises to minimize their need for external capital. Therefore, it is expected that there is a negative relationship between cash-holding and derivative use. Based on a differential effect between ambiguity and risk, Friberg and Seiler (2017) argue that higher ambiguity is associated with greater cash holdings, whereas more risk causes a higher probability of derivative use. Financial constraints are identified as a significant factor influencing firms' decision of whether to invest in derivatives as a means of hedging (Froot et al. 1993). When deadweight costs are included in the costs of external capital, the underinvestment problem will emerge as internal cash flow will be severely insufficient; hedging by using derivatives can generate extra cash flow that allows firms to circumvent the underinvestment problem (Froot et al. 1993).

Smith and Stulz (1985) believe that managers of companies with large stocks and risk aversion are more inclined to use derivatives for hedging. Stulz (1984) points out that, if the interests of management are mainly affected by the fluctuations of the company's value, and the cost of the company's use of derivatives is lower than the manager's own

safe-haven costs, then risk-averse managers will perform hedging. Géczy et al. (2007) find that information asymmetry, between a company's management and shareholders, can affect a company's hedging behavior.

In summary, prior research has identified firm characteristics in terms of firm size, return on assets, return on equity, R&D investment, CEO shareholding rate, leverage, cash holding, foreign exchange gain, and tax liability as the main factors that are likely to influence a firm's derivative use. Thus, these factors will be included in the empirical analysis as the explanatory variables to address the first question of this study.

2.2. Derivative Use and Firm Performance

As shown in the last section, various factors at a corporate level can lead to firms' investment in financial derivatives for hedging. However, research results are inconclusive regarding whether derivative use is associated with better performance or value of the firm. Based on a sample of 720 large firms for the period from 1990 to 1995, Allayannis and Weston (2001) examined the relationship between firm value and the use of foreign currency derivatives. Results from this study suggest that, on average, the market value of firms that used hedging derivatives was approximately 5% higher than the value of firms that do not use any hedging instruments. Similarly, another study by Carter et al. (2006) reported a higher hedging premium of approximately 10%.

On the other hand, based on a sample of derivative users of nonfinancial firms, Guay and Kothari (2003) found that derivative usage does not have a significantly positive influence on a firm's value, as the potential premium on hedging instruments is small compared to cash flows in equity value. Therefore, they suggest that the effect of derivative use is spurious, and that the slight change in premium is driven by other forms of risk management or that. Similarly, based on a sample of companies from the US oil and gas industry, Jin and Jorion (2006) found that there was no difference in market value between the firms that used hedging derivatives and those that did not. Furthermore, Kim et al. (2006) argue that the positive impact of using derivatives on firm value, as reported by Allayannis and Weston (2001), is difficult to interpret, because of issues such as changes in risk exposure throughout the sample, and endogeneity between firm value and hedging. Another empirical study based on US airline companies demonstrates that the premium generated from derivative use can be attributed to solving underinvestment (Carter et al. 2006). However, derivative use is not the only way to resolve the underinvestment problem. Froot et al. (1993) suggest that firms tend to choose underinvestment when they encounter significant distress. They further argue that underinvestment occurs when internal cash flow is low and the costs of external capital include deadweight costs are high. Thus, there is no consensus regarding whether hedging by using financial derivatives will solve this problem of underinvestment. On the other hand, it is clear that derivative use is not the only way for the firm to address the underinvestment problem. For example, cash-holding and cash equivalents could be regarded as a more direct method for firms to deal with underinvestment issue.

Based on a sample of firms from 39 countries, Allayannis et al. (2012) examined the interactive relationship between corporate governance, investment in foreign financial derivatives, and firm performance. Findings from this study suggest that they find that when companies have strong internal and external corporate governance, there will be a positive relationship between derivative use and firm performance (Allayannis et al. 2012). However, the results from this multi-national study regarding a positive link between derivative use and firm performance differ from those generated from single-country studies. For example, based on a sample of firms from France, Khediri (2010) found that when a firm increases its investment in financial derivatives, the value of the firm tends to reduce rather than increase, and that this reduction of firm value is caused by a lack of premium value being assigned to the firm's derivative use. Similarly, based on a firm sample from the Australian market, Nguyen and Faff (2010) found that when a firm makes investments in financial derivatives, the value of the firm tends to decrease. Thus,

although a large number of empirical studies have focused on the relationship between derivative use and firm performance, empirical results regarding this relationship still remain conflicting with each other.

A potential factor leading to the conflicting results regarding the relationship between derivative use and firm performance is the difference in industries based on which firm samples are drawn. Material supply chains and costs of primary goods output in some industries are exposed to significant volatility, leading to negative consequences on both sales and the cost of sales in these industries (Lau 2016). Therefore, when operating in these industries, firms are more likely to invest in financial derivatives as derivative use may lead to more consistent pricing on raw materials and thus avoid unnecessary losses. However, the particularities of specific industries may contribute to the bias in empirical findings regarding the relationship between derivative use and firm performance. For example, based on a sample of operating firms, Jin and Jorion (2006) found that firm value is not affected by derivative use. However, Carter et al. (2006) criticized that the results from Jin and Jorion's study may have been biased, given the fact that firms operating in investors in the US oil and gas industry tend to not invest in financial derivatives for the purpose of hedging.

The inconclusive empirical findings regarding the relationship between derivative use and firm performance leads to the second research question of whether firms would benefit from their investment in financial derivatives.

3. Research Design and Methodology

3.1. Sample Description

This study aims to answer two questions as: (1) what factors affect a firm's decision to use financial derivatives, and (2) whether derivative use of the firm leads to a positive effect on its performances. Data for this study were collected from China Securities Market and Accounting Research (CSMAR). The Shenzhen Stock Market was established in 1990. There are two stock exchange markets in China, and while the state-owned corporations were mainly listed on the Shanghai Stock Market, companies listed on the Shenzhen Stock Market were mostly privately-owned. Previous studies have suggested that firms that face large risk are more likely to use financial derivatives in their operations, and that financial derivative use tends to have a positive impact on a firm's value (Allayannis and Weston 2001; Carter et al. 2006). Compared with state-owned companies, privately-owned firms in China tend to suffer more severe financial constraints and face more financial difficulties in their operations, due to a lack of government support. Therefore, it is appropriate to sample for this study from the companies listed in Shenzhen Stock Market.

The sample of this study included 2529 firms listed on the Shenzhen Stock Exchange and the Growth Enterprise Market of China. Our unbalanced panel data consists of 8129 firm-year observations of derivative use and 12,177 firm-year observations for performance, covering an 11-year period from 2005 to 2015. In order to eliminate bias generated from the differences between industries, firms from all industries listed in the Shenzhen Stock Exchange have been included in this study, except for the financial industry. The reason for excluding firms in the financial industry is that firms in this industry may invest in financial derivatives for other reasons rather than hedging. Including financial firms may result in bias. Therefore, financial firms (e.g., banks, insurance, and investment companies), companies subject to Special treatment (ST), and Particular Transfer (PT) were excluded from the sample. Table 1 provides a description of the data.

Table 1. Data description (excluding financial firms).

Variable	N	Mean	SD	Min	P25	P50	P75	Max
Derivative_dummy	8129	0.0630	0.243	0	0	0	0	1
ROA	12,177	0.0410	0.0400	−0.0410	0.0140	0.0370	0.0670	0.125
ROE	12,177	0.0730	0.0690	−0.0790	0.0300	0.0700	0.113	0.213
Ln (Tobin's Q)	11,628	0.456	0.894	−2.739	−0.110	0.480	1.020	6.891

Table 1. *Cont.*

Variable	N	Mean	SD	Min	P25	P50	P75	Max
Tobin's Q	11,628	2.121	1.670	0.350	0.896	1.616	2.774	6.595
EBTA	12,151	0.408	0.300	0.0650	0.190	0.324	0.529	1.207
Leverage	12,177	0.428	0.213	0.0910	0.248	0.420	0.603	0.802
Net Profit Margin	12,158	0.154	7.507	−277.9	0.0230	0.0670	0.141	715.1
Assets Turnover	12,177	0.600	0.387	0.144	0.313	0.498	0.770	1.600
Size	12,177	21.92	1.331	14.94	21.00	21.75	22.64	28.51
Operating Cash Flow	12,158	0.0700	0.149	−0.267	−0.00200	0.0690	0.155	0.368
CEO_TS	11,841	0.138	0.212	0	0	0.00100	0.256	0.897
Z	11,627	0.618	0.383	0.162	0.333	0.518	0.785	1.603
Cash Holding	12,152	0.423	0.421	0.0430	0.130	0.260	0.554	1.616
Capital Expenditure	12,158	0.123	0.131	0.00400	0.0290	0.0740	0.164	0.492

This table reports the information obtained from the sample, which has been collected from the CSMAR from 2005 to 2015. This sample covers 8129 derivative observations and 12,177 firm performance observations in the Shenzhen Stock Exchange and the Growth Enterprise Market (GEM). In this table, ROA is return on assets; ROE is return on equity; Tobin's Q, is adopted to measure a firm's market value at the stock exchange market, Ln(Tobin's Q) is the natural logarithm of Tobin's Q; EBTA is earnings before interests and tax scaled by total assets; Leverage is the leverage ratio which is calculated by dividing debt by size; Net Profit Margin is profit over sales, to capture the effects of profitability on firms' performance; Assets Turnover is calculated by sales over book value of total assets; Size is the natural logarithm of a firm's total assets. Operating Cash Flow is the firm's cash flow scaled by total assets; CEO_TS is the stockholding ratio of CEO of the firm; Z is the Altman Z-score, which measures the bankruptcy risk of the firm; Cash Holding is cash and cash equivalents scaled by total assets; Capital Expenditure is the ratio of capital expenditure over total assets.

To eliminate the impact of the industry, our regression model controlled the variable of the industry. This variable was denoted by the industry code developed by China Securities Regulatory Commission (CSRC). When operationalizing the variable in the study, we kept the original CSRC codes for the primary classification of the industries (i.e., the first letter of the CSRC industry codes for industries was retained) except the manufacturing industry. As shown in Table 2, over 60% of the companies in the sample came from the single industry of manufacturing, and this more severe outlier in terms of the industry could generate bias in model estimations. Thus, firms in the manufacturing industry required a secondary classification.

Table 2. Industrial distribution of the sample (excluding the financial industry) [1].

Industry	Frequency	Percentage	Cumulation
A	39	1.54	1.54
B	67	2.65	4.19
C	1629	64.41	68.6
D	85	3.36	71.97
E	64	2.53	74.5
F	151	5.97	80.47
G	83	3.28	83.75
H	10	0.4	84.14
I	139	5.5	89.64
K	132	5.22	94.86
L	27	1.07	95.93
M	18	0.71	96.64
N	24	0.95	97.59
O	3	0.12	97.71
P	1	0.04	97.75
Q	3	0.12	97.86
R	29	1.15	99.01
S	25	0.99	100
Total	2,529	100	

[1] This table shows the industry distribution of all 2529 firms in the sample. The first column shows the CSMAR industry code. The manufacturing industry, which is represented by C, occupies 64.41% of the total sample. Therefore, the firms in the manufacturing industry have secondary classification codes.

Based on the difference in ownership, the firms included in the sample can be divided into two groups of privately-owned and state-owned companies. In comparison with state-owned companies, private firms are more likely to use derivatives to hedge against financial risks. State-owned companies are significantly different from private firms along the dimension of objectives, resource endowment, operational risks, and government intervention (Yang et al. 2017). With the support from the Chinese government, state-owned firms have easier access to financial and credit approval than their privately-owned counterparts. With the encouragement from the Chinese government, banks provide more financial support to state-owned firms, even though some of them have lower productivity than privately-owned enterprises, resulting in low efficient capital investment by state-owned companies (Chang and Boontham 2017; Song et al. 2011). Even over 30 years after the reform and opening-up of the Chinese economic policies, there has been still a bias against privately-owned firms in markets and banks, such as charging higher interest rates and imposing harsher conditions (Yang et al. 2017). Therefore, private firms rely more on their internal funds, such as cash and cash equivalents, than state-owned companies, and have more incentives to use derivatives in order to stabilize their cash flows.

Table 3 demonstrates the differences in characteristics between firms that use and those that do not use derivatives. The differences between users and non-users of derivatives leads us to the first research question of the study: which factors lead to the use of derivatives by Chinese firms? Moreover, observing the performance indicators (measured as ROA, ROE, and Tobin's Q) as shown in Table 3, non-users of derivatives have slightly outperformed derivative users. This observation suggests that it is uncertain whether derivative use has a positive effect on firm performance. Therefore, we have the second research question of this study: do firms truly benefit from their derivative use?

Table 3. The description of derivative-using firms and non-derivative-using firms. [1.]

Panel A								
Variables				**Derivative_dummy= 0**				
	N	**Mean**	**SD**	**Min**	**P25**	**P50**	**P75**	**Max**
Derivative_dummy	7618	0	0	0	0	0	0	0
ROA	7049	0.0450	0.0400	−0.0410	0.0170	0.0420	0.0710	0.125
ROE	7049	0.0720	0.0660	−0.0790	0.0310	0.0690	0.109	0.213
Ln (Tobin's Q)	6697	0.627	0.829	−2.182	0.137	0.635	1.150	6.891
Tobin's Q	6697	2.375	1.678	0.350	1.147	1.886	3.158	6.595
Growth	7031	0.392	0.280	0.0650	0.195	0.319	0.498	1.207
Leverage	7049	0.377	0.207	0.0910	0.200	0.350	0.534	0.802
Net Profit Margin	7037	0.237	8.859	−58.38	0.0310	0.0830	0.160	715.1
Asset Turnover	7049	0.564	0.362	0.144	0.304	0.470	0.708	1.600
Size	7049	21.56	1.089	14.94	20.83	21.44	22.14	26.07
Operating Cash Flow	7037	0.0700	0.149	−0.267	−0.00400	0.0710	0.157	0.368
CEO_TS	6975	0.197	0.232	0	0	0.0590	0.399	0.897
Z	6697	0.584	0.357	0.162	0.327	0.491	0.728	1.603
Cash Holding	7034	0.490	0.458	0.0430	0.149	0.316	0.675	1.616
Capital Expenditure	7037	0.137	0.137	0.00400	0.0370	0.0870	0.185	0.492
Panel B								
Variables				**Derivatives_dummy = 1**				
	N	**Mean**	**SD**	**Min**	**P25**	**P50**	**P75**	**Max**
Derivatives_dummy	511	1	0	1	1	1	1	1
ROA	476	0.0400	0.0380	−0.0410	0.0140	0.0360	0.0620	0.125
ROE	476	0.0740	0.0680	−0.0790	0.0320	0.0650	0.115	0.213
Ln (Tobin's Q)	454	0.306	0.826	−2.489	−0.178	0.366	0.860	2.829
Tobin's Q	454	1.816	1.396	0.350	0.837	1.442	2.364	6.595
EBTA	475	0.283	0.216	0.0650	0.146	0.220	0.342	1.207
Leverage	476	0.443	0.209	0.0910	0.274	0.442	0.615	0.802
Net Profit Margin	475	0.0590	0.0820	−0.443	0.0170	0.0410	0.0850	0.601
Asset Turnover	476	0.788	0.409	0.144	0.455	0.759	1.034	1.600
Size	476	22.21	1.340	19.63	21.19	21.97	22.86	27.14
Operating Cash Flow	475	0.0640	0.116	−0.267	0.0120	0.0640	0.124	0.368
CEO_TS	474	0.153	0.222	0	0	0.0190	0.260	0.775
Z	454	0.804	0.403	0.162	0.474	0.780	1.047	1.603
Cash Holding	474	0.264	0.310	0.0430	0.0710	0.156	0.305	1.616
Capital Expenditure	475	0.103	0.112	0.00400	0.0290	0.0620	0.136	0.492

[1] Panel A presents the information regarding derivative non-users and Panel B presents the information regarding derivative users. The firm performance of derivative non-users (the median value of ROA, ROE, Ln (Tobin's Q), and Tobin's Q) is slightly better than that of derivative users.

3.2. Estimation Models

Our empirical estimations were based on the dataset of the unbalanced panel data. In comparison to other types of data such as time-series data and cross-sectional data, the panel data type of longitudinal data has unique advantages, including its ability to detect and measure statistical effects that either pure time series or cross-sectional data cannot, as well as the ability to minimize estimation biases that may arise from aggregating time series groups into a single time series. However, when using panel data for estimation, some potential problems need to be addressed. First, there is a probability that the variables from different firms in the data are not independent. Second, when the estimations involve a large number of parameters, standard regression methods could become ill-posed. Our study addressed the issue of potential correlations among the sampled firms. We performed regression analysis clustered by firms. To meet the independent and identical distribution, we allowed for correlation among residuals with groups, but rejected the presence of correlation between different groups.

An alternative modeling method is linear stochastic approximations. Stochastic approximation methods are a family of iterative methods typically used for root-finding problems or for optimization problems. The recursive update rules of stochastic approximation methods can be used for solving linear systems when the collected data is corrupted by noise, or for approximating extreme values of the function, which cannot be computed directly by only estimated via noisy observations (Kouritzin 1996; Nemirovski et al. 2009; Toulis and Airoldi 2015). A major advantage of linear stochastic approximation methods lies in the fact that they can facilitate estimation with a large amount of data, in which model parameters are updated sequentially using small batches of data at each step (Toulis and Airoldi 2015).

3.2.1. Estimation Model for Firm Characteristics and Derivative Use

Based on our review of previous studies in the last section regarding firm characteristics and derivative use, we developed the following model to examine factors that lead to derivative use by Chinese firms:

$$\begin{aligned}\text{Derivatives\_dummy}_{it} &= \beta_0 + \beta_1 \ln(\text{size}_{i,t}) + \beta_2 \text{OPERCF\_a}_{i,t} + \beta_3 \text{Leverage}_{i,t} + \beta_4 \text{ExGain}_{i,t} \\ &+ \beta_5 Oprevenuegrowth_{i,t} + \beta_6 \text{CEO\_TS}_{\text{i,t}} + \beta_7 \text{RD\_dummy}_{i,t} + \beta_8 \text{Z}_{i,t} + \beta_9 Dep\_a_{i,t} \\ &+ \beta_{10} ROA_{i,t} + \beta_{11} ROE_{i,t} + \beta_{12} Tobin's\ Q_{i,t} + \varepsilon,\end{aligned} \tag{1}$$

$$\begin{aligned}\text{Derivatives\_dummy}_{it} &= \beta_0 + \beta_1 \ln(\text{size}_{i,t}) + \beta_2 \text{OPERCF\_a}_{i,t} + \beta_3 \text{Leverage}_{i,t} + \beta_4 \text{ExGain}_{i,t} \\ &+ \beta_5 Oprevenuegrowth_{i,t} + \beta_6 \text{CEO\_TS}_{i,t} + \beta_7 \text{RD\_dummy}_{i,t} + \beta_8 \text{Z}_{i,t} + \beta_9 Dep\_a_{i,t} \\ &+ \beta_{10} ROA_{i,t} + \beta_{11} ROE_{i,t} + \beta_{12} Tobin's\ Q_{i,t} + \beta_{13} \text{SOE}_i + \varepsilon,\end{aligned} \tag{2}$$

where $\text{Derivatives\_dummy}_{it}$ as the dependent variable equals 1, if firm i uses derivatives at time t, otherwise it equals 0. Equation (1) provides a baseline model to examine the relationship between firm characteristics and derivative use. Equation (2) adds firm ownership (SOE) to examine the effect of the firm's ownership structure on derivative use. In either Equations (1) or (2), ε represents the idiosyncratic error term at time t.

The explanatory variables are included as:

(1) $\ln(\text{size}_{i,t})$ is the size level of a firm i at time t.
(2) $\text{OPERCF\_a}_{i,t}$ is the operational cash flow of a firm i at time t.
(3) $\text{Leverage}_{i,t}$ is the leverage ratio which is calculated by dividing debt by size.
(4) $\text{ExGain}_{i,t}$ indicates the exchange gains of firm i at time t.
(5) $Oprevenuegrowth_{i,t}$ is the growth rate of the operational revenue of a firm i at time t.
(6) $\text{CEO\_TS}_{\text{i,t}}$ is the stockholding ratio of CEO of the firm i at time t.

(7) $RD\_dummy_{i,t}$ is a dummy variable to judge if firm i has made research and development investment at time t.
(8) $Z_{i,t}$ is the Altman Z-score, which measures the bankruptcy risk of firm i at time t.
(9) $Dep\_a_{i,t}$ measures the tax shield of firm i at time.
(10)–(12) Three variables represent the performance of the firm, measured by ROA, ROE and Tobin's Q, respectively.
(13) SOE_i is the dummy variable to analyze ownership of the firms, which equals to 0 if the observation is a private enterprise, and it equals to 1 if the observation is a state-owned enterprise.

The Logit model was selected to estimate Equations (1) and (2), as the dependent variable of derivative use is a binary-choice dummy. The Logit model is a widely used analytical method for binary-choice estimation. In comparison to the Probit model, it provides an unambiguous and concise setting on result explanation, because the cumulative distribution function in logistic distribution specifies an analytical expression while the standard distribution in the Probit model does not (Wooldridge 2010). As shown in Table 3 (Panels A and B), data for firms' derivative use are highly unbalanced, with an overwhelming majority of firms reported as non-derivative users. If untreated, empirical estimation may suffer from potential event bias. Following (King and Zeng 2001), we applied the bias-corrected estimations in our regression analysis so that empirical results would not be biased from the unbalanced distribution of the derivative use as the dummy variable.

As shown in the Results section, four model specifications were performed. Model (1) is the benchmark regression used to test the common phenomenon. Model (2) adds two fixed variables (*industry* and *Year*) in order to control the effects of industry and time. In Model (3), the full sample is split into two groups of state-owned and privately-owned firms by adding the variable of SOE to examine. The differences between these two types of firms in terms of their derivative use. Based on Model (3), Model (4) controls the effects of industry and time.

3.2.2. Estimation Model for Derivative Use and Firm Performance

In order to examine the relationship between derivative use and firm performance, Models (3) and (4) were developed, and three variables were adopted as the measures of firm performance. Following previous studies (Bartram et al. 2011; Jin and Jorion 2006), Tobin's Q, is adopted to measure a firm's market value at the stock exchange market, and it is a proxy of firm performance in Model (3). By measuring the market value created over the book value, Tobin's Q helps to produce market values comparable across sample firms and mitigates any scale effects. Following previous research (Choi et al. 2013; Gay et al. 2011), Model (4) uses Return on Assets (ROA) and Return on Equity (ROE) as indicators for firm performance, were introduced in this study.

$$\text{Tobin's Q}_{i,t} = \beta_0 + \beta_1 * \text{Derivatives\_dummy}_{i,t} + \sum_K \beta_K * CONTROL_{i,t}^K + \varepsilon, \quad (3)$$

$$\text{Tobin's Q} = \frac{((Total\ shares\ Outstanding - Bshares\ Outstanding) * P_A + BShares\ Outstanding * P_b * exchange\ rate)}{(Total\ Assets)}$$

$$\text{Firm performance}_{i,t} = \beta_0 + \beta_1 * \text{Derivatives\_dummy}_{i,t} + \beta_2 * \text{Derivatives\_dummy}_{i,t} * \text{SOE}_i + \sum_K \beta_K * CONTROL_{i,t}^K + \varepsilon. \quad (4)$$

In Models (3) and (4), derivative use is the independent variable. In Model (4), $\text{Derivatives\_dummy}_{i,t} * \text{SOE}_i$ is included to measure the different effects between private and state-owned companies. The control variables and their definitions are shown in Table 4.

Table 4. Description of control variables.

Control Variable	Definition
SOE	The dummy of a firm's nature from CSMAR, which equals to 0 if the firm is privately-owned and equals to 1 if the firm is state-owned. It is used to control the effects of a firm's' ownership structure.
Size	The Napierian Logarithm of a firm's total assets, to control the relationship between a firm's size and its performance
Operating Cash Flow	Using a firm's cash flow scaled by total assets to control the relationship between a firm's operations and its performance
Depreciation	Depreciation scaled by total assets to establish the effects of tax shields on a firm's performance
CEO_TS	The ratio of shareholding by a CEO is introduced to control the potential relationship between agent costs and a firm's performance
RD_dummy	Is used to judge whether companies invest in research and development to control the underinvestment problem and firm performance
Z	The Altman Z-score is used to control the influences of bankruptcy costs on a firm's performance. This variable is calculated by the formula: $Z = 0.012 * X_1 + 0.014 * X_2 + 0.033 * X_3 + 0.006 * X_4 + 0.999 * X_5$, where, X_1 = (liquid asset-liquid debt)/total assets; X_2 = retained earnings/total assets; X_3 = EBIT/total assets; X_4 = market value of common shares and preferred stock/total debt; X_5 = total sales/total assets
Leverage	The leverage ratio is calculated by total debt over total assets, to establish the relationship between capital structure and a firm's performance
Exchange Gain	Exchange gain scaled by total assets is used to control the impacts of movements of foreign exchange rates on a firm's performance

Following Lau (2016), pooled Ordinary Least Square (OLS) regression model was adopted to empirically examine the effect of derivative use on firm performance. In pooled OLS model, clustering by each firm can cut out the potential interactions among individual firms and thus generate the independence of probability. Before performing a dynamic panel data analysis, three statistical issues need special treatment. First, firm-specific, time-specific, and industry-specific effects in the dataset may have potential implications in empirical estimations, because the residuals of a given firm, a given year, or a given industry may be correlated across years or firms (i.e., time-series dependence and cross-sectional dependence). Second, the choice between fixed-effects and random-effects model specifications needs to be made. Third, although this paper focuses only on the use of financial derivatives with the purpose of hedging, the relationship between derivative use and its explanatory variables may not be clear-cut. As the nature of hedging by using derivatives is a type of investment, the reverse causality may arise with the feedback effects between firm profitability and corporate hedging capacity.

Several diagnostic tests were performed to address these three statistical issues. First, the Hausman test was performed, and the results suggest that the idiosyncrasies in the cross-section data need to be fixed, and thus the fixed-effects model was adopted for model estimation. Second, time-effects and industry-effects were also controlled in the model estimation, and the results are reported following benchmark regressions in the respective tables of results. Third and more importantly, robust standard error estimations with a fixed-effects model were performed to control the potential problems with the endogeneity in the data. Prior research suggests that robust standard error estimations (FE-SE or RE-SE) in either fixed-effects or random-effects model are found to be unbiased due to the permanent firm-effect (Abadie et al. 2017; Cameron and Miller 2015; Petersen 2009). Thus, the potential problem of endogeneity was effectively addressed.

As shown in Results section, four model specifications of the pooled OLS estimation were performed for each of the three performance measures respectively (ROA, Tobin's Q, and ROE). The first one is a benchmark regression, including all the control variables except the variable of SOE. The second regression model controlled the effects of time and industry. The third regression (Model 4) added $\text{Derivatives\_dummy}_{i,t} * \text{SOE}_i$ and the

control variable of SOE. Based on regression three, the fourth regression controlled the effects of time and industry.

4. Empirical Results and Discussion

4.1. Firm Characteristics and Derivative use

Table 5 demonstrates the empirical results regarding the factors that influence companies' decisions on whether to use financial derivatives. Six variables of firm size, operational cash flow, tax shield (measured as depreciation divided by total assets), R&D investment, bankruptcy possibility (represented by Z-score), and Tobin's Q, are significant across all four model specifications. As shown in the specifications of Models 3 and 4, ROA is significant after controlling the variable of firm ownership. However, the variable of firm ownership is insignificant after controlling the effects of time and industry.

Table 5. Factors that impact a firms' decision to use derivatives [1].

	(1)	(2)	(3)	(4)
	Derivatives_dummy	**Derivatives_dummy**	**Derivatives_dummy**	**Derivatives_dummy**
SOE			−0.366 **	−0.186
			−2.14	−1.05
Ln(size)	0.441 ***	0.491 ***	0.440 ***	0.489 ***
	9.02	8.18	9.04	8.20
Cash Flow	1.734 **	1.504 *	1.708 **	1.485 *
	2.33	1.83	2.29	1.81
Depreciation	−0.572	−1.027 *	−0.532	−1.042 *
	−1.18	−1.66	−1.10	−1.69
CEO_TS	0.185	0.003	0.237	0.031
	0.73	0.01	0.92	0.11
RD_dummy	0.944 ***	0.469 ***	0.937 ***	0.473 ***
	7.37	2.92	7.30	2.94
Z	0.547 ***	0.596 ***	0.543 ***	0.595 ***
	9.88	8.34	9.82	8.35
Leverage	−0.074	0.008	−0.054	0.014
	−0.27	0.04	−0.21	0.08
Exchange Gain	−0.000	−0.000	−0.000	−0.000
	−0.19	−0.70	−0.21	−0.70
Growth	−0.001	−0.001	−0.001	−0.001
	−0.54	−0.51	−0.59	−0.53
ROE	1.039 *	0.875	1.048 *	0.882
	1.71	1.39	1.73	1.41
ROA	−4.136 **	−2.735	−4.105 **	−2.755 *
	−2.54	−1.64	−2.54	−1.68
Tobin's Q	−0.093 ***	−0.144 ***	−0.095 ***	−0.145 ***
	−2.73	−3.14	−2.78	−3.16
Fixed Effects	NO	Yes	NO	Yes
N	8387	7715	8387	7715

[1] This table shows the factors that may affect firms' decisions regarding hedging using derivatives. These factors are: firm size, operating cash flow, tax shield (represented by depreciation divided by total assets), research and development investment, possibility of bankruptcy (represented by Z-score), ROA, and Tobin's Q. After controlling the effects of time and industry, the nature of a firm is not a deciding factor of derivative usage. *t*-statistics in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

The significant effect of firm size suggests that larger companies are more likely to invest in financial derivatives. Two factors may contribute to this result. First, larger firms have a higher level of risk exposure in comparison to smaller firms, due to their more extensive operations. Second, larger firms are financially more capable of performing complex derivative operations by hiring professional managers. Firms with more cash flow are more likely to use derivatives, as these firms have a stronger need to stabilize their daily operations against the financial risks from the uncertainty associated with unexpected changes of exchange and interest rates. A higher R&D level indicates that

the firms have more investment opportunities. As a result, these firms are more likely to engage in derivative use to safeguard the R&D investment. A lower Altman Z-score means a firm has a larger probability of bankruptcy. Therefore, a positive relationship between a Z-score and the derivative usage dummy indicates that firms with lower bankruptcy risk are more likely to use derivatives. The negative impact of tax shields (represented by depreciation to total assets) on a firm's derivative use indicates that companies that enjoy more tax benefits tend to reduce their derivative investment.

When it comes to the influence of a firm's performance variables, the negative relationships between derivative use and ROA, as well as between derivative use and Tobin's Q, support the suggestion that firms in the Chinese market tend to invest in financial derivatives with the purpose to improve firm performance.

4.2. Derivative Use and Firm Performance

In this section, we address the issue of whether the investment in financial derivatives can result in improvement of the firm performance. Here, firm performance is measured by the three indicators of ROA, ROE, and Tobin's Q.

Table 6 demonstrates the effect of derivative use on ROA as one measure of firm performance. As shown in Table 6, four model specifications are performed. Model 1 is the benchmark model. Based on Model 1, Model 2 adds two control variables of time and industry. Model 3 tests derivative use on ROA in terms of the two different firm groups (state-owned and private firms) by adding the dummy variable SOE. Based on Model 3, Model 4 adds two control variables of time and industry. Some control variables are automatically removed by Stata due to multicollinearity.

Table 6. The effects of derivative use on ROA [1].

	(1)	(2)	(3)	(4)
	ROA	**ROA**	**ROA**	**ROA**
Derivative_dummy	−0.007 ***	−0.006 ***	−0.012 **	−0.008
	(−4.39)	(−3.39)	(−2.09)	(−1.56)
Derivative_dummy *SOE			0.005	0.003
			(0.80)	(0.53)
SOE	0.002	0.002	0.002	0.002
	(1.53)	(1.13)	(1.24)	(0.93)
Size	0.007 ***	0.008 ***	0.007 ***	0.008 ***
	(16.29)	(19.07)	(16.28)	(19.05)
Asset Turnover	0.023 ***	0.031 ***	0.023 ***	0.031 ***
	(19.90)	(24.40)	(19.89)	(24.39)
Net Profit Margin	0.000 ***	0.000 ***	0.000 ***	0.000 ***
	(4.46)	(5.04)	(4.45)	(5.03)
Leverage	−0.107 ***	−0.105 ***	−0.107 ***	−0.105 ***
	(−46.18)	(−43.90)	(−46.16)	(−43.89)
Fixed Effects	NO	Yes	NO	Yes
N	7512	7512	7512	7512
R2	0.238	0.315	0.239	0.315
Adjust R2	0.238	0.310	0.238	0.310

[1] In this table, four regressions are introduced. The first column is the benchmark regression of model (3). The second column is based on the first regression but controls the effects of time and industry. The third column is the benchmark regression of model (4). The fourth column is based on the third regression but controls the effects of time and industry. This table shows that using derivatives has negative effects on ROA, and that the nature of a company has no impact on the outcomes of using derivatives. Some variables included are automatically removed by Stata due to multicollinearity. *t*-statistics in parentheses ** $p < 0.05$, *** $p < 0.01$.

The results shown in Table 6 suggest that derivative use negatively affects ROA (Model 1), although the negative impact is slightly reduced when the effects of time and industry are controlled in Model 2. Results from Model 3 demonstrates that private enterprises are more seriously exposed to the negative effects of using derivatives (−0.014), while state-owned companies also suffer from these negative effects of derivative use, but

the magnitude is less severe in comparison to that of the private firms. The reason for the difference most likely lies in the fact that state-owned companies have better access to significant financial support from the Chinese government. Financial support from the government can lead to increased profitability and investor confidence, thus partly offsetting the negative effects of using derivatives, such as the negative return of derivatives and the loss of effectiveness when risks erupt in the whole market (e.g., when the stock market crashed in 2015).

In order to further examine the relationship between derivative use and firm performance, we replaced the performance measure of ROA with another two performance indicators of Tobin's Q and ROE. Table 7 presents the model results with Tobin's Q as the performance measure. Similar to the case in Table 6, we performed four model specifications. As shown in Table 7, derivative use has a significant but negative effect on the dependent variable of Tobin's both in Models 2 and 4. These results confirmed the negative effect of derivative use on firm performance. Further, this negative effect is consistent across both state-owned and private firms.

Table 7. The effects of derivative use on Tobin's Q [1].

	(1)	(2)	(3)	(4)
	Tobin's Q	**Tobin's Q**	**Tobin's Q**	**Tobin's Q**
Derivative_dummy	−0.033	−0.079 ***	−0.193 *	−0.163 **
	(−1.06)	(−3.29)	(−1.94)	(−2.17)
Derivative_dummy *SOE			0.176 *	0.093
			(1.70)	(1.19)
SOE	−0.030	−0.002	−0.045	−0.011
	(−1.03)	(−0.11)	(−1.48)	(−0.46)
Size	−0.312 ***	−0.364 ***	−0.312 ***	−0.364 ***
	(−39.07)	(−57.01)	(−39.10)	(−57.03)
Asset Turnover	0.012	0.175 ***	0.012	0.175 ***
	(0.60)	(9.50)	(0.58)	(9.48)
Net profit margin	0.004 ***	0.004 ***	0.004 ***	0.004 ***
	(4.12)	(5.41)	(4.09)	(5.40)
Leverage	−1.327 ***	−1.083 ***	−1.326 ***	−1.083 ***
	(−31.06)	(−31.12)	(−31.04)	(−31.11)
Fixed Effects	NO	Yes	NO	Yes
N	7140	7140	7140	7140
R^2	0.439	0.685	0.439	0.685
Adjust R^2	0.438	0.683	0.438	0.683

[1] In this table, four regressions are introduced. The first column is the benchmark regression of model (3). The second column is based on the first regression but controls the effects of time and industry. The third column is the benchmark regression of model (4). The fourth column is based on the third regression but controls the effects of time and industry. This table shows that using derivatives brings negative effects on Tobin's Q and that the nature of a company has no impact on the outcomes of using derivatives, after controlling the effects of time and industry. *t*-statistics in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

The same procedure of four model specifications is performed after adopting ROE as the measure of firm performance. The results are presented in Table 8. The regression results are qualitative, similar as with the case of using ROA and Tobin's Q as measures of firm performance. Thus, the negative effect of derivative use on firm performance is further confirmed.

Table 8. The effects of derivative use on ROE [1].

	(1)	(2)	(3)	(4)
	ROE	**ROE**	**ROE**	**ROE**
Derivative_dummy	−0.010 ***	−0.006 *	−0.016	−0.010
	(−3.14)	(−1.95)	(−1.57)	(−1.00)
Derivative_dummy *SOE			0.007	0.004
			(0.65)	(0.42)
SOE	0.004	0.003	0.003	0.003
	(1.39)	(1.12)	(1.14)	(0.95)
Size	0.012 ***	0.014 ***	0.012 ***	0.014 ***
	(15.83)	(18.45)	(15.81)	(18.44)
Asset Turnover	0.037 ***	0.054 ***	0.037 ***	0.054 ***
	(17.95)	(23.66)	(17.94)	(23.65)
Net Profit Margin	0.000 ***	0.000 ***	0.000 ***	0.000 ***
	(4.62)	(5.18)	(4.61)	(5.17)
Leverage	−0.065 ***	−0.067 ***	−0.065 ***	−0.067 ***
	(−15.60)	(−15.52)	(−15.59)	(−15.52)
Control Year and industry	NO	Yes	NO	Yes
N	7512	7512	7512	7512
R2	0.073	0.175	0.073	0.175
Adjust R2	0.072	0.169	0.072	0.169

[1] In this table, four regressions are introduced. The first column is the benchmark regression of model (3). The second column is based on the first regression but controls the effects of time and industry. The third column is the benchmark regression of model (4). The fourth column is based on the third regression but controls the effects of time and industry. This table shows that using derivatives has negative effects on ROE, and that the nature of a company has no impact on the outcomes of using derivatives. *t*-statistics in parentheses * $p < 0.1$, *** $p < 0.01$.

In summary, derivative use tends to exert a negative effect on firm performance as measured by indicators of ROA, ROE, and Tobin's Q. This means that using derivatives reduces a company's performance. Two factors may be associated with the negative effects of derivative use on firm performance in the context of firms from China. First, compared with developed markets, the market of financial derivatives in China is flawed and suffers from tight control of government agencies. Insufficient hedging instruments mean that Chinese firms often fail to manage the risks through using derivatives. Moreover, the intervening actions were taken by various government agencies such as China Securities Regulatory Commission (CSRC) after the stock market crashed in 2015 led to a high level of difficulty for Chinese firms to invest in derivatives, and thus it is impractical for Chinese firms to use investment in financial derivatives as an effective method when managing business risks. Second, there is a severe lack of skills and expertise in Chinese firms in relation to business transactions for investment in financial derivatives. Investments in financial derivatives made by inexperienced operators contribute to the risks of corporations and reduce their performance.

It takes time for the derivative use to generate influence on firm performance, especially when firms just initiated derivative use first time. In order to consider the time effect of derivative use, we examined the relationship between derivative use and firm performance by taking a time lag of one year. For this analysis, firm performance is measured by the three financial indicators of ROA, ROE, and Tobin's Q, respectively. Table 9 shows the effect of derivative use in the past on the firm performance in the current period. The first column for each performance indicator presents the results of the benchmark regression, and the results of the second column have controlled time and industry effects. As shown in Table 9, derivative use has a significant and negative effect on both ROA and ROE as the measures of firm performance, and these negative effects remain when the time lag effect has been controlled. On the other hand, derivate use has no significant effect on firm performance when performance is measured by Tobin's Q.

Table 9. The lagged effects of derivative use on firm performance [1].

	ROA	ROA	ROE	ROE	TQ	TQ
$\text{Lag(Derivative\_dummy)}_{-1}$	−0.08 ***	−0.008 ***	−0.013 ***	−0.011 ***	−0.037	−0.039
	(−3.99)	(−3.95)	(−3.64)	(−3.27)	(−0.55)	(−0.63)
SOE	−0.002	−0.002	−0.000	−0.001	−0.071	−0.054
	(−1.02)	(1.29)	(−0.03)	(−0.38)	(−1.26)	(−1.04)
Size	−0.002 ***	−0.001 ***	0.006 ***	0.007 ***	−0.660 ***	−0.694 ***
	(−5.42)	(−3.97)	(9.61)	(11.46)	(−52.03)	(−59.28)
Asset Turnover	0.013 ***	0.013 ***	0.037 ***	0.034 ***	−0.305 ***	−0.245 ***
	(12.79)	(12.45)	(19.78)	(18.72)	(−8.55)	(−7.48)
Net Profit Margin	0.000 *	0.000 **	−0.000 *	−0.000	0.000	0.001
	(1.68)	(2.05)	(−1.67)	(−1.40)	(0.20)	(0.92)
Fixed Effects	NO	YES	NO	YES	NO	YES
N	11,429	11,429	11,429	11,429	10,788	10,788
R2	0.0175	0.0378	0.0426	0.0624	0.2140	0.3488
Adjust R2	0.0171	0.0367	0.0422	0.0613	0.2136	0.3480

[1] In this table, three different indicators of firm performance (ROA, ROE, and Tobin's Q) are used to test the lagged effects of using derivatives. For each indicator, the first column is the benchmark regression. The second column is based on the first regression, but the effects of time and industry are controlled. This table shows that derivative usage on forwarding time has a significantly negative influence on ROA and ROE, but no significant impact on firm value. *t*-statistics in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 9 demonstrates the negative effect of using derivatives in the past on the firm's current performance. This negative effect with time lag is consistent with the results from the empirical analyses in the last section. Two factors may explain this negative effect even with lagged time effect being controlled. Firstly, the ineffectual operation of investment in financial derivatives may increase the risk exposure of companies and then damage the firm's performance. Secondly, investment in hedging is not free. Usually, hedging by derivatives sacrifices returns as a prerequisite. Therefore, when firms increase investment in financial derivatives, investing firms will expect firm performance to decline in the future to some extent. The lack of impact on firm value (presented by Tobin's Q) may be due to derivative use only affecting the value of the firm during the current period. However, in the subsequent time periods, internal factors can have more obvious effects on firm value rather than just derivative investment.

4.3. Further Empirical Analysis

Results generated from our examination of the first research question (what type of firms are more likely to invest in financial derivatives) suggest that firms with poorer performance are more likely to invest in derivatives. However, results from our examination of the second research question (the relationship between derivative use and firm performance) demonstrate that derivative use tends to reduce, rather than improve, firm performance. To examine these seemingly contradictory empirical results, we conducted the further empirical analysis.

To conduct this further analysis, we split the full sample of firms into sub-samples. First, based on differences in terms of ROA among the sampled firms, we split the full sample into two sub-samples, and they are the firms with a ROA value higher and lower than the median value of the full sample. Second, based on differences in terms of ROE among the sampled firms, we also split the full sample into two sub-samples of firms with a ROE value higher and lower than the median value of the full sample, respectively. Then, we introduced the performance indicator Tobin's Q as the dependent variable to examine the relationship between derivative use and firm performance. The expected result is that derivative use will lead to a reduction of performance for those firms whose operations are less successful.

For this further regression analysis of the relationship between derivative use and firm performance, we adopted the conceptual model developed by Carter et al. (2006).

The model is provided below. All the control variables included in the model are listed in Table 10.

$$\text{Tobin's Q} = \text{Derivative\_dummy}_{i,t} + \sum_{K} \beta_K * CONTROL_{i,t}^{K} + \varepsilon. \quad (5)$$

Table 10. The control variables for the further test.

Control Variables	Definition
$Size_{i,t}$	The Napierian Logarithm of a firm's total assets, to control the relationship between a firm's size and its performance
$Dividend\_dummy_{i,t}$	Dividend payout dummy: if the observation pays dividends on time *i*, the variable is equal to 1, otherwise it is equal to 0.
$CapitalExpenditure\_a_{i,t}$	The ratio of capital expenditure over total assets, which controls the effects of growth opportunities.
$CF\_a_{i,t}$	Using a firm's cash flow, scaled by total assets, to control the relationship between a firm's operations and its performance
$Cash\_s_{i,t}$	The ratio of cash to sales, to control the influences of liquidity.
$CEO\_TS_{i,t}$	CEO options-to-shares outstanding, to control the potential relationship between agent costs and a firm's performance
Year	To control the effects of time
Industry	To control industry effects

4.3.1. Further Empirical Analysis

Table 11 shows the results for the relationship between derivative use and ROA as the measure of firm performance for the two sub-samples with ROA value higher and lower than the median value of the full sample, respectively. As shown in Column 1 in Table 11, the coefficient for the effect of derivative use carries a negative sign for the sub-sample with better performance (ROA > median), indicating a potentially negative effect on Tobin's Q as a measure of firm performance, but this effect is not significant. On the other hand, the negative effect of derivative use for sub-sample with poorer performance (ROA < median) is highly significant. These results clearly demonstrate that derivative use has a negative effect on performance, mainly for those firms that performed poorly.

Table 11. The effects of derivatives usage on Tobin's Q for groups separated by the median ROA value [1].

	ROA > Median (0.0370)	ROA < Median (0.0370)
Derivative_dummy	−0.047	−0.089 ***
	(−1.47)	(−2.70)
Size	−0.364 ***	−0.511 ***
	(−42.89)	(−64.77)
Dividend_dummy	−0.024	0.036
	(−0.53)	(0.69)
Capital Expenditure	0.203 ***	0.130 **
	(2.99)	(2.05)
Cash Holding	0.100 ***	0.173 ***
	(4.62)	(7.77)
Cash Flow	0.399 ***	0.101 *
	(7.04)	(1.79)
CEO_TS	0.087 **	−0.025
	(2.51)	(−0.61)
Fixed Effects	YES	YES
N	3756	3202
R2	0.649	0.755
Adjust R2	0.643	0.751

[1] In this table, the sample is grouped by the median value of ROA (0.0370). For the group in which ROA is greater than the median value, the use of derivatives has no significant impact on firm value. For the group in which ROA is less than the median value, a significantly negative relationship between derivatives usage and firm value has been found (at 99% confidence). *t*-statistics in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

As previously described, we also created two sub-samples based on the difference between firms that have a ROE value higher and lower than the median value of the full sample. We examined the effect of derivate use on Tobin's Q as the measure of firm performance, and the results of regression analysis are shown in Table 12. For the sub-sample of firms with higher ROE value (Column 1), the effect of derivative use has a negative value, but this negative coefficient is statistically insignificant, suggesting that derivative use does not have a significant effect on Tobin's Q as firm performance. On the other hand, the effect of derivative use on Tobin's Q is negative and significant for the sub-sample with lower ROE value (Column 2). These results confirmed the findings from Table 11.

Table 12. The effects of derivatives usage on Tobin's Q for groups separated by the median ROE value [1].

	ROE > Median (0.0700)	**ROE < Median (0.0700)**
Derivative_dummy	−0.051	−0.069 **
	(−1.47)	(−2.16)
Size	−0.395 ***	−0.529 ***
	(−45.70)	(−65.48)
Dividend_dummy	−0.032	0.015
	(−0.61)	(0.33)
Capital Expenditure	0.195 ***	0.147 **
	(2.59)	(2.52)
Cash Holding	0.194 ***	0.172 ***
	(7.88)	(8.76)
Cash Flow	0.488 ***	0.140 ***
	(7.92)	(2.70)
CEO_TS	0.130 ***	−0.011
	(3.39)	(−0.31)
Control Year and Industry	YES	YES
N	3521	3441
R2	0.676	0.741
Adjust R2	0.670	0.737

[1] In this table, the sample is grouped using the median value of ROE (0.0700). Similar to Table 10, for the group in which the ROE is greater than the median value, the use of derivatives has no significant impact on firm value. For the group in which ROE is less than the median value, a significantly negative relationship between derivative usage and firm value is found (at 95% confidence). *t*-statistics in parentheses ** $p < 0.05$, *** $p < 0.01$.

4.3.2. Robustness Tests

For the robustness test, observations have been grouped, for both ROA and ROE, into those which occupy the lowest 25% of the whole sample and the highest 25% of the whole sample. The model of Carter et al. (2006) has also been used in this test. The condensed data represents the extreme observations from the sample and leads to a stricter test. It is expected that the relationship between derivatives usage and Tobin's Q will be significant and negative in the groups that represent the firms with the lowest ROA and ROE. Furthermore, it is expected that this relationship will be insignificant in the groups that represent the firms with the highest ROA and ROE. The results of this robustness test are shown in Tables 13 and 14.

Table 13. The effects of derivative usage on Tobin's Q for groups with high and low ROA [1].

	ROA > p75 (0.0670)	ROA < p25 (0.0140)
Derivative_dummy	0.116	−0.075 ***
	(1.17)	(−2.73)
Size	−0.374 ***	−0.485 ***
	(−16.33)	(−72.06)
Dividend_dummy	−0.195	0.016
	(−1.25)	(0.37)
Capital Expenditure	0.272	0.112 **
	(1.21)	(2.07)
Cash Holding	0.096	0.159 ***
	(1.44)	(8.51)
Cash Flow	0.026	0.137 ***
	(0.14)	(2.87)
CEO_TS	0.328 ***	0.012
	(3.37)	(0.36)
Fixed Effects	YES	YES
N	539	4345
R2	0.669	0.746
Adjust R2	0.633	0.743

[1] This table presents the relationship between the use of derivatives and firm value by using a more extreme grouping method. The sample is separated into two groups; one includes the firms which have the greatest 25% ROA from the total sample (0.0670), and one includes firms with the lowest 25% ROA from the total sample (0.0140). In keeping with the previous findings, for the group with lower ROA, derivative usage has a significantly negative impact on firm value (at 99% confidence), whereas, for the group with higher ROA, there are no significant effects on firm value from using derivatives. *t*-statistics in parentheses ** $p < 0.05$ *** $p < 0.01$.

Table 14. The effects of derivatives usage on Tobin's Q for groups with high and low ROE [1.]

	ROE > p75 (0.113)	ROE < p25 (0.030)
Derivative_dummy	−0.028	−0.062 **
	(−0.44)	(−2.34)
Size	−0.412 ***	−0.500 ***
	(−25.70)	(−73.99)
Dividend_dummy	−0.016	0.027
	(−0.15)	(0.69)
Capital Expenditure	0.291 *	0.148 ***
	(1.68)	(2.95)
Cash Holding	0.241 ***	0.187 ***
	(4.02)	(11.28)
Cash Flow	0.240 *	0.221 ***
	(1.93)	(5.02)
CEO_TS	0.466 ***	0.096 ***
	(5.35)	(3.28)
Fixed Effects	YES	YES
N	955	5033
R2	0.737	0.726
Adjust R2	0.721	0.723

[1] This table presents the relationship between the use of derivatives and firm value by using a more extreme grouping method. The sample is separated into two groups: one includes the firms which have the greatest 25% ROE from the total sample (0.113), and one includes firms with the lowest 25% ROE from the total sample (0.030). In keeping with the previous findings, for the group with lower ROE, derivative usage has a significantly negative impact on firm value (at 95% confidence), whereas, for the group with higher ROA, there are no significant effects from using derivatives on firm value. *t*-statistics in parentheses * $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$.

Table 13 shows that, for the firms in the group with the lowest 25% ROA, using derivatives has a −0.075 effect on their value (Tobin's Q), which is significant at the 99%

confidence interval. Conversely, when it comes to the firms in the group that have the highest 25% ROA, derivative usage does not have any impact on a firm's value.

The same grouping method was used for ROE (as shown in Table 14). Although the coefficient of derivative usage, in the group which includes firms with the lowest 25% ROE (−0.062), is slightly lower than the group in which observations are lower than the median value of ROE of the sample (−0.069), the significant and negative relationship substantiates the previous findings.

In summary, through conducting additional regression analyses by splitting full samples into sub-samples along the two dimensions of ROA and ROE, respectively, our further analyses and robust tests confirmed the results generated from our initial analysis regarding the relationship between derivative use and firm performance.

5. Conclusions

This study aims to examine derivative use as the hedging against financial risks at the firm level in the research setting of emerging economies. While investment to financial derivatives is quite common for firms from developed economies, it is still a newly emerged economic and business phenomenon. Thus, there is a need to study firms' derivative use in the context of firms from emerging economies. This study addresses two research questions regarding investment in financial derivatives by firms from emerging economies: (1) what factors at the firm level leads firms to invest in financial derivatives? (2) Can derivative use lead to improvement of a firm's performance? These two research questions are examined in the context of Chinese firms that were listed on the Shenzhen Stock Exchange. Empirical data were collected from the CSMAR. In addition, data regarding firms' derivative use were collected manually for all the individual firms included in the sample. In total, the full sample includes 15,309 firm-year observations, covering a period of 11 years from 2005 to 2015.

To address the first research question, we followed prior studies in the developed economy setting to examine whether the firm characteristics in terms of firm size, operational cash flow, R&D investment, tax shield, the possibility of bankruptcy, and firm ownership would result in firms' investment in financial derivatives. To address the second research question, we adopted the conceptual model developed by Lau (2016) for regression analysis. Further, we performed additional analyses and robust tests to examine the relationship between derivative use and firm performance by splitting the full sample into sub-sample along the two dimensions of ROA and ROE.

This study contributes to the literature of derivative use by providing the following empirical findings based on a research setting of firms from China as a leading emerging economy. First, our study has identified firm characteristics of firm size, operational cash flow, R&D investment, tax shield, and the possibility of bankruptcy as the factors that determine firms' decision to invest in financial derivatives. Second, firms' ownership structures in terms of state-owned or private ownership do not affect a firm's decision on derivative use. Third, as a general tendency, derivative use has a negative effect on the firm's performance, and state-owned or private ownership does not change this negative effect. Fourth, firms with poorer performance are more likely to invest in financial derivatives, but derivative use tends to further reduce, rather than improve the performance of these firms.

These empirical findings have theoretical as well as practical implications regarding derivative use by firms from emerging economies such as China. First, prior research identified an association between certain firm-specific characteristics and firm investment in financial derivatives in the context of firms from developed economies (Allayannis and Ofek 2001; Haushalter 2001; Kuersten and Linde 2011; Titman and Grinblatt 2002). The empirical evidence based on our empirical findings confirmed such association in the setting of firms from China as an emerging economy. Secondly, but more importantly, our empirical findings shed new light on the relationship between derivative use and firm performance. Prior research in the context of firms from developed economies suggests

that derivative use tends to lead to improvement of firm performance (Allayannis and Weston 2001; Carter et al. 2006). The findings from our study provide empirical evidence of a negative effect of derivative use on firm performance. Moreover, while firms with poorer performance are more likely to invest in financial derivatives with the purpose of facilitating the improvement of performance, derivative use by these firms would further reduce their performance. We think that two factors may contribute to such a vicious cycle. The first is the serious flaws in the development of the derivatives market in developing or emerging economies, given its status of late development and poor institutional quality. The second is firms' lack of experienced professionals to operate the transactions for investment in financial derivatives. Third, the empirical findings regarding the relationship between derivative use and firm have practical implications both for the policymakers and managerial executives in the emerging economy setting. For the policymakers in developing and emerging economies, it is important to provide a business environment with high institutional quality for the development of derivative market performance. For the managerial executives of firms in developing and emerging economies, it is imperative to develop the skills and expertise required to effectively operate investments in financial derivatives.

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Performance Management for Growth: A Framework Based on EVA

Mihaela Brindusa Tudose [1], Valentina Diana Rusu [2,*] and Silvia Avasilcai [1]

[1] Engineering and Management Department, Faculty of Industrial Design and Business Management, Gheorghe Asachi Technical University of Iasi, Bulevardul Profesor Dimitrie Mangeron 29, 700050 Iasi, Romania; brindusatudose@gmail.com (M.B.T.); silvia.avasilcai@gmail.com (S.A.)
[2] Social Sciences and Humanities Research Department, Institute of Interdisciplinary Research, Alexandru Ioan Cuza University of Iasi, Lascar Catargi Street 54, 700107 Iasi, Romania
* Correspondence: valentinadiana.ig@gmail.com; Tel.: +40-742-973-287

Abstract: Some of the constructs in the field of performance management are intuitive or not empirically validated. This study provides a data-driven framework for measuring and improving the performance through synchronized strategies. The ultimate goal was to provide support for increasing business performance. Empirical research materializes in an exploratory case study and a statistical analysis with econometric models. The case study revealed that a company can improve its performance, even in periods of growth, being characterized by consistent investments. The statistical analysis, performed on a restricted sample of companies, confirmed the results that were provided by the case study. The measurement of performance was made by capitalizing on financial and non-financial data precisely to intensify the interest for corporate sustainability. The obtained results, contrary to previous research that showed that economic value added (EVA) is negatively influenced by the increase in invested capital, open up new research perspectives to find out whether, at the industry level, performance appraisal that is based on EVA stimulates the development of a business's economic capital. The research has a double utility: scientific (by providing an overview of the state of the art in the field of performance management) and practical (by providing a reference model for measuring and monitoring performance).

Keywords: performance; measurement of performance; EVA; strategies; business success

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1. Introduction

Business success depends on the quality of methods and techniques used for performance measurement, as well as on the ability of managers to manage the internal state and results of a company. Although increasingly complex methods have been developed, they failed to fully integrate (scientifically and practically) the 'multidimensional' feature of performance. Performance management has been accepted as a holistic process put at the disposal of managers due to diversity of elements defining high overall performance. Although scientific research is generous on methods of measuring performance, the companies are far from harnessing on the positive effects of implementing different methods. For performance measurement to become a good practice within companies, more awareness is needed regarding the role of measuring business performance. This is because performance measurement systems not only have an evaluative purpose, but they also help organizations to establish and use the most appropriate set of measurement indicators that reflect their objectives (Kennerley and Neely 2003). At the same time, measuring and monitoring performance facilitates the implementation of organizational strategy (Rodrigues 2010) and strengthens business confidence (Vukšić et al. 2013).

This study focuses on customizing and detailing the performance measurement methodology that is based on EVA for companies in the automotive industry, while taking the strength of this industry (Adane and Nicolescu 2018) in the national and international

economic context into account (Bostan et al. 2018). The choice for this research direction was justified from two points of view. First, we took the fact that, in the research on corporate performance, the traditional system of performance measurement indicators (focused on profit and return on assets/capital) is mainly used into account (Geng et al. 2021; Tudose and Avasilcai 2020). In this context, the research methodology focuses on the analysis of financial ratios (Batchimeg 2017; Luo et al. 2017; Egbunike and Okerekeoti 2018; Xu and Wang 2018; Kassi et al. 2019), which does not take all the costs of a business (such as the costs of capitals) into account and that allows for distorting or hiding of the real performance (Novyarni and Ningsih 2020). Second, out of all the modern methods for measuring performance, we considered the method that is based on the EVA because it allows the analysis of the results, but also of the way in which these results are obtained, being useful to both shareholders (for measuring real performance) and potential investors (in selecting investment opportunities). It is also a relatively simple method, and it can be implemented without incurring additional costs (that are related to the purchase of software or the investment of a person with exclusive monitoring responsibilities). Further proof of the reliability of this method is given by the fact that many organizations (such as Coca Cola, DuPont, Eli Lilly, Polaroid, Pharmacia and Whirlpool) have adopted EVA as a method of measuring performance (Annamalah et al. 2018).

Empirical research is focused on companies in the Romanian automotive industry. The arguments for this direction of research were multiple. First, because it has been reported that performance analysis depends on a multitude of factors that make it difficult to generalize results (Aguinis et al. 2012; Kijewska 2016), we opted for a case study and an econometric analysis for a restricted sample that was exposed to a common macroeconomic context. Second, many of the Romanian companies have not yet adopted a performance measurement model. Moreover, some authors (Crisan et al. 2010) opine that the problem for Romanian companies is not whether or not they have implemented a performance measurement system, but whether they make general measurements of business performance. Therefore, a reference model for measuring and monitoring performance is useful for both researchers and practitioners.

This study contributes to the existing literature in the following ways. First, it presents an original review of the management and performance measurement literature. Secondly, it presents the peculiarities of performance evaluation that is based on EVA for the automotive industry. Third, the paper provides evidence of the dynamics of performance (as assessed by EVA) during periods of growth throughout the company's life cycle. Because the results of our research are in contrast with the results of previous research, it is evidence that this area of research is far from exhausted; therefore, this study fills the research gap that is generated by the differences between theory and practice. The work was organized, so that the research has a double utility: scientific (by providing an overview of the state of the art in the field) and practical (by providing a reference model for measuring and monitoring performance). Therefore, the second section presents the results of the bibliographic research regarding the main methods of measuring performance and the specific features of EVA-based performance measurement. Afterwards, the research methodology and details the terminology used in this paper are presented. The next section presents the analysis, interprets the results of the performance measurement, and initiates discussions so that the case study and econometric analysis can be used as reference models for measuring and monitoring performance for companies in the automotive industry (to obtain higher earnings, to reduce the cost of capital, and to create value for stakeholders). The last section presents the conclusions and considerations on future research directions.

2. Materials and Methods

2.1. State of the Art Regarding Performance Measurement

The interest in performance measurement has intensified since 1980. In the early stage, efforts were made to measure the performance of the entire business. Later research placed performance measurement among the priorities of managers at all levels, so that

its scope widened, covering such issues as decision-making process, organizational roles, work maturity, business environment, increased competition, and advanced technology (Schläfke et al. 2013; Bhasin 2017; Taouab and Issor 2019).

Performance management aims to align performance (individual and team) with the strategic objectives of the organization, and performance management systems have multiple purposes (strategic, administrative, informational, developmental, organizational maintenance, and documentational purposes), according to Aguinis (2013) and Armstrong (2015). In the context of this research, the focus is mainly on the strategic purpose of performance management systems, which provide support for the design and adoption of growth strategies along the life cycle of the company.

Modern methods of performance measurement included various financial and non-financial indicators and provided organizations the support that is needed for their orientation (Searcy 2012). Growth in the number of stakeholders interested in the performance of an organization (Lozano 2015) and the growth of interdependencies of determining factors of performance increased the difficulty of measuring performance of an organization (Sorooshian et al. 2016). This is the context in which accurate measurement of performance became the main condition for growth of performance (Taticchi et al. 2010). The first modern methods of performance measurement were built around four items: economic added value, activity-based costing, market, and shareholder added value. Subsequently, other methods have been developed, such as: the methods that are based on the concept of 'total quality management' (ISO standards model, European model of quality management, model of service quality, 'six sigma' model); the methods based on the theory of causal relations (method of success critical factors and factor-results model); the measurement methods that are centered on processes (such as the reference model for supply chain operations and pyramid of performance measurement); the methods based on system balancing (Balance Score Card; performance prism; model of dynamic multi-dimensional performance); and, the multicriterial methods (such as TOPSIS, ELECTRE, PROMETHEE, VIKTOR, and COPRAS) (Narkunienė and Ulbinaitė 2018).

The modern methods pointed out that the companies do not have to sacrifice long-term growth to maximize current earnings (O'Byrne 2016). They also emphasized that there is a significant positive relationship between the quality of management tools and techniques that are utilized and organizational performance (Afonina 2015). Moreover, the use of performance appraisal methods depends on the management structure (Suriyankietkaew and Avery 2016; Dobija and Kravchenko 2017), the structure of the board of shareholders (Liu et al. 2019), and size of business (Lee 2009). Researchers have also shown that the use of certain methods allow for reaching higher performance (Rajnoha et al. 2016) and the positive perception of companies on their business environment may stimulate their financial performance and accelerate their positive influence on the whole society (Belas et al. 2015).

2.2. State of the Art Regarding EVA

In its initial form, the measure EVA stipulated that a company can create wealth if it generates real economic profit and if its earnings in a business deal (respectively, net operation profits) are higher than the remuneration expected by funders. One hundred years later, the method was developed by the consultancy firm Stern Value Management (which owns the brand name EVA™) (SVM 2016) by moving it to the area of performance measurement from the perspective of company's ability to generate value for the shareholders. According to the methodological framework, performance as a measure of economic profit is determined as a difference between net operation profit after tax and opportunity cost of capital investment. If EVA is positive, then it is accepted that an organization creates value. Otherwise (net operating profit lower than the opportunity cost of capital investment), it is accepted that an organization (through its management) loses value. Therefore, the rate of growth of wealth should be higher than the rate of growth of invested capital in order to create value.

Some researchers (O'Byrne 2016; Daraban 2018; Jankalová and Kurotová 2020) revealed that EVA differs from other traditional performance values (such as gain per share, gross operating surplus, and return on sales), as it measures all company administration costs (operational costs and funding costs) and focuses on the control of production time, as well as operational and capital costs. Others report that EVA is an efficient measure for evaluating performance, as it: (a) involves all used resources and decentralizes management decision-making (Morard and Balu 2010; Malichova et al. 2017); (b) neutralizes differences in the level of risk of each strategic business unit (Mocciaro Li Destri et al. 2012); improves the quality of decisions taken at the managerial level, which facilitates the harmonization of interests of parties involved in the creation of value (Hasani and Fathi 2012); allows the performance of such managerial functions as monitoring, planning and signaling of strategic changes (Alam and Nizamuddin 2012); is useful to both shareholders (for measuring real performance) and potential investors (in selecting investment opportunities) (Novyarni and Ningsih 2020); is a relatively mature tool for evaluating listed companies (Geng et al. 2021); and, reflects the true economic profit of a business (Orazalin et al. 2019).

Recent research that is based on the use of EVA as a performance measurement tool has resulted in analyzes being performed on a single company (Wang and Yang 2014; Ion and Man 2019; Jankalová and Kurotová 2020; Novyarni and Ningsih 2020; Radneantu et al. 2010) or in sample-level analyzes (Pavelková et al. 2018; Geng et al. 2021). From the point of view of the analyzed field of activity, these studies focused on various fields, such as: tourism and hotel industry (Trandafir 2015; Geng et al. 2021), construction (Horak et al. 2020) oil industry (Wang and Yang 2014), steel industry (Ion and Man 2019), banking industry (Owusu-Antwi et al. 2015), IT sector (Radneantu et al. 2010), and the sale of spare parts (Jankalová and Kurotová 2020). The conclusions of this research are very diverse. Some authors have reported that the use of EVA requires an adaptation of strategies according to the specifics of companies (Geng et al. 2021). At the same time, it has been reported that EVA is more comprehensive than other performance indicators (Panigrahi et al. 2014), but it does not fully capitalize on the non-financial factors of performance (Wang and Yang 2014).

The literature search provided few evidences on the use of EVA to assess the performance of companies in the automotive sector. The only study identified (Pavelková et al. 2018) showed that the automotive industry is highly sensitive to business cycles. While separately analyzing the behaviors of manufacturers and suppliers in the automotive sector (2005–2012), the authors showed that added value was a key factor with the greatest positive impact on performance (as assessed by EVA) in all investigated periods—pre- and post-crisis).

Analyzing its limits, Bhusan Sahoo and Pramanik (2016) report that EVA analysis: (a) does not include such important determinants of performance as brand capital and human resources, etc.; (b) does not provide information about financial performance of companies affected by variations of business cycles; and, (c) does not stimulate growth of company wealth (as it is believed that the acquisition of fixed assets has a negative impact on performance measured by EVA).

Without neglecting the mentioned limits, we considered measuring the performance through EVA, because managers (concerned about efficient use of capital and growth of company value) can perform four types of interventions (Kijewska 2016): (a) the growth of net profit margin that would generate improvement of operations and efficiency; in this sense, production costs reduction and improvement of processes are most important; (b) growth of sales by identifying the market trends and quick response to needs/expectations/desires of clients); (c) a decrease of invested capital when it is not fully used (whether by selling assets, or reduction of administrative costs); (d) optimization of capital structure, i.e., the calculation of the combination of own-borrowed capital that minimizes the costs of resource purchase without affecting company's financial autonomy and flexibility; and, (e) the latter intervention reduction of costs that are associated with tax

burden (including tax burden related to various methods of financing) and allocation of capital to profitable investments allowing value creation.

Moreover, we justify this choice by the fact that the experts have admitted that measuring performance through EVA intensifies interest in corporate sustainability. They showed that 'the link between the sustainable value and EVA provides a huge potential for synergy' (Jankalová and Kurotová 2020) and EVA translates the indicator of financial performance into today's corporate language (Bhusan Sahoo and Pramanik 2016).

The empirical research was conducted on the example of Romanian companies that usually use the traditional performance measurement indicators (indicators integrated in the annual financial statements). Unlike traditional indicators of measuring financial performance (which allow for the direct processing of the information that is available in annual reports), the methodology for determining EVA requires adjustments to eliminate the influence of various national accounting practices (especially those on creative accounting). Therefore, we synthesized the results of the main studies that were based on the use of EVA to assess the performance of Romanian companies in order to facilitate the proximity between theory and practice.

Brad and Munteanu (2012) looked for a link between the process of value creation in financial and non-financial companies; they started from the premise that the performance of companies is influenced by performance of financial institutions (a key role being attributed to financial leverage); although the authors could not validate their hypothesis, they showed that the macroeconomic environment has a significant influence on the results of their research.

Some authors (Radneantu et al. 2010) conducted a deep diagnosis of a company (the IT sector) during economic crisis, showing that the use of EVA improves a company's capacity to manage the financial and non-financial factors that facilitates the development of growth strategies and reduces risks. Trandafir (2015) provides an example of added economic value analysis for companies in the hotel industry; the results of analysis (negative values for EVA) are explained by the specificity of operations, being highly marked by seasonality; although high profits were generated at the end of financial year, turnover had not been high enough to cause the creation of value for shareholders. Ion and Man (2019) researched the relevance of the economic added value (EVA) for stakeholders. Analyzing one Romanian steel company, they showed that EVA (calculated while considering the overall result) provides a more accurate image of company's overall performance (when compared to situation when EVA is calculated based on net profit from operation and total net profit). When comparing EVA with MVA (market value added, determined as difference between the market value per share, and the book value per share), other authors (Sichigea and Vasilescu 2015) showed that the best way to grow MVA is to maximize EVA, which is only possible if EVA is treated as a target of internal and external decisions.

2.3. Research Methodology

We opted for the analysis of added economic value for only one company (case study), respectively, for a restricted sample of companies with the same object of activity (econometric analysis), as some authors argued that the results of studies on EVA differ significantly by country, by sector, or even by company (Kijewska 2016). Because previous studies have shown that large and performing companies have a higher sensitivity to the business cycle (Pavelková et al. 2018), we have reduced the analysis period to five years (2014–2018). Moreover, taking the importance of this industry into account, but also the fact that Romanian literature does not provide an example for this field, we decided to analyze the economic added value for a company in the field of the automotive industry.

The choice of the company for the case study was random. The selected company (in the field of automotive manufacturing) has been listed on the Bucharest Stock Exchange until 2016, and it was delisted in 2017, as it could not meet the criteria that were related to the number of publicly distributed shares. Even so, the company continued to disclose its financial statements and annual reports, which allowed for the collection of data for

analysis. In building the sample for econometric analysis, we had, as a benchmark, the adjustments made to the variables based on which EVA was determined (in the case study). In order to have access to information, such as current depreciation, advertising costs, research and development costs (R&D costs), advance expenses, shares held, and loans granted, our attention was directed to listed companies, which publish not only financial statements, but also explanatory notes and audited reports, and that detail the indicators mentioned. Out of the total number of companies listed on the regulated market, we only identified three companies that are producing spare parts for cars (CANE code 2392—Manufacture of parts and accessories for cars and car engines). Taking the recommendations of our research predecessors (indicated at the start of this section) into account, we decided to perform the econometric analysis on a pilot sample. Therefore, the final sample was represented by four companies: one unlisted company (on the example of which the case study was also performed) and three listed companies. Being a mixed sample (with listed and unlisted companies), the analysis was based on the capitalization of accounting information, which was collected from the financial statements and annual reports (available on the stock exchange website or on the website of each company).

Indicators used to analyze the dynamics of economic added value were:

- net operation profit after tax (NOPat) as a measure of company's capacity to generate cash based on recurrent operations; it shows the operational income of a company (without being encumbered by income from financial operations);
- weighted average cost of capital (WACC) depends on the cost of different financing resources (it represents the remuneration expected by founders/creditors of invested capital) and their share in total funding; and,
- return of investment (ROI) is a net economic return rate of business and it is calculated as a ratio between net operation profit after tax and invested capital; this indicator was used as a measure of own capital cost.

Although the calculation of EVA seems to be relatively simple, it is, in practice, more complex, as several adjustments are needed to eliminate the influence of different accounting practices. Studies show that, out of 160 likely adjustments (Stewart 1999; Francisco de Almeida et al. 2016), only 10 have a more significant influence on NOPat and WACC (Brad and Munteanu 2012). These adjustments refer to: depreciation; research, development, and training expenses; promotional costs (advertising costs); deferred taxes; intangible assets (such as goodwill); non-interest-bearing debts (such as advances received from customers, salaries, and their related expenses); etc. In this context, we support the opinion, according to which the EVA method is usefulness due to its robustness and its immunity from creative accounting (Bhasin 2013).

In this study, NOPat was adjusted taking the following elements into account: current depreciation, research and development, and advertising expenses (Table 1). In order to calculate the invested capital (Ic), we used the elements of liabilities and assets from the balance sheet. Out of total external financing sources, we eliminated the non-cost debts (such as advances paid by clients, commercial debts and salaries, and their related payments). Next, net asset value purchased using financial leasing was seen as a long-term debt, and the related costs (annual expenses for lease payments) were treated as the elements of capital costs. The research and development and advertising expenses were also seen as belonging to invested capital, as they have effects over several years and contribute to business development. Additionally, we have deducted (of total invested capital) the assets not related to the fiscal year (such as prepaid expenses). Regarding the non-operating assets, as a novelty element in our research, we have extended the adjustment of the invested capital by deducting not only the owned securities, but also the granted loans. This adjustment is justified due to the fact that both investments in securities, as well as granted loans, are cash outflows reducing the company's possibilities to finance its current operations. In terms of financial management, these operations are associated with higher yield investments. As for operational management, these are viewed as a reduction of resources that are allocated for current operations.

Table 1. Indicators used in analysis.

Indicators	Computation Method (the Symbols Are Shown in Parentheses)
Net operation profit after tax_adjusted (NOPat_a)	NOPat_a = sales (S) − operational expenses (Oe) + current depreciation (Cd) + advertising costs (Ac) + research and development costs (RDc) − corporate income tax (Cit)
Invested capital_adjusted (Ic_a)	Ic_a = own capital (Oc) + external capital (Ec) + advertising costs (Ac) + research and development costs (RDc) − advance expenses (Ae) − shares held (Sh) − loans granted (Lg) Financial structure: 100% = weight of Oc + weight of Ec
Weighted average cost of capital (WACC)	WACC = cost of Oc × weight Oc + cost of Ec × weight of Ec × [1 − tax rate]

Source: Authors own elaboration according to Pavelková et al. (2018); Jankalová and Kurotová (2020).

Concerning WACC, the calculation method took the features of different sources of funding into account. For higher accuracy of results, we opted for separate calculation of costs, as there were significant differences in the cost of own capitals and cost of borrowed capital for the analyzed company.

We determined the compound annual growth rate (CAGR) to identify the trend and significance of the data used in the analysis. Subsequently, we drew two performance profiles, one at the end of the five years analyzed and one at the end of the five years of forecast. The model of analysis that we proposed was intended to be a simple one to allow its practical operationalization. This was also the reason why the data processing was done using the analysis toolkit that was provided by Excel. Thus, based on information from the five years of analysis, the annual compound growth rate was determined using the "XIRR" function and the trends were identified using the "Trendline options" function.

Based on the obtained data, we reconstructed the integrated framework of decision-making that enabled economic value creation during the five years of analysis. When compared to other performance measurement tools, we showed that EVA has the advantage that it includes, in the analysis, all costs that are related to the business, regardless of whether they appear in the income statement, balance sheet, or in the financial statements (Annamalah et al. 2018), allows for an analysis of results and highlights how these results are obtained and improves the quality of management decision-making.

The econometric analysis was performed on a sample of four companies in the same field of activity (automotive), having adjustments that were comparable to the company on which the case study was performed (also included in the sample), in order to ensure the representativeness of the data. Data were collected from secondary sources (for the same period for which the case study was conducted, 2014–2018). Eviews 9 software was used to perform statistical analyses with econometric models that estimate the impact of a set of variables on EVA. The analyses are based on the panel data method, which is a specific method of generating equations for data containing both time series and cross sections.

3. Results

Recent studies report that the adoption of EVA method by increasing companies worldwide is a proof of the fact that it provides an integrated decision-making framework for creating sustainable value for companies, clients, employees, shareholders, and management (Bhasin 2013; Bhusan Sahoo and Pramanik 2016).

In order to support companies wishing to adopt EVA as a performance measure, we will be presenting the features of this method (Table 2). The first step in measuring the added economic value includes the calculation of operational profit after tax (NOPat_a). The analysis shows that, in just five years, the company managed to double its gross operational profit. Yearly current depreciation was around half of NOPat_a due to the

high value of fixed assets. For the five analyzed years, the total value of net fixed assets grew by 22.4%; mainly technical installations, machinery, and working equipment had been purchased; therefore, as reported by earlier studies (Bhusan Sahoo and Pramanik 2016), growth in the fixed assets purchase could have a negative impact on performance that was measured by EVA. An increase in sales volume is attributed to the increase in advertising costs by 51% in 2018 as compared to 2014, and an increase in research and development costs by 40.6%. Therefore, by accepting that these costs contributed to business development, it is expected that NOPat_a will grow.

Table 2. Net operation profit after tax, invested capital, and weighted average cost of capital.

Indicators.	**2014**	**2015**	**2016**	**2017**	**2018**
(thousand euros)					
Sales (S)	3,952,769	4,022,281	4,358,176	4,857,448	5,189,945
Operational expenses (Oe)	3,873,640	3,939,203	4,259,972	4,765,066	5,036,971
Gross operation profit (Gop = S − Oe)	79,129	83,078	98,204	92,382	152,974
Current depreciation (Cd)	118,927	114,474	108,078	105,520	134,078
Advertising costs (Ac)	13,198	13,847	15,388	18,235	19,945
Research and development costs (RDc)	31,693	33,467	36,205	42,833	44,575
Corporate income tax (Cit)	6195	10,177	10,362	2400	12,720
(1) Net operation profit after tax_adjusted (NOPat_a)	236,753	234,688	247,514	256,571	338,852
Own capital (Oc)	773,854	798,092	816,651	913,882	1,071,795
External capital (Ec):	139,263	145,702	177,379	180,403	161,494
+financial debts (Fd)	104,396	111,286	138,939	145,803	127,370
+financial leasing (Fl)	34,867	34,416	38,440	34,600	34,124
Advertising costs (Ac)	13,198	13,826	15,388	18,235	19,945
Research and development costs (RDc)	31,693	33,467	36,205	42,833	44,575
Advance expenses (Ae)	1577	1383	1347	1738	2843
Shares held (Sh)	57,600	57,197	57,197	57,197	57,197
Loans granted (Lg)	651	636	636	638	538
(2) Invested capital_adjusted (Ic_a)	898,182	931,870	986,444	1,095,781	1,237,230
Own capital (Oc)	773,854	798,092	816,651	913,882	1,071,795
External capital, financial debts (Fd)	139,263	145,702	177,379	180,403	161,494
Cost of own capital (Cost of Oc)	78,007	94,014	95,818	113,140	157,913
Cost of financial debts (Cost of Fd)	3980	3794	3701	3811	4203
Fiscal advantage of debt (fa)	637	607	592	610	672
Real cost of financial debts (R_Cost of Fd)	3343	3187	3109	3201	3530
(%)					
Indicators	2014	2015	2016	2017	2018
Share of own capital (Oc) (%)	84.7	84.6	82.2	83.5	86.9
Share external capital (Ec) (%)	15.3	15.4	17.8	16.5	13.1
Cost of own capital (Coc) (%)	10.1	11.8	11.7	12.4	14.7
Real cost of financial debts (Cfd) (%)	3.2	2.9	2.2	2.2	2.8
3) Weighted average cost of capital (WACC) (%)	9.0	10.4	10.0	10.7	13.2

Source: Authors own calculation.

The second step in measuring the performance based on economic added value is the calculation of invested capitals and their adjustment in accordance with method's rigor. Table 2 shows that the company was mainly financed by own capitals. The external capital includes financial debts (mainly agreements within the group) and a financial leasing for a logistic deposit for a period of 15 years. In order to adjust the invested capital, we added the advertising costs and the R&D costs (seen as capital allocations for long-term business development) and we subtracted the value of shares held and loans granted as well as the expenses in advance. The increase in the invested capital may indicate a decrease of EVA (Ic that is multiplied by WACC is subtracted from NOPat_a, decreasing the prospects of growth for EVA).

The strategic financial structure was used as a reference point to calculate the weighted average cost of capital. As it also results from Table 2, the company was mainly financed by its own funds (the average share—along all years—of these funding amounts to 84.4%). The cost of own capitals was calculated by relating the net dividends to own capitals. The cost of indebtedness (corresponding to external capitals) was calculated considering the deductibility of interest expenses. During 2014–2018, the interest expenses were fully deductible (because the interest expenses were lower than the income from interest).

The increase of weighted cost of capital (from 9.0% in 2014 to 13.2% in 2018), correlated with the increase of invested capital, may be linked to the negative impact on EVA (if the rate of growth of NOPat_a is lower than the rate of growth of invested capital opportunity cost). Economic Value Added asserts that businesses should create returns at a rate that is above their cost of capital (EVA 2019).

Table 3 presents the summary of results. In all five years of the analyzed period (2014–2018), the company had a positive EVA, which means that the rate of growth of income was higher than the rate of growth of capital that was allocated to production processes. By analyzing the rate of annual variation of added economic value, we have found an alternation between the annual decreases and increases.

Table 3. Economic value added (thousand euro).

Indicators	2014	2015	Δ2015/2014	2016	Δ2016/2015	2017	Δ2017/2016	2018	Δ2018/2017
NOPat_adjusted	236,753	234,688	−2065	247,514	12,826	256,571	9057	338,852	82,281
Ic_adjusted	898,182	931,870	33,688	986,444	54,574	1,095,781	109,337	1,237,230	141,449
WACC (%)	9.00	10.40	1.40	10.00	−0.40	10.70	0.70	13.20	2.50
EVA	155,635	137,742	−17,893	148,488	10,746	139,310	−9178	175,945	36,635

Source: Authors own calculation.

Strategically, for the five analyzed years (from the perspective of the initial and final situation), we observe two important aspects: (a) each year the company increased the invested capital; and, (b) EVA has been positive and has increased.

We performed an econometric analysis, according to the coordinates established in the *Research methodology* section because the case study showed that a company can increase EVA, even if the invested capital increase. The dependent variable of econometric analysis is EVA. The independent variables are: adjusted invested capital (Ic_a); return on assets (ROA) determined as the ratio between gross profit and total assets; fixed assets volume (FA); return on fixed assets (Raf), determined as the ratio between gross profit and total fixed assets); and, level of indebtedness (LI), determined as the ratio between debt and total financing.

The indicators determined on the basis of fixed assets (FA and Raf) were included in the analysis precisely to identify the link between their dynamics and EVA dynamics. Subsequently, because the case study indicated that part of the investments was financed on the basis of external capital (financial debts), the influence of this variable was also analyzed.

Based on the identified interdependencies, we proposed testing the following hypothesis:

Hypothesis 1 (H1). *Adjusted invested capital (Ic_a) is positively correlated with EVA.*

This first hypothesis was based on the results of the case study indicating that EVA increased due to the increase in investments in fixed assets. The confirmation of this hypothesis may bring an element of novelty in scientific research, as previous studies have reported opposite results (Bhusan Sahoo and Pramanik 2016).

The ROA variable was introduced, because, at the sample level, it was observed that a company registers a positive EVA while the gross result is negative. This situation justified the testing of the interdependencies between the return on assets (ROA) and EVA, for which the following hypothesis was formulated:

Hypothesis 2 (H2). *There is a direct determination relationship between EVA and the rate-based performance indicator (ROA).*

The confirmation of this hypothesis may be further evidence to support the superiority of EVA over traditional performance measures (accused of not reflecting economic reality) (Novyarni and Ningsih 2020).

The analysis at the level of descriptive statistics (Table 4) indicated that the indebtedness level is the variable with the highest variation. Thus, the indebtedness level of the companies from our sample varied between a minimum of 29% and a maximum of almost 55%. The return on fixed assets is another variable that also varied significantly, which took values between a minimum of −3.69% and a maximum of 10.4%. ROA also recorded significant variations (between 9.4 and −2.1). We calculated the natural logarithm for these indicators (Logarithm of EVA, Logarithm of Ic_a, and Logarithm of FA) due to the fact that EVA, Ic_a, and FA are expressed in absolute dimensions (thousand euros), in order to obtain correct results in future analyzes. However, the number of observations obtained for Logarithm of EVA is 18 due to the fact that EVA also has two negative values (see Table 4). The econometric practice shows that, for obtaining the logarithm of the variables that also have negative values, either a constant value is added to the data prior to the log transformations. Additionally, the transformation becomes log (Y + a), where a is the constant. However, this is not always a good idea, because it might change the way that we interpret the results. Sometimes, a better way to handle negative values is to use the missing values for the logarithm of a non-positive number.

The correlation matrix shows that, from the independent variables chosen, some are highly correlated: fixed assets with invested capital adjusted, and ROA with a return on fixed assets (marked with bold in Table 5). Therefore, in the following analysis, we alternatively excluded the correlated variables.

The general equations of the regression model applied are as follows:

Model 1:

$$\text{Logarithm of EVA}it = \text{Logarithm of Ic\_a } it\ \beta 1 + \text{ROA}it\ \beta 2 + \text{LI}it\ \beta 3 + \text{U}it, \quad (1)$$

where: i represents the companies included in the analysis, t is time (2014, . . . , 2018); Logarithm of EVAit is the dependent variable and Logarithm of Ic_a it, ROAit, and LIit are the independent variables; β1, β2, β3, represent the coefficients; and, Uit is the error term.

Model 2:

$$\text{Logarithm of EVA}it = \text{Logarithm of FA}it\ \beta 1 + \text{Rfa}it\ \beta 2 + \text{LI}it\ \beta 3 + \text{U}it, \quad (2)$$

where: i represents the companies included in the analysis, t is time (2014, . . . , 2018); Logarithm of EVAit is the dependent variables and Logarithm of FAit, Rfait, and LIit are the independent variables; β1, β2, β3, represent the coefficients; and, Uit is the error term.

Table 4. Descriptive statistics of the variables included in the analysis.

	Mean	Maximum	Minimum	Std. Dev.	Observations
EVA [1]	191.76	834.23	−3.18	313.64	20
Logarithm of EVA	17.56	20.54	14.96	1.95	18
EVA [2]	39.37	171.30	−0.65	64.40	20
Ic_a [1]	1397.87	5894.91	81.03	2106.18	20
Logarithm of Ic_a	19.80	22.50	18.21	1.62	20
Ic_a [2]	287.04	1210.45	16.64	432.48	20
ROA (%)	4.03	9.42	−2.12	3.32	20
FA [1]	1109.19	4465.38	54.37	1701.12	20
Logarithm of FA	19.44	22.22	17.81	1.73	20
FA [2]	287.04	1210.45	16.64	432.48	20
Rfa (%)	5.27	10.40	−3.69	4.41	20
LI (%)	41.54	54.55	29.39	8.24	20

Note: [1] Values in millions of RON (national currency of Romania); [2] Values in millions of EURO. Source: Processed by the authors.

Table 5. Correlation matrix.

Variables	Logarithm of EVA	Logarithm of Ic_a	ROA	Logarithm of FA	Rfa	LI
Logarithm of EVA	1.000					
Logarithm of Ic_a	0.974 (0.000)	1.000				
ROA	0.577 (0.012)	0.598 (0.008)	1.000			
Logarithm of FA	0.976 (0.000)	**0.997** (0.000)	0.590 (0.009)	1.000		
Rfa	0.322 (0.191)	0.341 (0.165)	**0.892** (0.000)	0.324 (0.189)	1.000	
LI	0.353 (0.150)	0.296 (0.232)	−0.410 (0.085)	0.312 (0.207)	−0.604 (0.007)	1.000

Note: probability in parenthesis. Source: Processed by the authors.

Table 6 centralizes the results of the regression analysis. The two regression models applied resulted in being statistically significant; the probability associated to F-statistic is higher than 0.01, showing that the predictors are related significantly with the dependent variable.

The coefficients that were obtained for Model 1 show that the invested capital adjusted and ROA are positively and statistically significantly related to EVA. For Model 2, only one variable has a positive and statistically significant coefficient: fixed assets.

Table 6. Regression analysis.

	Model 1	Model 2
Intercept	−4.171 *** (0.801)	−3.581 *** (0.664)
Logarithm of Ic_a	0.997 *** (0.089)	-
ROA	0.077 * (0.041)	-
Logarithm of FA	-	0.986 *** (0.070)
Rfa	-	0.057 (0.035)
LI	0.036 (0.023)	0.035 (0.024)
R-squared	0.959	0.961
Adjusted R-squared	0.950	0.953
F-statistic	110.73 ***	117.58 ***

Note 1: Standard error in parenthesis; Note 2: * and *** represents significant values at 1% and 10%. Source: Processed by the authors.

4. Discussion

4.1. Discussions on the Case Study

The recorded performance (appreciated by EVA) is the result of the strategies adopted by the company, such as: growth of operational efficiency; growth of income from sales; and, adaptation of financial structure to support the two previously formulated strategies.

1. The growth of operational activities efficiency was visible in the increase of gross operational profit (with an average annual rate of 20.7%). The effects of this strategy resulted in an average annual growth rate of operational expenses (6.8%) below the average annual growth rate of the volume of sales (7.1%). This strategy was based on:
    - Improvement of processes. For the analyzed period, the degree of automation of production lines grew. According to the management report, the company assumes the fact that a high degree of automation is a pre-requisite for shortening the production time and providing the highest level of quality.
    - Increasing the efficiency in the use of raw material. The products with the highest attractiveness on the market were targeted. In 2014, only one car model car amounted to 50% in total production. At the end of 2018, the share of this car model reached 79% (the highest demand came from the EU).
    - Increasing the efficiency in the use of human resources. The average sold production per employee grew from 12 to 15 million euro over five years. It could be explained by the changes in the structure of production; the company reducing the number of cars with a lower added value (and lower production cost) in favor of cars with higher added value (despite their higher cost). Evidence of the degree of accountability and involvement of human resource in the growth of performance lies in the fact that the average growth rate of human resource expense (6.9%) was below the average growth rate of production sold per employee (7.5%).
2. Increasing income from sales. This strategy (that is closely linked to the strategy presented above) was implemented by identifying and exploiting market trends and by a prompt response to the needs of car users. According to the Romanian catalogue for the depreciation period of fixed assets, cars have a depreciation period between four and six years, but the average age of car fleet in 2018 in Romania was 15.4 years (and the average in the European Union was 11 years). In sustaining the sale

strategy, the company used the opportunity that was provided by the market and undertook the goal to increase the volume of its production. When the sales strategy was formulated, it has been taken into account that 92% of sales in 2014 were on foreign markets. The company succeeded in only five years to reduce its dependence on foreign markets (the volume of sales from export reaching 85% in 2018) and focus on closer markets. In 2018, 66% of exports oriented towards Europe, 15% towards Asia, 12% towards Africa, and 7% towards America. This redefining in the share of markets is justified by high expenses that are related to car deliveries on different continents.

3. Adaptation of the financial structure. Although the costs are high, own capitals prevail in a company's strategic financial structure. The existence of just one majority shareholder (that owns 99.43% of shares) facilitated the implementation of a consistent policy of own capital consolidation (for the analyzed period, its share in the financial structure grew from 84.7% to 86.9%, especially on the account of reinvested profits and the development of business at the level of the group). The consequences of this policy (that resulted in the decrease of amounts allocated for dividends and/or delay of dividend payment owed for previous years) was accepted by the majority shareholder, mainly for business development and an increase of its future performance. To control and minimize the costs of financing, most of the financial resources allocated to operational activities were attracted from within the group. Even if this strategy of financing mainly from own funds (without making the most of tax benefits of indebtedness) led to a growth of the weighted average cost of capital, it facilitated the growth of business performance (as measured by EVA).
4. Dynamic analysis of the added economic value. We determined (based on the information in Table 2) the compound annual growth rate (CAGR) (Table 7) and constructed the tree of decomposition of influences to identify the interdependencies and significance of the variables included in the analysis (Figure 1).

Table 7. Compound Annual Growth Rate.

Indicators	CAGR [%]	Indicators	CAGR [%]	Indicators	CAGR [%]
S	5.60	Oc	6.73	%Oc	0.51
Oe	5.39	Ec	3.01	%Ec	−3.06
GOP	14.09	Ac	8.61	Coc	7.80
Cd	2.43	RDc	7.06	Cfd	−2.64
Ac	8.61	Ae	12.51	WACC	7.96
RDc	7.06	Sh	−0.14	Ic_a × WACC	15.10
Cit	15.48	Lg	−3.74	Fixed assets	3.46
NOPat_a	7.43	Ic_a	6.61	EVA	2.48

Source: Authors own calculation.

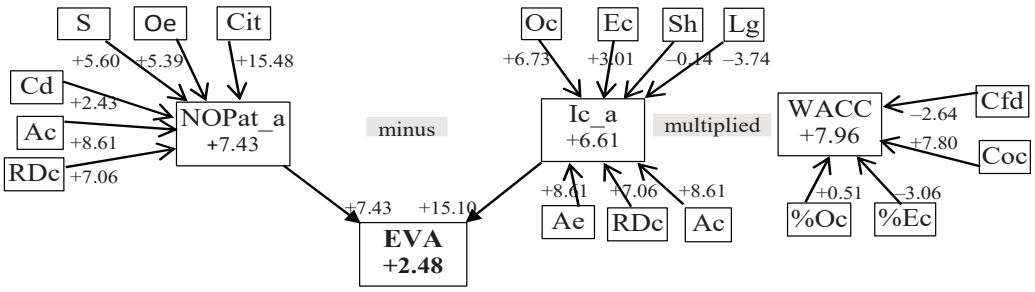
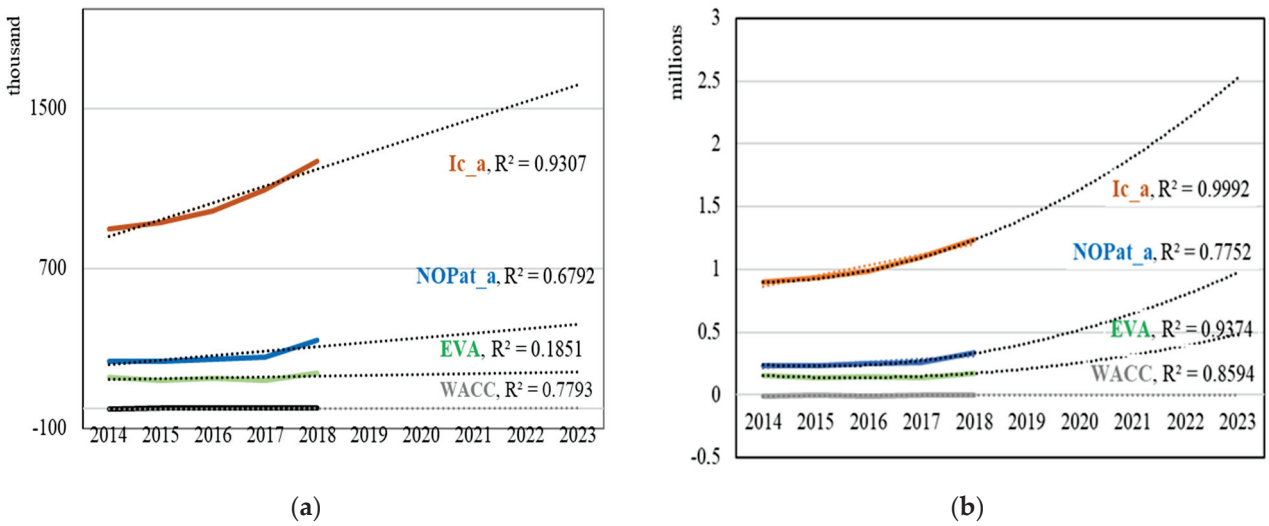


Figure 1. The impact of the variation of economic added value (EVA) determinants (compound annual growth rate (CAGR) [%]). Source: Authors own representation.

During the five years of the analysis, the adjusted NOPat had a compound annual growth rate of 7.43%. During the same period, adjusted invested capital (6.61%), the weighted average cost of capital (7.96%), and fixed assets (3.46%) have increased. The cumulative effect of these changes materialized in an annual compound growth rate of EVA of 2.48%. These results empirically prove that EVA can grow, even in the face of increased investment in fixed assets.

We determined the trends for the analyzed indicators (for a forecast horizon of five years) in order to obtain significant conclusions regarding the efficiency of management and the trends of the future evolution, based on the information in Table 2. Based on the least squares method, we looked for a suitable trend line. We tested the types of trends that best fit the data set analyzed. Figure 2 indicates that the polynomial model fits the data best, because R-square has the best values (closer to 1).



(**a**) (**b**)

Figure 2. Trend testing. (**a**) Linear trend lines; (**b**) Polynomial trend lines. Source: Authors own representation.

A polynomial trend line indicates that the data vary (as confirmed by previous annual analyses), being recommended by the Excel package to describe the relationship between two variables with different trends up to a certain point, beyond which their trends synchronize. Therefore, we can admit that, for the forecast period, the increase of invested capital (adjusted) and net operating profit (adjusted) will generate a higher economic value. These increases will amplify over time, due to operating expenses (such as research and development or promotion) that generate benefits in future financial years.

4.2. Discussions on the Econometric Analysis

The invested capital adjusted and ROA are positively and statistically significant related to EVA, according to Model 1. Therefore, an increase of investments in total assets will lead to an increase in EVA. Additionally, higher rates of ROA will determine an increase of EVA. These results are in contradiction with previously research results which shown that EVA does not provide information regarding the financial performance of companies affected by variations of business cycles and does not stimulate growth of company wealth (Bhusan Sahoo and Pramanik 2016). The lack of congruence of the research results is further evidence that this area of research is far from exhausted; therefore, this study fills the research gap that is generated by the differences between theory and practice.

The second hypothesis was assumed to test the extent to which different performance indicators are correlated, as we mentioned in the previous section. Because the increase in ROA (as an independent variable) contributes to the increase in EVA (as a dependent variable), the superiority of EVA over traditional performance measures is confirmed (Novyarni and Ningsih 2020). Subsequently, when considering the situation identified at

the level of the primary analysis data (for one of the companies in the sample the ROA was negative during the analyzed period while EVA was positive) it is confirmed that EVA reflects the true economic profit of a business (Orazalin et al. 2019).

Only one variable has a positive and statistically significant coefficient: fixed assets, according to Model 2. This result shows that increasing the level of fixed assets will determine an increase of EVA. Therefore, the acquisition of fixed assets (in the business growth phase) has a positive impact on performance that is measured by EVA. In other words, a company can improve its performance, even in periods of growth, which are characterized by consistent investments.

The other two variables considered (return on fixed assets and level of indebtedness) did not result in being statistically significant with EVA for the case of the companies considered. The value obtained for R-square adjusted indicates that over 95% of the variation of EVA is explained by the variation of the independent variables.

4.3. Practical Implication

The results of this study are of interest to both investors and managers, because they improve on the understanding of the variables that influence EVA. A positive and growing EVA (in the conditions of growth the invested capital) provides evidence to investors regarding the business's ability to generate superior performance in the future. Subsequently, the clarification of the methodology for determining the EVA, adapted to the Romanian companies in the automotive industry, facilitates the decision-making process of the managers, preventing any possible distortions in the performance evaluation. Thus, managers gain additional information regarding the performance and position of the company they manage. Following the EVA methodology, managers can know whether or not the investments made create value, if the weighted average cost of capital is lower than the internal rate of return of the business (respectively, if the absorption of financing is positive), whether the growth rate of sales is lower than the growth rate of operational expenses, etc. A skilled manager can turn this information into real competitive advantages.

5. Conclusions

EVA, as a measure of performance, provides managers the opportunity and motivation to take decisions growing the value of business in both the interests of shareholders and other stakeholders. Although the center of decision-making, which is responsible for monitoring and measuring performance, is placed in the area of financial management, it does not neglect the non-financial issues. The method's accuracy makes it easy to be understood by managers at all levels (including the non-financial managers) and makes it possible to measure the performance of the entire business.

Our literature reviews have found a growing interest in using EVA as a performance measure. Although empirical research focused on various areas, few evidences were identified on the use of EVA to assess the performance of companies in the automotive sector. For example, Pavelková et al. (2018) showed that the car industry is very sensitive to economic cycles, and value added is a factor with a major positive impact on performance in both the pre- and post-crisis period. This paper summarizes the advantages and disadvantages of using EVA as a tool for measuring performance, presents the peculiarities of its determination, analyzes the dynamics (relative to other variables), and points out its usefulness for shareholders, investors, and managers.

The case study provides an original methodological framework for applying this method of performance measurement, which is adapted to companies in the automotive industry. In an original manner, we have considered not only the calculation of indicators specific to EVA (based on past events), but also the presentation of arguments that lied at the basis of business decisions that led to the growth of performance. Thus, we have shown that EVA-based performance management depends not only on accounting information, but also on the way that the information from outside the company is used. Moreover, the study confirms that EVA has the ability to provide investors and corporate managers

the information regarding to the company's prospects for higher earnings in the future (Bhasin 2013).

Additionally, the empirical research provides evidence fighting one of the criticisms brought to this method, namely that the EVA methodology does not stimulate the development of economic capital of a business due to the fact that the purchase of fixed assets has a negative impact on performance (Bhusan Sahoo and Pramanik 2016). Our study has shown that a company can increase EVA, even under conditions of growth of invested capital, respectively, fixed assets if: (a) the rate of remuneration growth that is required by funders is lower than the rate of net operational profit growth; and, (b) there is a consensus among funders on the reduction of current remuneration over higher future financial remuneration. At the same time, the results confirmed that EVA is superior to traditional performance indicators (Novyarni and Ningsih 2020), and that it reflects the true economic profit of a business (Orazalin et al. 2019).

The increase in economic value added was possible due to the division of the company mission into synchronized strategies. This way, the strategy of growing the efficiency of operational activities allowed for the improvement of processes (by automation of production lines and improving quality), the growth of efficiency in the use of material resources (by their allocation to products with the highest attractiveness on the market), and growth of efficiency in the use of human resources (by increasing work productivity and the degree of accountability and involvement of human resources in growth of performance). Subsequently, the strategy of growth of income from sales focused on identifying and favorable exploitation of opportunities (the average age of car fleet in Romania and the EU, restrictions on imports and on polluting vehicles, the degree of competitive pressure) and of the needs of car users. To create value for clients, the company adapted its production lines in such a way as to them to produce the most solid model. The two strategies (growth of operations efficiency and sales growth) were supported by financial strategy centered mainly on the consolidation of own capital. From the perspective of shareholders, financial autonomy was more important than the opportunities for integral use of fiscal benefits that are related to indebtedness.

The study has some limitations. The adjustment of NOPat and Ic was made according to the most relevant elements that were identified in the case study, but they are not generally valid for all companies. In econometric analysis, only accounting financial data were used (not all companies in the sample are listed, which made it difficult to determine the real cost of equity from the perspective of shareholder expectations). The restricted sample on which the situations identified in the case study were tested allows for a limited generalization of the results. In order to ensure a greater representativeness of the results, we are considering an extensive research development (by enlarging the sample, so that the results are representative at the industry level, but without losing sight of the specificity of EVA determination) and an intensive development (by analyzing the performance in the different stages of economic growth/decline). We strongly believe that theory and practice from the performance management field (including performance measurement methods such as EVA) may be continuously improved, according to changes in the business environment. By providing support for putting the methods of performance measurement into practice, we aim to adapt the scientific methods of performance measurement to practical specificity of company performance measurement and validate these methods in practice.

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COVID-19 Pandemic and Romanian Stock Market Volatility: A GARCH Approach

Ștefan Cristian Gherghina *, Daniel Ștefan Armeanu and Camelia Cătălina Joldeș

Department of Finance, Bucharest University of Economic Studies, 6 Piata Romana, 010374 Bucharest, Romania; darmeanu@yahoo.com (D.Ș.A.); joldes.catalina@yahoo.com (C.C.J.)
* Correspondence: stefan.gherghina@fin.ase.ro; Tel.:+40-741-140-737

Abstract: This paper investigates the volatility of daily returns on the Romanian stock market between January 2020 and April 2021. Volatility is analyzed by means of the representative index for Bucharest Stock Exchange (BSE), namely, the Bucharest Exchange Trading (BET) index, along with twelve companies traded on BSE. The quantitative investigation was performed using GARCH approach. In the survey, the GARCH model (1,1) was applied to explore the volatility of the BET and BSE traded shares. Conditional volatility for the daily return series showed noticeable evidence of volatility that shifts over the explored period. In the first quarter of 2020, the Romanian equity market volatility increased to a level very close to that recorded during the global financial crisis of 2007–2009. Over the next two quarters, volatility had a downward trend. Besides, after VAR estimation, no causal connection was found among the COVID-19 variables and the BET index.

Keywords: Romanian stock market; volatility clustering; autocorrelation; COVID-19; GARCH models; vector autoregression model; Granger causality

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1. Introduction

The coronavirus malady (COVID-19) is a sanitary and economic turning point that has harmed the basis of the human condition (Verma and Gustafsson 2020), it being one of the most acute health emergencies in the recent past (Vera-Valdés 2021). The occurrence of the disease hurt the global economies and caused insecurity on worldwide equity markets (Engelhardt et al. 2021). The extensive uncertainty of the plague and its related economic failures has triggered markets to turn extremely volatile and unpredictable (Zhang et al. 2020). Baker et al. (2020) suggested that no prior contagious virus outburst, including the Spanish Flu, has disturbed the equity market as strongly as the COVID-19 pandemic. Since it was difficult to expect and has never hitherto arose, this slump was described as a "black swan" event (Yarovaya et al. 2021). As compared with the 2008 crash which commenced in the United States and progressively diffused to other nations with a substantial time postponement, the coronavirus disease rapidly brought the worldwide economy to a stoppage by instantaneously hampering demand and supply lines around the globe due to extensive lockdowns (Ozkan 2021). Anser et al. (2021) noticed that COVID-19 contaminated cases are the central element that impedes financial activities and reduces money allocation, but a growing number of recovered cases offer investors' trust to boost stock trade across nations. Agarwalla et al. (2021) documented that the rescue package had limited the extreme tail risks, but the volatility level persisted at a high level. Ghorbel and Jeribi (2021) claimed that equity indices and financial assets rely not only on their earlier volatility, but also on the preceding volatility of the fuel prices. Therefore, in the aftermath of SARS-CoV-2 virus diffusion, the unpredictability in stock exchanges substantially increased, thus causing huge shortfalls for investors (Farid et al. 2021). The decline of the composite indicator of systemic stress among February and April 2020 was equivalent to the failures it recorded at the beginning of the 2008 global financial crisis and the 2011–2012 sovereign debt crisis, whereas the collapse in March 2020 was

the fourth-greatest monthly change since the commence of the euro (Borgioli et al. 2020). Pan et al. (2021) emphasized that the level of sovereign credit default swap enlarged throughout periods when the coronavirus pandemic turned out to be more critical. S&P 500 and EURONEXT 100 indices plummeted by nearly 30–38% between January and 15 June 2020 (data.europa.eu 2020), whilst Romania ranked ninth by considering the top ten best-performing leading European indices in the first half of 2020 (Bucharest Stock Exchange 2020).

However, although the COVID-19 pandemic undesirably affected worldwide economies and stock exchanges, Fernandez-Perez et al. (2021) proved that culture significantly influences market volatility since nations with reduced individualism and great uncertainty avoidance respond more adversely and with larger instability than nations with high individualism and weak uncertainty avoidance. Thus, Hunjra et al. (2021) supported that East Asian markets reacted differently to manifold sanitation arrangements and virus security strategies. Additionally, Bannigidadmath et al. (2021) explored 25 nations and showed that their reaction to government measures was dissimilar, claiming that in states where the guidelines counted, the impact was mainly harmful. Orhun (2021) supported that equity markets of nations with greater health outflow, better promptitude for diseases and superior GDP per capita are more protected against the coronavirus crisis. Harjoto and Rossi (2021) proved that the current pandemic had a significantly larger adverse effect to the equity markets in emerging nations than in the developed states.

COVID-19 induced panic and concerns amidst investors, thus contributing to social mindsets such as the herding behavior (Mnif et al. 2020). Shaikh and Huynh (2021) documented that investors' concern came out to be greater in the equity sector first—ever since the stock market crash of 1987 and the global financial crisis of 2008–2009. For instance, Subramaniam and Chakraborty (2021) found a robust negative relationship among COVID-19 fear and stock returns. Hence, returns were adversely influenced by fear through rising the market risk premium claimed by stockholders (Aggarwal et al. 2021). Bourghelle et al. (2021) found that the COVID-19 shock caused further oil price instability, primarily attributable to intensified insecurity, alongside stockholder tension and fear. Chang et al. (2020) argued that different to the Global Financial Crisis, investors panic about assuming risks, so they may imprudently get rid of all their holdings. Karamti and Belhassine (2021) advised that concern in the US market dispersed to the worldwide markets at the longer investment horizons. Hence, Kizys et al. (2021) documented herding conduct in the first three months of 2020, along with Espinosa-Méndez and Arias (2021), which confirmed that the pandemic heightened herding conduct in European equity markets. Ortmann et al. (2020) established that investors raised their brokerage deposits and launched further accounts, whereas mean weekly trading intensity expanded by 13.9% as the number of cases duplicated. Moreover, Pagano et al. (2021) proved that retail investors lessened momentum trading and heightened contrarian trading operations throughout the preliminary stage of this turning point, whilst Smales (2021) claimed that individual traders are more inclined to perform online explorations for facts to settle dwelling insecurity in the course of the corona crisis. On the contrary, Sun et al. (2021) argued that coronavirus-associated reports and economic-related publications do not generate unreasonable investment judgments. Besides, Hong et al. (2021) advised that the pandemic period was related with market inefficiency, establishing rewarding prospects for dealers and opportunists.

Prior papers were focused on volatility examination for African equity markets (Lo et al. 2021; Takyi and Bentum-Ennin 2021; Zoungrana et al. 2021), the Australian stock market (Brueckner and Vespignani 2021), BRICS and G7 states (Yu et al. 2021), Canada and the US (Xu 2021), the Chinese stock market (Chen et al. 2021; Liu et al. 2021b; Shahzad et al. 2021), seven emerging countries (Hashmi et al. 2021), euro area stock markets (Duttilo et al. 2021), the Indian financial market (Bora and Basistha 2021), the South Korea stock market (Hoshikawa and Yoshimi 2021), Thailand (Hongsakulvasu et al. 2020), the Tunisian sectorial stock market (Fakhfekh et al. 2021), the US stock market (Curto and Serrasqueiro 2021; Hong et al. 2021), Vietnam and Philippines (Le and Tran 2021), Visegrad

Group member states (Czech et al. 2020), or several international markets (Al-Najjar et al. 2021; Al-Qudah and Houcine 2021; Anser et al. 2021; Banerjee 2021; Chowdhury et al. 2021; Contessi and Pace 2021; Engelhardt et al. 2021; Höhler and Lansink 2021; Rouatbi et al. 2021; Szczygielski et al. 2021b; Topcu and Gulal 2020; Vera-Valdés 2021; Youssef et al. 2021; Zhang et al. 2020). This paper aims to examine the volatility throughout the Romanian financial market during the COVID-19 pandemic. Investigating volatility is crucial, as an unexpected and substantial rise in instability may cause a financial meltdown (Uddin et al. 2021). We investigate an emerging stock exchange as long as these markets are more exposed to insecurity of pandemics and epidemics than developed markets (Salisu et al. 2020).

In the present article, it was analyzed how the volatility on the Romanian stock market manifested itself due to the COVID-19 pandemic outbreak. Thus, in order to fulfill the objective of the study, coronavirus daily data were used between January 2020 and April 2021 for the following markets: USA, Italy, and Romania. For the Romanian capital market, we selected the representative index for Bucharest Stock Exchange (BSE), namely, the Bucharest Exchange Trading (BET) index, as well as a number of twelve shares, these being positioned in the top of the most traded on BSE at the time of this research. Regarding the variables used as proxies for COVID-19, they are related to the evolution of the new number of cases of COVID-19 registered in the USA, Italy, and Romania. Italy was the epicenter of the COVID-19 pandemic in Europe, whereas the USA had the highest number of COVID-19 cases. Moreover, the USA has some of the largest stock markets that have a strong impact on other markets. For instance, Celık (2012) proved that emerging markets appear to be the most affected by the contagion consequences from the U.S. Moreover, Le and Tran (2021) found evidence that Vietnamese and the Philippine stock markets are affected by the contagion effect from the US stock market throughout the COVID-19 pandemic.

So far, the evidence for BSE is limited, this being, to the best of our knowledge, among the first studies that address the impact of COVID-19 on the Romanian capital market.

The rest of the paper is organized as follows. Section 2 reviews the related literature. Section 3 describes the dataset and quantitative techniques. Section 4 presents and discusses the empirical outcomes. Section 5 concludes the study.

2. Literature Review

The occurrence of COVID-19 has harmful effects on worldwide markets (Naeem et al. 2021), being expected to be the largest economic shock in human history (Insaidoo et al. 2021). Broadly, Xu (2021) noticed an adverse effect of a rise in the COVID-19 cases on the financial market. Chowdhury et al. (2021) claimed that European financial markets were the most terrible victim related to others. In the same vein, Youssef et al. (2021) noticed that European equity markets, excepting Italy, spread more spillovers to the whole other financial markets than they obtained, mainly through the coronavirus outburst. Szczygielski et al. (2021b) showed that pandemic insecurity has affected nearly all territories via smaller returns and heightened market volatility. Hence, the insecurity triggered by the COVID-19 outbreak and the rapidity with which the novel coronavirus dispersed around the world produced a panic in international financial markets (Lo et al. 2021). As such, Zhang and Hamori (2021) noticed that the effect of disease on the volatility of the oil and stock markets surpassed that of the 2008 global financial crisis. Moreover, Szczygielski et al. (2021a) proved that no national energy market was unharmed by COVID-19 insecurity. Hence, coronavirus disease lessened stock market liquidity involving equally the depth and the tightness facets (Mdaghri et al. 2021). For S&P 500 enterprises, Chebbi et al. (2021) documented a negative link among the quotidian increase in the numbers of coronavirus cases and fatalities and stock liquidity. Moreover, for the Shanghai stock market, Ftiti et al. (2021) confirmed the rise of stock market volatility and liquidity risk justified by a ripple effect triggered by the vulnerability of the sanitary sector. However, Curto and Serrasqueiro (2021) argued that coronavirus occurrence did not strike evenly across all the US segments and stock quotes. For instance, Milcheva (2021) noticed that the most affected segments in the US are

retail and hotels, but in Asia the most affected segment is the office. Nevertheless, Höhler and Lansink (2021) noted that the food sector was less influenced by the pandemic than other segments.

A first strand of literature was focused on the reaction of stock returns to the existing pandemic. Topcu and Gulal (2020) exhibited that Asian markets were the most influenced by the pandemic, succeeded by South America and the Middle East. As such, Hongsakulvasu et al. (2020) revealed that COVID-19 disquiet negatively influenced every kind of Thailand's stock return. Al-Najjar et al. (2021) claimed that coronavirus incidents exert an adverse impact on equity market indices of G8 countries. Al-Qudah and Houcine (2021) noticed that the surge in established cases of COVID-19 negatively influenced stock returns for the main affected nations in the WHO Regions. For Central, North, and the South American realm, Amin et al. (2021) concluded that COVID-19 cases undesirably influence market indexes. Takyi and Bentum-Ennin (2021) revealed that African financial markets performance lessened between −2.7% and −20 % throughout and subsequently the incidence of the pandemic. Czech et al. (2020) reported a negative association among the Visegrad stock market indices and the COVID-19 diffusion. For the case of emerging markets, Hashmi et al. (2021) advised that the number of coronavirus cases negatively influences stock prices mainly when these financial markets are in a bearish condition. Contrariwise, O'Donnell et al. (2021) found that the everyday amounts of COVID-19 cases did not explain the index price variations in China, Spain, Italy, the United Kingdom, and the United States. Zoungrana et al. (2021) revealed for the West African Economic and Monetary Union's (WAEMU) stock market that weekly validated cases do not influence stock returns, even if the impact of death cases is harmful. However, Brueckner and Vespignani (2021) documented that COVID-19 contaminations had a positive influence on the performance of the Australian equity market.

Another strand of research was oriented on how COVID-19 news influences stock returns and oil prices because terrific fear caused by the mass media is related with growing volatility in the financial markets (Haroon and Rizvi 2020). Chundakkadan and Nedumparambil (2021) provided evidence that emphasis on the pandemic has generated a pessimistic reaction between market players and weakened the stock exchanges. Weng et al. (2021) established that news throughout the coronavirus pandemic has more forecasting information, which is essential for the transient volatility estimating of fuel futures, whereas Salisu and Vo (2020) reinforced that considering health reports over illnesses boosts stock return foresight. Baek et al. (2020) advised a negativity tendency since adverse announcements concerning the number of fatalities are twice as impactful as optimistic facts with respect to recoveries. Wu et al. (2021) argued that media can stimulate the forecast of oil cost and usage over the COVID-19 contagion. Atri et al. (2021) noticed that the number of casualties and the COVID-19 panic adversely impact petroleum value, but the COVID-19 media coverage positively influences fuel cost in the short run.

Further studies were exploring safe-haven assets throughout ongoing health crises. Huang et al. (2021) suggested that Bitcoin can promote efficient diversification and risk alleviation, whereas Mariana et al. (2021) strengthened that Ethereum is a superior safe-haven than Bitcoin. Similarly, Disli et al. (2021) advised that gold, oil, and Bitcoin offer diversification benefits at extended investment perspectives. Ji et al. (2020) underlined that gold and soybean futures may uphold the worth of an investment. Contrariwise, Będowska-Sójka and Kliber (2021) claimed that cryptocurrencies rarely performed as weak safe-haven assets during several market disorders, whilst Conlon and McGee (2020) argued that Bitcoin does not behave as a safe haven over the bear market stemming from the coronavirus disease. For financial markets of Africa, Omane-Adjepong and Alagidede (2021) concluded that the safe-haven potential of precious metals, particularly gold, has diminished. In the same vein, Umar et al. (2021) contradicted the safe-haven feature of precious metals over the coronavirus plague, apart from silver. For the case of Chinese portfolios, Pho et al. (2021) found that Bitcoin is appropriate to risk-prone investors, whereas gold is adequate to prudent investors.

A summary of prior literature exploring equity market volatility due to the coronavirus pandemic is exhibited in Table 1.

Table 1. Brief review of earlier studies towards the effect of the COVID-19 pandemic on stock market volatility.

Author(s)	Sample	Period	Quantitative Methods	Outcomes
Shahzad et al. (2021)	CSI 300 sector index series for ten sectors	3 January 2019–30 September 2020	Vector autoregressive model	Bad volatility spillover shocks dominate good volatility spillover shocks
Salisu and Ogbonna (2021)	Prices of Bitcoin, Ethereum, Litecoin and Ripple	2 September 2019–29 September 2020	GARCH MIDAS	Return unpredictability of cryptocurrencies is riskier throughout the pandemic as related to prior financial slumps
Abuzayed et al. (2021)	14 country-specific stock markets	7 January 2016–1 July 2020	Dynamic conditional correlation (DCC) conditional autoregressive heteroscedastic (GARCH) model	Developed stock exchanges in North America and Europe spread and received more marginal extreme risk to and from the worldwide market index compared to Asian equity markets
Bai et al. (2021)	US, China, UK, and Japan financial markets	4 January 2005–30 April 2020	GARCH-MIDAS	Pandemic positively influence perpetual volatility up to 24-month lag
Li (2021)	G7 and 3 emerging nations (China, India, and Brazil)	1 June 2009–28 August 2020	Asymmetry in volatility spillovers	Equity markets of Japan, China, India, and Brazil are risk receivers Stock markets of the US, Germany, the U.K., France, Italy, and Canada are risk spreaders
Tian and Ji (2021)	MSCI indices of the US, the UK, France, Germany and the MSCI developed markets	2 January 2001–31 December 2020	GARCH copula quantile regression-based CoVaR model	Germany exhibits the greatest risk spillovers, succeeded by France, the US and, the UK
Malik et al. (2021)	Brazil, Russia, India, China, South Africa	1 January 2013–24 April 2020	Baba-Engle-Kraft-Kroner (BEKK) model	The US, China and Brazil exhibited the highest individual volatility spillovers
Yousfi et al. (2021)	S&P 500 index and the CSI 300 index	5 January 2011–21 September 2020	GARCH models, DCC process, and wavelet coherence	Higher volatility spillover among US and Chinese equity markets throughout the pandemic period than before it
Contessi and Pace (2021)	18 main stock market indices	1 November 2019–29 May 2020	Generalized Supremum ADF (GSADF) test	Volatility spread from the Chinese equity market to all other markets
Liu et al. (2021a)	16 main equity markets in the world	24 January 2019–30 December 2020	Spillover analysis in time and frequency domain	Following the outbreak of COVID-19 pandemic, the integration of global stock markets increases considerably and the market risk contagion between them also raised substantially

Table 1. *Cont.*

Author(s)	Sample	Period	Quantitative Methods	Outcomes
Zaremba et al. (2020)	67 nations	1 January 2020–3 April 2020	Regression models	Government interventions increase worldwide stock markets' volatility
Duttilo et al. (2021)	European stock markets	4 January 2016–31 December 2020	Threshold GARCH	The first wave of pandemic affected stock market volatility of euro area nations with middle-large financial centers, but the second wave impacted merely stock market volatility of Belgium
Banerjee (2021)	China and its key trading partners' index futures contracts	1 August 2015–31 July 2020	Bivariate asymmetric dynamic conditional (ADCC) GARCH model	Substantial financial contagion in most developed and emerging markets showing sizeable business relations with China throughout COVID-19 period
Liu et al. (2021b)	Shanghai A shares	1 January 2017–31 March 2020.	GARCH with skewness	The pandemic boosts financial market crash risk
Hoshikawa and Yoshimi (2021)	Volatility index of the South Korean Stock market (KVI)	2 January 2019–31 August 2020	VAR, OLS, GARCH	The rise of new infection cases caused an upsurge in stock market volatility
Bora and Basistha (2021)	Nifty and Sensex stock indices	3 September 2019–10 July 2020	GJR GARCH	Indian equity market has undergone volatility throughout the pandemic
Fakhfekh et al. (2021)	12 sectorial indices	4 January 2016–30 April 2020	EGARCH, FIGARCH, FIEGARCH, TGARCH	Subsequent COVID-19 eruption, volatility is frequent in all series
Yousaf (2021)	Precious metals, industrial metals and, energy markets	22 January 2020–4 January 2021	BEKK-MGARCH	Volatility diffusion is significantly negative from the COVID-19 to gold, palladium, and brent oil markets, but positively spread to the WTI oil market

Source: Authors' work based on the literature review.

3. Data and Methodology

3.1. Sample Selection

For our study, we selected the most traded companies on the Bucharest Stock Exchange (BSE)—ALR, BRD, BVB, COTE, EL, FP, SNG, SNP, TEL, TLV, TRP and WINE—for the period January 2020–April 2021. To capture the types of causality between the variables regarding COVID-19 and the Romanian stock exchange, we decided to select the latest number of cases of COVID-19 registered in the USA, Italy, and Romania. The selected measures are presented in Table 2.

Table 2. Variables' descriptions.

Variables	Description
	Variables regarding Romanian financial market
BET	Bucharest Exchange Trading is the first index developed by BSE and signifies the reference index for the Romanian equity market. BET indicates the performance of the most traded corporations on BSE's regulated market, apart from financial investment enterprises. It is a free float market capitalization weighted index, with the highest weight of its components of 20%.
ALR	Alro is affiliate of Vimetco N.V., a worldwide, vertically-integrated primary and processed aluminium manufacturer. Field of activity: Aluminium production.
BRD	BRD Groupe Societe Generale is the second leading bank in Romania and the fourth market capitalization on the BSE. Field of activity: Other monetary intermediation.
BVB	The Bucharest Stock Exchange is the most significant organization of the local capital market. It coordinates and operates the regulated markets of financial instruments under European guidelines. Field of activity: Administration of financial markets.
COTE	CONPET delivers specific gas transport services via tubes and by rail, ensuring the supply of the factories with domestic and imported crude oil and derivatives. It manages a 3800 km pipeline grid encompassing 24 Romanian counties. Field of activity: Transport via pipeline.
EL	Societatea Energetica Electrica is a major participant in the energy sharing and supply market in Romania. Field of activity: Business and other management consultancy activities.
FP	Fondul Proprietatea is a joint stock company running as a closed-end investment company (Alternative Investment Fund) short of a set period, integrated in Romania, trading on the BSE since January 2011, and on the London Stock Exchange since April 2015. Field of activity: Trusts, funds and similar financial entities.
SNG	Romgaz is the leading natural gas manufacturer and the key provider in Romania. It is a joint stock corporation whose majority stockholder is the Romanian State owning a 70% share. Field of activity: Extraction of natural gas.
SNP	OMV Petrom is the leading energy corporation in Southeastern Europe. The firm is involved along the whole energy value chain: from exploration and fabrication of oil and gas, to processing and fuels supply, and further on to power production and advertising of gas and power. Field of activity: Extraction of crude petroleum.
TEL	Transelectrica is the Romanian Transmission and System Operator which performs a vital position in the Romanian electricity market. It operates and runs the energy spread system and delivers the electricity connections among the Central and Eastern European nations as a member of European Network of Transmission and System Operators for Electricity. Field of activity: Transmission of electricity.
TLV	Banca Transilvania is the first largest bank in Romania in terms of total assets. Field of activity: Other monetary intermediation.
TRP	TeraPlast SA is the parent corporation of the TeraPlast Group, respectively the major Romanian manufacturer of construction materials. Field of activity: Manufacture of plastic plates, sheets, tubes and profiles.
WINE	Purcari Wineries Group is a prominent participant in the wine and brandy sectors in the Central and Eastern Europe area, handling around 1,300 hectares of vineyards and 4 wineries placed in Romania and the Republic of Moldova. Field of activity: wineries.
	Variables regarding COVID-19 pandemic
RO_COVID	Number of new cases of COVID-19 in Romania
IT_COVID	Number of new cases of COVID-19 in Italy
US_COVID	Number of new cases of COVID-19 in USA

Source: Authors' own work.

The data consist of daily observations. For the variables regarding the Romanian financial market, the data source was Thomson Reuters Datastream, whereas for the variables regarding the COVID-19 pandemic, the data source was Our World in Data.

The formula for daily yields is in line with Banerjee (2021); Bora and Basistha (2021); Curto and Serrasqueiro (2021); Duttilo et al. (2021); Fakhfekh et al. (2021); Ftiti et al. (2021); Ghorbel and Jeribi (2021); Höhler and Lansink (2021); Hong et al. (2021); Hongsakulvasu et al. (2020); Le and Tran (2021); Orhun (2021); Tian and Ji (2021); Yousfi et al. (2021); Yu et al. (2021); Zoungrana et al. (2021):

$$R_{i,l} = ln\left(\frac{P_{i,l}}{P_{i,l-1}}\right) \tag{1}$$

where $R_{i,l}$ is the yield of the index/asset i in period l, $P_{i,l}$ is the asset price/stock market index value i in period l and $P_{i,l-1}$ is the price of the asset/stock market index value in the *l-1* period. Logarithmic yields were used because they are expected to have a normal distribution.

3.2. Quantitative Methods

To explore the selected financial time series, we will employ ARCH/GARCH models as in prior studies (Salisu and Ogbonna 2021; Abuzayed et al. 2021; Bai et al. 2021; Banerjee 2021; Bora and Basistha 2021; Curto and Serrasqueiro 2021; Czech et al. 2020; Duttilo et al. 2021; Fakhfekh et al. 2021; Farid et al. 2021; Ghorbel and Jeribi 2021; Harjoto and Rossi 2021; Haroon and Rizvi 2020; Hongsakulvasu et al. 2020; Insaidoo et al. 2021; Le and Tran 2021; Liu et al. 2021b; Malik et al. 2021; Mariana et al. 2021; Omane-Adjepong and Alagidede 2021; Szczygielski et al. 2021a, 2021b; Uddin et al. 2021; Vera-Valdés 2021; Xu 2021; Yousaf 2021; Yousfi et al. 2021; Yu et al. 2021; Zhang and Hamori 2021; Zoungrana et al. 2021). These models simultaneously evaluate and test processes of yields and volatility processes.

ARCH models were introduced by Engle (1982) and Generalized (GARCH) by Bollerslev (1986). A GARCH model allows conditional variation to be dependent on its previous lags. GARCH models transform the AR process from the ARCH model into an ARMA process by adding an MA process. The GARCH model (p, q) has the following form:

$$y_t = \mu + \varepsilon_t \sim N\left(0, {\sigma^2}_t\right) \tag{2}$$

$${\sigma^2}_t = \omega + \alpha_1 {\varepsilon^2}_{t-1} + \cdots + \alpha_q {\varepsilon^2}_{t-q} + \beta_1 {\sigma^2}_{t-1} + \cdots + \beta_p {\sigma^2}_{t-p} \tag{3}$$

where $\omega > 0$ and $\alpha_i \geq 0$, $\beta_i \geq 0$.

From Equations (2) and (3), it can be seen that the conditioned variance of random perturbations depends both on the historical values of the shocks and on the values of the variance in the past. The coefficients of ${\sigma^2}_{t-p}$ represent persistence of volatility, whereas the coefficients of ${\varepsilon^2}_{t-q}$ signify the rate of reaction of volatility to shocks in the financial market. Parameter p is the order of the terms GARCH and q is the order of the ARCH terms.

According to Baybogan (2013), the core issue with an ARCH specification is that it involves a substantial number of lags to seize the type of the volatility, whereas the GARCH framework is generally much more parsimonious for the reason that it integrates much of the evidence that a larger ARCH model with considerable lags would cover.

In order to analyze the causality between the BET index and the number of new COVID-19 cases, we will estimate in the first instance three vector autoregression (VAR) models, much like those found in Anser et al. (2021), Chen et al. (2021), Chowdhury et al. (2021), and Youssef et al. (2021), incorporating the stock market index and each COVID-19 pandemic measure, as described below:

$$BET_t = \delta_1 + \sum_{j=1}^{k} \beta_j BET_{t-j} + \sum_{j=1}^{k} \gamma_j COVID_{t-j} + u_{1t} \tag{4}$$

$$COVID_t = \delta_2 + \sum_{j=1}^{k} \psi_j COVID_{t-j} + \sum_{j=1}^{k} \varphi_j BET_{t-j} + u_{2t} \quad (5)$$

where δ_1 and δ_2 are the intercepts, β, γ, ψ, and φ are the endogenous variables coefficients, whereas u are the residual terms.

Further, for each estimated VAR model, we will employ the Granger causality test, as in earlier literature (Bourghelle et al. 2021; Chen et al. 2021; Liu et al. 2021b). So as to perform the causality test, the data series must be stationary and zero average (Granger 1969). The null hypothesis is that b does not cause Granger on c and that c does not cause Granger on b. The following bivariate regressions are given:

$$c_t = \alpha_0 + \alpha_1 c_{t-1} + \cdots + \alpha_p c_{t-p} + \beta_1 b_{t-1} + \cdots + \beta_p b_{-p} + \epsilon_t \quad (6)$$

$$b_t = \alpha_0 + \alpha_1 b_{t-1} + \cdots + \alpha_p b_{t-p} + \beta_1 c_{t-1} + \cdots + \beta_p c_{-p} + u_t \quad (7)$$

Thus, a first step in the present study is the examination of the stationarity of the selected variables, which is an important stage in any econometric study. This will be verified by the ADF test, much like Bai et al. (2021) and Chen et al. (2021). Next, we intend to model BSE volatility through the GARCH model and identify the types of causality that are established between BSE and COVID-19 variables through the Granger causality test after VAR estimation.

The research hypotheses are formulated as follows:

Hypothesis 1 (H1). *The COVID-19 pandemic negatively influences the return of the Bucharest Exchange Trading Index.*

Hypothesis 2 (H2). *The COVID-19 pandemic adversely impacts the return of the companies traded on the Bucharest Stock Exchange.*

4. Empirical Results

4.1. Preliminary Statistics

Table 3 shows descriptive statistics for the daily logarithmic returns of the shares traded on BSE, as well as for the BET stock market index, whereas Figure 1 reveals the density graphs. The selected shares have a negative skewness (except for the TRP share) in line with Agarwalla et al. (2021), Banerjee (2021), Malik et al. (2021),Yousaf (2021), and Zhang and Hamori (2021). As a common condition of financial markets, skewness is negative, suggesting an asymmetry to the left.

Table 3. Descriptive statistics for daily logarithmic returns.

Variables	Mean	Std. Dev.	Skewness	Kurtosis	Jarque–Bera	Probability
BET	0.000328	0.013891	−1.69758	16.55179	2748.758	0
ALR	0.000654	0.024085	−1.52064	18.71394	3607.831	0
BRD	-8.72×10^{-5}	0.018169	−0.82825	7.13984	280.0083	0
BVB	-6.82×10^{-5}	0.014499	1.201959	21.34744	4822.239	0
COTE	0.000448	0.016037	−1.33521	16.31311	2596.545	0
EL	0.000723	0.016134	−0.64638	8.430259	438.822	0
FP	0.000995	0.020352	−0.23783	34.51292	13,988.84	0
SNG	−0.000359	0.01451	−0.52513	6.038829	145.5867	0
SNP	-8.05×10^{-5}	0.020049	−1.47295	14.83691	2095.471	0
TEL	0.000837	0.01552	−0.65783	7.630885	326.3964	0
TLV	6.32E−05	0.01956	−0.99008	7.62791	356.8519	0
TRP	0.003905	0.023626	1.82107	19.48105	4012.206	0
WINE	0.000398	0.016247	−0.52416	7.145975	257.5572	0

Source: Authors' calculations. Notes: Variables' descriptions are provided in Table 2.

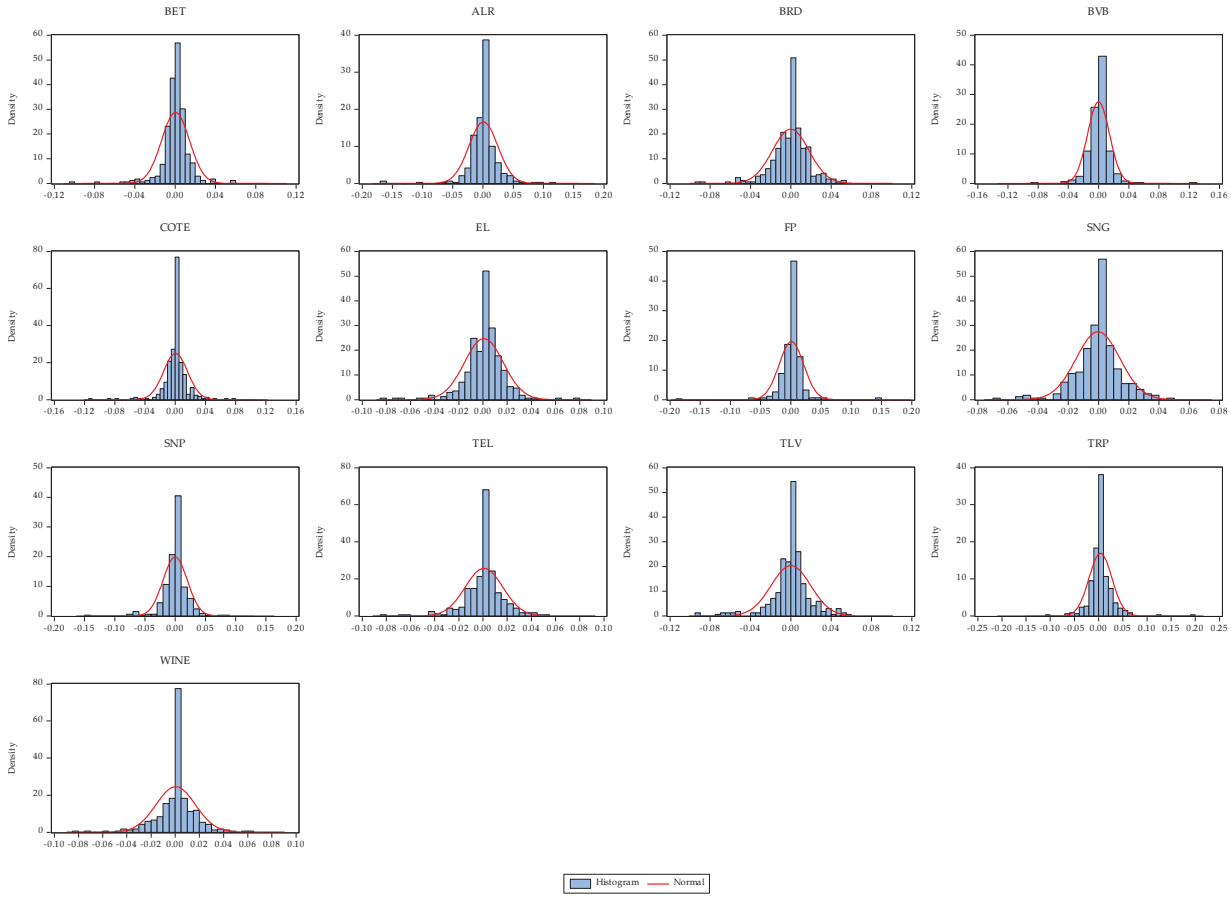

Figure 1. Density plots for daily logarithmic returns. Source: Authors' own work. Notes: Variables' descriptions are provided in Table 2.

The Kurtosis indicator measures the magnitude of the extreme values. Accordingly, in the current investigation, all the explored variables register a value of kurtosis greater than three. This fact indicates that the return series has fatter tails than the normal distribution, similar to Banerjee (2021), Bourghelle et al. (2021), Fakhfekh et al. (2021), Ftiti et al. (2021), Malik et al. (2021), Yu et al. (2021), and Zhang and Hamori (2021). This feature is referred to as leptokurtosis, which could be caused by volatility clustering.

Additionally, through the Jarque–Bera test, we can decide the distribution of variables. Consistent with the empirical results presented in Table 2, the probability accompanying the test is 0%. Hence, the test values are quite different from those of the normal distribution, proving that the series are not normally distributed, much like Curto and Serrasqueiro (2021), Liu et al. (2021a), Malik et al. (2021), Yousfi et al. (2021), and Zhang and Hamori (2021).

Figure 2 shows the Q–Q (quantile–quantile) plots. The quantiles–quantiles graph is a straightforward method used to compare two distributions. Therewith, it signifies the graph of an empirical distribution versus a theoretical distribution (normal distribution). If the empirical distribution is normal, the subsequent Q–Q graph should be the first bisector. However, in current investigation, the distribution is very different from the normal one.

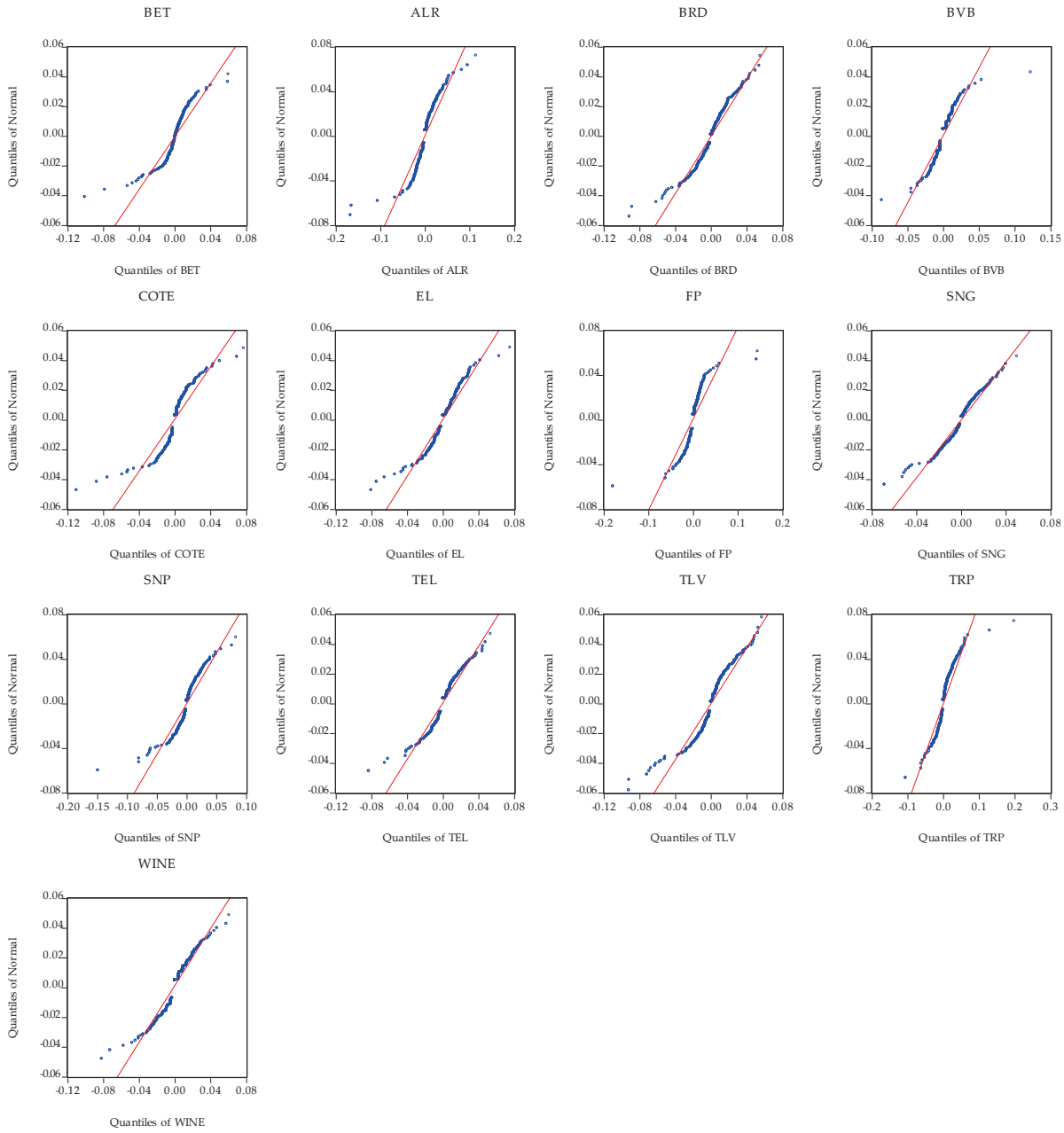

Figure 2. Q–Q plots for daily logarithmic returns. Source: Authors' own work. Notes: Variables' descriptions are provided in Table 2.

The density graph (see Figure 1) and Q–Q plot (see Figure 2) against the normal distribution show that the returns distribution also exhibits fat tails confirming the results in Table 2.

Further, we studied the stationarity of stocks and the stock market index using the ADF (Augmented Dickey–Fuller) test, much like Abuzayed et al. (2021), Atri et al. (2021), Banerjee (2021), Bora and Basistha (2021), Insaidoo et al. (2021), Li (2021), Yousaf (2021), Yousfi et al. (2021), and Zhang and Hamori (2021). ADF test is a very common method of assessing stationarity. The null hypothesis of the test is that the analyzed data series is not stationary and has a root unit. The outcomes of ADF test are revealed in Table 4.

Table 4. ADF test results for daily logarithmic returns.

Level	Augmented Dickey–Fuller Test Statistic	1% Level	5% Level	10% Level
BET	−7.012889	−3.44986	−2.87003	−2.571363
ALR	−7.440329	−3.44968	−2.86995	−2.571321
BRD	−18.45231	−3.44956	−2.8699	−2.571293
BVB	−16.64729	−3.44962	−2.86993	−2.571307
COTE	−10.02282	−3.44962	−2.86993	−2.571307
EL	−23.85922	−3.44956	−2.8699	−2.571293
FP	−7.815322	−3.44986	−2.87003	−2.571363
SNG	−16.81902	−3.44956	−2.8699	−2.571293
SNP	−17.54115	−3.44956	−2.8699	−2.571293
TEL	−17.88766	−3.44956	−2.8699	−2.571293
TLV	−17.41272	−3.44956	−2.8699	−2.571293
TRP	−15.9066	−3.44956	−2.8699	−2.571293
WINE	−6.367165	−3.44980	−2.8700	−2.571349

Source: Authors' calculations. Notes: Intercept included in test equation. Lag length: Automatic selection based on Schwarz Info Criterion. Variables' descriptions are provided in Table 2.

According to the results presented by the ADF stationarity test in Table 4, the null hypothesis of a unit root can be rejected, indicating that the daily logarithmic returns are significant at the 1% level, hence stationary, similar to Bai et al. (2021) and Yu et al. (2021). Thus, taking into account the empirical results of the ADF stationarity test, the examined variables are stationary and have an integration order I (0). Likewise, the stationarity of the series can be seen in Figure 3, where the daily yields of the analyzed series are represented.

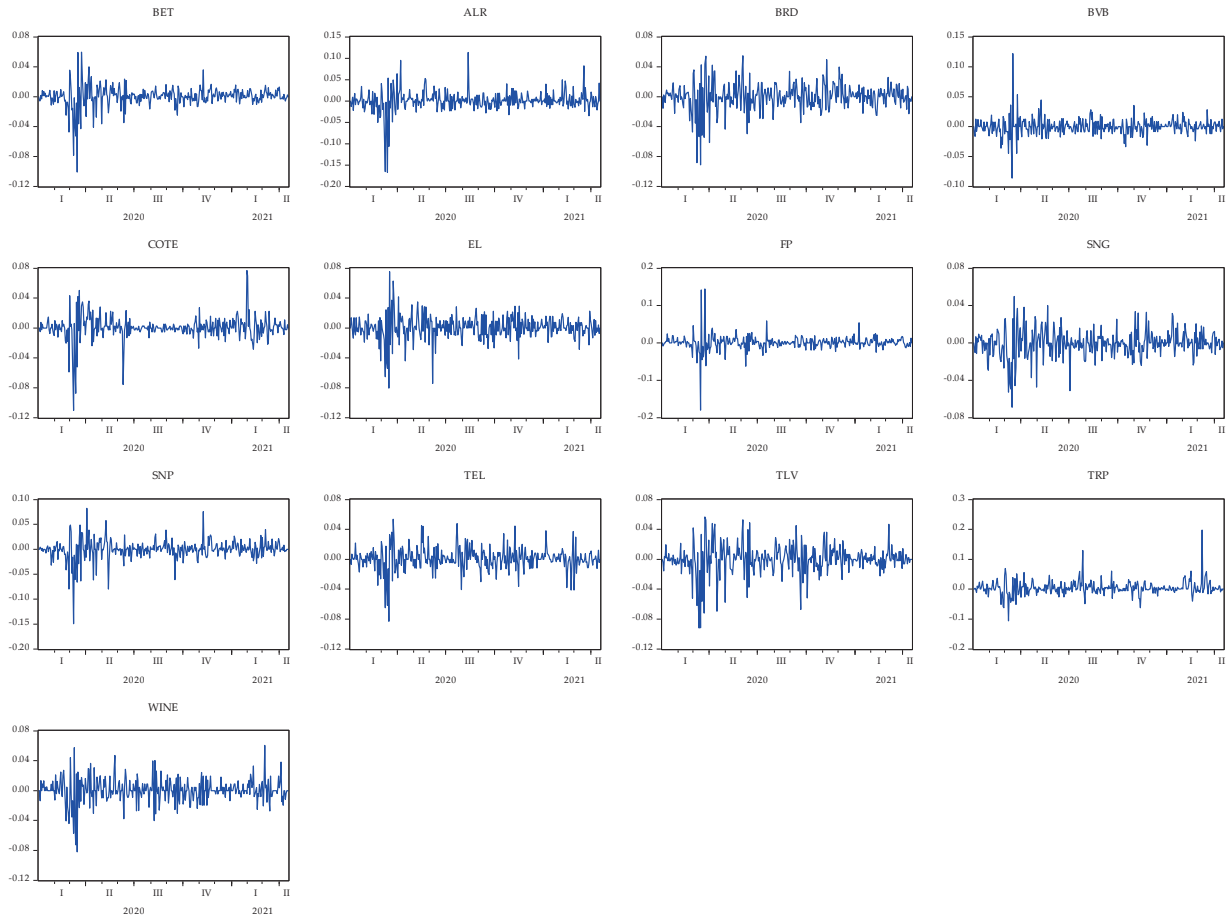

Figure 3. Daily values of the logarithmic returns. Source: Authors' own work. Notes: Variables' descriptions are provided in Table 2.

Figure 3 shows the evolution of the selected returns. Hence, there is acknowledged a phenomenon of "volatility clustering" and an alternation between periods of low volatility and those with high volatility, similar to Abuzayed et al. (2021), Insaidoo et al. (2021), Malik et al. (2021), and Yousfi et al. (2021). Moreover, "volatility clustering" implies a strong autocorrelation of returns.

Figures 4–6 reveal the evolution of the BET index against the new cases of COVID-19. The relationship between the evolution of the BET index and the number of new SARS-CoV-2 cases (USA, Italy, and Romania) is an indirect one. Thus, the increase in the number of infections (USA, Italy, and Romania) determined a decrease in the local stock market index and its return.

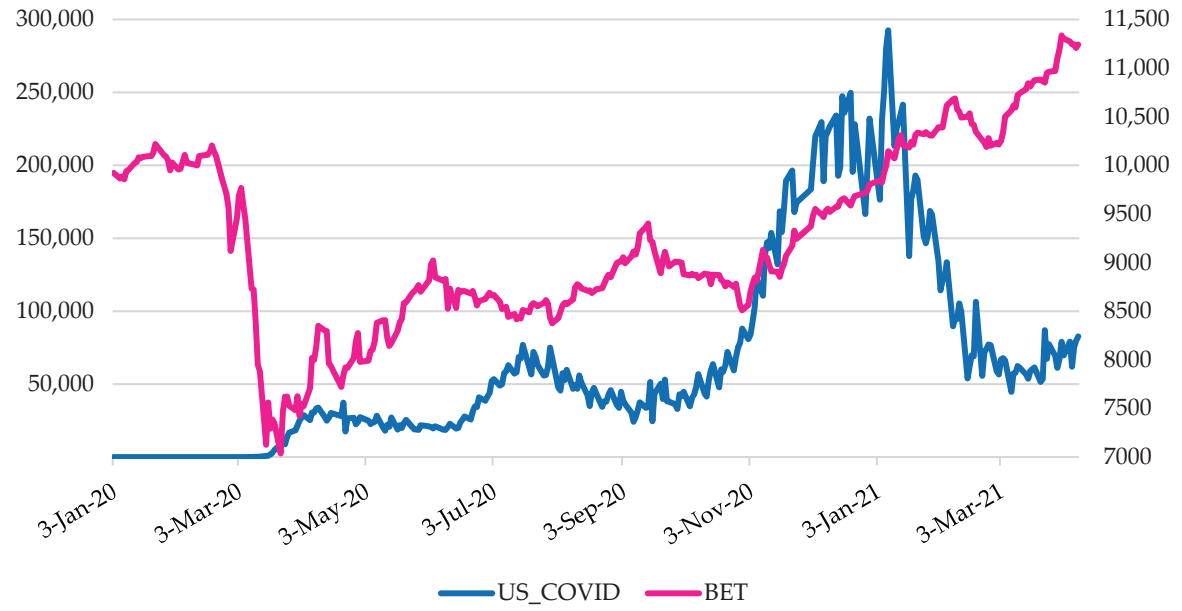

Figure 4. The evolution of the daily BET index quotes vs. no. of SUA new cases of SARS-COV-2. Source: Authors' own work. Notes: Variables' descriptions are provided in Table 2.

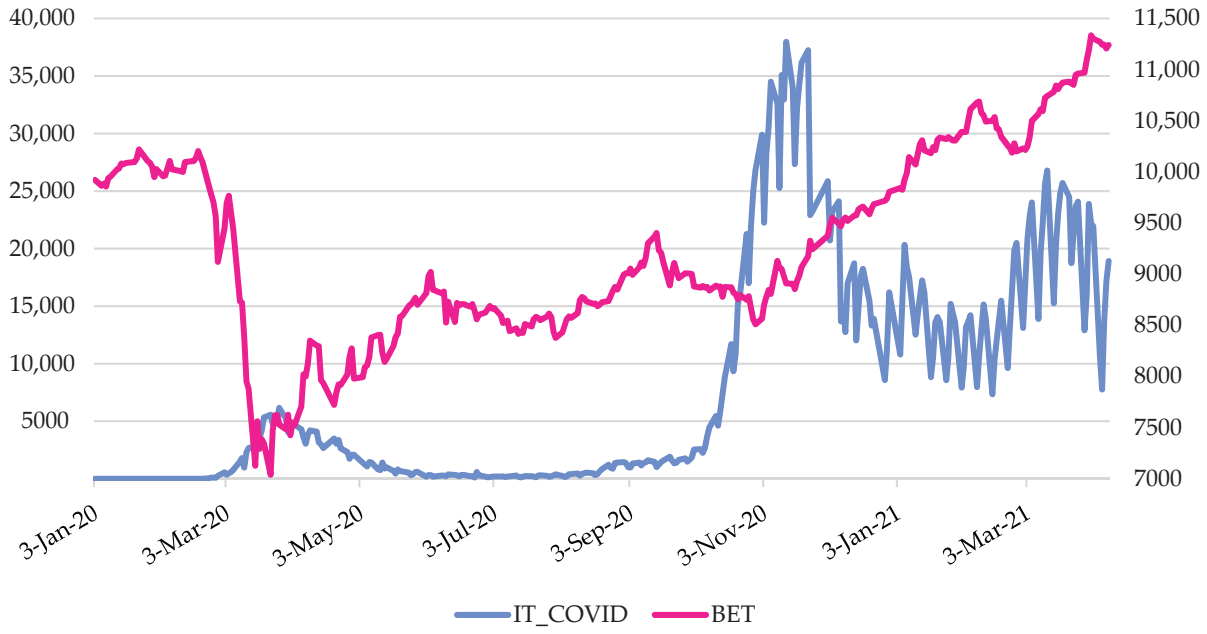

Figure 5. The evolution of the daily BET index quotes vs. no. of Italy new cases of SARS-COV-2. Source: Authors' own work. Notes: Variables' descriptions are provided in Table 2.

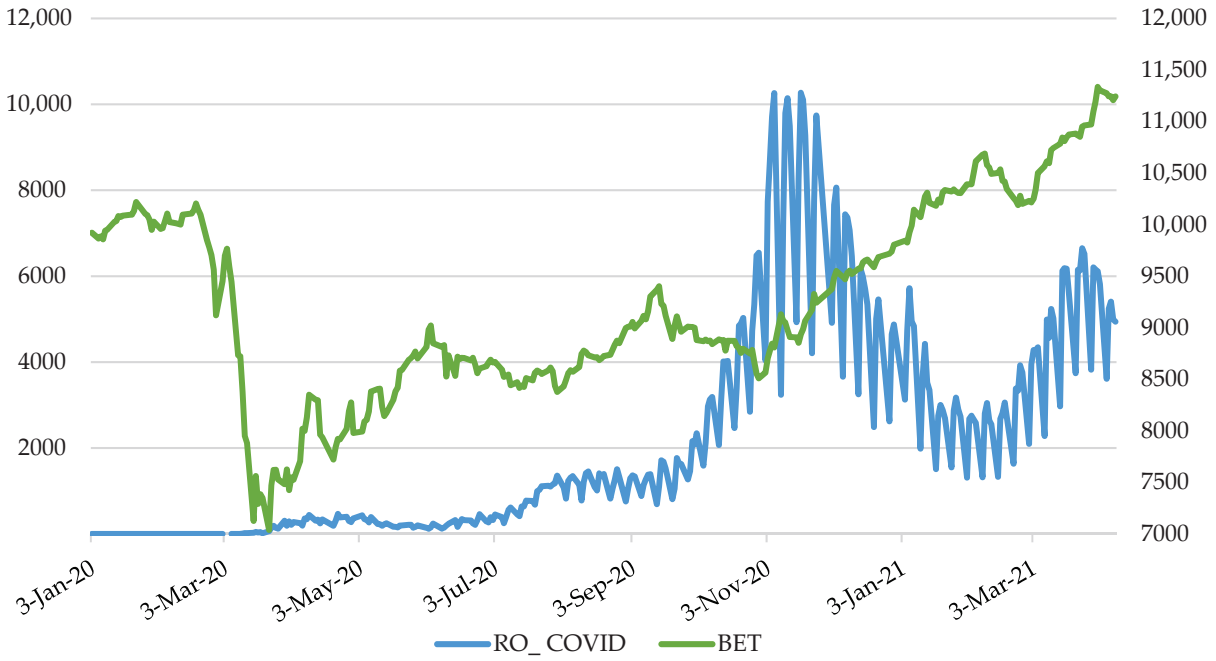

Figure 6. The evolution of the daily BET index quotes vs. no. of Romania new cases of SARS-COV-2. Source: Authors' own work. Notes: Variables' descriptions are provided in Table 2.

4.2. GARCH Outcomes

Before applying GARCH models, it is advisable to perform preliminary tests to detect the effects of ARCH. Heteroskedasticity was investigated by determining autocorrelation (AC), partial autocorrelation (PAC), and Q test. The number of offsets used for all the time series was 20. The outcomes of AC, PAC and Q-Stat are revealed in Table 5.

Table 5. Estimated autocorrelation (AC), partial autocorrelation (PAC) and Q-statistics with 20 lags for daily squared returns.

Variables	AC	PAC	Q-Stat	Prob
BET	0.013	−0.062	269.34	0.000
ALR	−0.017	−0.079	100.97	0.000
BRD	−0.039	−0.068	304.44	0.000
BVB	−0.020	−0.001	94.308	0.000
COTE	0.006	0.016	133.29	0.000
EL	−0.009	0.021	201.63	0.000
FP	−0.008	0.059	140.89	0.000
SNG	−0.028	−0.073	204.75	0.000
SNP	0.036	−0.024	80.962	0.000
TEL	−0.028	0.004	146.21	0.000
TLV	0.020	−0.012	220.99	0.000
TRP	−0.023	−0.028	7.8138	0.993
WINE	0.041	−0.071	204.04	0.000

Source: Authors' own work. Notes: Variables' descriptions are provided in Table 2.

According to the results of the Q test, in most of the cases, the existence of the serial correlation, heteroscedasticity (p-value less than 5%), is confirmed. However, in the case of TRP, the probability is greater than 5% and the null hypothesis of the absence of the serial correlation up to lag 20 cannot be rejected. Therefore, the data series shows heteroscedasticity that can be modelled by GARCH models (except TRP, because heteroskedasticity is a pre-condition for applying GARCH models for financial time series, where we may not be able to match GARCH models).

Table 6 shows the outcomes of GARCH approach. The model used was GARCH (1,1), restriction-Variance target, error distribution: Student's t being selected to register among the smallest AICs among the other available variants, similar to Czech et al. (2020) and Xu (2021). Only valid models, whose coefficients are statistically significant and different from 0, have been selected.

Following the application of a GARCH model (1,1), we estimated the conditioned volatilities which are plotted in Figure 7.

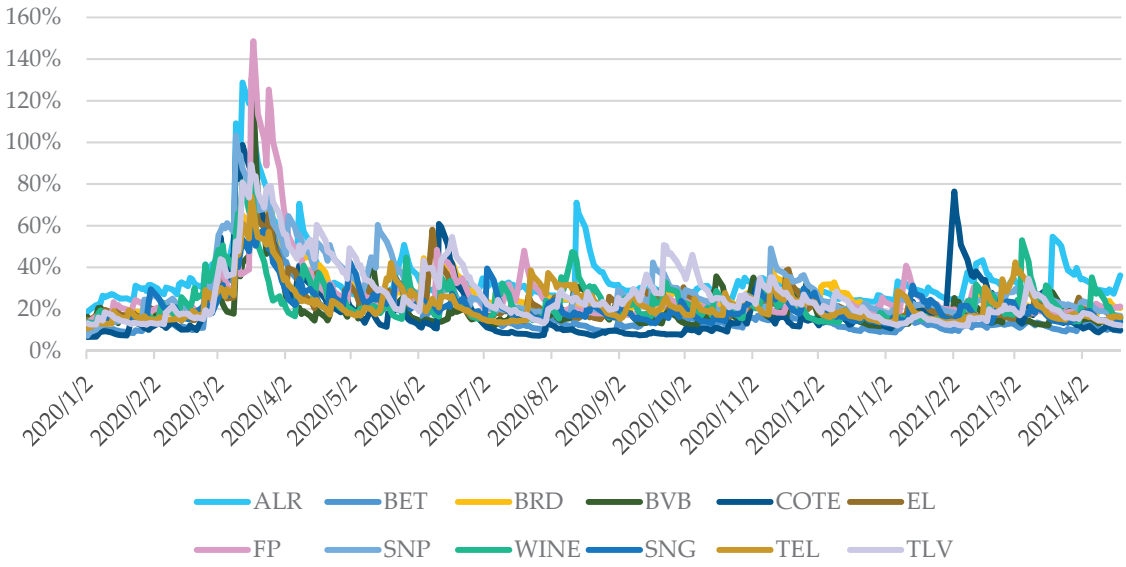

Figure 7. Conditional volatility of stock market shares and BET stock market index over January 2020–April 2021. Source: Authors' own work. Notes: Variables' descriptions are provided in Table 2.

We notice that in the first quarter of 2020, the volatility of the Romanian capital market increased to a level very close to that recorded during the global financial crisis of 2007–2009. Similarly, Curto and Serrasqueiro (2021) noticed an intensification of volatility following February 2020. Hence, this outcome is in line with both of the proposed hypotheses H1 and H2. Our results are consistent with Czech et al. (2020), which noted that Visegrad Group member countries were hit by the COVID-19 disease at the outset of March 2020 when the first case was registered.

Besides, in the next two quarters, volatility had a downward trend, argued by the fact that COVID-19 vaccine findings were declared (Yu et al. 2021). In the same vein, Rouatbi et al. (2021) reinforced that the launch and expansion of the vaccinations reduce stock market volatility.

Further, Figure 8 exhibits the daily evolution of selected shares' yields and the BET index for the period 2007–2021 in order to highlight the fact that the volatility in the period 2007–2009 was much more significant than that during the COVID-19 pandemic. This fact supports Le and Tran (2021), which pointed out for the case of Vietnam that the contagion effect throughout the coronavirus period was lesser than that over the global financial crisis.

Thus, the first two quarters of 2020 were marked by an increase in volatility on international financial markets, more pronounced in March and April, and the companies FP, ALR, SNP, and BVB had the highest volatilities during this period. August, September, and October show moderate volatility, being higher than before the outbreak of the COVID-19 pandemic.

Table 6. GARCH estimations.

Dependent Variable: BET					Dependent Variable: ALRO				
Variable	**Coeff**	**Std. Error**	**z-Stat**	**Prob.**	**Variable**	**Coeff**	**Std. Error**	**z-Stat**	**Prob.**
C	0.00118	0.000391	3.014619	0.0026	C	0.000289	0.000749	0.385655	0.6998
Variance Equation					**Variance Equation**				
C	4.76×10^{-6}				C	4.51×10^{-5}			
RESID(−1)^2	0.184229	0.054926	3.35414	0.0008	RESID(−1)^2	0.139141	0.050071	2.778885	0.0055
GARCH(−1)	0.7911	0.062407	12.67647	0	GARCH(−1)	0.782887	0.077865	10.05445	0
T-DIST. DOF	4.264243	0.887964	4.80227	0	T-DIST. DOF	2.915888	0.214055	13.62215	0
R-sq	−0.003773	Mean dependent var		0.000328	R-sq	−0.000231	Mean dependent var		0.000654
Adj R-sq	−0.003773	S.D. dependent var		0.013891	Adj R-sq	−0.000231	S.D. dependent var		0.024085
S.E. of regr	0.013917	Akaike info crit		−6.537876	S.E. of regr	0.024088	Akaike info crit		−5.236626
Sum sq resid	0.065275	Schwarz crit		−6.492633	Sum sq resid	0.195534	Schwarz crit		−5.191383
Log likelihood	1108.901	Hannan–Quinn crit		−6.519845	Log likelihood	888.9898	Hannan–Quinn crit		−5.218595
DW stat	2.106484				DW stat	1.936172			
Dependent Variable: BRD					**Dependent Variable: BVB**				
Variable	**Coeff**	**Std. Error**	**z-Stat**	**Prob.**	**Variable**	**Coeff**	**Std. Error**	**z-Stat**	**Prob.**
C	0.00077	0.000709	1.085874	0.2775	C	−0.000109	0.000504	−0.21581	0.8291
Variance Equation					**Variance Equation**				
C	1.43×10^{-5}				C	2.12×10^{-5}			
RESID(−1)^2	0.150634	0.043495	3.463245	0.0005	RESID(−1)^2	0.292829	0.072636	4.031475	0.0001
GARCH(−1)	0.806065	0.061517	13.10319	0	GARCH(−1)	0.606027	0.102678	5.902193	0
T-DIST. DOF	5.300367	1.31796	4.021645	0.0001	T-DIST. DOF	4.976087	1.251612	3.975743	0.0001
R-sq	−0.002232	Mean dependent var		-8.72×10^{-5}	R-sq	−0.000008	Mean dependent var		-6.82×10^{-5}
Adj R-sq	−0.002232	S.D. dependent var		0.018169	Adj R-sq	−0.000008	S.D. dependent var		0.014499
S.E. of regr	0.018189	Akaike info crit		−5.52442	S.E. of regr	0.014499	Akaike info crit		−6.126467
Sum sq resid	0.11149	Schwarz crit		−5.479177	Sum sq resid	0.07084	Schwarz crit		−6.081224
Log likelihood	937.627	Hannan−Quinn crit		−5.506389	Log likelihood	1039.373	Hannan–Quinn crit		−6.108436
DW stat	2.011758				DW stat	2.525927			

Table 6. *Cont.*

Dependent Variable: COTE					Dependent Variable: EL				
Variable	**Coeff**	**Std. Error**	**z-Stat**	**Prob.**	**Variable**	**Coeff**	**Std. Error**	**z-Stat**	**Prob.**
C	0.000205	0.00034	0.604738	0.5454	C	0.001186	0.000632	1.87812	0.0604
Variance Equation					**Variance Equation**				
C	4.99×10^{-6}				C	2.13×10^{-5}			
RESID(−1)^2	0.250596	0.04803	5.217482	0	RESID(−1)^2	0.209315	0.052881	3.958218	0.0001
GARCH(−1)	0.729937	0.053054	13.75829	0	GARCH(−1)	0.708624	0.078695	9.004646	0
T-DIST. DOF	3.486178	0.373561	9.332278	0	T-DIST. DOF	5.627834	1.419299	3.965221	0.0001
R-sq	−0.000229	Mean dependent var		0.000448	R-sq	−0.000828	Mean dependent var		0.000723
Adj R-sq	−0.000229	S.D. dependent var		0.016037	Adj R-sq	−0.000828	S.D. dependent var		0.016134
S.E. of regr	0.016039	Akaike info crit		−6.427494	S.E. of regr	0.016141	Akaike info crit		−5.754231
Sum sq resid	0.086694	Schwarz crit		−6.382251	Sum sq resid	0.087795	Schwarz crit		−5.708987
Log likelihood	1090.246	Hannan–Quinn crit		−6.409463	Log likelihood	976.465	Hannan–Quinn crit		−5.736199
DW stat	1.767033				DW stat	2.51603			
Dependent Variable: FP					**Dependent Variable: SNP**				
Variable	**Coeff**	**Std. Error**	**z-Stat**	**Prob.**	**Variable**	**Coeff**	**Std. Error**	**z-Stat**	**Prob.**
C	0.001227	0.000524	2.341939	0.0192	C	0.000648	0.001333	0.486339	0.6267
Variance Equation					**Variance Equation**				
C	2.92×10^{-5}				C	0.00016			
RESID(−1)^2	0.191734	0.06115	3.13549	0.0017	RESID(−1)^2	0.000401	0.007995	0.050126	0.96
GARCH(−1)	0.737594	0.078636	9.379818	0	GARCH(−1)	0.6	0.56513	1.061702	0.2884
T-DIST. DOF	2.80621	0.225963	12.41887	0	T-DIST. DOF	20	3.777537	5.294455	0
R-sq	−0.00013	Mean dependent var		0.000995	R-sq	−0.001325	Mean dependent var		-8.05×10^{-5}
Adj R-sq	−0.00013	S.D. dependent var		0.020352	Adj R-sq	−0.001325	S.D. dependent var		0.020049
S.E. of regr	0.020353	Akaike info crit		−5.925241	S.E. of regr	0.020062	Akaike info crit		−5.118899
Sum sq resid	0.139607	Schwarz crit		−5.879998	Sum sq resid	0.135641	Schwarz crit		−5.073656
Log likelihood	1005.366	Hannan–Quinn crit		−5.90721	Log likelihood	869.0939	Hannan–Quinn crit		−5.100868
DW stat	2.534692				DW stat	1.912486			

Table 6. *Cont.*

Dependent Variable: SNG					Dependent Variable: WINE				
Variable	**Coefficient**	**Std. Error**	**z-Statistic**	**Prob.**	**Variable**	**Coeff**	**Std. Error**	**z-Stat**	**Prob.**
C	−0.00011	0.000579	−0.190745	0.8487	C	0.00093	0.000575	1.616535	0.106
	Variance Equation						**Variance Equation**		
C	0.0000175				C	2.53E-05			
RESID(−1)^2	0.206748	0.053863	3.838396	0.0001	RESID(−1)^2	0.274618	0.063641	4.315126	0
GARCH(−1)	0.709914	0.084466	8.404724	0	GARCH(−1)	0.629318	0.093136	6.757009	0
T-DIST. DOF	4.572915	0.814926	5.611448	0	T-DIST. DOF	4.076108	0.615755	6.61969	0
R-squared	−0.000296	Mean dependent var		−0.000359	R-sq	−0.001074	Mean dependent var		0.000398
Adjusted R-squared	−0.000296	S.D. dependent var		0.01451	Adj R-sq	−0.001074	S.D. dependent var		0.016247
S.E. of regression	0.014512	Akaike info criterion		−5.903807	S.E. of regr	0.016256	Akaike info crit		−5.761172
Sum squared resid	0.070969	Schwarz criterion		−5.858564	Sum sq resid	0.089052	Schwarz crit		−5.715929
Log likelihood	1001.743	Hannan–Quinn criter.		−5.885776	Log likelihood	977.6381	Hannan–Quinn crit		−5.743141
Durbin-Watson stat	1.830748				DW stat	2.292014			
Dependent Variable: TEL					**Dependent Variable: TLV**				
Variable	**Coefficient**	**Std. Error**	**z-Statistic**	**Prob.**	**Variable**	**Coefficient**	**Std. Error**	**z-Statistic**	**Prob.**
C	0.000993	0.00053	1.873592	0.061	C	0.000385	0.00059	0.652159	0.5143
	Variance Equation					**Variance Equation**			
C	0.0000155				C	0.00000789			
RESID(−1)^2	0.184978	0.055272	3.346684	0.0008	RESID(−1)^2	0.169068	0.040267	4.198672	0
GARCH(−1)	0.750384	0.07748	9.684826	0	GARCH(−1)	0.810254	0.046858	17.2916	0
T-DIST. DOF	3.593242	0.439082	8.183526	0	T-DIST. DOF	3.940655	0.593309	6.64183	0
R-squared	−0.000102	Mean dependent var		0.000837	R-squared	−0.000272	Mean dependent var		0.0000632
Adjusted R-squared	−0.000102	S.D. dependent var		0.01552	Adjusted R-squared	−0.000272	S.D. dependent var		0.01956
S.E. of regression	0.015521	Akaike info criterion		−5.879238	S.E. of regression	0.019563	Akaike info criterion		−5.561135
Sum squared resid	0.081186	Schwarz criterion		−5.833995	Sum squared resid	0.128969	Schwarz criterion		−5.515892
Log likelihood	997.5912	Hannan–Quinn criter.		−5.861207	Log likelihood	943.8319	Hannan–Quinn criter.		−5.543104
Durbin-Watson stat	1.953884				Durbin-Watson stat	1.899838			

Source: Authors' calculations. Notes: Notes: Variables' descriptions are provided in Table 2. Method: ML ARCH—Student's t distribution (BFGS/Marquardt steps). Included observations: 338. Coefficient covariance computed using outer product of gradients. Presample variance: backcast (parameter = 0.7).

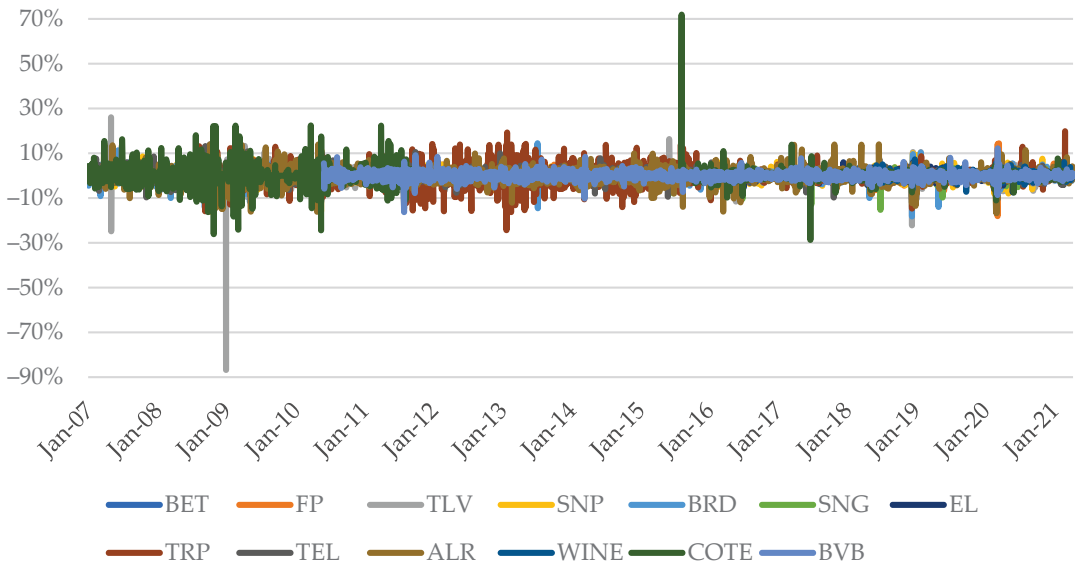

Figure 8. Daily values of the selected data over the period 2007–2021. Source: Authors' own work. Notes: Variables' descriptions are provided in Table 2.

4.3. Causality Analysis

Given that the health crisis has a significant impact on the global economy, we also aimed to explore the causal relationships that are established between the variables regarding COVID-19 and the BET stock market index. Primarily, it was checked if the stock market index and each COVID-19 pandemic measure were cointegrated. In this regard, Table 7 exhibits the outcomes of the Phillips–Ouliaris cointegration test. Accordingly, we reject the null hypothesis and decide that the series are cointegrated.

Table 7. The outcomes of the Phillips–Ouliaris cointegration test.

	Dependent	tau-Statistic	Prob.*	z-Statistic	Prob.*
Series: RBET, DRO_COVID Included observations: 312 after adjustments	RBET	−20.03971	0	−387.7359	0
	DRO_COVID	−37.24025	0	−316.0871	0
	Dependent	**tau-Statistic**	**Prob.***	**z-Statistic**	**Prob.***
Series: RBET, DIT_COVID Included observations: 316 after adjustments	RBET	−18.96646	0	−400.8999	0
	DIT_COVID	−23.96736	0	−284.9561	0
	Dependent	**tau-Statistic**	**Prob.***	**z-Statistic**	**Prob.***
Series: RBET, DUS_COVID Included observations: 316 after adjustments	RBET	−18.93794	0	−400.6069	0
	DUS_COVID	−27.8585	0	−369.0163	0

Source: Authors' calculations. Notes: * MacKinnon (1996) *p*-values. Sample (adjusted): 6 January 2020–9 April 2021. Cointegrating equation deterministics: C. Long-run variance estimate (Bartlett kernel, Newey–West fixed bandwidth). No d.f. adjustment for variances. Variables' descriptions are provided in Table 2.

Further, the lag selection criterion is explored. Table 8 reveals the related lag order selection criteria. Hence, the Schwarz information criterion suggests five and seven lags.

Table 8. VAR lag order selection criteria.

	Lag	LogL	LR	FPE	AIC	SC	HQ
Endogenous variables: RBET, DRO_COVID Exogenous variables: C Included observations: 296	0	−1607.62	NA	181.2816	10.87581	10.90074	10.88579
	1	−1587.74	39.35295	162.8402	10.76852	10.84333	10.79847
	2	−1559.53	55.4685	138.2672	10.60494	10.72961	10.65485
	3	−1551.44	15.79743	134.5	10.5773	10.75184	10.64718
	4	−1458.68	179.8884	73.8342	9.977539	10.20195	10.06739
	5	−1439.81	36.32215	66.78202	9.87712	10.1514	9.986937
	6	−1429.8	19.15297	64.12454	9.836468	10.16062	9.966253
	7	−1399.38	57.75557 *	53.64450 *	9.657959 *	10.03198 *	9.807711 *
	8	−1398.9	0.893729	54.94222	9.681783	10.10568	9.851501
	Lag	**LogL**	**LR**	**FPE**	**AIC**	**SC**	**HQ**
Endogenous variables: RBET, DIT_COVID Exogenous variables: C Included observations: 308	0	−2012.61	NA	1645.988	13.08185	13.10607	13.09153
	1	−2007.18	10.74477	1630.827	13.0726	13.14526	13.10165
	2	−1987.05	39.60666	1468.66	12.96785	13.08896	13.01628
	3	−1975.61	22.36096	1399.403	12.91954	13.08909	12.98733
	4	−1947.2	55.16232	1194.285	12.76102	12.97902	12.84819
	5	−1902.16	86.8554	914.9435	12.49456	12.76099 *	12.60109
	6	−1892.38	18.73185	881.2824	12.45703	12.77191	12.58293
	7	−1884.43	15.12514 *	859.0133 *	12.43138 *	12.79471	12.57666 *
	8	−1883.75	1.295962	877.7618	12.4529	12.86467	12.61755
	Lag	**LogL**	**LR**	**FPE**	**AIC**	**SC**	**HQ**
Endogenous variables: RBET, DUS_COVID Exogenous variables: C Included observations: 308	0	−2539.78	NA	50478.62	16.50506	16.52928	16.51474
	1	−2520.57	38.04213	45731.93	16.4063	16.47897	16.43536
	2	−2508.57	23.61618	43416.26	16.35434	16.47544	16.40276
	3	−2503.86	9.195366	43218.5	16.34976	16.51931	16.41756
	4	−2483.95	38.65642	38977.11	16.24645	16.46444	16.33361
	5	−2453.01	59.68167	32721.35	16.07148	16.33791 *	16.17801
	6	−2442.42	20.28741 *	31351.76 *	16.02868 *	16.34356	16.15458 *
	7	−2441.24	2.234599	31934.01	16.04703	16.41035	16.1923
	8	−2439.71	2.89233	32452.48	16.06306	16.47483	16.2277

Source: Authors' calculations. Notes: Sample: 3 January 2020–9 April 2021. * indicates lag order selected by the criterion. LR: sequential modified LR test statistic (each test at 5% level). FPE: Final prediction error. AIC: Akaike information criterion. SC: Schwarz information criterion. HQ: Hannan–Quinn information criterion. Variables' descriptions are provided in Table 2.

After estimating the VAR model for the stock market index and each COVID-19 variable (see Tables A1–A3), we proceed to explore the Granger causality relationships. According to Freeman (1983), a variable, X, which evolves over time, causes another variable in evolution, Y, if the predictions of the value Y based on its own past values and on the previous values of X are better than the predictions of Y based only on Y's own past values. Table 9 shows the empirical results of the Granger causality test after VAR estimation.

Thus, for the analyzed period January 2020–April 2021, no causal relationship was identified between the COVID-19 variables and the BET index. This outcome is not consistent with Liu et al. (2021b), who found that fear sentiment causes stock market crash risk. Therefore, Yu et al. (2021) cannot be maintained either since it was found that the COVID-19 Anxiety Index causes stock market returns.

Table 9. The results of the VAR Granger causality/block exogeneity Wald tests.

Sample: 3 January 2020–9 April 2021 Included observations: 298	**Dependent variable: RBET**			
	Excluded	Chi-sq	df	Prob.
	DRO_COVID	2.811942	7	0.9018
	All	2.811942	7	0.9018
	Dependent variable: DRO_COVID			
	Excluded	Chi-sq	df	Prob.
	RBET	4.566812	7	0.7127
	All	4.566812	7	0.7127
Sample: 3 January 2020–9 April 2021 Included observations: 311	**Dependent variable: RBET**			
	Excluded	Chi-sq	df	Prob.
	DIT_COVID	1.199299	5	0.9449
	All	1.199299	5	0.9449
	Dependent variable: DIT_COVID			
	Excluded	Chi-sq	df	Prob.
	RBET	3.959237	5	0.5553
	All	3.959237	5	0.5553
Sample: 3 January 2020–9 April 2021 Included observations: 311	**Dependent variable: RBET**			
	Excluded	Chi-sq	df	Prob.
	DUS_COVID	1.266153	5	0.9384
	All	1.266153	5	0.9384
	Dependent variable: DUS_COVID			
	Excluded	Chi-sq	df	Prob.
	RBET	0.801005	5	0.977
	All	0.801005	5	0.977

Source: Authors' calculations. Notes: Variables' descriptions are provided in Table 2.

5. Concluding Remarks

The COVID-19 virus has spread very rapidly around the globe, negatively impacting the economy, and according to the latest information, it undergoes various mutations, with new variants of COVID-19 always appearing. The study of volatility has always been a hotly debated topic by experts, especially now in these times of uncertainty. The impact of COVID-19 on the capital markets did not take long to appear, so it initially manifested itself on the largest stock markets in the world, then, due to the contagion effect, it was transmitted to the other smaller markets. To our knowledge, the studies conducted on the Romanian capital market related to the research of volatility during the pandemic are extremely limited, which led us to focus on analyzing the volatility of the BSE indices.

Our main goal of the article was to analyze the BSE volatilities during the COVID-19 pandemic, selecting indices and a group of traded shares (these being among the most traded on BSE, which are also found in the BET stock index). To study volatility, we used the GARCH model (1,1), and the graphical outputs capture the episodes of volatility. Finally, through the Granger causality test, after VAR estimation, we were able to identify the relationships to be established between BSE stock index, respectively, the shares traded on BSE and variables that capture the evolution of the COVID-19 pandemic in the USA, Italy, and Romania.

This research contributes to the existing literature, which is the reason that we studied the volatility of the main companies traded on the Bucharest Stock Exchange, between January 2020 and April 2021, a period subject to a major change due to the COVID-19 pandemic, using GARCH models. We found that the distribution of the daily return series for the Romanian stock market is leptokurtic, it is not normally distributed, and has

significant time dependencies. The GARCH (1,1) model was used to model volatility on the Romanian stock market.

The study revealed strong evidence of volatility that lasts over time, a trend of high and low volatility periods, and a high persistence of volatility on the Bucharest Stock Exchange. In the first quarter of 2020, capital market volatility in Romania increased to a level very close to that recorded during the global financial crisis of 2007–2009. In the next two quarters, volatility had a downward trend. Nevertheless, no causal association was noticed between the COVID-19 variables and the BET index.

The empirical outcomes could help investors and asset managers to adjust their trading strategies. Moreover, the government should consider economic relief packages and formulate policies to lessen severe falls in prices (Hashmi et al. 2021).

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Appendix A

Table A1. Vector autoregression estimates for stock market index and the number of new cases of COVID-19 in Romania.

	RBET	DRO_COVID
RBET(−1)	−0.039042 −0.05944 [−0.65686]	−1347.071 −3387.07 [−0.39771]
RBET(−2)	0.104624 −0.05457 [1.91723]	−2907.972 −3109.71 [−0.93513]
RBET(−3)	−0.008179 −0.05343 [−0.15309]	−1776.737 −3044.46 [−0.58360]
RBET(−4)	−0.017674 −0.05245 [−0.33699]	−1706.189 −2988.76 [−0.57087]
RBET(−5)	0.099649 −0.05212 [1.91184]	−3998.206 −2970.19 [−1.34611]
RBET(−6)	−0.195458 −0.05129 [−3.81120]	−2384.377 −2922.5 [−0.81587]

Table A1. *Cont.*

	RBET	DRO_COVID
RBET(−7)	−0.012525 −0.05213 [−0.24025]	1802.935 −2970.85 [0.60687]
DRO_COVID(−1)	-8.20×10^{-7} -9.40×10^{-7} [−0.87075]	−0.57646 −0.05368 [−10.7389]
DRO_COVID(−2)	1.33×10^{-7} -1.10×10^{-6} [0.12428]	−0.803286 −0.06107 [−13.1529]
DRO_COVID(−3)	2.53×10^{-8} -1.20×10^{-6} [0.02129]	−0.150507 −0.06772 [−2.22260]
DRO_COVID(−4)	5.87×10^{-7} -1.20×10^{-6} [0.50356]	−0.261028 −0.06638 [−3.93240]
DRO_COVID(−5)	-1.44×10^{-7} -1.20×10^{-6} [−0.12112]	0.637747 −0.06798 [9.38180]
DRO_COVID(−6)	4.04×10^{-7} -1.10×10^{-6} [0.37555]	0.306384 −0.06128 [4.99998]
DRO_COVID(−7)	3.67×10^{-7} -9.50×10^{-7} [0.38643]	0.4326 −0.05413 [7.99193]
C	0.001192 −0.00066 [1.79229]	31.51544 −37.8873 [0.83182]
R-squared	0.107799	0.729229
Adj. R-squared	0.063661	0.715834
Sum sq. resids	0.034824	1.13×10^{8}
S.E. equation	0.011093	632.1363
F-statistic	2.442354	54.44024
Log likelihood	926.2818	−2336.982
Akaike AIC	−6.115985	15.78511
Schwarz SC	−5.92989	15.97121
Mean dependent	0.00113	16.43289
S.D. dependent	0.011464	1185.836
Determinant resid covariance (dof adj.)		49.15166
Determinant resid covariance		44.32804
Log likelihood		−1410.638
Akaike information criterion		9.668714
Schwarz criterion		10.0409
Number of coefficients		30

Source: Authors' calculations. Notes: Standard errors in ( ) and t-statistics in [ ]. Sample (adjusted): 15 January 2020–9 April 2021. Included observations: 298 after adjustments. Variables' descriptions are provided in Table 2.

Table A2. Vector autoregression estimates for stock market index and the number of new cases of COVID-19 in Italy.

	RBET	**DIT_COVID**
RBET(−1)	−0.033198 −0.0569 [−0.58340]	−4632.009 −8536.69 [−0.54260]
RBET(−2)	0.246594 −0.05647 [4.36677]	−2994.404 −8471.69 [−0.35346]
RBET(−3)	0.029426 −0.05822 [0.50542]	−4806.22 −8734.25 [−0.55027]
RBET(−4)	−0.110034 −0.05661 [−1.94372]	−10,837.98 −8492.63 [−1.27616]
RBET(−5)	0.177356 −0.05708 [3.10725]	−8666.519 −8562.82 [−1.01211]
DIT_COVID(−1)	8.74×10^{-8} -3.40×10^{-7} [0.25850]	−0.211916 −0.05074 [−4.17662]
DIT_COVID(−2)	1.75×10^{-8} -3.40×10^{-7} [0.05158]	−0.302194 −0.05081 [−5.94763]
DIT_COVID(−3)	-3.00×10^{-8} -3.50×10^{-7} [−0.08468]	−0.169155 −0.05314 [−3.18296]
DIT_COVID(−4)	-2.90×10^{-7} -3.50×10^{-7} [−0.84012]	−0.204575 −0.05182 [−3.94743]
DIT_COVID(−5)	1.35×10^{-9} -3.50×10^{-7} [0.00386]	0.487342 −0.05253 [9.27781]
C	0.000266 −0.00079 [0.33573]	76.10105 −118.787 [0.64065]
R-squared	0.108079	0.452144
Adj. R-squared	0.078348	0.433882
Sum sq. resids	0.0579	1.30×10^{9}
S.E. equation	0.013892	2084.126
F-statistic	3.635264	24.75893
Log likelihood	894.2746	−2812.385
Akaike AIC	−5.680222	18.15682
Schwarz SC	−5.547947	18.28909
Mean dependent	0.000392	60.84887
S.D. dependent	0.014471	2769.942
Determinant resid covariance (dof adj.)		836.7493
Determinant resid covariance		778.6048
Log likelihood		−1917.822
Akaike information criterion		12.47474
Schwarz criterion		12.73929
Number of coefficients		22

Source: Authors' calculations. Notes: Standard errors in ( ) and t-statistics in [ ]. Sample (adjusted): 13 January 2020–9 April 2021. Included observations: 311 after adjustments. Variables' descriptions are provided in Table 2.

Table A3. Vector autoregression estimates for stock market index and the number of new cases of COVID-19 in the US.

	RBET	**DUS_COVID**
RBET(−1)	−0.033139 −0.05671 [−0.58440]	32,151.08 −50,868.3 [0.63205]
RBET(−2)	0.244778 −0.0564 [4.34020]	24,680.63 −50,592.7 [0.48783]
RBET(−3)	0.024836 −0.05813 [0.42722]	−17,993.17 −52,150.7 [−0.34502]
RBET(−4)	−0.108053 −0.05637 [−1.91689]	−26,717.78 −50,566.7 [−0.52837]
RBET(−5)	0.181611 −0.05668 [3.20434]	6054.621 −50,842.6 [0.11909]
DUS_COVID(−1)	2.85×10^{-8} -5.90×10^{-8} [0.48101]	−0.334621 −0.05323 [−6.28657]
DUS_COVID(−2)	4.52×10^{-8} -6.20×10^{-8} [0.72473]	−0.172527 −0.05599 [−3.08140]
DUS_COVID(−3)	5.78×10^{-9} -6.20×10^{-8} [0.09263]	−0.177546 −0.056 [−3.17063]
DUS_COVID(−4)	2.31×10^{-8} -6.20×10^{-8} [0.36926]	−0.151236 −0.05606 [−2.69776]
DUS_COVID(−5)	5.54×10^{-8} -6.00×10^{-8} [0.93125]	0.389606 −0.05339 [7.29772]
C	0.000223 −0.00079 [0.28226]	373.3586 −709.148 [0.52649]
R-squared	0.108277	0.360989
Adj. R-squared	0.078553	0.339689
Sum sq. resids	0.057887	4.66×10^{10}
S.E. equation	0.013891	12,461.02
F-statistic	3.64273	16.94756
Log likelihood	894.3091	−3368.533
Akaike AIC	−5.680444	21.73333
Schwarz SC	−5.548169	21.8656
Mean dependent	0.000392	265.91
S.D. dependent	0.014471	15,334.84
Determinant resid covariance (dof adj.)		29,925.76
Determinant resid covariance		27,846.27
Log likelihood		−2474.037
Akaike information criterion		16.05169
Schwarz criterion		16.31624
Number of coefficients		22

Source: Authors' calculations. Notes: Standard errors in ( ) and t-statistics in [ ]. Sample (adjusted): 13 January 2020–9 April 2021. Included observations: 311 after adjustments. Variables' descriptions are provided in Table 2.

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Does a Board Characteristic Moderate the Relationship between CSR Practices and Financial Performance? Evidence from European ESG Firms

Matteo Rossi *, Jamel Chouaibi, Salim Chouaibi, Wafa Jilani and Yamina Chouaibi

Department of Accounting, Faculty of Economics and Management of Sfax, University of Sfax, Sfax 3018, Tunisia; jamel.chouaibi@fsegs.usf.tn (J.C.); chouaibi.salim@fsegs.usf.tn (S.C.); wafa.jilani@fsegs.usf.tn (W.J.); yamina.chouaibi@fsegs.usf.tn (Y.C.)
* Correspondence: mrossi@unisannio.it

Abstract: This study aims to examine the potential effect that corporate social responsibility practices (CSR) have on financial performance in ESG firms, using the moderating role of board characteristics. To test the moderating effect of the board characteristics in the relationship between CSR practices and financial performance, we applied linear regressions with panel data using the Thomson Reuters ASSET4 database from European countries in analyzing data of 225 listed companies between 2015 and 2019. The results show that board characteristics partially moderate the relationship between CSR practices and financial performance in European ESG firms. In addition, this study indicates that CSR practices affect the firm's financial performance positively. The study findings appended a new dimension to governance research that could provide policymakers and regulators with a valuable source of information to strengthen governance mechanisms for better financial performance. Previous studies mostly investigate the direct effect of corporate governance on financial performance. A few studies examine the moderating effect of CSR practice. This paper contributes by investigating the moderating effect of governance mechanisms in the ESG context.

Keywords: CSR practice; financial performance; corporate governance; environmental social and governance (ESG)

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1. Introduction

Corporate social responsibility is an important topic in the fields of management, finance, and public relations, and it is essential to increase the trust of stakeholders in the company (Plumlee et al. 2015; Tomo and Landi 2017; Liu and Lee 2019; Ongsakul et al. 2020; Chouaibi and Chouaibi 2021; Rossi et al. 2021). The recent growth in CSR has had a significant effect on the role of the company and has contributed to a shift in accounting standards (Aribi and Gao 2010; Plumlee et al. 2015; Liu and Lee 2019). On the other hand, corporate governance plays an important role, including improving corporate accountability, building a corporate reputation, and providing valuable investment decision-making information (Gray et al. 1996; Friedman and Miles 2001; Liu and Lee 2019; Ongsakul et al. 2020). In academic research, firms are now seen as entities that function within society and are responsible for ensuring social and economic fairness while expanding the interests of stakeholders (including shareholders), in line with stakeholder theory (Al-Alawi et al. 2007; Chouaibi and Chouaibi 2021). The role of CSR as a means of discharging transparency has become more important (Lee et al. 2014). Furthermore, CSR initiatives are frequently integrated from the core business of a company, which is likely to increase their contribution to short and long-term success. Isaksson and Woodside (2016) affirmed that when evaluating CSR and the financial performance of a business, scholars should combine internal and external influences. Although corporate governance focuses on resolving the issue of the agency's alignment between the interests of management and shareholders,

corporate social responsibility focuses on stakeholders other than shareholders (Nawaiseh 2015). Sacconi (2011) stated that social responsibility is the principle of corporate governance and its goals as the result of its strategic management. Thus, the option of the best corporate governance system may be considered the most acceptable solution for the 'social contract'. In addition, some researchers conclude that corporate governance has a major effect on the dimensions of CSR (Jones et al. 2009; Chouaibi et al. 2021a). As a consequence, the integration between corporate governance and CSR strategies is a new empirical research strand that tries to connect the strategies of firm CSR to financial results (Ntim and Soobaroyen 2013; Peng and Yang 2014; Chouaibi et al. 2021b). Governance practices empirical research has concentrated mainly on its effect on the financial results of a firm (Kumar and Zattoni 2015; Pucheta-Martínez and Gallego-Álvarez 2019). The board of directors of the firm is responsible for developing effective structures for monitoring and managing the operations of the firms. The board is also responsible for the accountability and transparency of an organization by data disclosure. For a large variety of stakeholders, boards have mutual responsibilities.

Consequently, in this article, we, first, attempt to identify the circumstances in which societal practices create competitive advantages for the ESG company and thus generate high financial performance. Second, this article aims to investigate how board characteristics reinforce the relationship between CSR practices and financial performance.

This paper contributes to the existing literature in several ways. First of all, the main motivation of this article is the shortage of research papers in the context of the relationship between board characteristics, corporate social responsibility, and financial performance. Theoretically, the possible contribution of this research aims to highlight the crucial importance of the financial performance concept, along with the notion of corporate social responsibility and its relationship with board characteristics and to outline the most important significance of adopting the ESG approach.

The results show that corporate social responsibility practices have a positive impact on financial performance. The reached empirical results prove to indicate that both the board size and independence have strengthened the impact of corporate social responsibility on financial performance. Also noteworthy, is the fact that the appointment of an independent non-executive chairman weakens the relationship between CSR practices and financial performance and holds for firms with no independent chairman.

The results of this study add to the literature in many ways. First, its findings provide additional useful insights into the existence and role of firms' governance mechanisms. Second, the findings of this study are also expected to provide input for users of financial statements, sustainability reports, and corporate managers, as it helps in understanding the relationship between corporate governance and CSR, which would improve corporate financial performance. Third, this research explores the moderating role of corporate governance between CSR practices and financial performance. Findings from this paper provide implications for global regulators and policymakers. Our research offers the information user a vision to better assess the financial performance of the company and its future growth opportunities in a context where corporate social responsibility and corporate governance occupy a central position in business valuation. The index of ESG firms (environmental, social, and governance) is objectively and consistently defined in measures permitting like-for-like measurement of firm-specific CSR practices. This index is captured in this paper as an index used as a proxy of firms' engagement on CSR, which is provided by the ASSET4® database of Data-Stream, by Thomson Reuters.

The rest of the paper is structured as follows: In Section 2, the literature is discussed based on the hypotheses constructed. Section 3 outlines the method of data collection and variable measurement. As for the empirical results, the discussions of our findings and their implications are presented in Sections 4 and 5. Finally, Section 6 concludes the paper, presents the limitations and provides suggestions for future research.

2. Prior Literature and Hypotheses Development

2.1. Effects of CSR Practices on Financial Performance

The question of how corporate social responsibility practices affect a firm's financial performance has been the subject of contentious debate. Much research about CSR practices has been conducted (Ahan et al. 2015; El Ghoul et al. 2016). However, there are still theoretical and empirical challenges that need to be answered to the effect of corporate social responsibility on financial performance. According to the theory of the stakeholder, through its impact on revenue and costs, companies may derive various benefits from performing CSR activities (Tomo and Landi 2017; Ongsakul et al. 2020; Chouaibi and Chouaibi 2021). CSR may produce additional income directly or indirectly.

Empirical research on the effect of CSR activities on company results indicates unclear outcomes. Thus, Russo and Fouts (1997) and Chouaibi et al. (2021a) found positive effects of CSR on financial performance. Consequently, corporate social responsibility (CSR) can be perceived as an excellent tool for enhancing the legitimacy of the company. Aguinis and Glavas (2012) find that CSR has a marginally positive effect on company results. In fact, El El Ghoul et al. (2016) also discovered that in nations with poorer market institutions, CSR is more strongly linked to firm value. Financial performance demands social and environmental issues and also to take some constructive steps while showing tolerance for negative company data (Servaes and Tamayo 2013). On the other hand, the consumer-oriented CSR practices, intangible attributes, such as reliability for consistency, and reliability can be used, which can eventually establish product differentiations and generate more revenues (Lev et al. 2010). Thus, CSR practices help to minimize costs and increase the financial performance (El Ghoul et al. 2011; Baalouch et al. 2019; Wong et al. 2020; Murashima 2020). Thus, the theoretical basis of these practices is represented by legitimacy theory. Hence, we propose our first hypothesis as follows:

Hypothesis 1 (H1). *There is a positive association between CSR practices and financial performance.*

2.2. CSR Practices and Financial Performance: The Moderating Effect of Board Characteristics

The board of directors is often considered one of the essential components of the corporate governance system. The finance literature defines corporate governance as "the ways in which suppliers of finance to corporations assure themselves of getting a return on their investment" (Murtaza et al. 2014; Kiran et al. 2015; Jie and Hasan 2016). The board of directors is central to the commercial governance system (Uwuigbe 2011; Cormier et al. 2017). An important factor perceived to affect the board's effectiveness is the size (Belkhir 2009; Achdi and Ameur 2011).

The moderating effect of Board size. Larger board decisions can reflect the compromise of stakeholders' competing demands. Therefore, decisions by larger boards can address stakeholders' concerns better than those of smaller boards. Agency problems become more severe with a larger board, so it becomes easier for the CEO to manipulate and monitor the board (Achdi and Ameur 2011; Jilani and Chouaibi 2021). Nonetheless, larger boards can be more efficient, as a larger number of people can be separated into the workload of monitoring managers. Larger boards are more likely to reinforce the influence of CSR on financial results with better addressed CSR and more tools provided for consulting and tracking roles. Previous research recognizes that large boards have a greater diversity of expertise and experience, which in turn has a positive influence on the reputation of companies and their image (Ntim and Soobaroyen 2013; Jizi et al. 2014).

Therefore, a literature review offers a number of empirical findings that maintain the positive relationship between the board size and the CSR. Ntim and Soobaroyen (2013) use of a sample of listed companies between 2002 and 2009 supports that larger boards lead to greater investments in CSR operations. Jo and Harjoto (2011) give proof that firms with larger boards are taking the CSR pledge. That is to say, broader boards ensure that corporate laws and guidelines, such as CSR, are complied with (Ntim and Soobaroyen 2013). Given that the previous debate presents reasons that endorse positive board-size moderating positions, we suggest the following hypothesis:

Hypothesis 2. *There is a positive relationship between board size and financial performance.*

Hypothesis 2a. *The link between CSR practices and financial performance will be positively moderated by board size.*

The moderating effect of board independence. Independent directors have distinct spurs, values, and time skies relative to internal directors, who normally pay attention to lucrative short-term targets (Post et al. 2011). Boards of directors are referred to as the entity that substantially upholds the interest of all concerned stakeholders. Thus, to gain and further substantiate the involvement of stakeholders, it is important to have both managers and non-executive members on the board (De Andres and Vallelado 2008; Fuzi et al. 2016).

The extensive literature on corporate governance demonstrates that the independence of the board has a positive impact on the social responsibilities of the firm. For example, Jizi et al. (2014) found a positive and substantive relationship between board independence and CSR practices. More specifically, they argue that independent external directors on the board would ameliorate the oversight and control business of the board to assure that shareholders' social interests are bulwarked. They also indicate that independent directors are less likely to concentrate on short-term targets than on long-term targets that could be generated by investment in CSR. Ntim and Soobaroyen (2013) suggest that independent board members strengthen management oversight, allowing executives to participate in sustainable CSR activities with potentially beneficial consequences for the financial performance of their firms. They are better at engaging multiple stakeholders and have more sensitive strategies, juggling short-term and long-term priorities, leading to a positive moderating impact in the relationship between CSR and financial performance (Liao et al. 2019). Board independence is supposed to play a moderating role in this relationship. Thus, we assume that:

Hypothesis 3. *There is a positive relationship between the board's independence and financial performance.*

Hypothesis 3a. *The link between CSR practices and financial performance will be positively moderated by board independence.*

The moderating effect of CEO duality. Duality occurs when the same person holds both positions in a company at the same time (Naushad and Malik 2015). An individual who holds these roles has remarkable power to govern the board and the management. If the CEO is also the chairman, the efficiency of the board of directors in conducting the role of governance can be undermined by the concentration of decision-making and control powers in the hands of the same person (Haniffa and Cooke 2002). In the other hand, the theory of the agency predicts that role duality generates individual power for the CEO that would inhibit the board's effective control (Donker et al. 2008). Tuggle et al. (2010) proposed that, largely for independence purposes, these two positions should be separated. Although the division of roles is recommended, certain organizations are not prepared to separate the roles completely categorically (Bukair and Rahman 2015).

Multiple CEO positions lead to problems in carrying out their respective duties, leading to confusion and mismanagement (Vo and Nguyen 2014). However, Hajes and Anis (2018) reported a positive relationship between CEO duality and a firm's financial performance. Moreover, as aforementioned, Bukair and Rahman (2015) find a mixed outcome between CEO duality and a firm's financial performance. Thus, such duality creates a greater power in decision-making that allows CEOs to make decisions that do not take into account the greater interests of a wider variety of stakeholders. As a result, the duality could affect the governance position of the board over sustainable practices, including CSR practices (Lattemann et al. 2009). A negative association between the duality of CEO and chairman positions and the level of CSR practices has been documented in several empirical studies (Muttakin et al. 2015; Sundarasen et al. 2016). In this regard, empirical

evidence about the relationship and the interaction between CEO duality and corporate social responsibility is mixed and inconclusive. Based on what has been advanced, we can say that the CEO duality moderates the relationship between CSR practices and financial performance and, therefore, the assumption will be formulated as follows:

Hypothesis 4. *There is a significant relationship between CEO duality and financial performance.*

Hypothesis 4a. *The link between CSR practices and financial performance will be moderated by CEO duality.*

3. Research Design

3.1. Sample Selection and Data Collection

This study focuses on examining the associations between CSR practices and the firm's performance with the moderating effect of corporate governance mechanisms. The population of this study consists of firms belonging in European countries during the period 2015–2019. The data were collected from different sources. First, the primary data source is ASSET4 from Thomson Reuters Data Stream. Thomson Reuters ASSET4 is a leading source of objective ESG information worldwide. Second, data related to the corporate governance mechanisms were manually extracted from each firm's annual reports for the years concerned. The sample selection is summarized in Table 1; Panel A describes the sample selection; Panel B provides the distributional properties of the full sample by country.

Table 1. Sample selection.

Panel A: Sample selection			
Selection procedure		**Firms**	**Observations**
Initial sample		295	1475
Firms with missing data		(47)	(235)
Banks and Financial institutions		(23)	(115)
Final sample		225	1125
Panel B: Sample distribution by country			
Country	**Firms**	**Observations**	**%**
France	79	395	35.12
Spain	41	205	18.23
Germany	73	365	32.44
Italie	32	160	14.21
Total	225	1125	100

Notes: Panel A describes the sample selection, and Panel B provides the distributional properties of the full sample by country. Observations are the total of the firm-years observations by industry.

3.2. Variables

To analyze the impact of the moderating effect of different aspects of corporate governance on the relationship between CSR and financial performance, the measures of variables are defined below.

3.2.1. Dependent Variable: Financial Performance

The dependent variable used in this study is the financial performance of firms. Many accounting and financial ratios: Tobin's q (TOBINQ), return on assets (ROA), return on equity (ROE), and market-to-book value (MTBV), were used as the indicators of business performance (Barnett and Salomon 2012; Delmas et al. 2015). In this study, in order to measure firm performance, we use return on assets (ROA).

3.2.2. Independent Variables

As discussed in the literature review, most studies break down CSR practices into social and environmental performance scores. Similarly, as in the work of Ioannou and Serafeim (2012) and Huang et al. (2014), we will adopt a measure developed by ASSET4 to measure the CSR practices, CSR practices measure a company's capacity to generate trust and loyalty (Ioannou and Serafeim 2012; Huang et al. 2014). It also measures a firm's ability to reduce environmental risk and generate environmental opportunities in order to minimize the environmental impact on living and non-living natural systems, including the air, land, and water, as well as complete ecosystems.

3.2.3. Moderating Variables

Board size (BOA_SIZE): As part of our study, we are interested in the role of the board as a mechanism of corporate governance, as well as the size, which is measured by the total number of directors. This measure has been employed by several authors, Cornett et al. (2008), Ravina and Sapienza (2009), Leng and Ding (2011), Sun et al. (2012), Hunziker (2013), Al-Janadi et al. (2013), Akbas et al. (2016).

Board Independence (BOA_IND): This variable is determined by the proportion of independent administrators compared to the total number of administrators. This measure has been used in many studies, including Aboody and Lev (2000), Van den Van den Berghe and Baelden (2005), Striukova et al. (2008), and Baharudin and Marimuthu (2019).

CEO duality (DUAL): The duality of functions is a binary variable equal to 1 if the two functions of the chief executive officer and the chairman of the board of directors are combined and 0 if not. This measure has been used in several studies, such as those by Datta et al. (1991), Jensen and Zajac (2004), Chau and Gray (2010), and Ammari et al. (2014).

3.2.4. Control Variables

In terms of control variables, our analysis used two variables that are related to the firm's characteristics and that affect the endogenous variable, i.e., financial performance. The two control variables are firm size and leverage. In addition, Table 2 includes all variables and their measurements.

Table 2. Description of variables.

Variables	Coding	Measurement	Source
		Dependent variable	
Financial performance	FIR_PER	Financial performance is determined by ROA (the average return on assets).	Thomson Reuters ASSET4 (Datastream)
		Independent variable	
Corporate social responsibility practices	CSR_INDEX	It is a score developed by ASSET4 that consists of a series of items that represent the CSR practices of companies.	Thomson Reuters ASSET4 (Datastream)
		Moderating variables	
Board size	BOA_SIZE	Number of directors on the board.	Annual report
Board Independence	BOA_IND	Proportion of independent non-executive directors to total number of directors.	Annual report
CEO duality	DUAL	Dummy variable with the value of 1 if the CEO is also the chair, and 0 otherwise.	Annual report
		Control variables	
Firm size	FIR_SIZE	The natural logarithm of total assets.	Thomson Reuters ASSET4 (Datastream)
Leverage	LEV	The total debt divided by total assets.	Thomson Reuters ASSET4 (Datastream)

Notes: This table reports the definitions of the variables used in our study.

3.3. Regression Model

To analyze whether corporate governance moderates the relationship between CSR practice and firms' financial performances, we have applied a regression analysis model as a statistical technique to estimate the proposed models. The following regression models in equations are posited. The variables used in the estimation models are defined in Table 2.

$$FIR\_PER_{i,t} = \beta_0 + \beta 1\ CSR\_INDEX_{i,t} + \beta_2 FIR\_SIZE_{i,t} + \beta_3\ LEV_{i,t} + \beta_4 year\ fixed\ effect_{i,t} + \beta_5 firm\ fixed\ effect_{i,t} + \varepsilon_{i,t} \quad \textbf{(Model 1)}$$

$$FIR\_PER_{i,t} = \beta_0 + \beta 1\ CSR\_INDEX_{i,t} + \beta 2\ BOA\_SIZE_{i,t} + \beta 3 CSR\_INDEX * BOA\_SIZE_{i,t} + \beta_4\ LEV_{i,t} + \beta_5 FIR\_SIZE_{i,t} + \beta_6\ year\ fixed\ effect_{i,t} + \beta_7\ firm\ fixed\ effect_{i,t} + \varepsilon_{i,t} \quad \textbf{(Model 2)}$$

$$FIR\_PER_{i,t} = \beta_0 + \beta 1\ CSR\_INDEX_{i,t} + \beta 2\ BOA\_IND_{i,t} + \beta 3\ CSR\_INDEX * BOA\_IND_{i,t} + \beta_4\ FIR\_SIZE_{i,t} + \beta_5 LEV_{i,t} + \beta_6\ year\ fixed\ effect_{i,t} + \beta_7 firm\ fixed\ effect_{i,t} + \varepsilon_{i,t} \quad \textbf{(Model 3)}$$

$$FIR\_PER_{i,t} = \beta_0 + \beta 1\ CSR\_INDEX_{i,t} + \beta 2\ DUAL_{i,t} + \beta 3\ CSR\_INDEX * DUAL_{i,t} + \beta_4\ FIR\_SIZE_{i,t} + \beta_5 LEV_{i,t} + \beta_6\ year\ fixed\ effect_{i,t} + \beta_7 firm\ fixed\ effect_{i,t} + \varepsilon_{i,t} \quad \textbf{(Model 4)}$$

4. Results and Discussion

4.1. Descriptive Statistics

The descriptive statistics of variables are presented in Table 3. Indeed, the statistical tests show that the companies, the objects of our samples, have a high level of financial performance; "ROA" mean value is (0.17). This variable displays a standard deviation that is very small compared to the average (0.186), which shows that there is no difference in the financial performance of the companies in our sample. This implies that the financial performance of the firms is strong. The results are consistent with those of Hassan and Bashir (2003), Rosly and Bakar (2003) and Olson and Zoubi (2017).

Table 3. Descriptive statistics.

Variables	Obs.	Mean	SD	Min	Max
Panel A: Descriptive statistics for metric variables					
FIR_PER	1125	0.170	0.186	-0.181	0.712
CSR_INDEX	1125	0.689	0.211	0.194	0.928
BOA_SIZE	1125	8.849	2.754	3	19
BOA_IND	1125	52.864	23.100	0	1
FIR_SIZE	1125	21.855	3.599	2.397	28.305
LEV	1125	0.426	0.315	0.002	0.945
Panel B: Frequencies (%) for binary variable					
Variables	Modality			%	
DUAL	0			4.5	
	1			94.5	

Note: This table reports descriptive statistics. Variable definitions are provided in Table 2.

Table 3 reports that the average CSR practice is 0.689. The minimum and maximum values of the CSR practices are, respectively, equal to "0.194" and "0.928". This practice is smaller than in developed countries, such as Germany, which has complete CSR practice (Gamerschlag et al. 2011). As can be seen from Table 3, the statistics reveal that the mean value of board size is 8 with a standard deviation of 2.754. This variable varies between 3 and 19 members. We also note that the average proportion of independent directors is 52.864%.

Another result to highlight in Table 3 is that the mean percentage of CEO duality is 94.5%, which means that 94.5 percent of firms combine the position of the chairman of the board of directors and the CEO. Further, the mean value of firm size is 21.855. Its minimum and maximum values are equal to 2.397 and 28.305, respectively. On the other hand, it is also important to mention that firm leverage is about 42.6% on average.

4.2. Correlation Matrix and VIF Values

Table 4 presents the correlation matrix. The Pearson coefficients were computed to examine the associations between the independent variables. The matrix of Pearson correlation fails to detect a correlation value equal to or greater than 0.8 (Damodar and Porter 2004). The tabulated results of the Pearson correlation matrix suggest that in this analysis, there is no multicollinearity problem as the interaction between the variables is below 0.80. All board characteristics' variables are significantly positively correlated.

Table 4. Correlation matrix and VIF values.

Variables	1	2	3	4	8	9
(1) CSR_INDEX	1.000					
(2) BOA_SIZE	0.135 ***	1.000				
(3) BOA_IND	0.285	0.140 ***	1.000 ***			
(4) DUAL	0.271 ***	0.313 **	0.216 **	1.000		
(5) LEV	0.130 **	0.255 *	0.043 **	0.044 **	1.000	
(6) FIR-SIZE	0.082	0.255	0.077 *	0.181 *	−0.102	1.000
VIF	3.64	7.19	3.47	6.19	1.24	1.23

Notes: Variable definitions are provided in Table 2. The asterisks ***; **; * indicate significance at the 1%; 5%; and 10 % levels, respectively.

As can be seen in Table 4, the intercorrelations for all the explanatory variables have been examined by applying the variance inflation factors (VIF) analysis, which revealed no sign of multicollinearity. The highest reported VIF value is 7.19 for the BOA_SIZE variable, and the lowest is 0.38 for firm size. When a VIF value exceeds 10, it indicates a potential multicollinearity problem. These findings are deemed statistically appropriate, demonstrating that there is no multicollinearity.

4.3. Regression-Analyses

The regression of financial performance as a dependent variable is depicted in Table 5. This table summarizes the results of the estimating model (1) to test our H1. As can be seen in the table, the decision to adopt a CS practice leads to a high level of financial performance. The first model also indicates that CSR practices lead to higher financial performance. As per Fisher's (F) statistics, equal to 5.41, this model is significant at a threshold lower than 1%. The *p*-value of the *t*-statistic of each coefficient is shown in italics. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. The empirical results prove to reveal that 38.9% of the variation in the financial performance can be explained by the CSR practices. Table 5 presents the results of estimating Model 2, 3, and 4 to test our; Hypothesis 2, Hypothesis 2a, Hypothesis 3, Hypothesis 3a and Hypothesis 4a. To define the role of "board characteristic", the regression of financial performance "FIR_PER" as a dependent variable is depicted in Table 5. Our findings highlight a positive and significant relationship between a board characteristic and its financial performance, confirming the research hypothesis. With respect to the control variables introduced in our models, the results show that all the variables are statistically significant in the explanation of the studied phenomenon. The attainted empirical findings appear to strongly support our advanced hypotheses.

Table 5. Regression results.

	Model 1	Model 2	Model 3	Model 4
Intercept	0.434 (1.31)	0.340 (0.000) ***	0.695 (0.000) ***	0.570 (0.000) ***
CSR_INDEX	0.286 (5.53) ***	0.003 (2.60) **	0.019 (2.23) **	0.047 (3.816) ***
BOA_SIZE	-	0.001 (2.20) **	-	-
BOA_IND	-	-	0.004 (1.97) **	-
DUAL	-	-	-	-0.458 (−2.02) **
CSR_INDEX * BOA_SIZE	-	0.046 (3.76) ***	-	-
CSR_INDEX * BOA_IND	-	-	0.004 (1.98) **	-
CSR_INDEX * DUAL	-	-	-	−0.733 (−2.46) **
LEV	−0.030 (−0.37)	0.094 (0.042) **	0.130 (0.001) ***	0.031 (0.669)
FIR_SIZE	−0.017 (−1.76)	0.055 (0.681)	−0.017 (−0.233)	−0.095 (−0.655)
Firm fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
R^2	0.389	0.509	0.332	0.365
F-statistic	5.41 **	6.73 **	5.26 **	5.60 **

Notes: Variable definitions are provided in Table 2. ***, ** significance at $p < 0.01$ and $p < 0.05$, respectively.

5. Discussion of Findings

Table 5 depicts the results of the panel data with fixed effect regression estimates with observations from all five years. The direct relationship between CSR practices and financial performance is provided in Model (1). The results of the regression presented in Table 5 show that CSR practice has a significant effect on financial performance. Therefore, our results confirm those found by other authors (Chouaibi and Chouaibi 2021). This result supports various studies that also resulted in confirming the existence of a positive and significant association between financial performance and CSR practice. The theory of stakeholders confirms our findings that there is an incentive by CSR for close relationships. On the other hand, the evidence is in line with the signal theory, indicating that corporate social responsibility practices are associated with financial performance. The findings are consistent with the results of (Iqbal et al. 2013; Bagh et al. 2017; Ofori et al. 2014; Jie and Hasan 2016; Kiran et al. 2015; Murtaza et al. 2014). Thus, to increase their financial performances, companies have more capital available to invest in areas of social performance, such as employee relations, environmental issues, or partnerships with the community. Consequently, it requires the ethical business processes to be redefined by developing the new strategy of ESG companies. On the other hand, when looking at control variables, Model 1 often shows some essential relations. Statistical results show that our control variables have no significant effect on financial performance. The results indicate that firm size and leverage are not associated with the firm's financial performance.

The results support Hypotheses 2 and 2a (H2 and H2a) (Model 2) and show a positive and significant relationship between the total number of directors on the board and the financial performance, and also show that the link between CSR practices and financial performance will be positively moderated by board size. Firstly, ESG firms should appoint larger boards of directors able to perform better monitoring and support the development of financial performance. Secondly, the evidence suggests that when board size is larger, the effect of CSR on financial performance is positive and significant, while when board size is smaller, the effect of CSR on financial performance is non-significant. Therefore, we suggest that a positive effect exists between board size and CSR index, which in turn generates improvement in a firm's financial performance. These results are consistent with earlier results by (Juras and Hinson 2008; Belkhir 2009; Achdi and Ameur 2011), who have shown that "increased levels of disclosure of corporate social responsibility with the advantage of having a board of directors in which individuals are responsible, fulfilling

their duty in the best possible way can increase the value of the company and therefore improve the financial performance of companies". Thus, the size of the board has an impact on the level of control and oversight. The benefit of having a larger board can increase the value of the company, as they provide a company with members from different areas of expertise. Additionally, large boards can play an important role in oversight and strategic decision-making, suggesting that large boards are less likely to be controlled by management. Indeed, large boards of directors lead to an increase in the diversity of expertise within the board, including expertise in financial reporting. The advantage of having a larger board is that it will improve the value of a business because it provides a company with representatives from various areas of expertise (Khan and Porzio 2010). This result suggests that organizations with a higher board size participate in CSR activities to a greater degree.

Hypotheses 3 and 3a (H3 and H3a) (Model 3) asserts that board independence is positively and significantly associated with financial performance in ESG companies. In the same vein, the findings of the study indicate that the link between CSR practices and financial performance is positively moderated by board independence. Accordingly, the positive fit between board independence and CSR drives financial performance increase. This allows us to confirm the second Hypothesis 3a (H3a). This finding agrees with that of Chen and Jaggi (2000); Xiao and Yuan (2007), and Donnelly and MulcAhy (2008), who argue that "independent directors can be encouraged to commit to better quality CSR reporting in order to legitimize the operation of the company and to increase the financial performance". The proportion of independent directors is positively associated with the board's ability to make a disclosure decision of the CSR information. In addition, voluntary CSR practice increases with the number of independent directors. For this, the independence of the board is a key determining quantity, which implies that the presence of independent directors on the board would influence the decision of management and encourage the firm to disclose more socially responsible activities. With continuous oversight from independent directors, the company would likely favor acquiring a better public image while managing its financial activities. In the same vein, Slawinski and Bansal (2012) argued that independent directors control the success of the board but are much more concerned with stakeholder perceptions. Independent directors will also affect the company's financial results positively.

The findings also verify Hypotheses 4 and 4a (H4 and H4a) (Model 4), showing that the separation of functions of the CEO and the chairman of the board of directors is likely to be a significant determinant of financial performance. Consequently, this separation helps reduce conflicts of interest. The findings of the study indicate that the relationship between CSR practices and financial performance is negatively moderated by CEO duality. A significant negative coefficient is found for CEO duality (DUAL), suggesting that CEO duality constraints CSR practice. Thus, the separation of roles may help boards to exercise their oversight functions more effectively. This outcome is consistent with previous studies (Xiao and Yuan 2007; Hashim and Devi 2008; Tuggle et al. 2010; Ramdani and Witteloostuijn 2010; VItolla et al. 2020), indicating that to improve the consistency of monitoring and CSR practice, these two functions should be separated. Therefore, the suggestion that separation of the chair and the CEO positions can increase the consistency of monitoring and improve benefits by not hiding details, such as CSR reporting, can be discounted based on our findings. Thus, to increase CSR practice and financial performance, it is necessary to separate the functions of the CEO and the chairman board. This result disagrees with those of Meniaoui et al. (2016) and VItolla et al. (2020), who suggested that companies with the same person in both executive and chairman positions better perform and report on social responsibility and sustainability. In terms of the information disclosed, several studies have addressed the impact of the separation of roles on information quality. Thus, in line with the contributions related to agency theory, this last result is in agreement with those of Ward and Forker (2017), who found that the separation of roles can increase control and reduce the likelihood of withholding information.

6. Conclusions

The goal of this study is to investigate the moderating effect of board characteristics on the relationship between CSR practices and financial performance in the ESG Company. For a more reliable estimate of the quality of the results, measures proposed by ASSET4 and annual reports were used. The study took steps in bridging the research gap by investigating theoretically and empirically the moderating role of board characteristics in the logically plausible link between CSR practices and financial performance. Our results confirm the expectations regarding the effect of some board characteristics on the link between CSR practices and financial performance. The findings from this study have indicated a positive effect between CSR practice and the firms' financial performance. Higher financial performance is experienced by firms that are more involved in CSR operations. Therefore, for investors, CSR practices may trigger extra certainty that positively affects their valuation of the business. Thus, there is a possibility that CSR practices themselves will reduce market performance issues, which will lead investors to raise their valuation.

Note that this article is a pioneer in assessing the relationship between CSR practices and financial performance. We also deepened the importance of the moderating effect of board characteristics in this relationship. The results show its usefulness for decision-making and its efficiency in providing information for investors and stakeholders. Thus, the interaction between CSR practices and board characteristics is a key instrument used to inform stakeholders about corporate social responsibility and sustainability issues. Corporate governance is characterized as a firm's decision-making body that is responsible for defining strategic priorities and objectives in various areas, including financial results that could affect the company's performance. The board of directors is a tool that investors perceive with increasing attention. Consequently, from a conceptual point of view, the research stimulates reflections on the potential implications of different board characteristics on the interaction between corporate social responsibility and financial performance. Furthermore, this study broadens the field of the determinants of financial performance and firm valuation.

A series of managerial implications are to be drawn from the empirical outcome of this analysis. This paper enables the user of information to better assess the future growth opportunities in a context where the approach of corporate governance and board characteristics occupies a central position in business valuation. This work serves in promoting the interaction between board characteristics and sustainable practices. The results of this paper have implications and additional motivations for practitioners, particularly for CEO and high-level corporate governance bodies. Companies are thus encouraged to redesign the board of directors in a way that favors ethical behavior, including CSR practices. Findings from this paper provide implications for global regulators and policymakers. Our research offers the information user a vision to better assess the financial performance of the company and its future growth opportunities in a context where corporate social responsibility and corporate governance occupy a central position in business valuation.

Concluding, this paper has a few limitations. Firstly, this study overlooked the differences between countries with regard to their CSR practices and their systems of corporate governance. Secondly, this study focuses solely on a European sample, as most of the ASSET4 data were consistently available only for European firms. Consequently, future research could attempt to address both issues and limitations. Future studies can first increase the sample and repeat the study taking into account the differences between countries with consideration to CSR practices and its systems of corporate governance. In addition, in the future, it is possible to examine other factors affecting the relationship between CSR practices and financial performance and obtain data from other third-party platforms.

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The Influence of the Independent Non-Executive Board Members on the Financial Performance of the Companies Listed in the Bucharest Stock Exchange

Bogdan Aurelian Mihail [1,*] and Carmen Daniela Micu [2]

[1] Doctoral School of Finance, Bucharest University of Economic Studies, 6 Piata Romana, 010374 Bucharest, Romania
[2] Department of Masters in Board Practice and Directorship, Henley Business School, University of Reading, Greenlands Campus, Henley-on Thames, Oxfordshire RG9 3AU, UK; carmen.micu@envisia.eu
* Correspondence: bog.mihail@gmail.com

Abstract: This paper studies the impact of independent board members on the financial performance of companies listed on the Bucharest Stock Exchange during the period 2016–2020. Different characteristics of the board of directors have been examined extensively in the literature and board independence was identified as one of the most effective corporate governance tools. In this context, the present study contributes to the relevant literature by examining recent data for Romania and investigating alternative performance indicators such as return on assets (ROA), return on equity (ROE) and Tobin's Q. The correlation analysis, scatter plots, and regression results document that a higher share of the independent board members was associated with higher returns on equity ratio. Specifically, a 10% rise in the share of independent members was associated with an approximately 0.9%-point increase in ROE.

Keywords: corporate governance; board size; firm performance; independent board members; return on equity; Romania

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1. Introduction

Corporate governance has gained increasing importance in the management of companies in recent decades (Solomon 2020). In response to frequent and major corporate governance problems, codes of conduct were developed over time and academia examined various dimensions of corporate governance in more detail. These studies looked at the theoretical aspects of corporate governance, as well as the empirical relationship between dimensions of corporate governance (such as independent board members, board diversity, CEO–Chairman duality, and committees) and financial performance (Bhagat and Bolton 2008; Jermias and Gani 2014; Pucheta-Martínez and Gallego-Álvarez 2020). The present study contributes to this growing literature by examining the role of independent board members in company performance for public companies listed on the Bucharest Stock Exchange during the 2016–2020 period. There are some studies that look at this research question in the context of Romania. However, they generally focus on smaller samples of cross-sectional data (Borlea et al. 2017) or look at earlier periods covering the global financial crisis (Vintilă and Gherghina 2013). Hence, it is not easy to generalize the findings of these studies to more recent periods. Given that stock market capitalization as a percentage of GDP has followed a downward trend in recent years (i.e., declining from 13% in 2013 to 10% in 2020; World Bank 2021) and stagnated at relatively low levels in Romania, it is important to examine the dynamics of stock market performance and factors affecting this performance. In this way, it can be possible to derive policy lessons to support stock market performance, and thereby economic growth, in Romania. Therefore, another important contribution of the present study is to derive important policy recommendations based on the research findings.

As corporate governance covers a broad area, relevant studies generally focus on certain dimensions such as minority rights, CEO characteristics (e.g., the CEO–Chairperson duality and CEO participation in committees), and board characteristics (e.g., size, meeting frequency, board committees, and board diversity) (Vafeas 1999; Carter et al. 2010; Green and Homroy 2018). The relevant conceptual approaches, such as the agency theory and the resource-based view of the firm, imply that independent board members can bring unique and valuable resources to the companies and improve monitoring and supervisory efficiency (Priem and Butler 2001; Bonazzi and Islam 2007; Bhatt and Bhattacharya 2015). Independent board members could be less susceptible to managerial pressures; their experience, expertise, and networks could provide important assets for the companies; and their reputational concerns would give incentives for more effective monitoring and supervision. These theoretical mechanisms show that the presence and higher shares of independent board members can positively affect the financial performance of public companies. Given these theoretical implications, there are many studies that look at the empirical relationship between the presence and share of independent board members and the company's performance. Aggarwal et al. (2009) conducted a large cross-country analysis with firm-level data. They looked at the effect of having independent members on the board as well as the board size, CEO–Chairman duality, audit committee presences and outside members in audit committees. The authors found that board size and CEO–Chairman duality were not related to the company performance (measured by Tobin's Q). However, board independence had a statistically significant and positive effect on performance. In addition, their results indicated that the presence of independent board members in audit committees had a positive impact on performance as well.

Dahya et al. (2008) also conducted a detailed cross-country study on the effects of board independence. They used data from 22 countries for close to 800 firms. The authors discussed the finding from the literature that in less regulated markets in some countries, dominant shareholders could divert funds to themselves. In this context, Dahya et al. (2008) postulated that having independent board members would balance this diversion and increase firm value. In their cross-country regressions, the authors found that countries with less regulated markets also had lower levels of Tobin's Q. After controlling for the level of legal protection in the country and other relevant variables, the empirical results indicated that a higher proportion of independent directors was positively associated with higher Tobin's Q. In determining the relevant causal mechanisms, the paper showed that a higher proportion of independent board members was associated with lower levels of related party transactions or tunnelling. Therefore, they established that independent directors increased company value by decreasing the tunnelling activities of dominant shareholders. Similar positive effects of board independence were found in the cases of individual countries as well, in the UK (Dahya and McConnell 2007) and China (Liu et al. 2015). Overall, these papers provide evidence that board independence can increase company performance. However, the results might differ across countries, legal frameworks, and economic development levels. Hence, providing additional evidence from different countries can make an important contribution to the relevant literature.

The purpose of the present paper is to document the relationship between board independence and firm performance. It contributes to the literature by examining the influence of independent non-executive board members on the financial performance of companies on the Bucharest Stock Exchange during the period 2016–2020. Romania is a transition country with developing capital markets. In this context, corporate governance codes have also developed over time. Hence, examining the relationship between corporate governance and firm performance can be expected to provide valuable contributions to the relevant literature from a developing and transition country perspective. In other words, the Romanian context is appropriate for this study in order to understand the role of evolving corporate governance practices in stock market development and performance in the context of a developing country. This analysis also allows the derivation of policy lessons to support the financial and stock market development of developing and transition

countries. As the above discussions show, there is relevant literature on the relationship between board independence and firm performance in both advanced and developing countries. There are also studies that examine similar questions in the case of the Bucharest Stock Exchange, such as Vintilă and Gherghina (2013), Vintilă et al. (2015), and Borlea et al. (2017), which are examined in more detail in the following section. Compared to these studies, the present paper uses a more recent data set from the 2016–2020 period and utilizes alternative performance measures. Hence, it expands the existing literature into different dimensions and provides some robustness analyses.

The paper is structured as follows. Section 2 presents a review of the relevant literature and states the research problem of the present study in relation to the existing literature. Section 3 presents the details of the data and research methods used in the quantitative analysis. The results of empirical analysis are given and discussed in Section 4. Finally, Section 5 concludes the paper.

2. Literature Review

Corporate governance is a broad concept that focuses on corporate behaviour such as "performance, efficiency, growth, financial structure, and treatment of shareholders and other stakeholders", as well as normative issues such as "the rules under which firms operate, with the rules coming from such sources as the legal system, financial markets, and factor (labor) markets" (Claessens and Yurtoglu 2012, p. 3). Within this broad literature, the focus of the present study is the influence of independent board members on the performance of companies listed on the Bucharest Stock Exchange. There are various studies that examine the relationship between corporate governance and firm performance, from both theoretical and empirical approaches and in both advanced and developing countries. In terms of theoretical models, the agency theory notes that there can be conflicts of interest between managers and shareholders or between large shareholders and minority investors (Jensen and Meckling 1976; Holderness 2003). In this context, the board of directors is expected to undertake important tasks of alleviating these agency problems (Eisenhardt 1989; Huse 1994). Alves (2014, p. 26) states that "an independent board will encourage management to focus more on the long-term performance of the firm rather than taking short-term actions intended to have a quick payoff in the stock market. In fact, boards dominated by independent outside directors may help to alleviate the agency problem by monitoring and controlling the opportunistic behaviour of management". Hence, agency theory provides supporting arguments for the positive effects of independent board members on public companies. In addition to the agency theory, the resource-based view of the firm and the stewardship theory also argue that independent board members could help firm performance (James and Joseph 2015; Glinkowska and Kaczmarek 2015; Ismail et al. 2020). Overall, the relevant theoretical approaches provide testable arguments for the performance benefits of independent board members.

In addition to elucidations of the theoretical mechanisms of the benefits of independent board members, there is a large and growing body of literature that examines this relationship empirically in both advanced and developing countries, including the case of Romania. For example, in an early study, Earle and Sapatoru (1994) examined corporate governance problems in the Romanian Private Ownership Funds (POFs). In a follow-up study, Earle and Telegdy (1998) studied the effects of the "Mass Privatization Programme (MPP), which offered shares in nearly 5000 companies to citizens in exchange for coupons" (313). The authors found that this specific privatization policy led to highly dispersed ownership, thereby creating many hardships, especially for small companies. Therefore, these two studies showed that corporate governance practices during the 1990s in Romania resulted in problems relating to incentive pay and dispersed ownership dimensions. Ioana et al. (2007) examined the evolution of corporate governance in the early 2000s. They noted there were some improvements in the corporate governance structure during the early years. However, there were some implementation issues (i.e., practice being different from legislation). In addition, there was no single corporate governance code. The authors

recommended various public and private measures to improve corporate governance practices in Romania.

Feleagă et al. (2011) also reviewed the evolution of corporate governance in Romania. They noted that due to political, legal, and economic difficulties, the development of corporate governance frameworks in the country was gradual. The Bucharest Stock Exchange (BSE) was opened in 1995, while the first corporate governance document was adopted in 2001, which aimed at only plus category companies. However, this code was ineffective as only one company was in this category. Therefore, before the global financial crisis in 2008, Romanian stock markets suffered from various corporate governance problems. These problems included lack of analysis of manager–shareholder relations, limited shareholder involvement in business processes, weak auditing practices, lack of harmonization in accounting standards, and weak control mechanisms. Subsequently, the BSE adopted new codes in 2009, which were based on OECD guidelines. These codes were revised in 2015. The final corporate governance document included requirements and recommendations on various issues such as board responsibilities (e.g., a sufficient number of meetings and clear responsibilities for the board, management, and committees), provisions to comply with (e.g., a minimum number of board members, the share of non-executive directors, and limitations on CEO–Chairman duality), risk management (e.g., internal and independent audits), internal control (e.g., audit committee), remuneration, and investor relations (Bucharest Stock Exchange 2015). It can be argued that the current set of formal codes and guidelines are mostly consistent with best-practice corporate governance approaches in advanced countries. As a result, the relevant research questions become how effectively these guidelines are enforced and how they affect the financial performance of Romanian companies listed on the BSE. These are the questions that the current study aims to answer using recent data from the Bucharest Stock Exchange. Specifically, the present study examines a specific dimension of board characteristics, i.e., the presence and share of the independent board members, and the corresponding effects on company performance. As the relevant literature in Romania is relatively scarce, the present paper is expected to make an important contribution and extension to this literature.

There are some studies that examined very similar topics to the present paper in the case of stock market companies in the Bucharest Stock Exchange. One such study was conducted by Vintilă and Gherghina (2013). The authors focused on two properties of boards, which were board independence and CEO duality. The study first provided a review of the corporate governance codes and practices in Romania. The companies listed on the Bucharest Stock Exchange (BSE) were dominated by unitary boards. In addition, the adoption of the existing corporate codes was voluntary in the sense that firms could either adopt the relevant suggestions or explain their deviation in detail. Therefore, the corporate governance framework at the BSE followed a "comply or explain" approach. Within this context, Vintilă and Gherghina (2013) developed two research hypotheses on the positive effects of "the percentage of independent directors" and "the percentage of non-executive directors" on the firm value at the BSE. In addition, the authors postulated that the separation of CEO and Chairperson roles would also have a positive influence on companies. To test these research hypotheses, the authors collected data from the 2007–2011 period covering all firms listed in the BSE. The sample ultimately comprised 63–68 firms over different years. The study used Tobin's Q as the dependent variable, while the share of independent board members, the share of non-executive board members, and CEO duality were used as the main independent variables. In addition, the firm size, leverage ratio, sales growth, and the years since listing were used as firm-specific control variables. The authors found that the average share of independent board members was relatively small, at 14%. The OLS results indicated that share of independent board members had a positive but non-linear relationship with firm performance, whereas share of non-executive members and CEO duality did not have statistically significant effects. When fixed-effect regressions were estimated, the regression coefficient of the board independence also became statistically insignificant. Hence, this paper provided partial or mixed evidence

for the influence of board independence within the BSE. In a follow-up study, Vintilă et al. (2015) used the same data set covering the 2007–2011 period for the BSE companies but expanded the list of explanatory variables. Namely, the study again used Tobin's Q as the dependent variable, while including as additional independent variables board committees, board size, CEO age and tenure, and board diversity. The authors estimated two separate regressions, one with the independent variable set of board characteristics and another with the independent variable set of CEO characteristics. Their results showed that board independence was positively associated with the firm value measured by Tobin's Q. A more recent study on the present research topic was conducted by Borlea et al. (2017). In this paper, the authors tried to examine the effects of various board characteristics on stock performance (measured by ROA and Tobin's Q) of companies in the Bucharest Stock Exchange. Specifically, the study looked at the possible effects of non-executive board members, independent board members, nomination committees, competencies of board members, remuneration committees, and audit committees. Their results indicated that there were no statistically significant associations between these board characteristics and firm performance. While this paper had very broad coverage, it suffered from some research limitations. For example, the study had only a cross-sectional dataset from the sample year of 2012. In addition, information on board characteristics was collected from the "Comply or Explain Statement", which are self-reported by companies. In the case of independent board members, the relevant information was the binary answer of either Yes or No to the following question: "Does the structure of the board of directors provide a sufficient number of independent members?" (Borlea et al. 2017, p. 63). It is seen that this question can be relatively subjective and the binary answer choices did not provide very detailed information on the presence and share of independent board members. The present study significantly improves on both dimensions by examining a longer period of 2016–2020 and using the exact share of independent board members as the main independent variable.

The above studies, especially Vintilă and Gherghina (2013) and Vintilă et al. (2015), are very relevant to the present study. The present paper differs from them in several dimensions. One is the time coverage. These studies used a panel dataset covering the 2007–2011 period, which is an important advantage. However, the sample period covered the global financial crisis, which might make the findings possibly less generalizable to normal periods. In this context, the present paper provides more recent evidence using a non-financial crisis period of 2016–2020. In addition, the second study includes board characteristics and CEO properties separately into the regression model. However, the exclusion of important variables in separate regressions implies that the model might suffer from serious omitted variable bias. The present paper tries to avoid this problem by including both board and CEO characteristics in the same regression model. Finally, the present study conducts the same regression models with three different performance indicators, namely Tobin's Q, ROE, and ROA, while the above studies only focused on ROA and Tobin's Q. The use of ROE as the main independent variable has advantages in terms of measuring the benefits accruing to equity investors and comparing the performance of different equity investments. This dependent variable becomes important to make assessments on the attractiveness of stock markets for investors and the possible factors affecting stock market development. Overall, the present paper differs from existing studies in various dimensions, which become the contribution of the present paper to the relevant literature.

Based on the above discussions, the research question of the present study can be stated as follows: "What is the impact of the presence and proportion of independent board members on the financial performance of the companies listed on the Bucharest Stock Exchange?" Hence, the study has a clear research question which is also widely examined in the literature. In this context, the paper has several additional aims. The first aim is to collect a unique set of data on the board characteristics of the leading companies listed on the BSE. To the best of our knowledge, there are no private or public sources of data with relevant information (such as board size, number of executive and non-

executive board members, number of independent board members, number of female board members, CEO duality information [i.e., whether the CEO holds the Chairperson position as well], and other CEO characteristics), other than the webpages and annual reports of the leading companies listed on the BSE. After this data is collected, another research aim is to display certain board characteristics, including the presence and share of independent board members, for the companies listed on the BSE. This analysis also provides valuable information on the existing conditions of corporate governance for these companies. Finally, the main aim of the present study is to document the impact of independent board members on the financial performance of companies listed on the BSE.

The above theoretical and empirical discussions show that the presence of higher shares of independent members on the board of directors can have positive effects on the financial performance of public companies. Therefore, consistent with the research question of the present study, the corresponding research hypothesis is stated as follows:

Hypothesis 1 (H1). *The share of independent board members has a positive effect on the financial performance of public companies on the Bucharest Stock Exchange.*

3. Data and Research Methods

3.1. Sample Selection and Variable Description

As explained in the previous section, there is no available public or private dataset that could be accessed to obtain the required variables for board and CEO characteristics. In this context, all variables were collected by hand from the annual reports of the companies. In terms of time coverage, data for the last five years from 2016 to 2020 were collected. All firms in the stock market were included in the empirical analysis. As discussed in the previous section, the data sample had some advantages over other papers focused on Romania, such as Vintilă and Gherghina (2013) and Borlea et al. (2017). For example, the former used data from the 2007–2011 period, which includes the global financial crisis, and the second paper used data only from 2012 and provided information on board characteristics in terms of self-reported binary variables (such as whether the level of independent board members is enough or not). Hence, it can be difficult to generalise the findings of these two papers. The dataset in the present paper provided information from more recent years and was suitable to obtain more robust findings. The relevant variables and their definitions are presented in Table 1. This dataset provides information on three financial performance indicators, ROE, ROA, and Tobin's Q. In addition, various board and CEO characteristics were obtained for these companies. In this way, it became possible to check the possible effect of these board and CEO characteristics on the firm performance, thereby providing more robust findings. Hence, based on these points, the present sample can be considered one of the strengths of the paper. The selection of these variables was based on the large literature examining the effects of board and CEO characteristics on firm performance (Nelson 2005; Jermias and Gani 2014; Pucheta-Martínez and Gallego-Álvarez 2020; Naseem et al. 2020). These studies generally found positive effects on performance to result from diversity effects in terms of gender, non-executive, and independent board members, as well as positive effects resulting from women CEOs. In addition, the CEO duality was found to be generally negatively associated with firm performance. However, these results were not fully robust as some papers found these effects not to be statistically significant. While these general discussions are important to understand the effects of corporate governance on firm performance, examining all of these board and CEO characteristics in detail was beyond the scope of the present paper. Hence, the focus of the present study was on the effects of independent board members and the corresponding research hypothesis.

Table 1. Description of Variables.

Variable	Definition
Return on Equity	Net Profits as a percentage of Shareholder Equity
Return on Assets	Net Profits as a percentage of Total Assets
Tobin's Q	Market Value as a percentage of Total Assets
Board size	The number of members on the board
Non-executive Share	The number of non-executive members as a percentage of Board size
Independent Share	The number of independent members as a percentage of Board size
Women Share	The number of women members as a percentage of Board size
CEO Duality	Takes a value of 1 if the CEO has the dual duty of CEO and Chairperson
CEO Women	Takes a value of 1 if woman CEO

3.2. Econometric Specification

In terms of research methods, the present paper followed the studies in the literature closely so that results are comparable to the findings in the relevant literature. For example, O'connell and Cramer (2010) used a standard linear regression model where the financial performance indicator was the dependent variable, and various board characteristics such as board size and share of the non-executive directors on the board were the main independent variables. The regression model also included some control variables. Similar regression models have been used by other studies as well (Arora and Sharma 2016; Al Farooque et al. 2019). Therefore, the present paper also used an OLS regression equation given as follows:

$$Firm\ Performance_{i,t} = \beta_0 + \beta_1 Size_{i,t} + \beta_2 BoardSize_{i,t} + \beta_3 ShareInpdenendentBoardMembers_{i,t} + \beta_4 Controls_{i,t} + \varepsilon_{i,t} \quad (1)$$

In the above equation, i refers to firm (which ranges from $i = 1$ to $i = 72$) and t refers to the year (which ranges from t = 2016 to t = 2020). Consistent with the relevant literature, the return on equity (ROE) was used as the performance indicator. ROA and Tobin's Q were used as alternative performance indicators. The size of the company was measured by the turnover (i.e., the total revenue). Board size (i.e., the total number of members on the company board) was the first board-related variable. In this context, the share of the independent board members was the main variable of interest for the study. The regression model also included control variables such as board and CEO characteristics. In terms of firm-specific variables, the inclusion of size as the only control variable can be considered as a data-related shortcoming. This dimension can also be expanded in future research. To see possible non-linear effects, the square of the independent share was also included in one specification of the regression estimation.

4. Findings

This part presents the empirical findings. The results are given in two subsections. The first subsection documents the summary statistics and correlation analysis, and the second subsection presents the regression findings.

4.1. Summary Statistics and Correlation Analysis

The data for the companies listed on the BSE were collected from their web pages and annual reports. Due to data availability issues, some variables were missing from the sample. Table 2 shows the statistical summary of the variables used in the analysis.

Table 2. Statistical Summary.

	Obs	Mean	Std.Dev.	Min	Max
ROE	320	7.662	14.711	−52.8	86.19
ROA	319	3.151	9.645	−44.49	77.05
Tobin's Q	119	0.677	0.664	0	3.94
Ln_Size	303	18.282	1.97	12.37	23.41
Board Size	345	4.971	1.73	1	11
Independent Share	295	38.423	30.427	0	100
Non-Executive Share	345	67.585	29.602	0	100
Women Share	340	20.466	23.14	0	100
CEO Duality	320	0.297	0.458	0	1
CEO Women	330	0.106	0.308	0	1

It is seen from Table 2 that there were 295 observations for the share of independent board members. In the case of other variables, the number of observations was larger than 300, except for the variable of Tobin's Q with 119 observations. In the sample, the average ROE was 7.7%, with a standard deviation of 14.7%. The average board size was very close to five, with an interval that ranged from 1–11. The share of independent board members averaged 38%, whereas the proportion of non-executive board members averaged 68% and the proportion of women board members averaged 20%. The ranges for these three indicators were from 0% to 100%, implying that the variance is quite high in terms of these board characteristics. This variation could be useful to identify the impact of board characteristics on firm performance. There were also two CEO dummy variables, showing whether the CEO had a dual position and whether the CEO was a woman. Table 1 indicated that approximately 30% of the CEOs in the sample had dual positions of being the CEO and the Chairperson, and approximately 11% of CEOs were women. Figures 1 and 2 show the histogram of board size and proportion of independent board members. It is seen that there was some clustering in both variables. Namely, the board sizes were clustered at low values near three, moderate values near five, and higher values near seven. The proportion of independent board members was clustered at approximately 30% and 70%. The clustered nature of the board size was important as the regression model used the clustered standard errors.

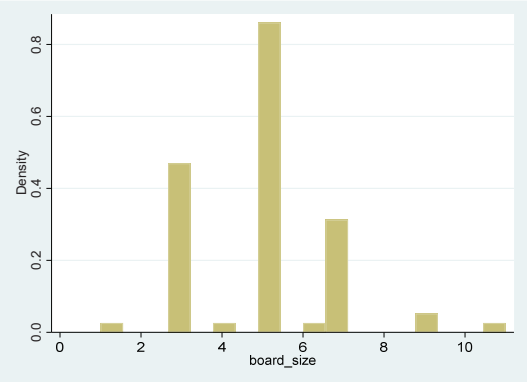

Figure 1. Board Size.

Table 3 shows the cross-correlations among the above variables. It is seen that the performance indicator of ROE was positively correlated with independent board share, but this correlation was not statistically significant at the 5% level. ROE had a negative and statistically significant correlation with the proportion of non-executive directors and negative and statistically insignificant correlations with CEO duality and CEO women indicators.

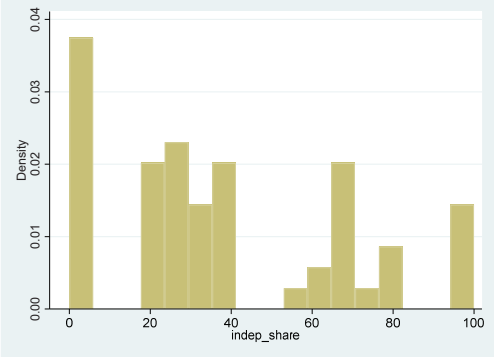

Figure 2. Share of Independent Members.

Table 3. Cross Correlations.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) roe	1.000									
(2) roa	0.405 *	1.000								
(3) tobins_q	0.251 *	−0.064	1.000							
(4) ln_size	0.120 *	0.243 *	0.129	1.000						
(5) board_size	0.055	0.140 *	0.097	0.448 *	1.000					
(6) indep_share	0.053	−0.100	0.181	−0.180 *	−0.039	1.000				
(7) non_exec_share	−0.126 *	−0.035	0.079	0.132 *	0.261 *	0.437 *	1.000	1.000		
(8) women_share	−0.074	0.063	−0.054	−0.168 *	−0.139 *	−0.149 *	−0.155 *	−0.067	1.000	
(9) ceo_duality	−0.011	0.023	−0.040	−0.003	−0.109	−0.328 *	−0.439 *	0.220 *	−0.118 *	
(10) ceo_women	−0.043	−0.034	0.084	−0.312 *	−0.133 *	0.187 *	0.072	1.000	1.000	1.000

* shows significance at the 0.05 level.

Figure 3 shows the scatter plot for the relationship between the financial performance indicator of ROE and the proportion of independent board members. The positive association between the two variables is evident in the graph. Hence, the correlation analysis and the scatter plot provided supportive evidence for the research hypothesis regarding the positive effects of independent board members on the profit efficiency of public companies at the Bucharest Stock Exchange. Before moving to the multiple regression analysis, the last bivariate quantitative method was to conduct a test of comparison between low and high levels of independent board member shares. For this purpose, board shares were categorised into two groups below and above the median value. The results of the parametric *t*-test and non-parametric Wilcoxon rank-sum test did not find any statistically significant differences between ROE across these groups. While these bivariate analyses provided useful insights on the research question, conducting multivariate analysis would present more robust findings as it would control for the possible effects of other relevant variables. The next subsection gives the results of the multivariate regression analysis.

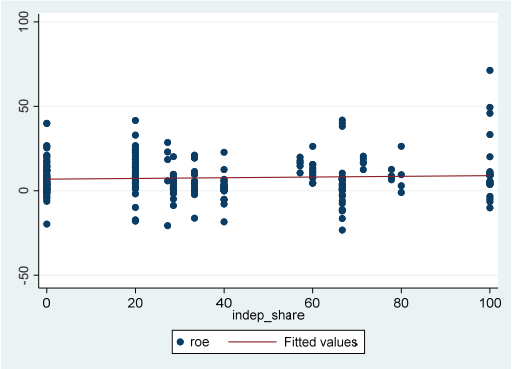

Figure 3. Scatter Plot between ROE and the Proportion of Independent Board Members.

4.2. Regression Analysis

The regression results are presented in two tables. Table 4 shows the regression findings where the control variables were only the board characteristics, whereas Table 5 documents the regression results where two CEO characteristics were also added into the regression model. These regression models were estimated using the OLS regression approach, with clustering of errors based on board size. In this way, the heteroscedasticity problem in the residuals was addressed. The additional diagnostic analysis also showed that these regression models did not suffer from the multicollinearity problem.

Table 4. OLS Regression Results with Board Characteristics.

ROE	Coef.	St.Err.	*t*-Value	*p*-Value	95% Conf	. Interval	Sig
ln_size	1.167	0.389	3.00	0.024	0.215	2.119	**
board_size	0.316	0.816	0.39	0.712	−1.682	2.313	
indep_share	0.057	0.012	4.79	0.003	0.028	0.086	***
non_exec_share	−0.069	0.048	−1.46	0.195	−0.186	0.047	
women share	−0.030	0.030	−1.00	0.356	−0.105	0.044	
Constant	−12.078	8.289	−1.46	0.195	−32.359	8.204	
Mean dependent var		7.875	SD dependent var			12.232	
R-squared		0.063	Number of obs			236	
F-test		295.766	Prob > F			0.000	
Akaike crit. (AIC)		1847.216	Bayesian crit. (BIC)			1867.999	

*** $p < 0.01$, ** $p < 0.05$.

It is seen from Table 4 that the only statistically significant regression coefficient was the proportion of independent board members. The relevant regression coefficient was statistically significant at the 1% level. The model had an R^2 value of 0.063, indicating that 6.3% of the variation in financial performance could be explained by the regression model. The F-value was also statistically significant, thereby showing the relevance of the regression model and the independent variables.

Table 5. OLS Regression Results with Board and CEO Characteristics.

ROE	Coef.	St.Err.	*t*-Value	*p*-Value	95% Conf.	Interval	Sig
ln_size	0.818	0.723	1.13	0.301	−0.951	2.588	
board size	0.564	0.812	0.69	0.513	−1.423	2.550	
indep_share	0.085	0.014	6.22	0.001	0.052	0.119	***
non_exec_share	−0.137	0.027	−5.00	0.002	−0.203	−0.070	***
women share	−0.058	0.021	−2.77	0.033	−0.109	−0.007	**
ceo_duality	−2.803	1.147	−2.44	0.050	−5.609	0.003	*
ceo_women	−1.536	3.119	−0.49	0.640	−9.167	6.095	
Constant	−1.065	15.624	−0.07	0.948	−39.295	37.164	
Mean dependent var		8.248	SD dependent var			12.437	
R-squared		0.079	Number of obs			216	
F-test		14027	Prob > F			0.000	
Akaike crit. (AIC)		1695.261	Bayesian crit. (BIC)			1715.512	

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 5 includes the two CEO characteristics in the regression model. It is seen that the R^2 value increased to 0.079, indicating a higher explanatory power. In this model, the proportion of independent board members again had a positive and statistically significant impact on performance. In addition, two CEO characteristics were negatively associated with performance. Overall, both regression tables provided strong evidence that the presence of independent board members could be a positive corporate governance factor for the companies listed on the Bucharest Stock Exchange.

In terms of robustness analysis, Appendix A presents the results of additional regression estimations. Similar to Vintilă and Gherghina (2013), the square of the board independence variable was also added to the regression models in Tables A1 and A2. However, the results showed the presence of some non-linear effects in the data. Table A3

estimated the regression with the dependent variable of ROA. In that case, the size variable became a positive predictor of the return on assets. In addition, the share of women on the board was found to have a statistically significant and positive effect on firm performance. However, board independence was not found to have any statistically significant effect. Finally, Table A4 presents the findings for the dependent variable of Tobin's Q. In that case, none of the variables had a statistically significant regression coefficient. The smaller sample in that case could be a major factor in finding weaker results. Overall, these findings show that the choice of firm performance variable can affect findings in major ways.

The findings of the above regression results provided important links to the relevant theoretical and empirical literature. The positive effects of the independent board members were consistent with the arguments of the agency theory and the resource-based view of the firm in terms of independent board members increasing the monitoring and advisory capacity of boards (Alves 2014; James and Joseph 2015). The findings were also in line with empirical literature that found positive performance effects of independent board members (Dahya et al. 2008; Aggarwal et al. 2009). Hence, the present study contributes to the relevant literature by providing supportive empirical evidence on the positive effects of the independent board members at the Bucharest Stock Exchange. There are also recent studies that examined the effects of board characteristics in Romania. For example, Vintilă and Gherghina (2013) examined the 2007–2011 period and found positive effects of independent board members. The presence of the global financial crisis years could be a factor restricting the generalisability of this study. In another paper, Borlea et al. (2017) examined the possible effects of board characteristics for the firms at the Bucharest Stock Exchange. However, their sample was restricted to 2012 and the authors did not find any statistically significant results. Hence, the present paper improved the results of the previous papers by examining a more recent period of 2016–2020, including more variables on board and CEO characteristics, and conducting various robustness analyses. The findings of the present paper also allow the derivation of some policy recommendations. The stock market capitalisation to GDP ratio is at relatively low levels in Romania and has followed a downward trend in recent years. The present findings imply that corporate governance practices, especially the presence of independent board members, can matter for firm performance. Improving corporate governance codes and practices can attract higher investor attention to the stock markets and support stock market development and economic growth in the country.

5. Conclusions

This paper examined the impact of independent board members on the financial performance of companies listed on the Bucharest Stock Exchange. The relevant corporate governance theories, such as the agency theory and the resource-based theory of the firm, argue that independent members would improve the monitoring capacity and supervising efficiency of the boards. In addition, empirical studies show that the presence of independent members is associated with better financial performance. When the corporate governance codes and regulations in Romania are examined, it is found that the relevant corporate governance has gradually evolved. While theoretical and empirical studies display the importance of independent board members, there are few studies that directly analyze the influence of independent board members (Vintilă and Gherghina 2013; Vintilă et al. 2015; Borlea et al. 2017). The present study contributed to this literature by collecting a unique dataset including board and CEO characteristics for the companies listed on the Bucharest Stock Exchange, and by conducting a more detailed and recent analysis on the topic. The correlation analysis, scatter plots, and regression results showed that a higher share of independent board members was associated with higher returns on equity ratio. Specifically, a 10% rise in the independent member share was associated with an approximately 0.9% point increase in ROE. These results imply that regulations recommending the presence of independent members on boards would be useful to improve corporate governance quality and firm performance in Romania. There are some limitations in the

present study that can be addressed in future research. For example, the present dataset did not allow for the implementation of more advanced regression techniques such as instrumental variables and difference-in-difference methods. These methods can be instrumental in addressing the possible endogeneity issues. In addition, changes in corporate governance codes can be used as events to understand the effects of corporate governance practices on firm performance. The dataset can also be improved to include more control variables related to firm characteristics such as leverage.

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Appendix A

Table A1. Non-Linear Model with Board Characteristics.

ROE	Coef.	St.Err.	*t*-Value	*p*-Value	95% Conf.	Interval	Sig
ln_size	1.235	0.331	3.73	0.010	0.424	2.046	**
board size	0.261	0.823	0.32	0.762	−1.753	2.275	
indep_share	−0.104	0.161	−0.65	0.541	−0.498	0.290	
indep_square	0.002	0.002	1.02	0.348	−0.002	0.006	
non_exec_share	−0.049	0.067	−0.74	0.489	−0.214	0.115	
women share	−0.019	0.050	−0.37	0.722	−0.142	0.105	
Constant	−12.602	6.929	−1.82	0.119	−29.555	4.352	
Mean dependent var		7.875	SD dependent var		12.232		
R-squared		0.079	Number of obs		236.000		
F-test		1.8×10^5	Prob > F		0.000		
Akaike crit. (AIC)		1843.277	Bayesian crit. (BIC)		1864.060		

** $p < 0.05$.

Table A2. Non-Linear Model with Board and CEO Characteristics.

ROE	Coef.	St.Err.	*t*-Value	*p*-Value	95% Conf	. Interval	Sig
ln_size	0.987	0.633	1.56	0.170	−0.563	2.537	
board size	0.589	0.828	0.71	0.504	−1.437	2.614	
indep_share	−0.111	0.171	−0.65	0.541	−0.529	0.308	
indep_square	0.002	0.002	1.03	0.342	−0.003	0.007	
non_exec_share	−0.126	0.033	−3.78	0.009	−0.208	−0.045	***
women share	−0.054	0.040	−1.34	0.227	−0.152	0.044	
ceo_duality	−2.601	1.242	−2.10	0.081	−5.640	0.437	*
ceo_women	0.205	2.268	0.09	0.931	−5.345	5.755	
Constant	−2.984	14.158	−0.21	0.840	−37.627	31.660	
Mean dependent var		8.248	SD dependent var		12.437		
R-squared		0.101	Number of obs		216.000		
F-test		1602.6	Prob > F		0.000		
Akaike crit. (AIC)		1689.910	Bayesian crit. (BIC)		1710.161		

*** $p < 0.01$, * $p < 0.1$.

Table A3. Regression Model for ROA.

ROA	Coef.	St.Err.	*t*-Value	*p*-Value	95% Conf.	Interval	Sig
ln_size	1.044	0.354	2.95	0.026	0.179	1.910	**
board size	0.410	0.584	0.70	0.508	−1.018	1.838	
indep_share	−0.035	0.048	−0.72	0.499	−0.152	0.083	
non_exec_share	0.042	0.017	2.40	0.053	−0.001	0.084	*
women share	0.048	0.019	2.54	0.044	0.002	0.095	**
ceo_duality	−0.069	1.453	−0.05	0.964	−3.625	3.487	
ceo_women	2.115	1.285	1.65	0.151	−1.028	5.259	
Constant	−20.481	3.214	−6.37	0.001	−28.345	−12.616	***
Mean dependent var		3.759		SD dependent var		9.444	
R-squared		0.103		Number of obs		214.000	
F-test		16.64		Prob > F		0.002	
Akaike crit. (AIC)		1556.144		Bayesian crit. (BIC)		1576.339	

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A4. Regression Model for Tobin's Q.

Tobin's Q	Coef.	St.Err.	*t*-Value	*p*-Value	95% Conf.	Interval	Sig
ln_size	0.070	0.043	1.63	0.154	−0.035	0.176	
board size	0.002	0.049	0.05	0.964	−0.118	0.123	
indep_share	0.004	0.007	0.51	0.627	−0.014	0.022	
non_exec_share	0.002	0.006	0.35	0.736	−0.012	0.015	
women share	−0.003	0.002	−1.68	0.143	−0.007	0.001	
ceo_duality	0.013	0.135	0.10	0.924	−0.316	0.343	
ceo_women	0.353	0.289	1.23	0.266	−0.353	1.059	
Constant	−0.815	0.602	−1.35	0.225	−2.288	0.659	
Mean dependent var		0.787		SD dependent var		0.740	
R-squared		0.075		Number of obs		79.000	
F-test		16.51		Prob > F		0.002	
Akaike crit. (AIC)		181.529		Bayesian crit. (BIC)		195.746	

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Contingent Effect of Board Gender Diversity on Performance in Emerging Markets: Evidence from the Egyptian Revolution

Melsa Ararat [1], Moataz El-Helaly [2], Alan Lowe [3] and Nermeen Shehata [2,*]

[1] Sabanci Business School Orta Mahalle, Sabanci University, Tuzla, Istanbul 34956, Turkey; melsa.ararat@connect.sabanciuniv.edu
[2] School of Business, The American University in Cairo, AUC Avenue, P.O. Box 74, New Cairo 11835, Egypt; m.elhelaly@aucegypt.edu
[3] College of Business and Law, RMIT University, 124 La Trobe Street, Melbourne, VIC 3000, Australia; alan.lowe@rmit.edu.au
* Correspondence: n.shehata@aucegypt.edu

Abstract: The 2011 Egyptian revolution was associated with significant political and social upheaval, followed by societal changes and attempts by policymakers to reduce the marginalisation of women and promote their inclusion in the economy. Drawing on this background, the authors compare the effect of board gender diversity before and after the revolution. Results indicate that gender diversity in corporate boards is coupled with improvements in firm performance in the immediate post revolution phase. This evidence provides insights into the contextual factors related to diversity and performance relationship and supporting arguments for regulatory changes to further encourage women's representation on boards.

Keywords: corporate governance; boards of directors; Egypt; gender diversity; Egyptian Revolution

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1. Introduction

In recent years, a number of countries have enacted hard or soft laws to increase the representation of women on corporate boards. Regulatory interventions of this type aim to address societal and labour concerns in addition to deficiencies in board oversight due to entrenchment. A subset of the regulatory changes has been focused on the diversity of the workforce designed particularly to address the evidence that women have experienced conscious or unconscious negative discrimination. Nevertheless, and despite the advances achieved, female representation in the boardroom remains far from desired levels. In this context, it is now past time to try to rectify the lack of board gender diversity (Reguera-Alvarado et al. 2017).

The objective of this study is to highlight the advantages of board gender diversity from an economic point of view. This is achieved by assessing the presence of female directors on Egyptian corporate boards around the 2011 revolution, and the changes in the impact of this presence on financial performance alongside with the changes in the social and economic context that have affected the perceptions around the value of women's contributions. This inquiry is motivated by two main drivers. First, investigating the contribution of board gender diversity to firm performance in an understudied but important country. Second, examining whether the presence of females in corporate boards may impact firm performance especially during times of uncertainty and economic instability.

Gender diversity is a popular field of inquiry. On one hand, an analysis of the existing literature in this field shows that several studies, especially empirical quantitative studies, have supported the argument that gender diversity in boards is typically associated with positive outcomes (Post and Byron 2015). However, on the other hand, there is also evidence that gender diversity is neutral for firm performance or may even be associated with negative outcomes (Adams and Ferreira 2009; Özbilgin et al. 2016). According to

Özbilgin et al. (2016), the mixed results, at least partially, have been attributed to the fact that the outcomes of diversity cannot necessarily be explained through a simple quantitative model that examines correlations or causal relationships with other variables of interest. Moreover, there are several factors that change over time and across countries that could logically influence the effect of gender diversity on organisational outcomes, especially financial performance (Özbilgin et al. 2016).

Thus, it could be argued that providing evidence that the presence of women on corporate boards makes a difference and is associated with positive outcomes is quite challenging. This is especially the case for emerging markets where research outcomes on the role of board gender diversity deviates from developed markets due to market inefficiencies and institutional factors that cannot be easily operationalised in empirical studies (Ararat et al. 2021). Adams and Ferreira (2009) show that the impact of board monitoring on performance is most valuable in countries where there are weak corporate governance systems. As such we would expect women directors to influence monitoring and firm performance much more in countries where there is weak corporate governance and less corporate transparency. Regardless of the significant improvements that were achieved in Egypt related to corporate governance prior to the 2011 revolution, other challenges like corporate transparency and oversight in the accounting and auditing professions have remained (OECD 2010).

Therefore, this paper seeks to provide evidence on the positive impact of board gender diversity on firm performance in an emerging market to show that, in addition to the positive role of gender diversity documented by prior studies, gender diversity could be even more desirable during times of turmoil and uncertainty.

This study focuses the inquiry on the Egyptian Arab Spring revolution of 2011, as this setting facilitates investigation of the effect of board gender diversity from a unique angle. The context of the study represents a setting in which there had been an *exogenous shock* that changed the status of women in Egypt and reduced the extent to which they are marginalised, yet simultaneously entailed significant political and social changes throughout the country.

This study seeks to contribute to extant literature by providing evidence that may be persuasive, in the eyes of certain non-academic audiences, with regard to making more room for women on corporate boards. Specifically, the authors observe how the presence of women appears to have a different and more positive effect on firm performance during periods of political instability and economic uncertainty, while values of equality and justice are on the rise. It has also been reported that in the post-2011 revolution period, the representation of female directors on boards led to significantly higher firm performance, while no observable relationship is found between board gender diversity and firm performance before the revolution. The results also show that the positive effect of national diversity on firm performance diminished after the revolution, and foreign directors whose presence was associated with better performance were no longer effective. These two results together suggest that an enabling context is an important mediator in the relationship between gender diversity and firm performance.

The contribution of this study is two-fold. First, the authors engage in the discourse about women's inclusion in corporate boards and provide quantitative evidence on how women's presence in corporate boards could make a difference to firm performance in an enabling environment. Second, contrary to the mainstream of research investigating the relationship between board gender diversity and firm performance in regular circumstances or states of equilibrium, this paper extends the scarce, yet growing, evidence base on the role of gender diversity in contexts of political, social and/or economic turmoil and uncertainty (Farag and Mallin 2017). The authors argue that one key pillar that supports the originality of this study is driven by the exogenous shock employed in the research design, which helps in drawing comparative conclusions about two different time periods.

The remainder of this paper is organised as follows: Section 2 presents a detailed description of the Egyptian context, including the political scene, the role of women

in Egypt and the norms of corporate governance in the periods before and after the 2011 revolution. Section 3 provides an overview of literature on the board diversity-firm performance relationship, and then discusses the role of macroeconomic and political forces in shaping the corporate governance environment. Section 4 discusses the research design, data and sample; Section 5 presents the analysis and empirical results; and finally, Section 6 concludes the paper.

2. The Case in Context: Egypt

2.1. The Political Context

It has been argued that a number of significant factors contributed to the dissatisfaction and unrest that preceded the Arab Spring in Egypt. These included socio-economic issues such as inequality, poverty, a lack of social programmes, poor systems of government and extreme levels of corruption or personal favouritism (Acemoglu et al. 2018). By 2010, protests of various hues had broken out in a number of Arab countries (Ottaway and Hamzawy 2011). In late 2010 and early 2011, semi-permanent camps had been established by ordinary people fervently protesting the existing socio-economic and political status quo, which were widely seen to benefit a relatively narrow group of families and individuals. This preferential treatment was also seen as extending to a number of large Egyptian firms with ties to the regime (Acemoglu et al. 2018; Choukeir 2013). The peaceful demonstrations began in January 2011 and continued until the president (Mubarak) stepped down on 12 February 2011 (Aboud and Diab 2019).

The "January Revolution" of 2011 was followed by a period of clear political instability. The country was initially managed by the military (2011–2012), followed by an Islamist-majority parliament and presidency. Islamists, and the Muslim Brotherhood (MB) party in particular, then ruled the country for one year (2012–2013). In June 2013 the Muslim Brotherhood and their president were deposed after only one year of ruling. Abdel-Fattah El Sisi then began ruling the country (Aboud and Diab 2019) and remains in power as of 2021. In early 2014 the country entered into a more settled period, though still under military rule. This period was characterised by challenges in coping with a budget deficit running at over 12% of gross domestic product (GDP), and debt levels reaching 95% of GDP, but relative stability. The World Bank approved a $3 billion, three-year loan at the end of 2015. This may have played an instrumental role in restoring investor confidence in foreign exchange markets and improving the deficit. During this period, the economy also relied heavily on support from the Gulf States (The Economist 2016).

In common with earlier international support for developing nations, the World Bank loan was accompanied by a larger, $12 billion, loan from the International Monetary Fund (IMF). This IMF loan was subject to conditions that required the implementation of strict neoliberal-inspired reform, including tax reform (notably a new value-added tax), the elimination of energy subsidies and allowing the Egyptian currency to float. At the political and economic level, the IMF's seal of approval on a programme of reforms restored investor confidence. Egypt's Eurobond of $4 billion was oversubscribed by three times (Saleh 2017). The Ministry of Finance attributed the high demand for Egypt's Eurobond to the great confidence in the Egyptian economic reform programme (Reuters 2018).

The period of turmoil around the revolution has been assessed as extending over in excess of three years, from February 2011 to June 2014 (New York Times 2014). Therefore, the authors selected 2011–2014 as a recognised period of uncertainty ending in 2015. While Egypt moved up three places to 116 out of 140 economies in the World Economic Forum's (WEF) Global Competitiveness Index, and corruption was reported to have declined substantially, youth unemployment and poverty continued to contribute to Egypt's fragility (WEF 2017).

2.2. Women in Egypt

As shown in Table 1, women represent only about a quarter of the Egyptian workforce, with minimal participation in industry. Egypt was ranked 123 out of 144 countries in

the "Gender Gap Report" in 2011 (WEF 2017). Rising inequality and lack of social justice and discontent about the role of women have been a permanent concern for the society. The revolution's main slogan of "bread, freedom, and social justice" encapsulated the call for equal opportunities for all—including women, who played an influential role at the forefront of the 2011 revolution (Mostafa 2015; Naber 2011).

Table 1. Female presence in various positions.

Year	Population, Female (% of Total)	Labour Force, Female (% of Total Labour Force)	Employment in Services, Female (% of Female Employment)	Employment in Industry, Female (% of Female Employment)	Employers, Female (% of Female Employment)	Non-Discrimination Clause Mentions Gender in the Constitution (1 = yes; 0 = no)	Proportion of Seats Held by Women in the National Parliament (%)
2005	49.6	21.2	48.4	5.0	3.8	-	2.0
2006	49.6	21.9	50.6	6.0	2.8	-	2.0
2007	49.6	23.6	47.2	6.2	3.4	-	1.8
2008	49.6	23.6	48.8	5.6	-	-	1.8
2009	49.5	23.8	48.8	5.1	3.8	0	1.8
2010	49.5	24.0	51.2	5.9	3.1	-	12.7
2011	49.5	24.0	51.5	5.1	3.2	0	2.0
2012	49.5	24.1	56.9	5.5	2.8	-	2.0
2013	49.5	24.1	52.1	5.0	2.2	0	-
2014	49.5	24.1	51.8	4.9	2.2	-	-
2015	49.5	23.1	54.2	5.6	2.0	1	-
2016	49.4	23.0	55.4	6.1	2.3	-	14.9
2017	49.4	23.1	56.5	6.0	2.3	1	14.9

This table provides statistics on the presence of women in various positions in Egypt before and after the 2011 revolution. Source: World World Bank (2017). Percentages are rounded to the nearest decimal. '-' denotes missing data.

Socially defined gender roles change slowly. The Egyptians have significant patriarchal attitudes towards gender roles. 86.8% and 76.7% of men and women in Egypt, respectively, believe that the basic role for women is to take care of the home (UN Women and Promundo 2017). A strong majority of men (90%) and 58% of women say that final decisions about domestic life should be made by the man (UN Women and Promundo 2017). When it comes to leadership, around two-thirds of the men oppose to the prominence of women in political life (UN Women and Promundo 2017). According to the same report " . . . *religion was particularly important to many men in defining the 'rightful' attributes of men and women*". The first key recommendation of the report is to engage key sources of social influence, including religious, political and community leaders, to change patriarchal social norms.

A more prominent role for women was exemplified in unprecedented social changes following the revolution. Several female activists, politicians and university professors were frequently featured and interviewed in the media and on public TV shows. Moreover, in 2011, Buthayna Kamel became the first woman to announce her run in the 2012 presidential election. In the November 2011–January 2012 elections, only eight women were elected as members (less than 2%) of Parliament. Until 2015, the Egyptian constitution had no quotas for the political representation of women (Hasan 2015).

The National Council for Women issued a strategy for the empowerment of Egyptian women in 2017. The first paragraph of the report's introduction states that:

"Transformations witnessed by the Egyptian society since 2011, Egypt is progressing confidently towards building a new future for all the nation's sons and daughters. Serious efforts to truly empower the broader base of Egyptian women, ensure their full participation, and support the fulfilment of their full potential, contributes to the nation-building process and the achievement of sustainable development. Sustainable development entails a process of societal change that offers real and undiminished opportunities for all women to build their human capacities that would, in turn, widen their choices and enable their self-fulfilment and service of the nation." (National Council for Women 2017, p. 11).

As a result of changing norms, a non-discrimination clause first appeared in the constitution in 2015 (Table 1). Under the newly introduced electoral system, each political

party running for elections was required to nominate at least one woman (Hasan 2015). In the first elected parliament under the presidency of Abdel-Fattah El Sisi, 89 women (14.9%) were elected as members of parliament. Moreover, the last version of the Egyptian corporate governance code issued in 2016 was the only one that addressed board diversity by stating that "Guided by international best practices, the Board composition should ideally be made up of a diverse mix, unbiased to gender or faith." (EIoD 2016, p. 21). It should be noted that the first code in Egypt was issued in 2005. The code was amended in 2011 directly after the revolution, in March 2011, then the latest version was released in 2016. All versions of the CG code were issued on a comply/explain basis (Abdel-Meguid 2021).

Although the MB had full control over the political scene in Egypt for a period of less than a year (July 2012–June 2013), Egypt's ranking deteriorated immediately according to the Gender Gap Report (WEF 2017). However, religious and social conservatism did not take root in Egyptian society. The introduction of a non-discrimination clause in the 2015 constitution and a gender quota of 12% women in the national parliament signified a change in the number of women holding representative roles in government, reflecting the expectations of the society. The president was authorised to appoint a certain number of parliamentarians, which must include women. Of the 89 seats the president appointed 14 women (Al-Wahaidy 2017; El-Behary 2016). The percentage of seats held by women was 14.9% in 2015/16—a huge increase from the 2% in 2011, preceding the introduction of the quota.[1]

These developments signify changes in perceptions of women's role in society, at least from the rule makers' perspective. According to one female parliamentarian, "new policies, new societal attitudes, new structures and new outlooks [are needed] for women's participation to become effective" (Fracolli 2017). This has also been reflected in the representation of women on boards. Figure 1 shows that the percentage of women on board steadily increased post-2011, suggesting that men stepped down to open spaces for women, and women were not just token additions to existing boards.

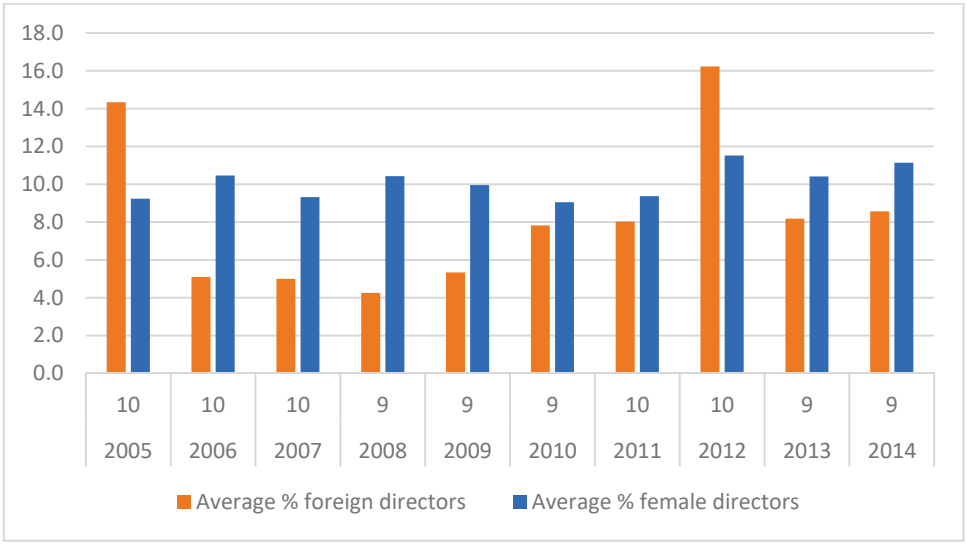

Figure 1. BOD diversity. This figure presents the average board size provided on the primary axis while the average percentage of female directors, and average percentage of foreign directors for the sample companies for 2005–2014 provided on the secondary axis.

In summary, the political and social upheaval witnessed in Egypt after the 2011 revolution was accompanied by significant changes in the role of women in society at large. In addition, there was clear indication that political leadership in the country was seeking to decrease the extent to which women were marginalised. This context of shock enables us to investigate how such a change in the role of women in society was echoed at the level of corporate boards and had an impact the acceptance of women in positions of

authority. Additionally, assuming that women's inclusion in corporate boards increased subsequent to the revolution, findings that firm performance is positively impacted with such increases would provide persuasive evidence that women's inclusion in corporate boards is beneficial to firms when the contribution is encouraged.

3. Prior Literature and Hypothesis

3.1. Corporate Governance and Board Diversity

Women can contribute to firm performance through three channels. The first pertains to the differences between men and women in terms of individual characteristics, preferences and backgrounds (Adams and Ferreira 2009). For example, women's contributions to boards have been extensively discussed with respect to their greater socio-moral sensitivity and the added value it may represent for firms (Tremblay et al. 2016). It has been argued that women experience a greater sense of morality (Sinclair 1998) and mutual empowerment (Dillard and Reynolds 2008). Finally, the fact that women have been shown to differ from men in several aspects, are more risk averse then men and are more likely to propose less aggressive strategies represents one of the main arguments that links board gender diversity to the economic results of the firm (Reguera-Alvarado et al. 2017).

The second relates to diversity, since diverse teams make better decisions compared to homogenous teams, and a higher degree of gender diversity is likely to improve boards' decision-making quality (Kahane et al. 2013). Female directors are likely to bring different resources, add diversity to the boards' human capital, and help displace less productive male directors (Hermalin and Weisbach 2003). Prior studies have argued that greater gender diversity among board members creates richness of opinions and critical questioning, and that the outcomes generally reflect a greater consideration of moral concerns (Lau and Murninghan 1998). The third channel entails eliminating discrimination. If companies discriminate against women in director appointments, they are likely to experience a competitive disadvantage (Becker 1957).

While theoretically all channels suggest a positive association between board gender diversity and firm value and performance, empirical studies have revealed mixed results. Studies examining the effect of board gender diversity on firm value and performance have focused predominantly on developed markets, where capital markets are considered to be more efficient (Kirsch 2018).

Ahmadi et al. (2018) report a positive association between board gender diversity and firm performance in France. Adams and Ferreira (2009) showed that boards with higher levels of gender diversity can allocate more time to board monitoring but reported that the direction of the performance effect of gender quotas is contingent upon the quality of governance. They suggest that women can improve the governance of badly governed companies, but not that of companies that are already well governed. More recent research suggests that the quality of male directors increase when companies search for qualified female candidates when mandated by quotas (Ferreira et al. 2020). This literature has also tended to argue that gender diversity is more likely to be realised if firms value diversity (Van Knippenberg et al. 2007)—a point that is particularly important for the intended inquiry. On the impact of public opinion, Giannetti and Wang's (2021) recent research documents that public attention to gender equality is associated with an increase in presence of women on boards. Their findings further suggest that, during such periods, female board representation also generate higher abnormal announcement returns. (Carter et al. 2003; see also Cumming et al. 2015; Francoeur et al. 2008; Velthouse and Kandogan 2007) report that greater gender diversity enhances the independence of the board. On the other hand, several studies provide evidence on the negative association between gender diversity and firm performance. Adams and Ferreira (2009) found a negative relationship between the proportion of women on the board and firm performance in better governed companies. Similarly, Smith et al. (2006) documented a negative relationship between gender diversity and firm performance in a sample of Danish firms.

Similarly, the boards' gender diversity research in emerging economies provides mixed evidence on the abovementioned relationship. One stream of the literature suggests that gender diversity may have a positive performance effect in emerging economies provided that women are professionally competent, and the power of controlling shareholders is contestable by independent directors (Ararat and Yurtoğlu 2021). Similarly, Mertzanis et al. (2019) find that in the MENA region board gender diversity has a significant positive effect on firm performance measured by ROA, whereas no effect is traced to Tobin's Q. This notion is also supported by the findings of Ramadan and Hassan (2021) who document a positive relationship between board gender diversity and firm efficiency in Egyptian listed firms. On the contrary, other studies provide evidence on negative consequences of gender diversity. Al-Yahyee et al. (2017) documented that female directors had a negative and significant influence on market risk disclosures in six Gulf Cooperation Council (GCC) countries. Also, in India, Oware and Mallikarjunappa (2021) found a negative association between gender diversity in boards and firm performance.

In summary as a recent meta study suggests, gender diversity in boards may have a positive influence on corporate performance but the relationship is contextual (Post and Byron 2015). This result is in line with some arguments that challenge findings based on the notion that the relationship between board diversity and firm performance is contingent on other factors, like culture, legal regulation, geographical context, and institutional factors. Therefore, the literature suggests a complex picture of diversity outcomes, rather than a simple linear relationship (Özbilgin et al. 2016).

3.2. Hypothesis

The relationship between diversity and financial performance is too complex to be explained by a simple linear relationship or through causal assumptions that might disregard internal and external factors that moderate the diversity-performance relationship (Özbilgin et al. 2016). Internal factors such as organisational strategy, and external factors represented by market and institutional factors and changes in the pressure shaped by those forces on organisations, even contribute further to the complexity of the relationship between diversity and performance. It is worth noting that little is known about whether the assumption that the representation of women on boards is associated with positive organisational outcomes holds in regions and times characterised by turmoil and uncertainty. In that vein, although existing evidence is rare, Farag and Mallin (2017) examined the influence of board diversity on bank performance in the aftermath of the global financial crisis. Their results showed that a critical mass of female representation on both the supervisory board and the board of directors may reduce banks' vulnerability to financial crisis. That said, the significant change in the status of women in Egypt after 2011, as well as the apparent attention given to increasing women's representation and inclusion on different fronts, offers a unique opportunity to generate broader knowledge of the impact of diversity.

Thus, the authors argue that, given the nature of the revolution, which represents a sudden change in both the status of women in Egypt and the internal and external factors that could affect the relationship between gender diversity and firm performance, examination of the relationship between the two variables in a context characterised by turmoil and upheaval, coupled with an increased role of women in social life, is warranted. Finally, given the currently limited evidence on whether gender diversity has a significant effect on firm performance during times of uncertainty, the authors assess whether such diversity has positive organisational outcomes during times of uncertainty. Thus, the hypothesis is as follows:

The relationship between boards' gender diversity and firm performance changed after the 2011 Egyptian Revolution, such that increased gender diversity enhanced firm performance.

4. Methodology, Data and Sample

4.1. Main Regression Model

Studies on the impact of diversity on firm performance have provided evidence on the positive relationship between board gender diversity and firm performance; however, such studies have also noted that the results might be subject to endogeneity issues. Thus, observed differences in firm performance could have been caused by unobservable heterogeneity across firms, or observable determinants of firm performance that were omitted from the analysis (Nikolaev and Lent 2005). This problem can best be tackled via a natural experiment conducted in the context of an exogenous shock to board diversity itself (Wintoki et al. 2012). Such shocks include the introduction of legal quotas, and new regulations or listing rules that affect board structure. The Egyptian Revolution is used to represent an exogenous shock to the economic sectors that disrupted both political linkages and the relationship between board diversity and the financial performance of the companies studied. The authors' reasoning for focusing on this event is as follows: although political upheaval was not immediate, the revolution was unexpected, and its outcomes were not predictable. Moreover, the period that followed the revolution entailed several chaotic shifts in political (and, concurrently, economic) power. In such a setting, it would not be expected that firms have continuously optimised their board structures. Thus, this study aims to assess the impact of gender diversity on firm performance using the same model for two periods. The multivariate model includes firm performance as the dependent variable and board diversity and control variables as the independent variables:

$$FirmPerformance_{it} = \beta_0 + \beta_1 Female_{it} + \beta_2 Foreign_{it} + \sum \beta_n Controls + \varepsilon_{it} \quad (1)$$

The dependent variable (*Firm Performance*) is captured through several indicators using accounting measures, including return on assets (*ROA*), return on equity (*ROE*) and return on invested capital (*ROIC*), providing evidence regarding firms' past performance. ROA has been the most commonly used measure of firm performance in the literature (e.g., Easterwood et al. 2012; Erhardt et al. 2003; Shrader et al. 1997). In addition to ROA, ROE and ROIC are used to measure firm performance. The market-to-book ratio (*MTB*) is also used to measure firms' market performance. Measuring firm performance throughout the literature has been performed through two measures: accounting and market performance (e.g., Ararat and Yurtoğlu 2021; Mertzanis et al. 2019).

The main board diversity measure is gender diversity, which is measured by the ratio of the number of women to the total number of board members (*Female*). The authors also control for national diversity, which is operationalised by the ratio of foreigners (*Foreign*). In all models, several firm characteristic measures (leverage, firm size and audit-firm size) are added as control variables. All variable definitions and data sources are detailed in Table 2.

4.2. Sample

The sample includes the top 50 "most active" (a term used by the Egyptian Exchange (EGX) to represent trading volume) companies listed on the EGX (EGX 50). The Disclosure Department at EGX published data on EGX 50 in a so-called "Disclosure Book" which included board structure information that was only available to firms included in this publication. The Disclosure Book was published for 2005 through 2011, which was the last year of its issuance. Board structure data was retrieved manually for seven years (2005–2011) from the Disclosure Book for EGX 50 companies. Data was manually collected for the years 2012–2014 from other publicly available sources, including companies' annual reports and websites. Data on firm performance, and on the financial characteristics used as control variables, were collected from Thomson Reuters.

Table 2. Definitions of variables.

Category	Abbreviation Used in Statistics	Variable	Measurement
Firm performance	ROA	Return on assets	(Net income − bottom line + ((interest expense on debt-interest capitalised) × (1 − tax rate)))/average of last year's and current year's total assets × 100
	ROIC	Return on invested capital	(net income − bottom line + ((interest expense on debt − interest capitalised) × (1 − tax rate)))/average of last year's and current year's (total capital + short-term debt and current portion of long-term debt) × 100
	ROE	Return on equity	(Net income − bottom line − preferred dividend requirement)/average of last year's and current year's common equity × 100
	MTB	Market-to-book value	Market value of ordinary (common) equity/balance sheet value of ordinary (common) equity in company
Independent variables	Female	Female BOD (board of directors)	Number of female board members/total number of board members
	Foreign	Foreign BOD	Number of foreign board members/total number of board members
Control variables	Firm Size	Total assets	Log of total assets
	Auditor Type	Auditor type	1 = Audited by a Big 4 0 = Audited by a non-Big 4
	Leverage	Total debt % common equity	(Long-term debt + short-term debt + current portion of long-term debt)/common equity × 100

This table explains the main variables used in the empirical analysis and how they were measured. Source: Firm performance and control variables were retrieved from Thomson Reuters database. Independent variables were retrieved from the 'Disclosure Book' published by EGX, companies' annual reports, and companies' websites.

As the authors aimed to check the outcome of the regime change occurring in 2011 on board structure, and its role in predicting firm performance, data for 2012–2014 was collected for the same companies that were listed on EGX 50 during 2005–2011. Checking the number of companies with full datasets for the 10-year period (2005–2014) after removing companies with missing data resulted in 311 firm-year observations for 2005–2011 (pre-2011) and 88 observations for 2012–2014 (post-2011).

4.3. Descriptive Statistics and Univariate Analysis

Descriptive statistics of the main variables of interest before and after 2011 are provided in Table 3. The means of all performance measures, including ROA, ROE, ROIC and MTB decreased by almost half post-2011, indicating the instability in the economy post-2011. Table 3 also shows the similarity in the board structure variables (percentage of females on the board and percentage of foreign directors) in the two periods under study. Descriptive statistics for firm characteristics (size of audit firm, firm size and leverage) are also reported in Table 3, which reveals that there was a decrease in debt as measured by leverage.

The percentage of females on the board varied between 0% and 50% post-2011, and between 0% and 45% pre-2011. On average, female representation on corporate boards increased from 9% to 11% after the revolution, with median values of 7.69% and 9.55% before and after the revolution, respectively. Therefore, the descriptive statistics show that there was an increase in the presence of females on corporate boards after the revolution. The authors argue that the figures are still low, but the increase is significant; therefore, any changes in the impact of women on boards can be attributed not to approaching a critical mass, but to changing board culture and attitudes towards women that enabled women to contribute.

Table 3. Descriptive statistics.

Variable	Pre-2011						Post-2011					
	Observations	Mean	Median	SD	Minimum	Maximum	Observations	Mean	Median	SD	Minimum	Maximum
ROA	311	9.41	7.59	11.05	−25.89	107.58	88	4.95	3.12	8.40	−13.20	34.69
ROE	311	18.03	15.16	23.04	−91.87	161.54	88	7.59	6.32	14.92	−25.66	62.72
ROIC	311	13.81	11.33	16.59	−90.51	124.39	88	7.94	5.80	13.27	−15.53	62.73
MTB	291	2.70	1.78	3.16	0.27	24.85	78	1.36	0.98	1.21	0.29	8.06
Female	311	9.22	7.69	10.46	0.00	45.45	88	10.92	9.55	11.69	0.00	50.00
Foreign	311	6.29	0.00	15.16	0.00	90.91	88	8.33	0.00	20.48	0.00	90.91
Auditor Type	311	0.56	1.00	0.50	0.00	1.00	88	0.60	1.00	0.49	0.00	1.00
Firm Size	311	14.71	14.63	1.65	10.87	18.37	88	14.37	14.11	1.68	11.11	18.03
Leverage	311	57.25	22.52	84.61	0.00	644.02	88	43.85	16.61	75.88	0.00	397.76

This table presents summary statistics on the variables used in the empirical analysis. All variables are defined in Table 2.

The percentage of foreign directors ranged between 0% and 90%, with means of 6.29% and 8.33% for the pre-2011 and post-2011 periods, respectively, whereas the median was 0.00% in both periods. These figures demonstrate a large variation between firms in terms of their percentage of foreign directors.

Table 3 also shows that around 60% of the sampled firms were audited by one of the Big 4 audit firms post-2011, consistent with an influential belief that large accounting firms imply better quality of reported financial statements. Firm size shows relatively limited variation. This reflects that the sample consists of the most liquid and largest firms before 2011. On the other hand, debt level (leverage) shows high variation, with a range between 0 and 644 and a mean (median) of 57.25 (22.52) pre-2011, whereas the variation decreased drastically after the revolution to between 0 and 398, with a mean (median) of 43.85 (16.61).

Table 4 presents correlations for the main variables of interest. For assurance, Spearman's non-parametric coefficients in Panel A and Pearson's parametric coefficients in Panel B are both reported. The two panels in Table 4 report the coefficients pre-2011 and post-2011 below and above the diagonal, respectively. The correlations between the independent variables are not significant (below 0.7), and thus do not appear to pose multicollinearity issues.

Table 4. Correlation analysis.

Panel A: Spearman's Correlations

Variable	ROA	ROIC	ROE	MTB	Female	Foreign	Auditor Type	Firm Size	Leverage
ROA	1.000	0.920 ***	0.865 ***	0.363 ***	0.154	0.124	0.114	−0.112	−0.254 **
ROIC	0.870 ***	1.000	0.963 ***	0.409 ***	0.094	0.150	0.206 *	0.012	−0.245 **
ROE	0.832 ***	0.943 ***	1.000	0.363 ***	0.109	0.086	0.185 *	0.006	−0.250 **
MTB	0.352 ***	0.469 ***	0.480 ***	1.000	−0.037	0.120	0.234 **	−0.128	−0.146
Female	−0.023	−0.036	−0.086	−0.043	1.000	0.024	−0.281 ***	−0.203 *	−0.281 ***
Foreign	0.072	0.182 ***	0.217 ***	0.177 ***	−0.007	1.000	0.217 **	0.347 ***	0.061
Auditor Type	−0.066	−0.028	−0.010	0.081	−0.154 ***	0.412 ***	1.000	0.172	0.245 **
Firm Size	−0.043	0.084	0.162 ***	0.091	−0.160 ***	0.468 ***	0.350 ***	1.000	0.447 ***
Leverage	−0.075	−0.105 *	0.072	0.146 **	−0.058	0.282 ***	0.243 ***	0.381 ***	1.000

Panel B: Pearson's Correlations

Variable	ROA	ROIC	ROE	MTB	Female	Foreign	Auditor Type	Firm Size	Leverage
ROA	1	0.947 ***	0.906 ***	0.439 ***	0.159	0.117	0.087	−0.071	−0.180 *
ROIC	0.827 ***	1	0.959 ***	0.434 ***	0.127	0.133	0.104	−0.018	−0.196 *
ROE	0.787 ***	0.895 ***	1	0.301 ***	0.143	0.095	0.081	−0.031	−0.305 ***
MTB	0.111 *	0.282 ***	0.329 ***	1	0.030	0.179	0.184	−0.016	0.280 **
Female	−0.065	−0.082	−0.130 **	−0.060	1	0.150	−0.285 ***	−0.202 *	−0.078
Foreign	0.077	0.163 ***	0.210 ***	0.085	0.023	1	0.252 **	0.243 **	0.023
Auditor Type	−0.019	−0.042	0.016	−0.072	−0.175 ***	0.352 ***	1	0.236 **	0.215 **
Firm Size	0.041	0.075	0.152 ***	0.022	−0.155 ***	0.391 ***	0.360 ***	1	0.360 ***
Leverage	−0.065	−0.063	0.122 **	0.133 **	−0.020	0.160 ***	0.173 ***	0.280 ***	1

Table 4 shows that the percentages of females and foreign directors on the board do not seem to be correlated before or after 2011. This table shows correlation coefficients between all the variables used in the empirical analysis. Panel A shows the Spearman's correlations and Panel B shows the Pearson's correlations. Pre-2011 correlations are provided below the diagonal, whereas post-2011 correlations are above. All variables are defined in Table 2. *** correlation is significant at the 1% level; ** correlation is significant at the 5% level; * correlation is significant at the 10% level.

5. Empirical Results

First, an *OLS* regression is run with all observations to investigate the association between the ratios of female and foreign directors and firm performance during the period from 2005 to 2014. The results of this regression are reported in Table 5. Table 5 shows that, on average, there is no significant association between the ratio of female board members and firm performance, whereas the presence of foreign directors has a significant and positive relationship with firm performance for the same period, when all observations for the total period under investigation are pooled in the regression. These results follow

Detthamrong et al. (2017) reporting no significant impact of board gender diversity on firm performance in Thailand. In addition, the positive association between the presence of foreign board members and firm performance follows results reported by Guney et al. (2020) in East African frontier markets.

Table 5. Pooled OLS.

Variable	(1) ROA	(2) ROE	(3) ROIC	(4) MTB
Female	0.019	−0.062	−0.013	−0.104 *
	(0.389)	(−1.197)	(−0.245)	(−1.915)
Foreign	0.032	0.112 **	0.119 **	0.150 ***
	(0.664)	(2.120)	(2.199)	(2.690)
Auditor Type	0.015	−0.079	−0.075	−0.220 ***
	(0.304)	(−1.461)	(−1.360)	(−3.764)
Firm Size	0.197 ***	0.155 ***	0.167 ***	−0.085
	(3.594)	(2.624)	(2.754)	(−1.366)
Leverage	−0.207 ***	−0.083 *	−0.195 ***	0.071
	(−4.508)	(−1.665)	(−3.838)	(1.357)
Observations	399	399	399	399
Adjusted R2	0.367	0.261	0.225	0.244
Year fixed effect	Yes	Yes	Yes	Yes
Industry dummy	Yes	Yes	Yes	Yes

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. This table shows the results of the OLS regression specified in Equation (1). In this table, the results of the pooled OLS regressions are presented for all firm-year observations. Columns (1), (2), (3), and (4) use ROA, ROE, ROIC, and MTB, respectively, as the dependent variable proxying firm performance. All variables are defined in Table 2.

Next, a regression to test the hypothesis is run. The main test was an *OLS* regression, as described in Equation (1), across two different subsamples (time periods): before and after 2011. The results of this test are shown in Table 6. The results show that none of the dependent variables is significantly associated with the presence of women on the board (except for ROE at the 10% level) before 2011. However, the presence of women on the board appears to have been a positive and significant determinant of most of the firm performance proxies (*ROA*, *ROE* and *ROIC*) after 2011, with models generally more capable of explaining variations in firm performance—except for *MTB*, which changes its direction from negative to positive, but remains insignificant. This shows that in the post-2011 period, overall, the presence of women on boards led to better performance of firms in all performance measures.[2] There are two possible explanations for the insignificant relationship between the presence of women on the board and *MTB* values. First, capital markets were still dysfunctional, with a significant capital flight in the post-2011 period. Second, the post-2011 period in the sample is characterised by increased political uncertainty. Models of political risk predict that increases in political uncertainty will lead to a decrease in stock prices (Liu et al. 2017). Thus, the relationship between firm-level performance and *MTB* ratio is more likely to be influenced by the witnessed decrease in stock prices, which will lead to a decrease in the MTB ratio.

The results confirm that the relationship between board diversity and firm performance changes in the event of an external shock and reflects changes in the board dynamics in response to changes in the competitive environment. These results resemble the findings of Yang and Zhao (2014), who reported a conditional effect of CEO duality on performance in the event of an exogenous shock. Findings also report that different diversity attributes are more likely to have a positive influence on firm performance, and that woman directors may make unique positive contributions, while foreign directors have no effect. Table 6 also shows that firm size and leverage are significant determinants of firm performance before and after 2011, while the relationship between leverage and various performance proxies is negative and significant before and after 2011. Interpretation of these findings is

that the revolution, as an exogenous shock to the Egyptian market, did not influence the relationship between firm fundamentals and firm performance. Results also support the notion that the macroeconomic and political environment can affect the quality of corporate governance and boards' role in emerging economies (Ugur and Ararat 2006).

Table 6. Pre- and post-revolution: board diversity.

Variable	Pre-2011				Post-2011			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	ROA	ROE	ROIC	MTB	ROA	ROE	ROIC	MTB
Female	−0.001	−0.100 *	−0.04	−0.095	0.303 **	0.381 ***	0.305 **	0.173
	(−0.017)	(−1.665)	(−0.641)	(−1.484)	−2.317	−2.999	−2.221	−1.406
Foreign	0.071	0.178 ***	0.185 ***	0.134 **	−0.206 **	−0.224 *	−0.182	−0.069
	(1.199)	−2.847	−2.884	−1.985	(−1.703)	(−1.901)	(−1.430)	(−0.607)
Auditor Type	0.013	−0.098	−0.091	−0.239 ***	0.126	0.109	0.098	0.034
	(0.223)	(−1.528)	(−1.388)	(−3.414)	−0.995	−0.885	−0.73	−0.284
Firm Size	0.134 **	0.114	0.125 *	−0.073	0.350 **	0.348 ***	0.320 **	0.001
	(2.018)	−1.626	−1.727	(−0.979)	−2.626	−2.687	−2.283	−0.005
Leverage	−0.185 ***	−0.006	−0.156 ***	0.102 *	−0.224 *	−0.298 *	−0.232 *	−0.033
	(−3.384)	(−0.107)	(−2.608)	−1.659	(−1.816)	(−2.486)	(−1.789)	(−0.261)
Observations	311	311	311	291	88	88	88	78
Adjusted R2	0.285	0.196	0.151	0.145	0.285	0.324	0.21	0.447
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. This table presents the results of the re-estimation of the OLS regression specified in Equation (1) across two subsamples. The first subsample (pre-2011) includes firm-year observations of the pre-2011 period, while the second subsample (post-2011) includes firm-year observations of the post-2011 period. Columns (1) and (5) employ ROA as the dependent variable, Columns (2) and (6) employ ROE as the dependent variable, Columns (3) and (7) employ ROIC as the dependent variable, and Columns (4) and (8) employ MTB as the dependent variable. All variables are defined in Table 2.

In summary, findings show that after a significant change in the role of women due to the political and social changes taking place in Egypt after 2011, an unprecedented positive and significant relationship between board gender diversity and firm performance can be observed. This evidence provides significant support for discourse seeking to promote the presence of women on corporate boards and, unlike other studies, shows that the importance of gender diversity could be even more significant during times of turmoil and a lack of economic stability.

6. Conclusions

Despite the growing literature on board diversity in corporate boards, evidence has been mixed on the association between various diversity attributes and firm performance. This has largely been attributed to contextual differences and endogeneity issues. In this paper, the authors employ a novel approach that mitigates the endogeneity challenge in the setting of a radical change in the environment firms face benefiting from an external shock. Findings show that gender diversity is a significant determinant of firm performance when firms' political and economic environment becomes complex and unpredictable. Based on the contradictory results for directors' nationality diversity, it is reported that not all diversity attributes function in the same way and it is suggested that researchers should be careful about using holistic diversity measures. The results provide further support to the argument that women can make a unique contribution to firm performance during difficult times based on their different cognitive abilities compared to men. They may also contribute more when their contribution is valued more.

The study is subject to the following caveats. First, results may not apply to other countries, since each emerging economy varies in a different way and the authors chose an emerging economy, Egypt, as the current context. Second, the sample size is relatively small limiting the number of control variables that the authors could use in the estimations. Finally, the authors acknowledge that controlling for board independence is expected to improve the explanatory power of the models and reduce the potential bias of omitting

a correlated variable. However, this variable is not available for the sampled firm-year observations since the classification was introduced in Egypt after the study period.

Accordingly, we believe that this study has academic implications through supporting future research as follows. First, it lays the groundwork for future research to explore how the relation between board diversity attributes and firm performance could be affected by changes in the macroeconomic (country-level) context, by employing a natural or quasi-natural experiment as per this study. Second, the increased frequency of drastic changes in a political environment offers opportunities for using new lenses in governance research. Additionally, future research on the moderating effect of board dynamics and board culture on the relation between gender diversity and performance in the presence of an exogenous shock would provide insights into the channels through which the benefits of diversity may materialize. In addition, these findings can provide policy makers, regulators, investors and other stakeholders with a broader perspective that could help assess the relationship between board diversity and firm performance in listed companies in Egypt or in other emerging markets. Finally, these findings support the importance of women's role in society, especially during periods of uncertainty and when external shocks are occurring in the economy.

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Notes

1 Egypt had a quota for women in parliament from 2010 to 2012. The quota was abolished in 2012 when the constitution was changed by the Islamist government. It was reinstated in the 2015 constitution. Further details about the constitution articles are available at: https://www.idea.int/data-tools/data/gender-quotas/country-view/100/35 (accessed on 25 March 2021).

2 In untabulated regressions, the authors examined whether the period post-2011 was associated with firm performance. The coefficient of the dummy variable post-2011 is negative and significant at the 1% level.

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The Role of Investor Relations and Good Corporate Governance on Firm Performance in the Case of the Companies Listed on the Bucharest Stock Exchange

Bogdan Aurelian Mihail [1,*], Dalina Dumitrescu [2], Daniela Serban [1], Carmen Daniela Micu [3] and Adriana Lobda [3]

[1] Doctoral School of Finance, Bucharest University of Economic Studies, 6 Piata Romana, 010374 Bucharest, Romania; daniela.serban@gmx.com
[2] Department of Finance, Bucharest University of Economic Studies, 6 Piata Romana, 010374 Bucharest, Romania; dalina.dumitrescu@fin.ase.ro
[3] Department of Masters in Board Practice and Directorship, Henley Business School, University of Reading, Greenlands Campus, Henley-on Thames, Oxfordshire RG9 3AU, UK; carmen.micu@envisia.eu (C.D.M.); adriana.lobda@envisia.eu (A.L.)
* Correspondence: bog.mihail@gmail.com

Abstract: The objective of this paper is to investigate the role of Investor Relations (IR) in the performance of companies listed on the Bucharest Stock Exchange. The study is motivated by the findings in the literature that investor relations may boost information disclosure, analyst following, institutional investor share, liquidity, and business valuation. The current article contributes to the relevant literature by making use of the recently released unique database of VEKTOR scores on company investor relations for 2019 and 2020. The main finding based on regression methodology shows that IR scores have a strong positive relationship with firm performance. Specifically, a one standard deviation rise in the IR score corresponds to a 2.6% rise in company ROA. Companies may be advised to strengthen their investor relations based on these findings about the beneficial role of investor relations.

Keywords: corporate governance; investor relations; firm performance; Bucharest Stock Exchange; Romania

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1. Introduction

Investor Relations (IR) is a relatively new area of corporate governance that tries to improve the transparency and accountability of companies and strengthen their visibility and attractiveness for investors (Craven and Marston 1997; Marston and Stracker 2001; McCahery et al. 2013; Crifo et al. 2019). According to Bushee and Miller (2012), "institutional investors and security analysts tend to neglect firms that lack visibility-enhancing characteristics, such as large size, high liquidity, and prominent exchange listing" (p. 868). Hence, it seems that firms' size and other leading indicators can be the main factors attracting large investors in stock markets, thereby creating a size premium in the stock markets. The authors note that IR can play an important role in addressing this problem in terms of providing voluntary disclosure of additional information and providing access points for the investors. Bushee and Miller (2012) note that while voluntary disclosure of information can help, there can still be a size premium in the sense that less visible and smaller firms can face challenges in attracting investor attention and funds. It is very important for any publicly traded company to communicate with its investors in an efficient and transparent way, using an investor relations department that is actively involved in the coordination of the meetings and conferences with shareholders and press and ultimately has the responsibility for timely release of financial information or any other information that may be of interest for shareholders or other stakeholders. Then, the benefits of IR and whether these benefits differ across firms stand out as an important research question.

The present study aims to examine the above research questions for the companies listed on the Bucharest Stock Exchange (BVB). Specifically, the study documents different board characteristics of the companies, examines their corporate governance scores, including IR dimensions, and looks at the relationship of both board characteristics and IR scores with the financial performance indicators. In this way, it aims to see if the IR practices can be an important corporate governance strategy for the companies listed on BVB. The relevant literature on IR is relatively new and scarce compared to other dimensions of corporate governance. This is very evident in the case of the companies listed on the Bucharest Stock Exchange. There are only a few studies that examine the IR issues for public companies in Romania, and they try to measure IR using different indicators (Popa et al. 2008; Achim and Borlea 2014; Achim et al. 2016). This lack of a consistent and comprehensive IR indicator becomes a major shortcoming of the existing literature. The present paper overcomes this shortcoming by using a newly generated institutional indicator called VEKTOR. As discussed in the data and methodology section, this indicator documents various dimensions of IR for the companies listed on the BVB in a consistent way. The VEKTOR indicator has been released only since 2019 and the 2019–2020 period is used for research in the present paper. Hence, the current study has an important data advantage over the existing studies. Then, using the dataset, it examines the effects of IR on the financial performance indicators of public companies in Romania and contributes to this literature by expanding the empirical evidence set in the case of the companies listed on the BVB. The findings indicate that higher IR positively affects the performance indicator of return on assets (ROA). Specifically, a one standard deviation rise in the IR score corresponds to a 2.6% rise in company ROA. This finding also has important consequences for policymakers and managers. Namely, it implies that increasing the IR requirements can be part of the best-practice corporate governance measures and executives can use IR measures to improve financial performance and investor attention.

The paper is structured as follows. The Section 2 provides a short literature review on the topic. Then, the Section 3 describes the details of the data and research methods used in the analysis. The empirical findings are presented in the Section 4. The Section 5 concludes the paper.

2. Literature Review

Corporate governance is a broad term that includes many dimensions and characteristics like boards, committees, executive pay, shareholder rights, and corporate social responsibility (Becht et al. 2003; Bebchuk et al. 2009; Larker and Tayan 2015; Solomon 2020). There are many studies that provide both theoretical discussions and empirical findings on these dimensions of corporate governance. In this context, a relatively new topic is Investor Relations (IR). In an early study, Brennan and Tamarowski (2000) examine the causal role of IR. The authors argue for the presence of a causal mechanism running from IR activities to the number of analysts following the relevant stock, then from the number of analysts to the liquidity of firm shares, and finally from liquidity to the cost of capital or financial performance of the company. In order to display the relevance of this causal chain, the authors use the existing evidence in the literature and also conduct their empirical analysis. They find supportive evidence for all three chains of the causal mechanism and conclude that "a firm can reduce its cost of capital and increase its stock price through more effective investor relations activities, which reduce the cost of information to the market and to investment analysts in particular" (Brennan and Tamarowski 2000, p. 26). While this study displays possible causal effects of IR, one issue in the relevant literature is the measurement of IR in a comparable way across firms. Agarwal et al. (2008) overcome this issue by using "The Annual Investor Relations Magazine Investor Relations Awards from 2000 to 2002" as a proxy for the quality of IR in companies. The authors show that being nominated by this award is associated with superior abnormal returns, higher analyst following, and higher liquidity in the following periods. In a similar study, Chang et al. (2008) examine the internet activities of companies to determine the quality of their IR practices. After

developing relevant metrics, the authors find that firms that provide higher quality information via IR activities are generally larger, they have higher levels of analyst or trader following, and a larger share of institutional investors. Overall, these studies show that IR can be important to improve the visibility, liquidity, and performance of companies in the stock markets. However, these studies also show that larger firms benefit highly from these activities, indicating the presence of a size premium in IR.

Bushee and Miller (2012) focus on the size premium in IR practices. The authors note that for small and less visible firms, it might not be possible to have high benefits from IR even if these firms enhance the quality and transparency of information disclosures. To see this possible effect of firm size on the effects of IR, the authors examine the case of 210 small and mid-cap companies. In terms of the relevant policy change, the authors examine the hiring of IR firms by the stock market companies. The authors find that this specific policy was effective in terms of analyst following, a higher share of institutional investors, and higher valuation. Similar results are obtained in more recent papers as well. For example, Kirk and Vincent (2014) examine the case of publicly traded companies and show that "companies initiating internal professional IR experience increases in disclosure, analyst following, institutional investor ownership, liquidity, and market valuation relative to a matched sample of control firms" (p. 1421). In another recent paper, Chapman et al. (2019) show the beneficial effects of having an in-house IR officer by helping efficient information sharing with market players.

Xiao et al. (2007) is a relevant study that examines the role of IR in the case of Chinese companies. The authors look at the possible associates of the IR index developed academically and find that IR intensity is positively related to the outside ownership share, the separation of the CEO and chairperson positions, and firm size. Rodrigues and Galdi (2017) examine the case of Brazilian companies in terms of whether IR activities reduce information asymmetries between firms and investors. The authors conduct regression analysis using the collected IR information from the annual reports and find that more effective IR is associated with lower bid-ask spreads. Hence, this study displays the importance of IR in terms of addressing market inefficiencies. This point is stated by Laskin (2021) as follows: "Efficient markets require information in order to function properly" (p. 3). Overall, this growing literature shows various benefits of investor relations for publicly traded companies.

In addition to the above studies that mainly focus on developed stock markets, there are also some studies that look at the effects of investor relations in the context of corporate governance in Romania. In a relatively early study, Popa et al. (2008) look at the possible effects of the internet-based IR activities of companies in the BVB. Specifically, the authors examine the internet disclosures for investors and construct an IR score based on these disclosures. They find that out of 87 firms in the stock market, 72 had an active website as of 2007. Among these, 45% use the internet as an alternative publication media, 27% use it for investor communication, and 19% exploit internet features extensively for IR purposes. Based on these numbers, the authors argue that the companies listed on the BVB do not utilize internet-based IR strategies extensively or effectively. Achim and Borlea (2014) is a more recent study in this context. The authors examine the quality of corporate governance in the BVB and include IR as a dimension of this analysis. For the IR dimension, the authors collect information by using a short questionnaire with 10 questions, including the presence of an IR officer/unit or active communication with investors. Then, using the relevant scores, the authors rank the sectors for the companies listed on the BVB in terms of the quality of corporate governance practices. While these two studies provide valuable information on the IR conditions for the companies listed on the BVB, they do not look at the effects of IR strategies on any firm indicators like performance evaluation.

Achim et al. (2016) extend the above studies by looking at the effects of the corporate governance scores, including the IR dimension, on various strategies and outcomes like the "Comply or Explain Statement", corporate social responsibility, financial performance, turnover growth rate, liquidity, leverage, and investment propensity. Except in the case

of effects on corporate social responsibility, the authors look at the impact of the overall corporate governance score, not the specific dimensions like the IR score. Regarding the effects on financial performance, their results indicate positive effects on the return on assets (ROA), but not on the returns on equity (ROE). Hence, this study is very relevant for the present paper; however, it does not focus on the IR dimension separately. In a recent study, Ioniţă (2020) conducts a qualitative analysis of the relationship between IR and the sustainable growth of public companies in Romania. The author argues that IR would positively affect the economic performance and the VEKTOR dataset can be used to measure the IR intensity of companies, whereas the paper does not conduct any quantitative analysis. In another recent paper, Hategan et al. (2020) show that the BVB companies actively used public reports to communicate about the consequences of the recent pandemic on their businesses. Hence, IR can also be used to improve the communication strategy of public companies in response to public health developments.

The present paper contributes to this literature by looking at the general effect of the corporate governance score, as well as the separate effect of the IR score. Overall, these findings on the IR practices of companies listed on the BVB show that companies in Romania were not very active in terms of IR and the relevant strategies were not very effective on the firm performance indicators. Then, these findings stay in contrast to the findings in advanced countries which show significant benefits of IR. Hence, there is a need to examine this research question with more recent data and use more detailed quantitative methods. The present paper fills these research gaps using recent and detailed data on the IR scores, board characteristics, and firm performances of companies at the BVB. Based on these discussions, the main research hypothesis is given as follows:

Hypothesis 1 (H1). *Active IR measures, measured by higher IR scores, are associated with the better financial performance of companies in the BVB.*

3. Data and Research Methods

3.1. Sample Selection and Variable Description

In order to examine the research question regarding the relationship between IR, board characteristics, and firm performance, detailed data are collected on these dimensions for the companies listed on the BVB. For the board and firm characteristics, the relevant variables are collected from the year ending annual reports of 70 companies for 2019 and 2020. These variables include the firm-specific variables of firm size (measured as the total revenue), return on equity (ROE), return on assets (ROA), Tobin's Q (market value as a ratio to total assets), and various board characteristics, including the board size, the shares of non-executive, independent, and women board members, the duality of the CEO and chairperson positions, and whether CEO is a woman. These variables and their short descriptions are presented in Table 1.

The discussions in the literature review showed that the main challenge in the IR studies within corporate governance literature can arise from the difficulty of getting comparable IR measures across firms. Some papers like Popa et al. (2008) and Achim and Borlea (2014) try to overcome this challenge by producing their IR scores. However, the limited comparability of these measures across years and different papers becomes a shortcoming. For the present paper, an important development on this dimension has been the publication of corporate governance and IR scores for the companies at the BVB by the Romanian Investor Relations Association (ARIR 2020). These scores are produced for the first time for 2019 and then repeated for 2020. The relevant dataset is called VEKTOR and includes scores on 15 dimensions of corporate governance and investor relations. The relevant dimensions of VEKTOR overlap closely between 2019 and 2020, while there are some changes in the content and grouping of questions. Then, the availability of the VEKTOR dataset determines the sample period as 2019 and 2020. As this index is repeated in the following years, future research can be conducted with larger datasets as well.

Table 1. Description of Firm and Board-Specific Variables.

Variable	Definition
Return on Equity	Net Profits as a ratio to Shareholder Equity
Return on Assets	Net Profits as a ratio to Total Assets
Tobin's Q	Market Value as a ratio to Total Asset
Firm size	The Total Turnover or Total Revenue
Board size	The number of members on the Board
Non-executive Share	The number of Non-executive Members as a ratio to Board size
Independent Share	The number of Independent Members as a ratio to Board size
Women Share	The number of Women members as a ratio to Board size
CEO Duality	Takes a value of 1 if the CEO has the dual duty of CEO and Chairperson
CEO Women	Takes a value of 1 if Women CEO

In contrast to the other studies on Romania, the use of the recent VEKTOR scores for the IR relations, which are comparable across firms and cover many dimensions of IR, is a major contribution of the present paper. The details of this indicator are presented in Table 2. Overall, these dimensions can be considered as the best practices regarding investor relations, and having high scores on them would be supportive of the good IR strategies. The Code of Governance adopted by the BVB also makes recommendations on the effective use of investor relations (BVB 2015).

Table 2. Dimensions of Investor Relations measured by the VECTOR 2019 Dataset.

Category	Items
A. Investor Relations Office Governance	1. Dedicated IR Contact Person/Team
	2. IR Contact Details
B. Corporate Governance Disclosures	3. Corporate Governance Section
	4. Board of Directors and Management Disclosure
	5. Key Policy
C. Engaging IR Approach	6. Financial Results Conference Calls
	7. Investor Presentation
	8. Financial Results Press Releases
	9. Investor Conferences
D. Interactive IR Tools	10. Historical Financial Results in an Easy to Process Format
	11. Conference Call Replay/Transcript
	12. Stock Price Information
	13. Use of Social Media or Other Channels for IR News
E. Analyst Coverage	14. List of Covering Analysts
F. Non-financial Reporting	15. Non-Financial Reporting

3.2. Econometric Specification

Regression methods are used commonly to examine the possible causal relationship of different board and firm characteristics on the financial performance of companies. For example, in the case of Romania, the paper by Achim et al. (2016) constructs scores of corporate governance quality, including investor relations, and then examines their effects on the firm performance indicators of ROE, ROA, and Tobin's Q using multiple regression approach. The present paper also follows a similar strategy and estimates the following regression model:

$$ROA_{it} = \beta_0 + \beta_1 VEKTOR\ Score\ for\ Investor\ Relations_{it} + \beta_2 Firm\ Size_{it} + \beta_3 BoardSize_{it} + \beta_4 Controls_{it} + \varepsilon_{it} \quad (1)$$

In the regression model, i refers to the companies and t refers to years 2019 or 2020. In terms of the dependent variable, the return on assets (ROA) is chosen as the relevant firm performance indicator. Achim et al. (2016) use different performance indicators and find

that there is a statistically significant effect of the corporate governance score on the ROA measure. Hence, this study also follows a similar approach, while the results for the other performance measures of ROE and Tobin's Q are also estimated for robustness purposes.

4. Findings

4.1. Summary Statistics and Correlation Analysis

This part presents the results of the summary statistics and the correlation analysis between the board characteristics, IR scores, and firm performance variables. In this context, Table 3 presents the summary statistics of the firm and board-specific factors, while Table 4 presents the summary statistics of the VEKTOR scores on the investor relations. It is seen that the mean ROA is 2.5%, with a standard deviation of 8.6%. In the case of ROE, the mean is estimated as 6.6%, with a standard deviation of 16.2%. The board size in the sample ranges from 1 to 11, with an average size of 5. The share of independent board members is 38%, while the share of non-executive board members is 68%. In addition, the women's share on the boards is estimated at 20%. As a relevant statistic, Table 3 also shows that 11% of the CEOs in the sample are women. Lastly, 30% of the CEOs also hold the dual position of chairperson.

Table 3. Summary Statistics of Firm and Board-Specific Variables.

Variable	Obs	Mean	Std.Dev.	Min	Max
ROA	126	2.515	8.631	−44.49	36.01
ROE	134	6.57	16.155	−52.8	76.91
Tobin's Q	119	0.677	0.664	0	3.94
Ln Size	127	18.266	2.087	12.37	23.41
Board Size	138	4.971	1.734	1	11
Independent Share	118	38.423	30.505	0	100
Non-executive Share	138	67.585	29.666	0	100
Women Share	136	20.466	23.192	0	100
CEO_duality	128	0.297	0.459	0	1
CEO_women	132	0.106	0.309	0	1

Table 4. Summary Statistics of VEKTOR Measures on Investor Relations.

Variables for 2019	Obs	Mean	Std.Dev.	Min	Max
2019 Score	70	3.564	3.113	0	10
1. Dedicated IR Contact Person/Team	70	0.586	0.496	0	1
2. IR Contact Details	70	0.357	0.228	0	0.5
3. Corporate Governance Section	70	0.214	0.249	0	0.5
4. Board of Directors and Management Disclosure	70	0.121	0.216	0	0.5
5. Key Policy	70	0.079	0.183	0	0.5
6. Financial Results Conference Calls	70	0.386	0.49	0	1
7. Investor Presentation	70	0.343	0.478	0	1
8. Financial Results Press Releases	70	0.114	0.211	0	0.5
9. Investor Conferences	70	0.086	0.19	0	0.5
10. Historical Financial Results in	70	0.2	0.403	0	1
11. Conference Call Replay	70	0.171	0.38	0	1
12. Stock Price Information	70	0.329	0.239	0	0.5
13. Use of Social Media or Other Channels	70	0.229	0.251	0	0.5
14. List of Covering Analysts	70	0.136	0.224	0	0.5
15. Non-Financial Reporting	70	0.214	0.249	0	0.5

Table 4. *Cont.*

Variables for 2020	Obs	Mean	Std.Dev.	Min	Max
2020 Score	69	3.725	3.519	0	10
1. IR Contact Details	69	0.594	0.495	0	1
2. Investor Presentation	69	0.362	0.484	0	1
3. Financial Results Conference Calls	68	0.199	0.246	0	0.5
4. Financial Results Press Releases	69	0.174	0.24	0	0.5
5. Stock Price Information	69	0.333	0.237	0	0.5
6. Investors Conferences	69	0.109	0.208	0	0.5
7. Conference Call Replay or Transcript	69	0.246	0.434	0	1
8. List of Covering Analysts	69	0.138	0.225	0	0.5
9. Historical Financial Results in an Easy Format	69	0.275	0.45	0	1
10.Use of Social Media or Other for IR News	69	0.239	0.252	0	0.5
11. Corporate Governance Section	69	0.188	0.244	0	0.5
12. Advisory' Committees	69	0.203	0.247	0	0.5
13. Board of Directors and Management Disclosure	69	0.167	0.237	0	0.5
14. Remuneration Policy	69	0.116	0.213	0	0.5
15. Non-Financial Reporting	69	0.384	0.43	0	1

Table 4 presents the summary statistics of the VEKTOR measures on investor relations. By construction, the total score can range between 0 and 10, and it is seen that the average score is 3.564 in the sample of 70 companies in 2019, while it is 3.725 in the sample of 69 companies in 2020. Hence, there was a slight improvement in the IR score in the last year. Overall, this score of around 4 out of 10 can be considered relatively low compared to the best practices identified by the ARIR (2020). The scores for specific items also display very different average and standard deviations from each other.

After displaying the summary statistics, this part also presents the cross-correlations of the leading variable in a bivariate way. The relevant pairwise Pearson correlation coefficients are presented in Table 5. It is seen that among the three indicators of firm performance, there are positive and statistically significant correlations between ROA and ROE, as well as between ROE and Tobin's Q. In addition, both ROA and ROE have positive and statistically significant correlations with the IR score, whereas the correlation between Tobin's Q and IR is not statistically significant. In addition, the correlation coefficient between ROA and IR is larger than the correlation coefficient between ROE and IR. When other correlations are examined, it is found that IR scores are positively associated with the size variables of firm size and board size. This finding can be considered to be related to the size premium that some studies in the literature obtain (Brennan and Tamarowski 2000; Agarwal et al. 2008).

Table 5. Pairwise Correlation Coefficients.

Variables	(1)	(2)	(3)	(4)	(5)	(6)
(1) ROA	1.000					
(2) ROE	0.390 *	1.000				
(3) Tobin's Q	−0.064	0.251 *	1.000			
(4) Ln Size	0.243 *	0.088	0.129	1.000		
(5) Board Size	0.208 *	0.024	0.097	0.443 *	1.000	
(6) Investor Relations Score	0.338 *	0.210 *	0.109	0.477 *	0.493 *	1.000

* Shows significance at the 0.05 level.

In addition to the above descriptive and correlation analyses presented in quantitative nature, providing some graphical analyses can also be informative. In this context, Figure 1

shows the distribution of the scores for investor relations at the BVB in 2019. It is seen that these scores are mostly clustered around low values between 0 and 4, with another small cluster at very high values between 8 and 10. Therefore, the IR practices for the companies listed on the BVB seem to differ greatly from each other.

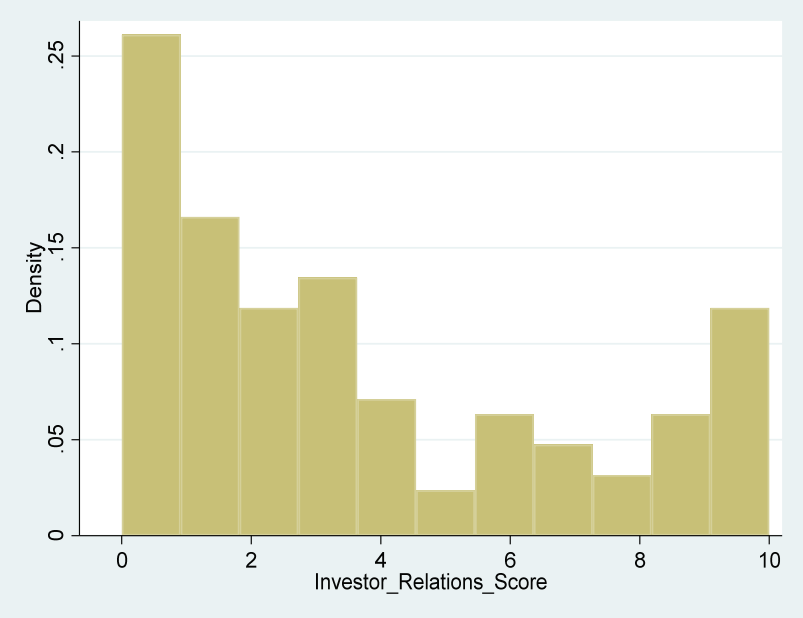

Figure 1. Scores for Investor Relations.

Figure 2 shows the scatter plot between return on assets (ROA) and the investment relations (IR) scores. It is seen that there is a mild positive association between these variables. Namely, for high values of investor relations scores (i.e., above 6 out of 10), the majority of the ROA observations are on the positive side. In contrast, for the low values of investor relations scores (i.e., less than 4 out of 10), there are many negative values of ROA. Overall, this graph shows the possible positive effects of investor relations on firm performance in the case of the companies listed on BVB.

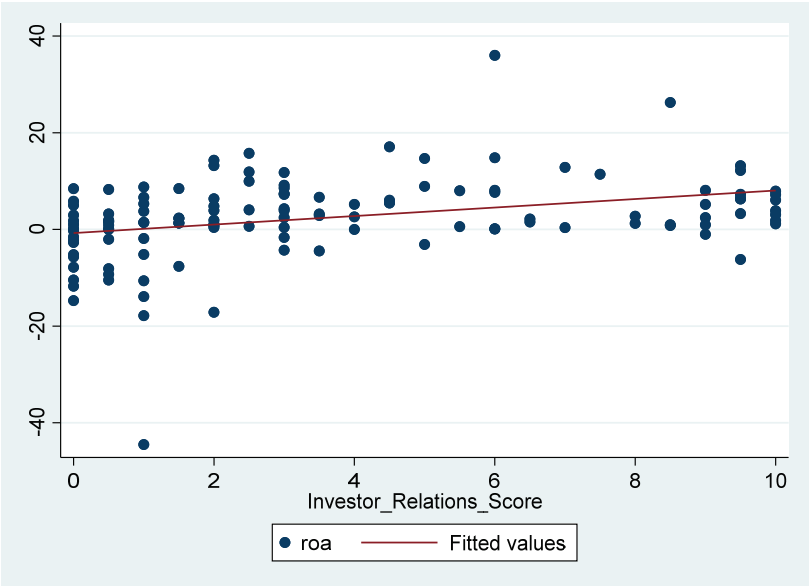

Figure 2. Scatter Plot between ROA and IR Scores.

4.2. Regression Analysis

This part presents the results of the regression results. Table 6 presents the OLS results with firm and board characteristics. Robust standard errors are estimated in the regressions in order to correct for heteroscedasticity. Given that there are only two years of observations, it is not very feasible to estimate dynamic regressions. However, as more data points accumulate in the coming years, future research can implement more advanced regression methods such as GMM estimations. In the first model given in the upper panel of the table, only two control variables of firm size and board size are included in the regression model.

Table 6. OLS Regression Results with Firm and Board Characteristics.

ROA	Coef.	St.Err.	*t*-Value	*p*-Value	[95% Conf. Interval]		Sig
Investor Relations Score	0.802	0.245	3.28	0.001	0.317	1.287	***
Ln Size	0.442	0.321	1.38	0.171	−0.194	1.079	
Board Size	0.178	0.618	0.29	0.775	−1.048	1.403	
Constant	−9.199	5.881	−1.56	0.121	−20.856	2.459	
Mean dependent var		2.672		SD dependent var		9.088	
R-squared		0.139		Number of obs		111.000	
F-test		6.777		Prob > F		0.000	
Akaike crit. (AIC)		795.384		Bayesian crit. (BIC)		806.222	
Linear regression							
ROA	**Coef.**	**St.Err.**	***t*-Value**	***p*-Value**	**[95% Conf. Interval]**		**Sig**
Investor Relations Score	0.613	0.218	2.82	0.006	0.180	1.046	***
Ln Size	0.590	0.381	1.55	0.125	−0.167	1.346	
Board Size	0.330	0.562	0.59	0.559	−0.788	1.447	
Independent Share	−0.036	0.030	−1.19	0.238	−0.095	0.024	
Non-Executive Share	0.026	0.027	0.95	0.344	−0.028	0.079	
Women Share	0.103	0.036	2.84	0.006	0.031	0.175	***
Constant	−14.196	6.856	−2.07	0.041	−27.825	−0.568	**
Mean dependent var		2.985		SD dependent var		8.563	
R-squared		0.222		Number of obs		93.000	
F-test		3.113		Prob > F		0.008	
Akaike crit. (AIC)		653.027		Bayesian crit. (BIC)		670.756	

*** $p < 0.01$, ** $p < 0.05$.

It is found from Table 6 that the IR score has a positive and statistically significant relationship with the firm performance indicator of ROA. The coefficient of 0.802 implies that one standard deviation increase in the IR score (which is 3.31) corresponds to a 2.65% points rise in the ROA measure. This is an economically sizeable effect. The lower panel of Table 6 includes additional control variables of the shares of independent, non-executive, and women board members. In this case, a positive and statistically significant effect is found for women board members. In this regression model, the adjusted R^2 value increases to 0.222, indicating higher explanatory power of the new regression model. In addition, the size of the regression coefficient for the IR score changes from 0.802 to 0.613 and is still statistically significant at the 1% level. Overall, the regression results in Table 6 support the positive effects of investor relations on the firm performance indicator of ROA.

As a robustness analysis, Table 7 shows the results of the same regression model with the addition of CEO characteristics. In this case, the women share retains its positive and statistically significant regression coefficient, while the share of non-executives has a positive effect and the share of independent board members has a negative effect. The regression coefficient of the scores for investor relations is also statistically significant at the 1% level and estimated at 0.758. Overall, these regression results provide supportive evidence on the positive effects of investor relations on the firm performance for the companies listed on the BVB, measured by ROA. This finding is also consistent with the

results of Achim et al. (2016) and Kirk and Vincent (2014). Appendix A (Tables A1 and A2) presents the regression results for the other performance indicators of ROE and Tobin's Q. Results in these cases do not show statistically significant effects of IR.

Table 7. OLS Regression Results with Firm, Board, and CEO Characteristics.

ROA	Coef.	St.Err.	*t*-Value	*p*-Value	[95% Conf.	Interval]	Sig
Investor Relations Score	0.758	0.247	3.07	0.003	0.266	1.250	***
Ln_size	0.326	0.482	0.68	0.501	−0.635	1.287	
Board_size	−0.086	0.594	−0.14	0.885	−1.270	1.097	
Independent_share	−0.085	0.039	−2.17	0.033	−0.163	−0.007	**
Non_exec Share	0.093	0.045	2.08	0.041	0.004	0.183	**
Women_share	0.107	0.039	2.74	0.008	0.029	0.184	***
CEO Duality	0.197	1.811	0.11	0.914	−3.410	3.804	
CEO Women	1.589	1.731	0.92	0.361	−1.858	5.037	
Constant	−11.192	8.737	−1.28	0.204	−28.593	6.209	
Mean dependent var		3.215		SD dependent var		8.598	
R-squared		0.254		Number of obs		85.000	
F-test		2.680		Prob > F		0.012	
Akaike crit. (AIC)		599.086		Bayesian crit. (BIC)		621.070	

*** $p < 0.01$, ** $p < 0.05$.

Overall, the relevant regression analyses imply that more active investor relations by public companies in the BVB, such as investor presentations, conference calls, press releases, stock price information, the readability of reports, corporate governance section in reports, and non-financial information reporting would be good corporate governance practices to improve the financial performance of companies. There can be various mechanisms creating this positive relationship such as lower information problems and higher investment interest. Then, these results can be used to improve the corporate governance practices for the companies listed on the BVB as well.

5. Conclusions

This paper has examined the effects of investor relations on firm performance for the companies listed on the BVB. The relevant literature displays that investor relations can improve information disclosure, analyst following, the share and participation of the institutional investors, liquidity and overall, the company performance. There are only a few studies on this topic for the case of the companies listed on the BVB, and the availability of comparable IR scores across firms is a major challenge. The present paper uses the newly generated VEKTOR scores on investor relations for the companies listed on the BVB, for 2019 and 2020. The results indicate that the IR scores have a close positive association with the firm performance indicator of ROA. The regression coefficient implies that one standard deviation increase in the IR score is associated with a 2.6% increase in the ROA. Moreover, it is found that IR scores are positively associated with the size variables of firm size and board size. These findings are generally consistent with the studies in the literature about other countries (Bushee and Miller 2012; Kirk and Vincent 2014) and about Romania (Achim et al. 2016). Hence, the present paper expands the relevant literature by contributing to the IR dimension of corporate governance from the perspective of Romanian public companies. Similar analyses can be conducted in the case of other countries to see if the results of the present paper generalise to the joint-stock companies in other countries.

Based on these findings regarding the positive effects of investor relations it can be recommended for the companies listed on the BVB to intensify their investor relations. Namely, active IR policies can be expected to decrease the intensity of information asymmetries between firms and investors, thereby decreasing the riskiness of the stock markets and improving economic efficiency. These results also imply that policymakers can increase the regulatory requirements for public companies to have more detailed and active investor re-

lations and disclosures. Future research could include more years in the analysis as new IR scores become available. As another extension, one could also create some IR scores using the reports of companies (similar to Achim and Borlea (2014) and Achim et al. (2016)) and compare them to the existing VEKTOR scores, and check the effects of other IR variables on financial performance.

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Appendix A

Table A1. OLS Regressions for the dependent variable of ROE.

ROE	Coef.	St.Err.	*t*-Value	*p*-Value	[95% Conf Interval]		Sig
Investor Relations Score	−0.210	0.580	−0.36	0.719	−1.365	0.946	
Ln_size	−0.148	0.904	−0.16	0.870	−1.948	1.652	
Board_size	1.199	1.313	0.91	0.364	−1.415	3.813	
Independent_share	0.115	0.084	1.38	0.172	−0.051	0.281	
Non_exec Share	−0.111	0.075	−1.49	0.141	−0.261	0.038	
Women_share	−0.031	0.070	−0.45	0.655	−0.171	0.108	
CEO Duality	−2.457	2.432	−1.01	0.315	−7.297	2.383	
CEO Women	−3.418	3.311	−1.03	0.305	−10.008	3.172	
Constant	11.292	15.843	0.71	0.478	−20.244	42.827	
Mean dependent var		8.354		SD dependent var		13.340	
R-squared		0.065		Number of obs		88.000	
F-test		0.604		Prob > F		0.772	
Akaike crit. (AIC)		716.794		Bayesian crit. (BIC)		739.091	

Table A2. OLS Regressions for the dependent variable of Tobin's Q.

Tobin's Q	Coef.	St.Err.	*t*-Value	*p*-Value	[95% Conf Interval]		Sig
Investor Relations Score	−0.010	0.034	−0.30	0.765	−0.078	0.057	
Ln_size	0.078	0.049	1.60	0.114	−0.019	0.175	
Board_size	0.011	0.050	0.22	0.824	−0.088	0.110	
Independent_share	0.004	0.004	1.05	0.299	−0.004	0.013	
Non_exec Share	0.001	0.003	0.41	0.681	−0.005	0.008	
Women_share	−0.003	0.004	−0.83	0.409	−0.010	0.004	
CEO Duality	−0.003	0.205	−0.01	0.990	−0.411	0.405	
CEO Women	0.356	0.256	1.39	0.168	−0.154	0.866	
Constant	−0.926	0.750	−1.24	0.221	−2.422	0.570	
Mean dependent var		0.793		SD dependent var		0.749	
R-squared		0.079		Number of obs		77.000	
F-test		2.393		Prob > F		0.025	
Akaike crit. (AIC)		184.625		Bayesian crit. (BIC)		205.719	

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Efficiency and Determinants of Capital Structure in the Greek Pharmaceutical, Cosmetic and Detergent Industries

Ioannis E. Tsolas

School of Applied Mathematical and Physical Sciences, National Technical University of Athens, 15780 Athens, Greece; itsolas@central.ntua.gr

Abstract: The purpose of this paper is to investigate the relationship between a firm's capital structure (i.e., leverage) and its operating environment, taking into account firm (i.e., efficiency, asset structure, profitability, size, age and risk) and industry effects. For a sample of Greek pharmaceutical, cosmetic and detergent (PCD) enterprises, firm efficiency was estimated using bootstrapped data envelopment analysis (DEA), and a leverage model was produced using ordinary least squares (OLS) regression. The findings confirm the significance of firm efficiency (i.e., the franchise-value hypothesis over the efficiency-risk hypothesis) and asset structure on leverage. Efficiency and overall and short-term leverage have a significant negative relationship, indicating that more efficient firms tend to choose a relatively low debt ratio. Pharma firms are more affected since they are less efficient than cosmetics and detergents firms. Furthermore, asset structure and short- and long- term leverage have a significant negative and positive relationship, respectively, indicating that the firms with more tangible assets have less short-term debt and more long-term debt in their capital structure. Cosmetic and detergent firms, which have slightly more tangible assets than pharma firms, appear to be able to substitute high-cost, short-term debt with the low-cost, long-term debt by using such assets as collateral.

Keywords: capital structure; firm efficiency; data envelopment analysis (DEA); pharmaceutical, cosmetic and detergent (PCD) firms; Greece

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1. Introduction

The capital structure of a firm refers to the amount of debt and/or equity used to fund operations and finance assets. Firms are looking for an optimum capital structure to ensure a lower cost of capital and, as a result, higher profitability. Several theories have been offered to address the various problems that firms have faced in this regard. Numerous hypotheses tested in the related literature support the challenge of providing a single capital structure mix for each industry. Many of the factors assumed to influence capital structure are either not clearly quantitative or impossible to measure, which is a major problem for researchers (Margaritis and Psillaki 2007).

The efficiency-risk and the franchise-value hypotheses (Berger and Patti 2006; Margaritis and Psillaki 2007, 2010) were tested in this study to analyze the impact of firms' technical efficiency on financial leverage that is used as a capital structure metric. The terms operational and financial leverage are used interchangeably. Fixed debt costs are tied to financial leverage, whereas fixed operational costs are linked to operational leverage (Dakua 2019).

According to the efficiency-risk hypothesis, efficient firms choose lower equity ratios than others because efficiency reduces the expected cost of bankruptcy and financial distress. Higher efficiency leads to higher expected returns of a given capital structure, and moreover, it substitutes equity to some extent to protect the firm from future crises. According to the franchise-value hypothesis, more efficient firms choose higher equity ratios to protect the economic rents or franchise value associated with higher efficiency

from the possibility of liquidation (Berger and Patti 2006). Therefore, under the efficiency-risk and franchise-value hypotheses, firms with higher efficiency ratings and hence lower potential risks of bankruptcy and financial distress may choose higher and lower debt-to-equity ratios, respectively (Margaritis and Psillaki 2007).

Frontier-based inefficiency, also referred to as X-inefficiency (Berger and Patti 2006) or technical inefficiency, as proposed initially by Leibenstein (1966), is defined as a failure to reach the efficient production frontier (Margaritis and Psillaki 2007). Competitive frontier-based approaches such as the parametric stochastic frontier analysis (SFA) (Aigner et al. 1977; Meeusen and Broeck 1977) and the non-parametric data envelopment analysis (DEA) (Charnes et al. 1978) are used to evaluate firm performance. SFA involves the econometric estimation of error term elements such as statistical noise and inefficiency, as well as the choice of a functional form of production (or cost) function. DEA is an operations research method used to calculate the efficiency of a sample of entities (e.g., firms) known as decision-making units (DMUs).

The DEA-based efficiency used in the current study demonstrates how well a firm generates profits from its different sources of capital. Efficiency ranges from zero to one, and only the units with efficiency scores of one are included in the efficiency (best-practice) frontier. DEA determines the efficient frontier by considering the optimal relationship between inputs and outputs, as well as the efficient DMUs that optimize this relationship. The ambiguity surrounding DEA rating estimates is not taken into account; therefore, any variation from the frontier is considered to be attributable to inefficiency in traditional DEA applications. There is uncertainty in DEA due to sample variability or frontier estimation, which can lead to biased DEA (point) estimations and thus incorrect conclusions. The bootstrap method (Efron 1982; Efron and Tibshirani 1993) is used to correct the calculated efficiency and produce bias-corrected efficiency (Simar and Wilson 1998, 2000a, 2000b).

The current study aims to investigate whether DEA-bootstrapped firm efficiency and selected firm-specific factors are important in capital structure decisions for a sample of Greek pharmaceutical, cosmetic and detergent (PCD) firms. Moreover, the industry effect on leverage is also investigated. PCD firms in Greece are considered a broader sector, see, e.g., Pirounakis (1997). Pharmaceuticals are seen as an industry with substantial export potential, which will help to boost the Greek economy. The pharmaceutical industry in Greece is one of the most competitive in the manufacturing sector, and it is an important element of the Greek economy (Kounnou and Kyrkilis 2020). Face, body and hair products, as well as fragrances, are the most important segments in the cosmetics industry. The manufacturing of various detergents, as well as aromatic and non-aromatic soaps in liquid and solid form, are the most important segments in the detergents industry. The purpose of this paper is to develop a leverage model by regressing leverage on DEA-bootstrapped efficiency and some other control variables.

The remainder of this paper is organized as follows: Section 2 reviews current research on capital structure and firm performance. In Section 3, the conceptual framework, methodology and data set are described. Section 4 summarizes and discusses the findings. Section 5 concludes the paper.

2. Literature Review

Capital structure is one of the most fascinating business problems, and top management and scholars are still trying to figure out the best mix of debt and equity to optimize firm value and boost investors' profits. While there has been comprehensive empirical research on capital structure, there is no universal agreement on the best debt-to-equity ratio (Vermoesen et al. 2013).

The vast majority of previous research has concentrated on identifying the factors that affect firm capital structure. To describe the impact of each firm factor on capital structure, two contrasting theories, the pecking order theory (POT) and the trade-off theory (TOT), have been proposed. The POT is based on the presence of asymmetric information between managers and investors, and according to this theory, no firm has an ideal capital

structure. Instead, companies tend to fund their operations with funding sources that have the least amount of asymmetric information, since borrowing costs are positively related to borrower information. As a result, companies prioritize their corporate financial decisions in a hierarchical order, with internal funds coming first, then debt, and eventually new equity as a last resort. The TOT claims that each firm has an optimal capital structure. This is accomplished by using an extra unit of debt to strike a balance between costs and benefits. The degree of leverage increases these costs.

In recent years, researchers have focused their attention on capital structure and firm performance using frontier methods to measure firm efficiency. Among the notable studies, there are DEA (Margaritis and Psillaki 2007, 2010; Mok et al. 2007; Seelanatha 2010; Kapelko and Lansink 2015; She and Guo 2018; Fernandes et al. 2018; Gadanakis et al. 2020) and SFA works (Weill 2008; Cheng and Tzeng 2011; Hanousek et al. 2015; Shaik 2015; Guo et al. 2021).

Firm efficiency was used as a surrogate for firm performance by Margaritis and Psillaki (2007, 2010). They investigated the bi-directional relationship between DEA-based performance and capital structure through empirical analysis. Mok et al. (2007) used Tobit regression to evaluate the impact of leverage on DEA-based efficiency for a sample of Chinese toy manufacturing enterprises. Seelanatha (2010) investigated the effects of firm efficiency, market share and industry concentration on capital structure. Kapelko and Lansink (2015) used bootstrapped DEA to estimate the efficiency of Spanish construction enterprises, and then bootstrap-truncated regression to find efficiency determinants such as leverage and other factors. She and Guo (2018) studied a sample of global e-retail firms using panel data and found them to be consistent with POT, a negative relationship between firm performance and leverage. Fernandes et al. (2018) analyzed the bi-directional relationship between technical efficiency and capital structure for a sample of Portuguese small-sized enterprises. Gadanakis et al. (2020) used double-bootstrapped DEA to investigate the relationship between efficiency and capital structure for the Italian cereal farms.

Weill (2008) investigated the relationship between leverage and corporate performance by using a stochastic cost frontier model. Cheng and Tzeng (2011) employed SFA to measure the efficiency of Taiwan manufacturing enterprises and then applied regression to techniques to examine the bi-directional relationship between leverage and efficiency. (Hanousek et al. 2015) employed SFA, and they studied factors, including leverage, that affect corporate efficiency in Europe. Shaik (2015) investigated the effect of debt risk on firm inefficiency and productivity using SFA. Guo et al. (2021) estimated firm efficiency using SFA in order to investigate the capital structure—firm performance nexus. They showed that different levels of debt financing have a different impact on corporate efficiency.

This research contributes in two ways. First, it investigated the role of profit generation and cost decisions in determining the extent of firm leverage. To do so, DEA was used to build a link between efficiency and capital structure, as well as to derive firm ratings based on how efficient their capital structure is. In particular, a DEA-bootstrapped technique was employed to measure technical efficiency, in contrast to most prior relevant DEA research, which lacked estimates of firm efficiencies' uncertainty. Second, the current study contributes to the corpus of knowledge by showing that DEA-based efficiency is an important factor in capital structure decisions.

3. Methods

3.1. Conceptual Framework

Firms can employ their assets with varied levels of managerial expertise, which is reflected in technical efficiency (Farrell 1957). A firm's technical efficiency is regarded as a performance metric, and DEA may be used to calculate it. A firm is technically efficient if it achieves high levels of net earnings before taxes without wasting financial resources (i.e., equity, and short- and long-term liabilities). The DEA model used in this study is based on

Harrison and Rouse (2016) "*Funding Efficiency Model*", and the efficiency ratings produced show how well firms maximize their return on investment.

The current work used a two-stage modeling methodology. A DEA model was employed in the first stage to measure firm technical efficiency. For instance, if a company delivers monetary outcomes (net profit before taxes) with the least number of total assets, it is considered efficient in attaining its objectives. The objective of the second stage was to regress leverage on DEA-based efficiency and some other control variables and thus provide a leverage model for a group of Greek PCD firms. In order to investigate whether efficiency is a determinant of leverage, the following hypotheses were formed:

Hypothesis 1 (H1). *The efficiency-risk hypothesis, i.e., efficiency has a positive effect on leverage;*

Hypothesis 2 (H2). *The franchise-value hypothesis, i.e., the effect of efficiency on leverage is negative.*

Two-stage DEA is a modeling tool that employs DEA to obtain efficiency ratings and then employs regression techniques such as Tobit and ordinary least squares (OLS) to investigate the impact of leverage and other firm-specific characteristics on DEA efficiency ratings. Instead of Tobit regression, Simar and Wilson (2007) recommended using an integrated with bootstrapping-truncated regression. They bootstrapped the efficiency ratings to generate bias-corrected efficiency scores and then used bootstrapped-truncated regression to regress these corrected efficiency scores on control variables. Many studies are interested in determining which regression approach is the most suitable to use. The interested reader is directed to Liu et al. (2016) for a recent review.

Another issue with two-stage DEA is the separation of the space of the DEA input–output variables from the space of the control variables. Simar and Wilson (2007) found that Tobit and OLS were ineffective and proposed bootstrapped-truncated regression, despite the fact that this technique could have the same flaw. According to Daraio et al. (2018), if the separability condition for the DEA input–output and control variables is not met, the second stage findings will have disadvantages. The separability assumption of Simar and Wilson (2007) is strong, and it is unlikely to be satisfied in real-world applications (Banker et al. 2019). Therefore, in the current paper the reverse hypothesis, i.e., leverage is a determinant of efficiency, is not investigated.

3.2. Model Building

3.2.1. DEA Modeling

The BCC variable returns to scale model (Banker et al. 1984) was adopted to account for scale effects because the sample contains firms of various sizes. In terms of model orientation, efficiency is calculated by either minimizing inputs or increasing outputs. Input-oriented models estimate the largest possible reduction in inputs for given outputs, whereas output-oriented models estimate the highest possible increase in outputs for a given quantity of inputs.

For a group of n firms, $j = 1, \ldots, n$ that use inputs $X \in \Re^m{}_+$ to generate outputs $Y \in \Re^{rk}{}_+$, the BCC input-oriented Model (1) (Cooper et al. 2007) is employed to quantify the relative technical efficiency of sample firms:

$$\begin{gathered} Min\theta \\ \text{subject to} \\ \sum_{j=1}^{n} \lambda_j x_{ij} \leq \theta x_{ij_0} \\ \sum_{j=1}^{n} \lambda_j y_{rj} \geq y_{rj_0} \\ \sum_{j=1}^{n} \lambda_j = 1 \\ \lambda_j \geq 0, j = 1,2,\cdots,n, i = 1,2,\ldots m, r = 1,2,\ldots,k \end{gathered} \tag{1}$$

where x_{ij} is the ith input used by the jth firm; y_{rj} is the rth output produced by the jth firm; θ signifies the efficiency score of firm "$_0$"; "$_0$" stands for the firm that is being assessed; and λ_j indicates the contribution of firm j in the computation of efficiency of firm "$_0$".

Model (1)'s optimal solution gives the firm "$_0$" an efficiency score. The model looks for a weighted by λ_j sum of firm outputs that is higher than firm's "$_0$" output and a weighted by λ_j sum of firm inputs that is lower than firm's "$_0$" input. For each firm, the model-solving technique is repeated, and firms with $\theta^* = 1$ and $\theta^* < 1$ are deemed efficient and inefficient, respectively. In the current study the derived efficiency ratings produced by Model (1) are bias-corrected by means of bootstrap (Simar and Wilson 1998, 2000a, 2000b).

3.2.2. The Leverage Model

The leverage model used to evaluate hypotheses H1 and H2 relates firm's leverage as a capital structure metric to firm's bootstrapped DEA-based performance as well as a range of other variables that have been found to be associated with leverage in the literature (see Margaritis and Psillaki 2007). The leverage equation is given by:

$$L_i = \beta_0 + \beta_1 TE_i + \beta_2 z_2 + v_i \quad (2)$$

where L_i is the firm leverage ratio, z_2 is a vector of factors other than technical efficiency (TE), and v_i is an error term. Under the efficiency-risk hypothesis, i.e., $\beta_1 > 0$, efficiency has a positive influence on leverage, whereas under the franchise-value hypothesis, i.e., $\beta_1 < 0$, efficiency has a negative influence on leverage.

The leverage model in this study uses three capital structure metrics as dependent variables: overall leverage (OL), i.e., the ratio of total liabilities to total assets, short-term leverage (STL), i.e., the ratio of short-term liabilities to total assets, and long-term leverage (LTL), i.e., the ratio of long-term liabilities to total assets; see also Kuč and Kaličanin (2021).

Firm size, asset tangibility, profitability, age of company and risk are the other firm-specific factors besides TE. Moreover, an industry dummy variable is used to capture the unobservable industry variant impact on leverage. The logarithm of a company's revenue (sales) is used to calculate its size. Size is expected to be positively related to leverage according to TOT since larger enterprises are more diversified and fail less frequently than smaller enterprises (Fernandes et al. 2018).

The ratio of fixed tangible to total assets is used to calculate asset tangibility (TANG). Because of asymmetric information and agency costs, lenders may be compelled to require assurances in the form of collateral. As a result, asset tangibility is assumed to be positively linked to debt (Fernandes et al. 2018).

Profitability (PROF) is determined by the ratio of pre-tax net income to total assets. On the impact of profitability on leverage, there are contradictory theoretical predictions. According to POT, profitability should be negatively associated with leverage, since profitable companies would finance their investments with internal funds first, and then turn to external financing when internal funding is inadequate. Because the most profitable companies have larger debt potential and can benefit from debt tax-shields, TOT can predict a positive association between profitability and leverage (Fernandes et al. 2018).

The age of the company is a crucial factor in measuring debt repayment and risk-taking behavior in terms of capital structure. In reality, the year a company was formed and how long it has been in service decide its age; in the current study the logarithm of age was used. When it comes to leverage and firm age, empirical research paints a mixed image. According to the TOT, age is a key determinant of a firm's reliability, and a positive relationship is predicted. Firms, according to the POT, keep their payment over time. Therefore, older firms have a considerable amount of accumulated retained earnings and depend less on external financing to complete their financial compliance than younger companies (Shil et al. 2019).

Risk is a term that refers to the possibility of failure and the potential loss of earnings, and it plays a significant role in capital structure. Risk tends to be inversely proportional

to leverage, according to finance theory. A firm with a high risk of losing money is more likely to go bankrupt and has less borrowing capacity (Shil et al. 2019). Risk, i.e., earnings variability measured as the logarithm of the standard deviation of the firm's net operating income over a 3-year period is expected to be negatively related to leverage, according to TOT (Sbeti and Moosa 2012).

3.3. Data Set

For the purposes of this study, thirty-eight PCD firms were evaluated. Twenty-two out of thirty-eight firms (58% of the total) are pharmaceuticals, eleven firms (29% of the total) are in the cosmetic industry and the remained firms (13% of the total) are in the detergent industry. Companies in the sample had financial statement data accessible between 2015 and 2017. The selected firms were evaluated by DEA to measure their performance based on the accounting data of 2017. In the first stage, the equity and short- and long-term liabilities were used as inputs, whereas net earnings before taxes was the only output. In the second stage, the firm-specific variables, except for the DEA-based efficiency, are: SIZE, which is the logarithm of sales, asset tangibility (TANG = net fixed assets/total assets), profitability (PROF = net earnings before taxes/total assets), AGE, which is the logarithm of the age of the firm, and RISK, which is the logarithm of the 3-year standard deviation of net earnings before taxes over the 2015–2017 period.

The descriptive statistics for the variables in the DEA assessment are shown in Table 1.

Table 1. Greek PCD firms: Descriptive statistics of DEA input–output variables ('000 Euros).

DEA Inputs–Output	DEA Inputs			DEA Output
Descriptive Statistics	**Equity**	**Short-Term Liabilities**	**Long-Term Liabilities**	**Net Earnings before Taxes**
Mean	21,271.74	26,968.65	12,238.60	2003.32
Standard deviation	27,246.78	42,960.74	20,708.45	5785.89
Median	12,728.29	13,154.87	3788.96	417.44
Min	33.43	1.64	8.29	−9938.19
Max	132,043.00	232,138.99	99,107.30	22,862.77

The sample firms are listed in Appendix A.

4. Results

The DEA Model (1) was employed in the first stage of analysis to estimate the technical efficiency of Greek PCD firms for the year 2017. Then, using bootstrap, the DEA efficiency scores of the firms were corrected for the bias. The bias-corrected scores were used to investigate the relationship between technical efficiency and leverage and to test the H1 and H2 hypotheses. The Model (1) was used to calculate each company's technical efficiency in minimizing equity and short- and long-term liabilities and achieving the observed earnings (i.e., net earnings before taxes). Inefficiencies account for the distance between each firm and the efficient frontier. By using statistical inference derived from the bootstrapping technique, these efficiency estimates provide insight into future improvements. The DEA efficiency calculations were corrected for bias using 2000 bootstrap samples. Table 2 summarizes results for the point (technical) efficiency, bias-corrected efficiency, and bias.

Table 2. Results (mean, standard deviation) of bias, original and bootstrapped efficiency estimates.

Estimates	Original (Point) Efficiency (%)	Bias-Corrected Efficiency (%)	Bias (%)
All firms			
Mean	40.68	28.23	12.46
Standard deviation	39.32	27.21	19.07
Pharma firms			
Mean	30.79	23.71	7.08
Standard deviation	30.54	22.31	8.90
Cosmetics-Detergents firms			
Mean	54.28	34.44	19.85
Standard deviation	46.55	32.53	26.19

Full efficiency = 100%.

As demonstrated by bias-corrected efficiencies, the magnitude of the corrected efficiencies is much lower than the point (i.e., original) efficiencies, with reduced dispersion. Because they offer a more accurate picture of the underlying efficiency, bias-corrected performance figures are favored over original efficiencies. The mean bias-corrected efficiency for all PCB firms is about 28%, indicating that each company should reduce their current financial resources by 72%, on average, achieving the current level of revenues. In comparison to pharmaceutical firms, cosmetic and detergent firms are more efficient.

The cross-efficiency method (Sexton et al. 1986) was also employed to validate the implementation of Model (1). The equivalent dual model of the BCC Model (1) focuses on self-evaluation using the model's optimal weights, whereas cross-efficiency is based on peer-evaluation using weights generated by evaluating each of the sample firms. Cooper et al. (2011) provide a detailed description of the cross-efficiency method for interested readers. The mean cross-efficiency is in-between the mean point and mean bias-corrected efficiency provided by Model (1) (mean cross-efficiency for all PCB firms: 36.50%). The cross-efficiency standard deviation (22.04 percent) is smaller than the point and bias-corrected efficiency standard deviations. For pharma and cosmetics-detergents companies, the mean cross-efficiency (and standard deviation) is 34.18% (20.38%) and 39.68% (24.46%), respectively. Detailed results are available from the author upon request. The ranking of firms does not indicate substantial variations in performance because Spearman's rank correlation coefficient between the bootstrapped and cross efficiency estimates is 0.70.

The OLS regression Model (2) was employed, which intends to examine efficiency as well as other variables as determinants of (overall, short-term, and long-term) leverage. Table 3 shows the descriptive statistics for the control variables, except for efficiency.

Table 4 summarizes the findings of the OLS regression Model (2). The OLS findings show a significant negative relationship between performance and both OL and STL ratios, supporting the franchise-value hypothesis over the efficiency-risk hypothesis. More efficient enterprises, according to the franchise-value hypothesis, tend to have more equity resources on hand; therefore, they choose lower debt levels to protect their potential earnings or franchise value, all other things being equal. Cosmetics and detergents companies appear to be more efficient (mean bias-corrected efficiency: 34.44%, mean cross efficiency: 39.68%) and choose lower debt levels (OL: 54.20%, STL: 35.40%) than pharmaceutical companies (mean bias-corrected efficiency: 23.71%, mean cross efficiency: 34,18%, OL: 58%, STL: 42.63%). The findings supporting the franchise-value hypothesis are consistent with those of Margaritis and Psillaki (2007) and Seelanatha (2010). Efficiency has a positive but insignificant effect on LTL ratio. It is worth mentioning that the average LTL ratio (16.81%) for PCB manufacturers is significantly lower than the average OL (56.40%) and STL (39.59%) ratios.

Table 3. Descriptive statistics of selected control variables.

Descriptive Statistics	OL (%)	LTL (%)	STL (%)	TANG (%)	PROF (%)	SIZE	AGE	RISK
All firms								
Mean	56.40	16.81	39.59	39.16	−0.14	16.57	3.30	13.22
Standard deviation	20.05	14.90	20.30	24.40	15.24	2.07	0.95	1.84
Median	58.62	12.29	42.56	38.37	1.82	17.15	3.77	13.58
Min	10.16	0.79	0.70	0.17	−65.76	8.98	0.69	8.15
Max	89.07	50.27	87.31	86.30	28.92	19.30	4.41	15.70
Pharma firms								
Mean	58.00	15.37	42.63	38.58	−2.07	38.55	3.30	13.23
Standard deviation	21.45	15.36	20.52	25.85	16.63	20.55	1.10	1.60
Median	59.10	9.60	44.27	38.92	1.82	45.50	3.82	13.58
Min	11.79	0.79	10.03	0.17	−65.76	2.00	0.69	9.79
Max	89.07	50.27	87.31	71.24	18.19	67.00	4.20	15.64
Cosmetics–Detergents firms								
Mean	54.20	18.80	35.40	39.95	2.52	33.44	3.31	13.22
Standard deviation	18.39	14.49	19.88	23.05	13.15	19.79	0.73	2.17
Median	54.51	17.46	37.68	38.37	2.23	27.50	3.31	13.56
Min	10.16	0.88	0.70	3.93	−26.45	4.00	1.39	8.15
Max	75.86	45.70	65.99	84.75	28.92	82.00	4.41	15.70

OL: Overall leverage; LTL: Long-term leverage; STL: Short-term leverage; TANG = Net fixed assets/total assets; PROF = Net earnings before taxes/total assets; SIZE = Ln(Sales); AGE: The logarithm of the number of years since the firm was founded; RISK: The logarithm of the 3-year standard deviation of net earnings before taxes over the 2015–2017 period.

Table 4. Leverage model: Results of the OLS regression.

Variable	Coefficient	Standard Error	t-Value	(*p*-Value)
Dependent variable: OL				
Intercept	0.418	0.3511	1.19	0.243
TE	−0.291	0.1460	−1.99	0.055
TANG	−0.142	0.1321	−1.07	0.291
PROF	0.375	0.2304	1.63	0.114
SIZE	0.048	0.0294	1.62	0.115
AGE	−0.047	0.0372	−1.27	0.215
RISK	−0.027	0.0316	−0.84	0.408
		R-squared = 0.35		
Dependent variable: LTL				
Intercept	−0.072	0.2696	−0.27	0.791
TE	0.040	0.1121	0.36	0.721
TANG	0.361	0.1015	3.56	0.001
PROF	0.201	0.1770	1.13	0.265
SIZE	0.015	0.0226	0.67	0.506
AGE	−0.015	0.0286	−0.51	0.614
RISK	−0.009	0.0243	−0.36	0.720
		R-squared = 0.31		
Dependent variable: STL				
Intercept	0.490	0.2968	1.65	0.109
TE	−0.332	0.1235	−2.69	0.012
TANG	−0.503	0.1117	−4.50	0.000
PROF	0.174	0.1948	0.89	0.379
SIZE	0.033	0.0249	1.31	0.200
AGE	−0.033	0.0315	−1.04	0.308
RISK	−0.018	0.0267	−0.66	0.512
		R-squared = 0.55		

OL: Overall leverage; LTL: Long-term leverage; STL: Short-term leverage; TE: Bias-corrected technical efficiency; TANG = Net fixed assets/total assets; PROF = Net earnings before taxes/total assets; SIZE = Ln(Sales); AGE: The logarithm of the number of years since the firm was founded; RISK: The logarithm of the 3-year standard deviation of net earnings before taxes over the 2015–2017 period; Number of obs. = 38.

The ratio of tangible (net fixed) assets to total assets is positively and substantially related to LTL ratio since tangible assets serve as a proxy for collateral. Both OL and STL ratios are negatively impacted by the ratio of tangible assets to total assets, but only STL is significantly affected. The current research supports both theoretical predictions by documenting statistically significant positive and negative coefficients for variables used to represent asset tangibility with LTL and STL ratios. These results are consistent with those of Seelanatha (2010). It is worth noticing that the average fixed tangible asset to total asset ratio does not differ much between pharma (38.58%) and cosmetic and detergent companies (39.95%).

All leverage metrics are positively, though not substantially, related to profitability, which contradicts the POT's expectations but is consistent with the TOT (Margaritis and Psillaki 2007). According to this theory, more profitable firms would raise their ideal debt-to-equity ratio because higher profitability lowers the risk of bankruptcy and financial distress associated with higher debt levels. It is worth noticing that the average profitability is lower in the pharma industry (−2.07%) compared to the cosmetic and detergent industry (2.52%). Firm size, as measured by the logarithm of sales, has a positive but insignificant impact on all leverage ratios. The firm's age, which is measured by the logarithm as the number of years after incorporation, has a negative but insignificant effect on all leverage ratios. The final explanatory variable is risk (i.e., earnings variability), which is negatively but not significantly related to all leverage metrics, according to TOT. In regard to the AGE and RISK variables, there are no substantial differences between pharma and cosmetic and detergent firms.

In order to test the results showed in Table 4, the cross-efficiency ratings were used instead of bias-corrected technical efficiency, but the findings were insignificant for almost all the explanatory variables.

Another OLS regression was performed incorporating a dummy variable to capture the unobservable industry variant impact on leverage. No evidence found to support the industry (i.e., pharmaceuticals, cosmetic and detergent) variant impact on leverage. The results are available upon request from the author. The signs for the estimated coefficients for the other control variables are to the same as the results presented in Table 4.

5. Conclusions

The current study adopted a two-stage modelling approach to investigate the relationship between firm efficiency and a range of other factors on capital structure (i.e., leverage) for a group of Greek PCD firms. Through the bootstrapped-DEA method, firm ratings reflect their relative efficient capital structure. The use of bootstrap provides the estimation of more robust efficiency scores and improves on the majority of most of the previous studies. Then, an attempt was made to explain how leverage ratios are influenced by efficiency as well as by other variables.

The following are the most important conclusions of the study: More efficient firms have a lower level of corporate leverage supporting the franchise value hypothesis, and they pick lower overall and short-term leverage ratios to safeguard their future revenue or franchise value. The pharma firms are mostly affected, as they are more inefficient compared to cosmetic and detergent firms. The firms with more tangible assets have more long-term debt and fewer short-term debt in their capital structure. The cosmetic and detergent firms with a slightly greater level of tangible assets compared to pharma firms seem to be able to substitute high-cost, short-term debt with the low-cost long-term debt by using such assets as collateral.

More profitable firms are able to increase their optimum debt-to-equity ratio because higher profitability reduces the potential costs of bankruptcy and financial distress associated with higher debt, assuming all other factors remain constant**.** The cosmetic and detergent firms that are more profitable compared to pharma firms seem to have the advantage of increasing their optimum debt-to-equity ratio.

Data gathering for the current study began three years before, and it is necessary to analyze the study's findings in light of the COVID-19 crisis. It seems only fitting, then, to wrap up the analysis with some musings on what the pandemic means for the financial structure of the companies studied. COVID restrictions have boosted revenues for huge tech firms such as pharmaceutical firms, while damaging or bankrupting numerous smaller firms that rely on the old economy (Levy 2020; Golubeva 2021). Furthermore, intellectual property rights may protect pharma companies' intangible assets for long periods of time (Baines and Hager 2021). Many companies in the cosmetics business will need to find new sources of funding as a result of the COVID-19 crisis, which has caused severe harm to their financial sheets. Although mergers and acquisitions are projected to increase, multiples may drop from pre-crisis levels (see also Gerstell et al. 2020). As for the detergent industry, due to the increase in demand for chemical materials such as detergents, their trend is expected to be higher than the general trend of the products of other sectors.

This study is useful for policy makers, regulators and investors because it provides evidence that sample firms are being deterred by high leverage due to low efficiency ratings. This is the case for the sample pharma firms as they are more inefficient compared to cosmetic and detergent firms. The cosmetic and detergent firms could take advantage of the slightly greater level of tangible assets compared to pharma firms and substitute high-cost, short-term debt with the low-cost long-term debt by using such assets as collateral. Moreover, the sample cosmetic detergent firms, as more profitable firms, can increase their optimal debt-to-equity ratio.

There are some limitations of the current research. Sample size can be questioned with regard to the number of firms and the years included in the data. The firms in the sample must have at least three years of data in order to measure earnings variability, and the choice of the three-year period requires a compromise between the number of firms that can be included in the study and the availability of sufficient firm-specific data. Although three years of data are used, adding additional years may provide an opportunity to expand the analysis. The current study can be seen as a first approach and as basis for future research on the determinants of the capital structure of the Greek PCB firms. It can be extended in the future to study a longer time period and also investigate the effects of the COVID-19 crisis.

In terms of future research directions, the study could benefit from a longer time period analysis to see whether capital structure is related to dynamic DEA-based metrics and lagged values of selected control variables and investigate the effects of the COVID-19 crisis. Moreover, although this study examines firm and industry effects on capital structure decisions for Greek PCD companies, macroeconomic factors may also be included in the analysis and therefore, the researchers wishing to continue the line of research in this article could consider factors such as interest rates and gross domestic product (GDP) in their future research.

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Conflicts of Interest: The author declares no conflict of interest.

Appendix A

The sample PCD firms are listed in Table A1.

Table A1. List of sample firms.

No.	Firms
Pharmaceuticals industry	
1	Abbvie Pharmaceuticals S.A.
2	Anfarm Hellas S.A.
3	Boehringer Ingelheim Hellas S.A.
4	Bristol Myers Squibb
5	Cooper S.A.
6	Demo S.A.
7	Doctum Pharmaceutical K. Giokaris & Co. S.A.
8	Elpen Pharmaceutical Co. Inc. S.A.
9	Galenica S.A.
10	Genepharm S.A.
11	Gerolymatos International S.A.
12	Innovis Pharma
13	Lavipharm S.A.
14	Nephroclinic S.A.
15	One Pharma Industrial Pharmaceutical S.A.
16	Pharmathen Industrial S.A.
17	Pharmathen International S.A.
18	Servier Hellas Pharmaceutique Ltd.
19	Simvis Pharmaceuticals S.A.
20	Uni-Pharma S.A. Pharmaceutical Laboratories
21	Vianex S.A.
22	Vioser Parenteral Solution Industry S.A.
Cosmetics industry	
1	Apivita S.A.
2	Bodyfarm Hellas S.A.
3	Farcom S.A.
4	Farmeco S.A. Dermcosmetics
5	Fresh Formula S.A.
6	Frezyderm S.A.
7	Gr. Sarantis S.A.
8	Hellenica S.A.
9	Korres Natural Products S.A.
10	Prodis S.A.
11	Zest Natural Cosmetics
Detergents industry	
1	Cleanway Ltd.
2	De Lux Kontelis
3	Eureka Hellas S.A.
4	Papoutsanis S.A.
5	Rolco Vianil S.A.

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Performance, Risk, and Cost of Capital: Trends and Opportunities for Future CSR Research

Asif Saeed [1,*] and Robert Sroufe [2]

[1] FAST School of Management, National University of Computer and Emerging Sciences, Lahore 54000, Pakistan
[2] Palumbo Donahue School of Business, Duquesne University, Pittsburgh, PA 15282, USA; sroufer@duq.edu
* Correspondence: asif.saeed@outlook.com; Tel.: +92-33-3630-9789

Abstract: The information within this study reviews the financial management literature focusing on proponents and opponents of corporate social responsibility (CSR). We review how CSR affects different areas of corporate finance. This study's core objective is to explore the last 20 years (2000–2019) of CSR top-tier literature to develop and theoretically support CSR and environmental management. Twenty years of publications provide a considerable amount of evidence on CSR's impacts on firm financial characteristics and some paradoxical findings. The majority of our insights support the argument that doing good is good for business. This study also highlights existing gaps in the literature. Based on our findings, we highlight three areas to further explore in the context of CSR and corporate finance: (1) Does CSR improve specific information contents in stock prices? (2) Does CSR mitigate financial distress risk? and (3) Is CSR good for firm trade credit?

Keywords: agency; corporate social responsibility; financial performance; information environment; distress risk; trade credit

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1. Introduction

In 2015, the United Nations (UN) presented the agenda of Transforming Our World: The 2030 Agenda for Sustainable Development, a plan of action for people, the planet, and prosperity. A total of 193 countries adopted this agenda for sustainable development over the next 15 years, with 17 sustainable development goals (SDGs) associated with 169 targets. Poverty eradication is one of the most significant challenges for United Nations member countries. Of the 197 parties of the UN convention in 2016, 143 ratified the Paris Agreement (member countries resolve to end poverty and hunger everywhere between now and 2030). The primary aim of the Paris Agreement is to "strengthen the global response to the threat of climate change by keeping global temperature rise this century well below 2.0 C above pre-industrial levels, and to pursue efforts to limit the temperature increase even further to 1.50 C" (The Paris Agreement 2016, p. 3 Article 2). In the European context, the main goal of the Europe 2020 strategic plan is for the EU to become a smart, sustainable, and inclusive economy.

While these global agendas provide a proving ground for CSR, we can also recall concerns from some who have said we should be leery of corporate social responsibility (CSR). Some are worried that there is a hidden agenda to CSR. Others are concerned that today's do-good companies and CEOs will end up doing bad things in the future. Other statements against CSR include but are not limited to some saying CSR strategies will hurt companies financially because they are not devoting all their attention to corporate finance and fiduciary responsibility to shareholders to increase profits (Bhandari and Javakhadze 2017). CSR can be a positive or negative opportunity for business decision-makers depending on the source of information. In this study, we argue that these ongoing global agendas and CSR-based plans are dynamic efforts. We posit that these types of efforts, when viewed through the lens of empirical work in the field, show CSR provides innovative opportunities for financial performance, risk management, and cost of capital.

To help sort this out, we draw from 20 years of prior literature to assess current trends and look for new insights.

The rest of this paper is as follows. We start with a review of the literature and define key concepts. Section three establishes the ethical arguments for the two opposing views on CSR. The fourth section explains the methods used in this study to review the literature. Section five discusses the CSR literature, three primary insights. The last section covers conclusions and opportunities for future research.

2. Literature Review

We next look at why CSR and environmental management are essential to a prosperous future and how the CSR paradigm is defined. The business literature presents several definitions of CSR. The central theme for all CSR definitions involves discretionary expenditures to improve social and environmental conditions (Groening and Kanuri 2016; Mackey et al. 2007; Margolis and Walsh 2003). CSR is defined as involving "actions that appear to further some social good, beyond the interests of the firm and that which is required by law" (McCarthy et al. 2017, p. 280; McWilliams and Siegel 2001, p. 117). For the purposes of this study, and building on the work of prior experts in CSR, we propose the following definition CSR is a firm's volunteer effort to achieve sustainable performance, by managing the social and environmental activities responsibly.

In the last two decades, a new class of socially and environmentally inclined investors and firms' evaluators has emerged: socially responsible investors. Such investors pay attention to both a company's social responsibility and stock performance and consider investing in a socially responsible firm is good for society and as an investment. To attract socially responsible investors, organizations spend more for the betterment of society. Asset managers prefer socially responsible companies, and other stakeholders (e.g., customers, suppliers, governments) are considering companies' CSR efforts. Companies organize different types of activities to support society. For example, Microsoft employees donated $1 billion in 30 years (1983–2012), and the company matched the amount through an employee giving campaign (Adhikari 2016). In 2015, Microsoft employees donated $125 million to 18,000 schools and nonprofit organizations around the world. Google directly donates 1% of its profit for charitable purposes based on its "do no evil" policy. On the same social responsibility grounds, General Electric has contributed $160 million to employee and community philanthropy programs and committed billions of dollars to develop eco-friendly products (Cheng et al. 2013). Intel has contributed $100 million to energy conservation and global education programs (Hong et al. 2012).

For-profit, as well as not-for-profit organizations, are showing interest in environmental management and social sustainability. According to a KPMG (2013) survey, 93% of Fortune Global 250 firms revealed their CSR in either a standalone report or a report integrated within the annual financial report (El Ghoul et al. 2016). Building on the CSR integration trend, Sroufe (2018) posits a theory of integrated management, saying firms managing environmental, social, and governance (ESG) performance across business functions will perform better than those not involved in CSR and ESG management. In another study, Sun and Cui (2014) explain that 90% of Fortune 500 companies are more transparent about CSR activities. For example, in the United States, one out of every nine professionally managed assets is invested in these companies with better CSR rankings valued at nearly $3 trillion. In addition, leading organizations (see, for example, Bloomberg, MSCI, SASB, GRI, CPD, among others) evaluate the corporate performance along hundreds of ESG performance metrics.

A considerable amount of literature is available regarding CSR in the corporate finance domain (see, for example, Attig et al. 2013; Herremans et al. 1993; Long et al. 2019). These studies highlight the importance of CSR strategies to enhance firm financial performance. We build on these studies while exploring and providing new insights based on a synthesis of contemporary empirical work in the field. First, we define and contextualize the notion of CSR from a proponents' view of doing good for business versus an opponent's view

of this paradigm. Our review of seminal work in the field over the past two decades explores the CSR and finance literature while finding three distinct areas of corporate finance: information environment, firm risk, and financing sources that are valuable to practitioners and scholars. Second, we discuss the critical literature in these areas and highlight a new and vital gap for future research.

Proponents and Opponents of CSR

The literature provides several theoretical frameworks for examining firms' ethical responsibility (like CSR). Carroll (1979), considered a pioneer in the CSR domain, outlines a three-dimensional corporate social performance (CSP) conceptual framework. The three dimensions are (1) the elements of CSR, (2) the social issues the organization must address, and (3) the organization's philosophy or mode of social responsiveness. In another study, McWilliams and Siegel (2001) state that the CSP model has a great deal in common with the stakeholders' perspective and is widely used in theoretical contexts.

Proponents of CSR find positive relationships between CSP and firm financial performance (Brine et al. 2007; Waddock and Graves 1997; Wu and Shen 2013). Most studies show that a firm's responsible behavior increases firm value. If CSR expenditures are made to better society and the environment, the firm value will increase because "doing good is good for business" (Adhikari 2016; Elfenbein et al. 2012; Servaes and Tamayo 2013). Prior evidence shows that CSR performance reduces competition shocks (Brine et al. 2007) and improves firm performance (Wu and Shen 2013). In a recent study, Lins et al. (2017) stressed that ethically and socially responsible firms experienced better financial performance and accelerated growth, enhanced labor productivity, and better access to finance. Overall, these studies demonstrated that a firm's ethical and social values are in the shareholders' and stakeholders' interest.

The corporate finance body of literature provides some mixed empirical results on CSR engagement. Opponents of CSR have challenged this "doing good is good for business" perspective supporting an agency perspective. Friedman's (2007) theory (this theory was first time presented by Friedman famous 1970 article in the New York Times) states that CSR engagements cause agency problems or conflicts of interest between managers and shareholders. Wright and Ferris (1997) empirically test this theory with South African data and find that stock prices reacted negatively to asset divestment announcements. Studies also show that CSR can reinforce agency problems (Adhikari 2016; Bénabou and Tirole 2010; Bhandari and Javakhadze 2017). Hemingway and Maclagan (2004) find that top management can also promote CSR to hide misbehavior. Some have even found that charitable giving goes indirectly to the CEO due to CEO-affiliated charities (Masulis and Reza 2015). More recent studies, Di Giuli and Kostovetsky (2014) find that directors' and employees' political leanings significantly affect CSR, ultimately hurting firm financial performance. Collectively, these prior studies indicate that managerial strategies under non-economic pressure create agency problems while opposing CSR efforts aligned with global agendas and country-level plans for increasing sustainable development.

Following the proponent's view, scholars have shown that if a firm constructs a CSR strategy on environmental and social grounds, the firm can take advantage of the "doing good is good for business" approach to business and financial management.

The framework provided in Figure 1 posits how these two opposing views redirect the outcomes of firm CSR policies. The basis of our framework is built on the theoretical underpinnings of prior business management work (see, for example, Flammer et al. 2019; Jones et al. 2019; Ting 2020; among others). The first theory (doing good is good for business) supports a firm's social and environmental efforts leading to better performance (Adhikari 2016; Lins et al. 2017; among others). Socially responsible firms improve the information flow to the investor, mitigating the firm's default risk and promoting a trusting culture among suppliers and buyers by increasing the overall trade credit. The second theory (agency theory) (Shapiro 2005) opposes this positive assertion and stresses that top management uses CSR to hide their misconduct (Shafai et al. 2018). These assertions

have helped address how CSR affects default risk, the relationships between buyers and suppliers, and the information environment providing the context for this study.

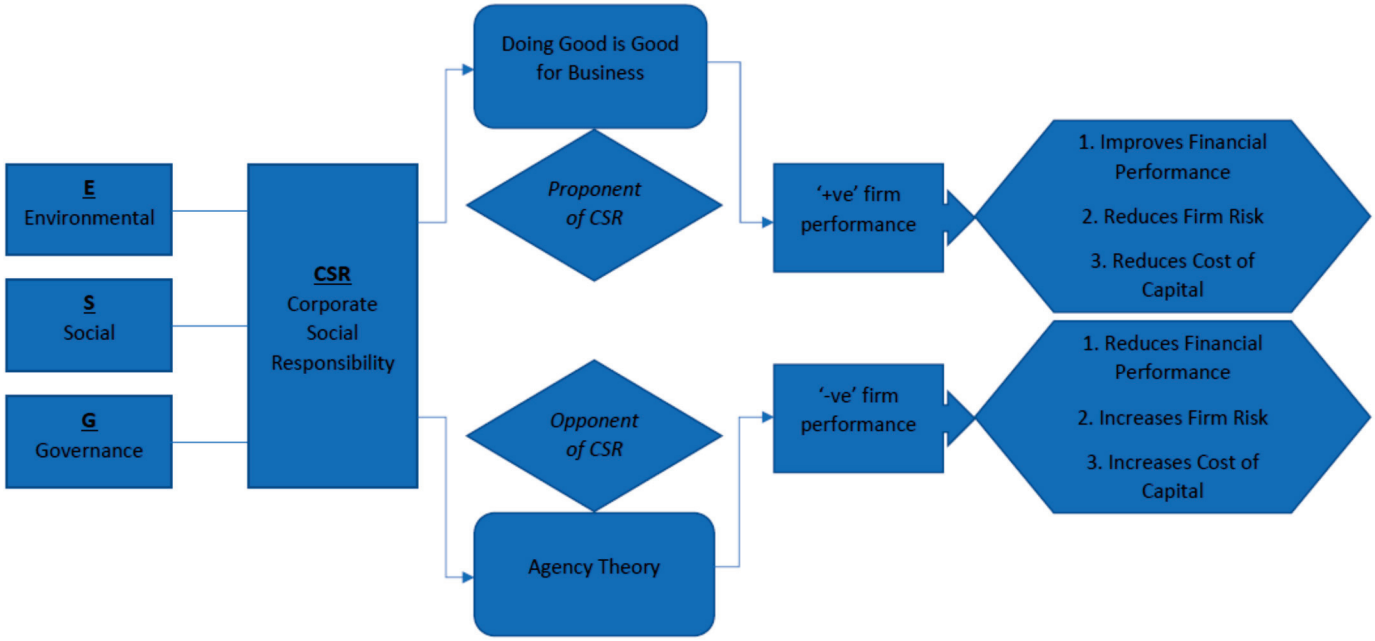

Figure 1. Conceptual Framework.

3. Methods

Next, we review the burgeoning studies in the business literature that show how a firm's standards involving CSR affect different firm financial attributes. These studies highlight the importance of investment in CSR activities and how voluntary CSR disclosures generate financial benefits for the firms. Further, we extend our discussion on three main areas (information environment, firm risk, and financing) in the corporate finance domain. Our motivation is to highlight the relationships between a firm's environmental and social practices; and other firm financial attributes in this analysis.

In the last two decades, business management and CSR have gained visibility (Harris et al. 2009; Harjoto and Rossi 2019) because of the growing amount of scholarly publications (Calabretta et al. 2011). We build upon previous research and review seminal studies that link the firm's CSR with firm information environment, firm risk, and financing sourcing. We mainly focus on the last 20 years (2000–2019) utilizing peer-reviewed publications in top-ranked journals of business management and corporate finance domains. These publications provide insight into current trends and empirical validation of relationships relevant to this study. We searched the literature using combinations of keywords: CSR, financial performance, information environment, firm risk, and financing.

For this study, we used Google Scholar to search these keywords and then downloaded the most relevant papers from their original databases (Sciencedirect, Willey, Springer, along with Taylor & Fances, and Sage). A significant portion of our literature comes from financial management journals, such as Journals of Banking & Finance, Journal of Corporate Finance, Management Science, and Journal of Finance. Next, we review these studies and synthesize findings while revealing new insights. After reviewing this literature, we take a step back from prior publications to also look at what leading multinational companies (MNCs) are doing regarding their CSR and environmental management efforts. Additionally, we also try to look at a country-level CSR context to see if it can provide additional layers of insight regarding the major themes from the literature and MNC practices.

4. CSR and Firm's Financial Characteristics

Prior CSR literature review studies have used meta-analysis, and bibliometric analysis (Dreesbach-Bundy and Scheck 2017; Malik 2015; Vishwanathan et al. 2020; among others). To identify CSR potential studies as part of our literature sample, we use only those articles that we could find using several primary keywords and deemed the most relevant to this study resulting in 26 prior studies. A significant body of literature on business management has investigated CSR's links with firm financial performance. Table 1 contains the summary information with the authors, title, hypothesis, data, methodologies, and findings of all the papers discussed in this study.

There are two widely cited meta-analyses on the relationship of CSR with firm performance. In the first, Margolis and Walsh (2003) analyze the literature from 1972 to 2002 and report that, of 127 studies, 54 show a positive relationship between CSR and firm performance. In the second analysis, Margolis et al. (2009) investigate 214 studies and conclude that, overall, CSR has a positive impact on firm performance but less so in the last decade. To increase CSR levels, organizations spend more on CSR activities, but investors are unwilling to pay a CSR premium (Pava and Krausz 1996). Overall, these meta-analyses show that investment in CSR activities improves firm financial performance.

As was found in previous studies, CSR improves a firm's financial performance. CSR also reduces financial risk (Herremans et al. 1993). Investors want to earn maximum stock returns for a given level of firm risk. In a recent article, Kim et al. (2014) found that an organization's strong social ethics mitigate its stock price crash risk. Socially and ethically responsible firms maintain a high level of transparency and engage less in bad news hoarding, which leads to lower crash risk. In addition, CSR has a negative association with idiosyncratic risk (Lee and Faff 2009). Mishra and Modi (2013) investigate the differential impacts of positive and negative CSR on idiosyncratic risk. Positive CSR reduces risk, but this is not guaranteed, while negative CSR increases risk. A similar study finds that high media coverage of a firm's corporate social irresponsibility increases its financial risk (Kölbel et al. 2017). The study reviewed 539 firms domiciled in 38 countries. The authors looked at every quarter of the firms between 2008 to 2013 in an unbalanced panel of 9939 firm-quarter observations.

The corporate finance literature provides evidence about the link between CSR and other firm financial attributes but overlooks these relationships' broader implications. Under certain circumstances (e.g., reduction in future cash flows), CSR expenditures create value for shareholders (Fatemi et al. 2015). Better CSR performance helps organizations obtain loans with easy terms and conditions and is also helpful when an organization has no collateral (Goss and Roberts 2011). Cai et al. (2016) use the MSCI ESG Intangible Value Assessment (IVA) database. Their final sample consists of 2636 firm–year observations from 2001 to 2006 from 36 countries. They find that minor variations in CSP ratings are due to firm characteristics. Interestingly they also find that a significant proportion of CSP rating changes are due to country-level factors such as institutional, cultural, and economic development.

In the business literature, the two most common ESG ratings are the MSCI ESG Ratings and Asset4, (Asset4 ESG ratings consist of ESG factors), which consist of different CSR dimensions (Cooper et al. 2010; Humphrey et al. 2012; Krüger 2015; Lys et al. 2015). The MSCI ESG ratings were formerly known as the KLD ratings. These ratings consist of seven qualitative issues: community, diversity, employee relations, the environment, humanity, product, and corporate governance. These CSR dimensions also have differential associations with firm financial characteristics. Bouslah et al. (2013) find that community strength has a negative impact, and diversity positively affects firm risk. The authors also see that employee, diversity, and corporate governance concerns positively associate with firm risk for Standard & Poor's (S&P) 500 companies. The literature also provides evidence that some, but not all, CSR dimensions are associated with firm financial attributes (Attig et al. 2013; Cai et al. 2015; El Ghoul et al. 2011). Attig et al. (2013) find that the five

dimensions of community, diversity, employee relations, the environment, and product quality/safety are associated with credit ratings, but not the human rights dimension.

Our review of this literature in this study aims to discuss the relevant findings from prior studies that link CSR with various firm financial attributes and highlight gaps for further research in the business CSR domain. To achieve this objective, we next explore the literature on CSR and corporate finance. In subsections, we discuss the prominent studies in CSR within three main areas of corporate finance. Details regarding the CSR articles can be found in Table 1.

Table 1. Referenced Literature in CSR.

Authors, Year and Title	Hypothesis	Data and Methodology	Findings
Panel A: CSR and Firm Information Environment			
Alniacik et al. (2011) How Corporate Social Responsibility Information Influences Stakeholders' Intentions	1. Positive CSR information will be associated with a greater intention to consume a company's product compared to negative CSR information. 2. Positive CSR information will be associated with a greater intention to seek employment with a company compared to negative CSR information. 3. Positive CSR information will be associated with a greater intention to invest in a company compared to negative CSR information.	In this study, they use the response of 250 undergraduate students from two Turkish universities. University students are potential customers and active users and future investors and employees of consumer electronics.	Their findings show that firm positive CSR information enhances consumer intentions to purchase products from, potential employees' intentions to seek employment with, and potential investors' intentions to invest in the company.
Gamerschlag et al. (2011) Determinants of voluntary CSR disclosure: empirical evidence from Germany	1. CSR is positively associated with company visibility. 2. CSR is positively associated with company profitability. 3. CSR is positively associated with more dispersed ownership.	They used 520 firm-year observations from 2005 and 2008 using the Global Reporting Initiative (GRI). They focus on the German DAX, MDAX, and SDAX.	They find that CSR disclosures are affected by their visibility, shareholder structure, and relationship with U.S. stakeholders. More environmental disclosure leads to a firm's higher profitability.
Gelb and Strawser (2001) Corporate Social Responsibility and Financial Disclosures: An Alternative Explanation for Increased Disclosure	More socially responsible firms are more likely to make discretionary disclosures.	In this study, the sample consists of 233 firm-year using data from the Association for Investment Management and Research (AIMR) ranking for the years 1989 to 1992 of all non-banking firms.	Their results show that socially responsible companies are more willing to provide financial disclosures. This relation is strengthening through better investor relations practices.
Haggard et al. (2008) Does Voluntary Disclosure Improve Stock Price Informativeness?	Voluntary disclosure improves the stock price informativeness.	Their final sample consists of 2084 firm-year observations covering the years 1982 to 1995. They only use those companies whose disclosure data are available on AIMR's database.	They find that overall firm disclosure policy improves the information in stock prices. They make this estimation using analyst evaluation of firm disclosure policy.

Table 1. *Cont.*

Authors, Year and Title	Hypothesis	Data and Methodology	Findings
Kim et al. (2012) Is Earnings Quality Associated with Corporate Social Responsibility?	1: Socially responsible companies are less likely to engage in earnings management.	The sample consists of 18,160 firm-years observations from 1991 to 2009 using the DSI400 index as a CSR indicator.	Socially responsible companies are less likely to manage their earnings through discretionary accruals, manipulate real operating activities, and be the subject of the SEC investigation.
Lee et al. (2018) The corporate social responsibility information environment: Examining the value of financial analysts' recommendations.	1. CSR-related information is associated with the variation in the value of analysts' recommendation revisions. 2. Changes in CSR-related information levels are associated with the value of analysts' recommendation revisions.	They used MSCI ESG data and IBES from 1995 to 2011 for U.S. companies. The final sample consists of 11,828 firm-year observations.	They find an inverse relationship between the value of both upgrade and downgrade revisions and the supply of CSR-related information compiled by third-party institutions, suggesting that CSR-related data are associated with a richer information environment that makes it more challenging for analysts to issue informative recommendations, thereby mitigating their contribution to the price discovery process.
Martínez-Ferrero et al. (2015) Effect of Financial Reporting Quality on Sustainability Information Disclosure	Sustainable information standardized disclosures have a negative (substitutive) relationship with financial reporting quality.	Their sample comprises 747 international listed nonfinancial companies from 25 countries from 2002 to 2010 using the Tobit method for panel data.	Results show that conservative companies, with a high level of accruals quality and those that carry out earnings management practices to a lesser extent, report high-quality financial information and, moreover, high-quality CSR information.
Martínez-Ferrero et al. (2016) The Causal Link between Sustainable Disclosure and Information Asymmetry: The Moderating Role of the Stakeholder Protection Context	1. Voluntary CSR disclosures increase information availability by reducing the asymmetric information problem. 2. Voluntary CSR disclosures reduce the information available due to more stakeholder-oriented environments.	They produce their results using the GMM estimator for an international sample of 575 firms for the period 2003 to 2009.	Greater asymmetric information leads to higher voluntary information disclosure practices, reducing the agency problem in environments characterized by strong socially responsible commitment.
Wanderley et al. (2008) CSR Information Disclosure on the Web: A Context-Based Approach Analyzing the Influence of Country of Origin and Industry Sector	On corporate website CSR disclosures influenced by country or industry.	They use data from 127 corporations from G20 countries along with Brazil, Chile, China, India, Indonesia, Mexico, South Africa, and Thailand with the chi-square test.	They report that CSR disclosures on websites are influenced by both industry and country. Thus, corporations are increasingly concerned with communicating ethically and responsibly their stakeholder diversity through the web.

Table 1. *Cont.*

Authors, Year and Title	Hypothesis	Data and Methodology	Findings
Panel B: CSR and Firm Risk			
Attig et al. (2013) Corporate Social Responsibility and Credit Ratings	1. CSR reduces the perceived risk of financial distress, and that has a positive impact on firm credit ratings.	They used an unbalanced panel of 11,662 firm years' observations representing 1585 unique U.S. firms over the period 1991–2010 using MSCI ESG and CSRSP, and order Probit model.	Using the U.S. sample, they conclude that socially responsible companies enjoy a relatively high credit rating. Furthermore, they explore that both strength and concerns influence the credit rating.
Chollet and Sandwidi (2018) CSR engagement and financial risk: A virtuous circle? International evidence	1. CSR engagement lowers financial risk. 2. Social and governance commitment reduces financial risk.	They used Asset4 data as a CSR measure and systematic, firm-specific, and total risks for the financial risk measure. The final sample consists of 23,194 firm-year observations from 2003 to 2012 from 62 countries.	They show that a firm's good social and governance performance lowers its financial risk, thereby reinforcing its commitment to good governance and environmental practices.
Cui et al. (2017) Corporate Social Responsibility, Religion, and Firm Risk	1. CSR negative association with firm risk is more pronounced if H.Q. (headquarter) in a religious area.	They used KLD data as a CSR measure and CompStat for the financial risk measure. The final sample consists of 27,800 firm-year observations from 1991 to 2013 from U.S.	They find that CSR religiosity is negatively associated with firm risk.
Drago et al. (2019) Do corporate social responsibility ratings affect credit default swap spreads?	1. Better CSR ratings lead to lower CDS spreads. 2. Better CSR ratings lead to higher CDS spreads.	They used Asset4 ESG data as a CSR measure. The final sample consists of 1349 firm-year observations from 2007 to 2017 from 18 European countries.	Final results support that a better CSR rating brings a significant decrease in CDS spreads.
Galema et al. (2008) The stocks at stake: Return and risk in socially responsible investment	CSR has a significant influence on stock returns.	They used KLD and monthly Fama French portfolio data from June 1992 to July 2006. They find results by using the Fama-Macbeth and GMM models.	They find that diversity, environment and product strategies dimensions of CSR has a significant positive impact on stock returns.
Husted (2005) Risk Management, Real Options, and Corporate Social Responsibility	Hypothesis: He develops the notion of corporate social responsibility as a real option and its implications for risk management.	Theoretical	Real options theory suggests that corporate social responsibility should be negatively related to the firm's ex-ante downside business risk.
Jo and Na (2012) Does CSR Reduce Firm Risk? Evidence from Controversial Industry Sectors	1. CSR engagements have a negative association with firm risk in the controversial industry.	They measure CSR with MSCI ESG data and financial variables using Compustat data. Their final sample is comprised of 2719 firm-year (513 controversial firms) observations from 1991 to 2010.	With controversial industries (such as alcohol, tobacco, gambling, and others) sample, they find that improved CSR performance is helpful to reduce the firm risk. Furthermore, they explore that CSR decreases the firm risk statistically more significantly with controversial industry firms than in noncontroversial industry firms.

Table 1. *Cont.*

Authors, Year and Title	Hypothesis	Data and Methodology	Findings
Kim et al. (2014) Corporate social responsibility and stock price crash risk	1. CSR has a significant influence on firm-level stock price crash risk.	They used 12,978 firm-year observations from 1995 to 2009 using the MSCI ESG database. They use a cluster effect at both firm and year levels.	They find that CSR performance is negatively associated with future crash risk after controlling the crash risk determinants. Because socially responsible companies have a high level of transparency and low level of bad news hoarding.
Lee and Faff (2009) Corporate Sustainability Performance and Idiosyncratic Risk: A Global Perspective	1. Corporate social performance has a significant association with firm idiosyncratic risk.	They used the DJSI and DJGI index from 1998 to 2002 with a combined sample of 11,479 firm-year observations.	Their findings show that leading (lagging) corporate social performance (CSP) firms exhibit significantly lower (higher) idiosyncratic risk and that idiosyncratic risk might be priced by the broader global equity market.
Sun and Cui (2014) Linking corporate social responsibility to the firm default risk	1. CSR has a negative relationship with firm default risk. 2. When a capability is higher, CSR has a strong impact on reducing default risk. 3. When environmental dynamism is higher, CSR has a strong impact on reducing default risk.	The final sample consists of 829 observations from 303 firms for 2008 to 2010 period. They use standard and poor credit rating data as a financial default risk measure.	They conclude that CSR has a strong effect on firm financial default risk reduction. Moreover, they observe that this relationship is stronger for high dynamism environments than low dynamism environments.
Panel C: CSR and Financing Sources			
Cheng et al. (2014) Corporate Social Responsibility and Access to Finance	1. CSR performance reduces agency cost due to effective stakeholder engagement. 2. CSR performance reduces the information asymmetry due to extensive CSR disclosures.	They used Asset4 data as a CSR measure and Kaplan-Zingales Index for the capital constraint measure. The final sample consists of 10,078 firm-year observations from 2002 to 2009 from 49 countries.	They find that better CSR performance faces significantly lower capital constraints. Stakeholder engagement and transparency both play an essential role in creating this impact. These results are also consistent with both the social and environmental dimensions of CSR.
Dhaliwal et al. (2012) Nonfinancial Disclosure and Analyst Forecast Accuracy: International Evidence on Corporate Social Responsibility Disclosure	1: CSR performance is positively associated with the accuracy of analyst earnings management. 2: CSR positive relationship with analyst forecast accuracy is more pronounced in countries with a high level of stakeholder orientation. 3: This relationship is stronger for firms with a high level of financial disclosures.	They used 7779 stands-alone CSR reports issued by public firms from 49 countries during 1994–2007. Their final sample consists of 7108 standalone CSR reports published by 1297 unique commercial companies.	They find a positive relationship between CSR stands-alone CSR reports issuance and a higher level of analyst forecast opacity. Furthermore, they explore that this association is more pronounced with more stakeholder-oriented countries and firms with a high level of financial disclosures.

Table 1. *Cont.*

Authors, Year and Title	Hypothesis	Data and Methodology	Findings
El Ghoul et al. (2011) Does corporate social responsibility affect the cost of capital?	1. High CSR firms have a lower cost of equity.	They used KLD STATS data for CSR measure. Their final sample consists of 12,915 observations representing 2809 unique firms between 1992 and 2007. To test their hypothesis, they use a pooled cross-sectional time series regression.	They find that firms with better CSR performance exhibit cheaper equity financing. They also suggest that employee relations, environmental policies, and product strategies dimensions of CSR are playing an essential role in reducing the cost of equity.
Feng et al. (2015) Equity Financing and Social Responsibility: Further International Evidence	1. Improved CSR has a significant influence on the firm's cost of equity capital. 2. CSR's negative relationship with the cost of equity capital is well-established in North America and Europe compared to other regions.	In this study, they used 10,803 firm-year observations from 2002 to 2010. They use Thomson Reuters Asset4 data from 25 countries.	They find that better CSR performance reduces the cost of equity capital in North America and Europe. But these results do not hold for Asian countries.
Goss and Roberts (2011) The impact of corporate social responsibility on the cost of bank loans	1. CSR concerns have a negative association with loan maturity. 2. CSR strength has a positive association with loan maturity (mitigating risk view).	They used the KLD dataset of 3996 loans extended to 1265 firms from 1991 to 2006.	They provide evidence in support of CSR concerns pay between 7 and 18 basis points more than firms that are more responsible. Lenders give importance to CSR strengths in the absence of security.
Jiraporn et al. (2014) Does Corporate Social Responsibility (CSR) Improve Credit Ratings? Evidence from Geographic Identification	Hypothesis: Increase in social responsibility increases the firm credit rating	Used the KLD database for CSR measurement. Their final sample consists of 2516 firm-year observations from 1995 to 2007.	They find that more socially responsible companies enjoy a more favorable credit rating. One standard deviation increase in CSR measure increase the 4.5% of firm credit rating. Furthermore, they also test these results using geographic proximity with 2SLS.
Verwijmeren and Derwall (2010) Employee well-being, firm leverage, and bankruptcy risk	Hypothesis: Firms with high employee well-being have lower target leverage.	They analyze 7494 observations from 2001–2005 using KLD data.	The results confirm that a firm with a leading record of employee well-being significantly reduces the probability of bankruptcy through a lower debt ratio. After controlling the differences in leverage, they observe that with better employee well track records firm improves their credit rating.

4.1. CSR and the Firm's Information Environment

CSR has a substantial impact on a firm's information environment. As previously discussed, 90% of Fortune 500 companies are transparent and publicly report their CSR efforts. Martínez-Ferrero et al. (2015) demonstrate that conservative companies with lesser earnings management practices and high levels of accrual quality report high-quality CSR information and high-quality financial information. Martínez-Ferrero et al. (2016)

examine the impact of CSR disclosure on information asymmetry. They find that voluntary disclosures regarding CSR reduce the information asymmetry problem. More significant information asymmetry leads to high levels of voluntary information disclosures; these disclosures reduce agency problems in a high socially responsible environment.

Organizations make their environment more informative with the help of extensive CSR disclosures. Wanderley et al. (2008) use a mix of qualitative and quantitative approaches to demonstrate this argument after analyzing 127 corporations' websites; they conclude that both the country and the industry significantly influence CSR disclosures on electronic media. These corporations belong to the G20 countries, along with Brazil, Chile, China, India, Indonesia, Mexico, South Africa, and Thailand. Alniacik et al. (2011) show the importance of the CSR information environment. The data were collected from 250 undergraduate students studying in various departments of two Turkish universities participating in the study as part of their classroom activities. They explore the link between positive and negative CSR performance and investment, purchases, and employment intentions. Generally, positive CSR is associated with strong social and environmental performance and negative CSR with weak social and environmental performance. According to Alniacik et al. (2011), positive CSR enhances potential consumer purchase intentions, potential investor investment intentions, and potential employee's employment intentions.

The business management literature provides growing amounts of evidence on CSR's impact on a firm's overall disclosure policy. Gamerschlag et al. (2011) explore the determinants of voluntary CSR disclosures in the German context. Consistent with political cost theory, their results show that German companies' shareholder structure, visibility, and U.S. stakeholder relationships affect German companies' CSR disclosure issues. Gelb and Strawser (2001) find a positive association between CSR and firm financial disclosures. More socially responsible companies provide information with extensive financial disclosures in comparison to less CSR-focused firms. Stakeholders recognize such information disclosure, which increases their satisfaction.

Numerous studies have investigated the relationship between CSR and financial information. Using the Domini Social Index 400 (DSI 400) as a CSR indicator, Kim et al. (2012) address this issue and find that socially responsible companies are less involved in manipulating operating activities and managing earnings through discretionary accruals. The authors also suggest that ethical concerns drive managers to produce high-quality financial reports. In the same vein, Dhaliwal et al. (2012) note that CSR standalone reports play an essential role in complementing financial disclosures. This relationship is more robust for firms and countries with high-quality financial disclosures. Furthermore, the authors show that financial and CSR disclosures act as a substitute to reduce equity costs.

The above-discussed studies help us understand that an organization's financial information environment has dynamic relationships with its CSR practices (Lee et al. 2018). According to Haggard et al. (2008), an influential firm disclosure policy increases the level of firm-specific information in stock returns. Therefore, a more significant amount of information is impounded in the stock prices of the company. Stock prices are thus also a source of firm-specific information for investors, analysts, and stakeholders. Here we see opportunities to advance the field with a focus on growing amounts of information and transparency. The corporate finance literature is paying more attention to the relationships between CSR and reporting as trends show transparency in reporting CSR and earnings management practices increasing over time.

4.2. CSR and Firm Risk

In the corporate finance literature, firm CSR increases firm valuation and decreases firm risk. Following real options theory, Husted (2005) concludes that CSR has a negative relationship with firms' ex-ante downside risk. The author also determines that the risk-free interest rate, the exercise price, uncertainty, and time play a vital role in the valuation of CSR investments. Some industries are controversial (e.g., alcohol, tobacco, firearms) in investors' eyes, and socially responsible investors hesitate to invest in these types of

industry stocks. Jo and Na (2012) argue that CSR engagement inversely affects firm risk in controversial industries, with a more substantial effect in more controversial industries than in noncontroversial industries. In light of their study, we can say that top management's engagement in CSR activities for those enterprises within controversial businesses sectors improves their risk management efforts.

Most business finance researchers use well-known risk measures (e.g., stock return beta and the standard deviation of returns) as a risk proxy. Galema et al. (2008) report that socially responsible investments impact stock returns by lowering the book-to-market ratio and not generating positive alphas. The book to market is used as a proxy for firm risk. Furthermore, the authors explain that this relationship strengthens CSR's diversity, product quality/safety, and environmental dimensions. Their research also supports our argument that not all CSR dimensions or factors affect firm characteristics in the same way. Particular measures of risk are also associated with stock prices (e.g., stock price crash risk). Kim et al. (2014) find that firm social responsibility performance is negatively related to stock price crash risk, which occurs in socially responsible firms due to high moral values and ethical standards (less bad news hoarding and a high level of transparency).

Using data from 2003 to 2012, Chollet and Sandwidi (2018) show that a better CSR reputation generates better stock returns at lower risk levels. They attribute such CSR investment performance to the psychic utility of economic gains. This work stresses that social and governance performance effectively mitigates financial risk after using international data from 67 countries. In light of the global evidence, Lee and Faff (2009) find that a firm's CSR performance leadership significantly mitigates its idiosyncratic risk. The authors analyze idiosyncratic risk and its determinants and find that it substantially reduces the apparent difference between lagging and leading CSR portfolios.

Credit agencies can consider a firm's socially responsible reputation as collateral (Drago et al. 2019). In a recent study, Sun and Cui (2014) use S&P credit rating (a firm's credit rating is the firm's ability to fulfill its financial commitment (or meet the expectations of debtholders) scores as a proxy for default risk and find an increase in CSR level reduces firm default risk. Several papers have examined the association between CSR and firm credit ratings. Attig et al. (2013) conclude that credit rating agencies give higher ratings to firms with better CSR performance. Furthermore, they find that community relations, diversity, employee well-being, the environment, and product strategies play an essential role in increasing creditworthiness. In the same vein, Jiraporn et al. (2014) inspect the association between CSR and credit rating from a geographical perspective. Their findings also support the previous literature. Improved credit ratings are associated with a lower likelihood of firm default risk. Along with the literature, we conclude that CSR increases credit ratings and reduces firm default risk.

Most of the evidence presented in this firm risk domain shows a negative association between CSR and different firm risk measures (e.g., idiosyncratic risk, stock price crash risk, default risk). Using data from 34 countries, Altman et al. (2016) state that the financial distress prediction accuracy (75%) of the Z-score model (Altman 1968) is reasonably good compared to the market-based model and can be further improved (to 90%) by using country-specific variables. However, the association between CSR and firm FDR (financial distress risk) (accounting-based measures, i.e., accounting-based measures of FDR are the Z-score, O-score, and ZM-score models) is still in question in the corporate finance literature, and this provides opportunities for future research to help provide more clarity as to the strength and direction of these relationships.

4.3. CSR and Financing Sources

Firms need better access to financing to run organizational activities smoothly. Most commonly, firms obtain financing from their shareholders and through bank loans. Publicly listed firms can obtain financing from the capital and credit markets. Acquiring investments from the credit market can be advantageous for firms because of tax benefits and the non-dilution of ownership. Firms' positive behavior toward the community and

the environment also plays an incremental role in their access to financing at cheaper rates. Cheng et al. (2014) find that firms reduce capital constraints with improved CSR performance. The authors use the Kaplan and Zingales (1997) index to measure capital constraint and show that both environmental and social dimensions drive this relationship.

CSR not only improves access to financing but also reduces the overall cost of capital (El Ghoul et al. 2011), minimizing both its components, that is, the cost of equity and the cost of debt. Feng et al. (2015) state that better CSR performance minimizes the cost of equity. They used a global sample and concluded that good CSR performance reduces the cost of equity in North America and Europe but find this association does not exist in Asian countries. This is based on 10,803 firm–year observations from 25 countries from 2002 to 2010. Dhaliwal et al. (2014) also find a negative association between CSR and the cost of equity, with a more pronounced association in stakeholder-oriented countries. On the other hand, better CSR performance also reduces bank loans' cost (Goss and Roberts 2011).

Additionally, CSR is essential to obtain debt financing at lower rates through improved credit ratings. Jiraporn et al. (2014) state that better CSR performance enhances a firm's credit rating potentially because of social interactions, local competition, or investor clienteles. Firms' CSR policies are affected by the firms' geographic peers' (by three-digit zip codes) and industry peers' CSR policies They conclude that funding agencies and banks greatly value firms' ethical behavior toward society. Attig et al. (2013) similarly find that firms with good social performance enjoy high credit ratings. CSR is a combination of both CSR-supportive activities (strengths) and non-CSR-supportive activities (concerns). Attig et al. (2013) also show that CSR support positively impacts U.S. firm credit ratings and non-support activities have a negative effect. These recent studies highlight CSR's importance in presenting a good firm image through high credit ratings to lending institutions.

During the 2007–2008 financial crisis, several organizations defaulted because of the credit crunch. CSR plays a vital role in reducing a firm's financial default risk. Sun and Cui (2014) state that CSR performance helps firms mitigate financial default risk (a firm's measure of financial default risk is its S&P credit rating) with a more pronounced association for firms in a highly dynamic environment. In support of this, Verwijmeren and Derwall (2010) find that firms can reduce bankruptcy probability through a leading track record in employee well-being. Hence, we conclude that a firm can mitigate default risk by opting for high moral and ethical values.

We have discussed the positive association between firm CSR performance and access to financing. Better access to funding at cheaper rates increases the financial soundness of high-CSR firms (García-Sánchez et al. 2019) and reduces their default risk (Cui et al. 2017). Firms with better CSR have lower costs of equity and debt compared to low-CSR firms. Trade credit is also a significant source of financing for organizations. Previous studies show CSR links with equity and debt financing. The association of CSR and financing sources is growing. We see CSR as growing in the future and note the importance of exploring relationships between CSR and trade credit as an area of research with the potential to uncover new relationships in a global marketplace.

4.4. CSR MNCs and Country Characteristics

In addition to our search and the synthesis of prior financial management literature, we also wanted to examine large multinational companies (MNCs) to look at their performance and country context for taking on CSR initiatives. We do this to help look for new insights and current practices. To provide scholarly and practical findings, we reviewed Fortune 500 companies' CSR performance. We selected the top 10 Fortune 500 companies in 2018 and examined their Asset4 environment, social, and governance (ESG) data over eight years (2011–2018). We chose these years due to the growing focus on CSR, the emergence of creating shared value (Kramer and Porter 2011), and this time is the third generation of CSR by Trapp (2012). Figure 2 shows all U.S. firms' average CSR performance compared to the top 10 Fortune 500 firms, with most Fortune 500 companies in the top quartile (75–100%).

The continuous line shows the average CSR scores of all U.S. companies. Each year's average score indicates that most U.S. companies are doing something for society, i.e., the community and the environment.

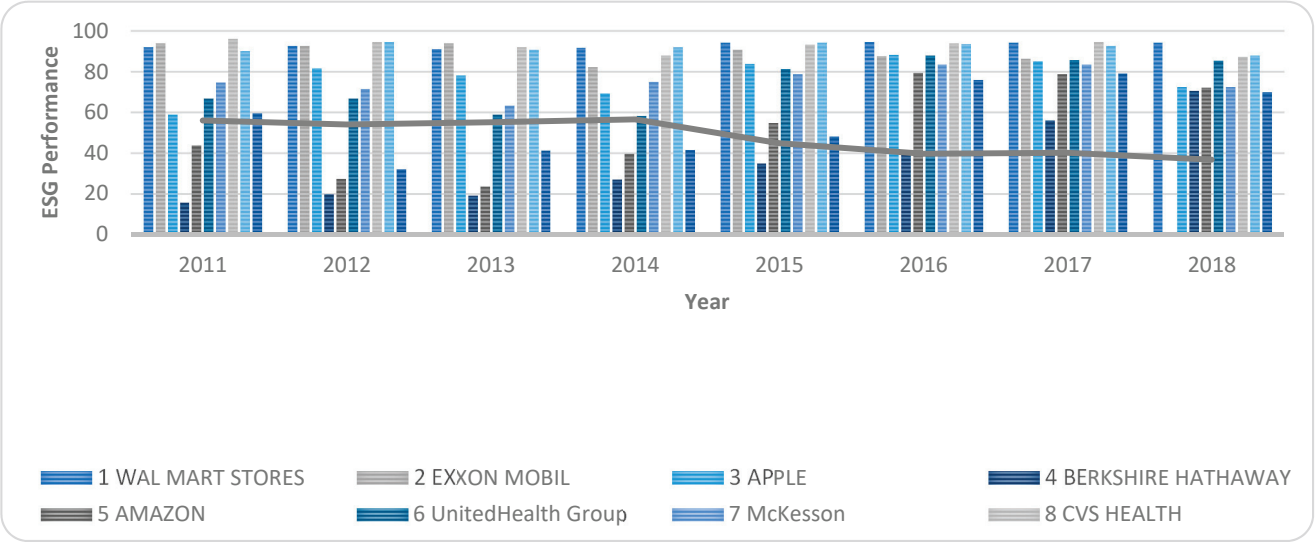

Figure 2. CSR performance of top ten Fortune 500 and average of U.S. companies from 2011 to 2018.

This figure shows the CSR performance of the top 10 Fortune 500 US and average U.S. companies. We use data from Asset4 ESG to measure CSR performance. Colored bars indicate the individual performance of the company, and the black line shows the average CSR performance of 1650 unique U.S. companies' year-wise. This figure depicts the CSR performance by country using data from Asset4 ESG in 2018. We excluded countries for which the total number of firms is below ten. Figure 3 shows the CSR performance of different countries, using Asset4 ESG data from 2018. The map shows European countries' (e.g., France, Spain, Netherland, Finland, Sweden) with high commitment to CSR. We exclude all countries with fewer than 10 firms in the Asset4 database in 2015. In 2018, Asset4 ranked large economies (e.g., the United States, China) below average on the social responsibility index.

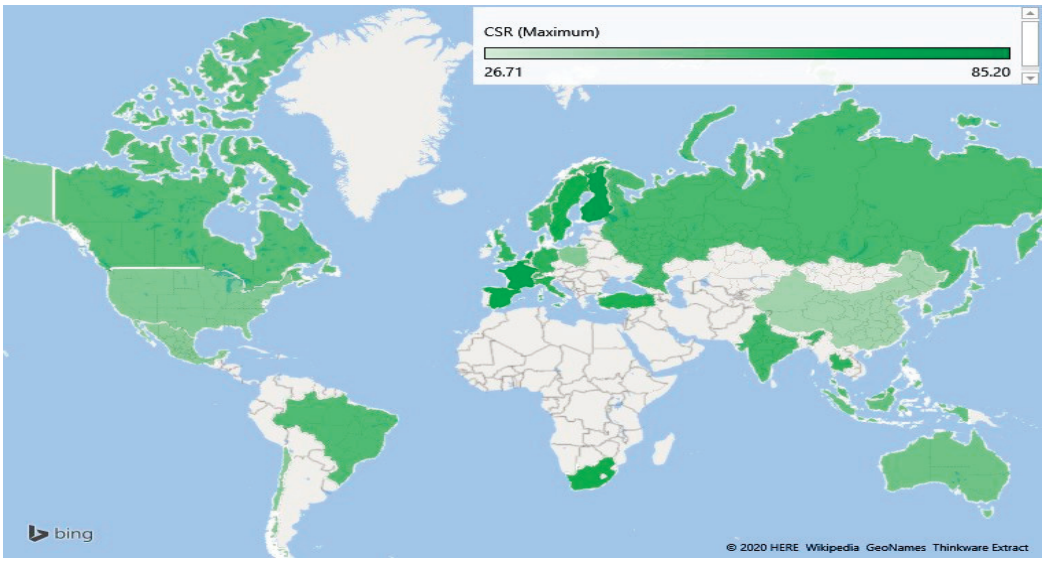

Figure 3. Global CSR performance.

5. Discussion

Based on an extensive literature review of CSR, our synthesis of information shows that firm CSR performance affects firm financial performance, firm risk, the cost of capital, and financial disclosures. The evidence from the literature suggests there have been and will be positive impacts from CSR and environmental management. Our approach in this study was to approach the CSR paradigm through the lens of two competing theories: (1) doing good is good for business, and (2) CSR creates agency problems. Our findings may be counterintuitive to what many in the financial sector have been saying for years, i.e., CSR is bad for business. Business finance researchers mostly show us that CSR has a positive relationship with financial performance and a negative association with firm risk, improves a firm's information environment, and reduces the cost of capital. Based on these findings, we posit that, overall, CSR investment creates value for organizations and their stakeholders. In general, our findings, therefore, support the argument that doing good (socially and environmentally) is good for business.

In support of the above conclusion, a battery of literature finds that the firm's responsible strategies are an actual effort and ultimately improve the firm performance and overall image (Fatemi et al. 2015; Jiraporn et al. 2014; among others). Furthermore, we find that the CSR literature in the corporate finance domain supports this notion that a firm's social and environmental activities generate financial benefits for the organization. Our work collectively supports the positive aspects of the theoretical models suggesting "Doing Good is Good for Business" (Margolis and Walsh 2003; Margolis et al. 2009).

The second objective of our study was to identify new relations between CSR and corporate finance. First, we discuss the CSR impact on a firm's information environment. Many business finance researchers state that firms doing more CSR promote information symmetry through financial and nonfinancial disclosures (Dhaliwal et al. 2012; Gelb and Strawser 2001; Kim et al. 2012). On the other hand, we find that CSR's link to information impounded into stock prices is still in question. Second, we explore the literature on CSR and different measures of financial risk. We find that the link between CSR and FDR is still inconclusive. Third, we discuss the literature on CSR and firm access to financing. CSR has a positive relationship with equity financing (Feng et al. 2015) and access to bank loans (Cheng et al. 2014; Goss and Roberts 2011). The relationships between CSR and trade credit are still undefined, however. This study identifies the emerging trends and pathways for future research by shining new light on the business management and financial management frontier.

We extend knowledge by identifying the gaps in corporate finance in relation to CSR. In reference to the cited studies we review, we are able to highlight the three new CSR associations with price information, financial distress risk, and trade credit. Above mentioned gaps will open new doors in the firm's financial and CSR domains. Further, we also propose that findings are significantly different in developed and emerging economies due to their level of priorities (Jamali and Carroll 2017; Sardana et al. 2020).

In comparison to prior CSR literature review studies, our paper is unique and constructive (Dionisio and Vargas 2020; Malik 2015; Pope and Wæraas 2016). Malik (2015) proffers an understanding between CSR and firm value studies. In another paper, Pope and Wæraas (2016) stress another side of a firm's ethical initiatives focused on CSR-washing. This work uses data from three sources (e.g., Dissertations, Google Scholar, and the New York Times) to show the growing importance of CSR-washing in the business management domain. In a more recent study, Dionisio and Vargas (2020) selected 89 articles from top business management journals and performed a thematic analysis of the literature. Our study utilizes the relevant articles from the last 20 years to explore theoretical justification for CSR, and we engage this literature to identify potential gaps for future research.

6. Conclusions

Our review of the CSR literature is not free of limitations. In this study, we focus on refereed journals' papers, working papers, and books and present our findings of the empirical evidence presented in the CSR literature. However, there could still be other studies unknown to us with different results or conclusions. Second, we have identified the gaps in these domains, but we do not define how researchers should find the answer to these questions. Third, this work only discusses the direct relationship (i.e., how CSR affects financial performance). Prior literature also shows the indirect relationships (for example, Galbreath (2018) argues that CSR mediates the gender diversity effects on financial performance). It is just that there are far too many to try and include, as the scope of the study was to find and summarize direct relationships. Future research may include studies with moderating and mediating effects to get more dynamic insights. Finally, the meta-analysis findings are more generalizable than individual studies' results (relying on a single database). Thus, future research should consider different data sets with samples from multiple countries and other contexts to increase the validity of the findings.

This comprehensive study contributes to the business management literature in the following ways. First, we present evidence from the literature that generally supports the notion that "Doing Good is Good for Business" (Bocquet et al. 2017; Martinez-Conesa et al. 2017; Buchanan et al. 2018). Second, our work contributes to the literature on CSR and firm information environment (Cui et al. 2018; Martínez-Ferrero et al. 2016). We highlight the importance of finding the missing link between CSR and a firm's stock price informativeness. Third, this research builds on the existing CSR literature showing that CSR mitigates different types of business risks (Kim et al. 2014; Braune et al. 2019). Our contribution in this domain is to bridge the gap between CSR and financial distress risk. Finally, this research also contributes to the literature on CSR and firm access to finance (like La Rosa et al. 2018; Jiraporn et al. 2014). In this review of the literature, we did not find evidence on how CSR impacts trade credit. Our contribution in this domain will open new avenues for business management and financial management researchers. It can motivate practitioners and projects looking for an increasing amount of and dynamic set of relationships between CSR practices and financial management.

Future research could investigate how CSR's relationship with firm performance is different in the developing world than in developed nations. However, it is an essential comparison as there exist conflicting opinions amongst the two country contexts as to how they perceive CSR, based on differences in national economies, politics, and stages of implementation of the UN SDGs. In addition, further research is necessary regarding how the financial gains reaped due to a focus on CSR performance reflected on employees, supply chains, compensation, and the well-being of such firms. Lastly, future research should help determine whether becoming socially, ethically, and environmentally responsible bring about a transformative change externally in an organization's market, customers, and financial sectors.

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The Relationship between LGBT Executives and Firms' Value and Financial Performance

Isabel Costa Lourenço [1], Donatella Di Marco [1,2], Manuel Castelo Branco [3,*], Ana Isabel Lopes [1], Raquel Wille Sarquis [4] and Mark T. Soliman [5]

[1] Business Research Unit (BRU-IUL), Instituto Universitário de Lisboa (ISCTE-IUL), 1649-026 Lisbon, Portugal; isabel.lourenco@iscte.pt (I.C.L.); ddimarco@us.es (D.D.M.); Ana.Isabel.Lopes@iscte-iul.pt (A.I.L.)
[2] Department of Social Psychology, Universidad de Sevilla, 41004 Sevilla, Spain
[3] Faculty of Economics, University of Porto, CEF.UP., OBEGEF, 4050-313 Porto, Portugal
[4] School of Economics, Business and Accounting, University of São Paulo (USP), São Paulo 13566-590, Brazil; raquel.sarquis@usp.br
[5] Marshall School of Business, University of Southern California, Los Angeles, CA 90089, USA; msoliman@marshall.usc.edu
* Correspondence: mcbranco@fep.up.pt

Abstract: Drawing on resource-based theory, we analyze the relationship between having LGBT executives in a firm's leadership positions and its value and financial performance. The existence of LGBT executives is considered to be associated with employee and customer goodwill towards LGBT-friendly policies and practices and to lead to human capital and reputational benefits. Our findings suggest that there is a positive effect of the presence of LBGT executives on a firm's value, both directly and indirectly, through its effect on the firm's financial performance. We interpret this as suggesting that besides the direct effect of the existence of LGBT executives on a firm's value, an indirect effect also exists, mediated through financial performance, presumably through the effect that this has on employee and customer goodwill towards LGBT-friendly policies and practices. As far as we are aware, our study is the first to examine the impacts of the presence of LGBT executives, as well as distinguish between its direct and indirect effects on firm value.

Keywords: financial performance; LGBT; market value; resource-based theory; sexual orientation and identity; simultaneous equations

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1. Introduction

In recent years, the composition of society has changed rapidly, becoming more diverse and heterogeneous (van Knippenberg and Mell 2016). According to these societal changes, many Western countries have tried to answer to the need to create fair and inclusive environments for everybody through the promotion and implementation of a legislative framework in defense of people's equal rights (e.g., the Civil Rights Act in 1964, in the United States; the Employment Equality Directive in 2000, in the European Union). One of the environments in which it is possible to observe the diversification of society is the workplace, which is becoming a melting pot of people from different social and identity groups in terms of age, sex, ethnicity, religion, gender identity, and sexual orientation. Hence, the traditional range of diverse groups presented at work is wider, and this creates a new reality that organizations need to manage.

Until now, a sense of social justice, equality, and legal compliance has promoted the efforts of researchers and practitioners to identify those organizational (e.g., policies and culture) and individual barriers (e.g., prejudice and negative stereotypes) that prevent the creation of an inclusive work environment and equal opportunities of career development (e.g., Roberson and Park 2007). However, data about diverse people at the upper echelons reveal that women still remain underrepresented, occupying no more than 10% of management positions (Fitzsimmons and Callan 2020), while other diverse groups (e.g.,

people with disabilities and lesbian, gay, bisexual, and transgender people) are even less represented.

Beyond the moral obligation and social justice issues related to offering equal career opportunities to everybody, researchers and practitioners have started to emphasize the opportunities made available by creating a diverse and inclusive work environment (Stavrou and Ierodiakonou 2018). In fact, in line with the increasing awareness of the business case for diversity, organizations have started to look at diversity as a source of competitive advantage (Arenas et al. 2017). A recent study carried out with more than 1000 organizations in 12 countries showed that greater diversity leads to better financial performance (McKinsey and Company 2018). Specifically, organizations with more gender and ethnic diversity at the top management level are those that obtain above-average profits. Research suggests that fostering diversity allows firms to retain talent and team cohesion, increase creativity and innovation, and foster career development (e.g., Tejeda 2006; Farndale et al. 2015), thus representing a strategic choice (Burdenson and Van der Vegt 2018). Despite such recent insights, the business case for diversity still remains an unexplored field of research (Farndale et al. 2015), and few studies (e.g., Al-Shaer and Zaman 2016; Cook and Glass 2016) offer empirical support for the impact of diversity at the upper echelons on organizational financial performance.

Research on diversity at the upper echelons of firms has focused on visible diversity, such as gender and ethnic diversity. However, in the last years, invisible identities (e.g., religion, sexual orientation) have been receiving attention (Roumpi et al. 2020). Sexual orientation and gender identity might be considered as invisible identities to the extent that it is necessary for lesbian, gay, bisexual, and transgender (LGBT) workers to engage in proactive action to disclose their sexual orientation or gender identity. Adopting LGBT-friendly policies can have a positive impact on those workers that have not disclosed their sexual orientation or gender identity at the workplace (Huffman et al. 2008; Badgett et al. 2013; Cook and Glass 2016). Being authentic at work has been related with higher workers' commitment, job satisfaction, and well-being (McFadden 2015; Di Marco et al. 2018), which, in turn, can contribute to positive organizational outcomes. One of the goals of such policies should be to guarantee the same options, in terms of career development, to everybody, eliminating those barriers that could create a glass ceiling. However, once these policies achieve the goal of propelling visible LGBT people to the upper echelons, how do stakeholders and shareholders react? Although research offers empirical support for the relationship between LGBT-friendly policies and practices and organizational financial performance, we do not know the impact of having visible LGBT people at the upper echelons of a business. The goal of this study is to answer this question.

Given the paucity of research about the business case of LGBT people being in managerial positions, this study analyzes the extent to which visible LGBT people in the executive positions of a firm have a positive impact on its value. We examine both the possibility of a direct impact and the possibility of an indirect one mediated through financial performance. In order to answer this question, we rely on the list of 100 leading LGBT executives published by OUTstanding and The Financial Times (FT). Using a matched sample methodology, we examine whether the listed firms in which these leading LGBT executives are working outperform firms from a matched sample based on country and size.

The framework of this study draws upon the integration of the theoretical and empirical contributions about the business case of diversity, the Corporate Social Responsibility (CSR) literature (Bowen 1953; Colgan 2011), and the resource-based perspective (Barney 1991; Branco and Rodrigues 2006; Barney et al. 2011; Barney et al. 2021). The resource-based perspective posits that the internal characteristics of an organization and its resources can be linked to organizational performance. One of these resources is the human capital, which can represent a competitive advantage compared with competitors (Jiraporn et al. 2019).

This paper contributes to the existing literature in various ways. Firstly, it provides information about the business case of diversity by examining the reputational effects of the presence of LGBT executives in firms' leadership teams in terms of their economic impacts. Secondly, the article sheds light on the importance of focusing on invisible diversity, such as sexual orientation and gender identity—a minority group that has been overlooked in the literature. Finally, by using simultaneous equations, we distinguish the effects on financial performance and on market value.

The paper is structured as follows. The next section provides the background and reviews relevant literature. The development of hypotheses is presented in Section 3. Section 4 describes the research design. In Section 5, research findings are presented. A discussion and concluding remarks are presented in the final section.

2. Conceptual Framework

2.1. The Business Case for Diversity at the Top

A large body of research underlines the effects of diversity on several organizational outcomes (e.g., Tejeda 2006; Farndale et al. 2015; Arenas et al. 2017; Burdenson and Van der Vegt 2018). According to the business case, when well managed (Özbilgin et al. 2016), diversity might positively impact those outcomes that create value for organizational stakeholders and shareholders. The basic assumption of the business case for diversity is that organizations can have a financial benefit by implementing policies that allow people to be authentic at work (Kossek and Pichler 2007). This idea has been empirically supported by studies that have demonstrated that the wise management of diversity leads to higher innovation, creativity, team performance, talent retention, and group cohesion (e.g., Cronin and Weingart 2007; Özbilgin et al. 2016; Mallory et al. 2017; Jiraporn et al. 2019). However, some other studies have showed mixed results (Randel and Jaussi 2003), and diversity has been associated with negative consequences, such as higher conflict (Özbilgin et al. 2016). The reason for such mixed results might lie in the lack of acknowledgement of those internal and external factors that might intervene in the effectiveness of the adoption of diversity policies and practices. In that sense, the perception of an adverse diversity climate (Gonzalez and DeNisi 2009) and the political and legislative context (e.g., Everly and Schwarz 2015; Roumpi et al. 2020) play a role in the relationship between diversity policies and practices, firm productivity, and return on profit.

Another factor that might determine financial performance is related to the composition of the corporate board, in terms of the extent to which having diverse people at the upper echelons can represent or promote a competitive advantage for the organization. To answer this question, many studies have been published devoted to exploring the topic of diversity on managing boards and its implications (Post and Byron 2015; Cabrera-Fernández et al. 2016; Halliday et al. 2021; Kyaw et al. 2021b), focusing mostly on the inclusion of women. Even in this case, the evidence offers mixed results (Post and Byron 2015). Some findings supported the business case for diversity, showing that increasing the number of women at the top of a company leads to positive outcomes in terms of corporate strategic decisions, participation, ethical behaviors, and firm profitability (Nielsen and Huse 2010; Post and Byron 2015). However, in their meta-analysis, Post and Byron (2015) found that firms with higher female representation on the board tend to present higher accounting returns but not necessarily better market performance. They found the positive relation between women on the board and accounting returns to be more positive in countries with stronger shareholder protections. They also found that the relationship between women on the board and market performance is positive in countries with greater gender parity. Such mixed results showed that further research is necessary.

2.2. Diversity in Management, CSR, and the Resource-Based Theory

The business case for diversity in management and its impact on financial performance has been explained through the lens of the Corporate Social Responsibility (CSR) theory (Bowen 1953; Colgan 2011) and resource-based theory (Branco and Rodrigues 2006; Surroca

et al. 2010; Barney et al. 2011; Lourenço et al. 2014; Shaukat et al. 2016; Tetrault Sirsly and Lvina 2019). CSR has to do with the responsibility organizations have "for their impacts on society" and implies the integration of "social, environmental, ethical, and human rights concerns" into their operations and strategy (European Commission (EC) 2011). The CSR issues pertaining to environmental aspects are crucial for the transition to a low-carbon economy (Ionescu 2020, 2021), but when one considers the pursuit of sustainable development overall, aspects such that of diversity become pivotal.

Organizations that behave socially responsibly might simultaneously pursue the moral case for diversity and the business case for diversity. Making fair and moral decisions with the aim of creating inclusive organizations for everybody increases the commitment of all workers', decreases turnover (Wang and Schwarz 2010), and generates positive repercussions in terms of higher organizational reputation (Branco and Rodrigues 2006). Thus, increasing diversity at the upper echelons might send a clear message to stakeholders and shareholders about organizational diversity values, which might have an impact on a firm's reputation and, consequently, on its financial performance. Offering diverse groups of people the same chances in terms of career development is not just fair but can also represent a strategic decision.

Considering diversity in management as an intangible strategic asset is in line with resource-based theory (Barney 1991; Barney et al. 2011; Barney et al. 2021). According to this theory, a firm's generation of sustainable competitive advantages depends on the effectiveness of the control and manipulation of those resources and capabilities which are valuable and rare, hardly imitable, and for which there is no perfect substitute available for their replacement (Barney et al. 2011). A popular definition of resources and capabilities is that of Barney et al. (Barney et al. 2011, p. 1300), who view them as "bundles of tangible and intangible assets, including a firm's management skills, its organizational processes and routines, and the information and knowledge it controls that can be used by firms to help choose and implement strategies". Firms' human capital and reputation are considered to be among the resources of greatest strategic importance (Surroca et al. 2010). Generating organizational commitment on the part of its employees and publicly favorable reputations are increasingly analyzed as rationales for a firm to engage in CSR. Firms that enjoy favorable reputations are deemed as more likely to have good relations with their stakeholders (including governments, suppliers, and community representatives).

While the presence of women at the top and its financial impact has been studied extensively (e.g., Al-Shaer and Zaman 2016; Arayssi et al. 2016; Cook and Glass 2016), other diverse groups have been under-researched. For instance, the presence of LGBT people at the upper echelons has been less explored, and only recently have several disciplines started to shed light on the implications of non-normative sexual orientations and gender identities at different organizational dimensions.

2.3. LGBT People at the Upper Echelons

For many years, research on inclusion at organizations has focused on visible diversity and on those minority or protected groups that are immediately recognizable as different (Roumpi et al. 2020). Women, people of color, and people with visible disabilities have been the focus of attention of many studies dedicated to the examination of the prejudicial dynamics that have developed at the organizational level and that might undermine the development of diverse groups of people's careers. However, visible diversities are not the only kinds of diversity. Quite recently, researchers have started to focus on those people whose diversity traits might not be immediately identified and who require the disclosure of their invisible identity. Sexual orientation and gender identity have been traditionally considered as invisible traits because they require the active action of LGBT people to disclose their identity (Clair et al. 2005; Ragins 2008). However, recent studies have started to challenge the idea of the disclosure of sexual orientation as the result of an individual choice (e.g., Clair et al. 2005; Ragins 2008), pointing out the role played by third-party

actors (supervisors, co-workers) in outing those colleagues who do not desire to come out (Ragins 2004).

Non-normative sexual orientations and gender identities have been stigmatized for many years. LGBT workers have been victims of discrimination, and although, currently, many countries offer legislative tools to protect their rights, in many other countries, such rights are not recognized by law (Di Marco 2017). Moreover, despite the legal protection offered by some countries, subtle discrimination still exists (Einarsdóttir et al. 2015; Di Marco et al. 2018).

One of the consequences of neglecting sexual orientations and gender identity at the workplace has been their exclusion from those actions which aim to create inclusive work environments (Roumpi et al. 2020), such as work–personal life-balance policies, career development, etc. Not including LGBT people in such policies, as a result of overt and subtle discrimination, is one of the reasons for the lower rate of LGBT people being openly out in management positions (Fitzsimmons and Callan 2020).

Despite the scenario above described, organizations are changing slowly. LGBT people's inclusion has become an important aspect of corporate practices and policies, albeit with an exponential growth in importance in the past few years. In 1984, IBM was the first to adopt a written policy concerning non-discrimination that included sexual orientation (Hayworth 2008). Currently, according to the Corporate Equality Index (CEI) published by the Human Rights Campaign Foundation (HRCF), which evaluates how the major corporations in the USA treat their LGBT employees, consumers, and investors, 89% of firms include sexual orientation in their non-discrimination policy (Human Rights Campaign Foundation HRCF 2015). The evolution of LGBT corporate policies has been especially noteworthy in terms of "gender identity protections and transgender-inclusive healthcare coverage" (Human Rights Campaign Foundation HRCF 2015). Whereas in the first CEI report, published in 2002, only 5% of employers protected their employees on the basis of gender identity, in the last report, 93% of businesses do so (Human Rights Campaign Foundation HRCF 2015). Moreover, the number of organizations that offer critical transgender-inclusive benefits has grown from no major business doing so in 2002 to 511 affirming such coverage today (Human Rights Campaign Foundation HRCF 2015). In line with this trend, between 1999 and 2013, the proportion of Fortune 500 companies including sexual orientation in their non-discrimination policies increased from 52% to 87% (Sears and Mallory 2014). Regarding the topic of gender identity, whereas in 1999 only a handful of such companies included it in these policies, by 2013, the proportion was 41% (Sears and Mallory 2014). The importance that LGBT rights are assuming in the business world is evidenced by the fact that a major international financial institution, Credit Suisse, launched an LGBT Equality Index for investors, which tracks the stock market performance of LGBT-friendly companies, in 2013.

Studies about the inclusion of LGBT-friendly policies and practices have shown positive results at the organizational level. The research found that performance, firm value, stock value, credit ratings, competitiveness, innovation, and customer satisfaction (Johnston and Malina 2008; Wang and Schwarz 2010; Li and Nagar 2013; Sears and Mallory 2014; Shan et al. 2017; Pichler et al. 2018; Jiraporn et al. 2019; Chintrakarn et al. 2020; Hossain et al. 2020; Hur 2020; Fatmy et al. 2021; Kyaw et al. 2021a; Opall 2021; Patel and Feng 2021) increase when such types of policies are adopted. Thus, although the implementation of LGBT-friendly policies represents a cost for the organization, it is not penalized by either stakeholders or shareholders (Johnston and Malina 2008; Cook and Glass 2016) because of their positive financial return.

The likelihood of the adoption of such policies is affected by factors such as the gender-diverse composition of the board (Cook and Glass 2016), while the organizational financial effect of the adoption of LGBT policies and practices is affected by the political orientation of both the environment of the organization's headquarters and the board of directors (Roumpi et al. 2020).

3. Hypotheses Development

We mentioned above that wise diversity management practices, such as the implementation of diversity policies and practices and the promotion of equal opportunities of career development, are viewed as a CSR issue that can lead to the creation of strategic resources and, in turn, to a firm's competitive advantage. Resource-based theory offers insight into how CSR measures can influence firms' financial performance (McWilliams and Siegel 2011). According to Lozano et al. (2015, p. 436), resource-based theory "offers a unique perspective to corporate leaders by providing an explanation of how internal resources can lead to proactive changes in the company, especially if they were to consider environmental issues, as well as the rights and responsibilities of the firm, internally and externally".

The economic impacts of corporate LGBT practices and policies that Sears and Mallory (2014) identified are mainly related to human capital and reputation. According to these authors, the most commonly mentioned benefits resulting from LGBT-friendly policies include a heightened ability to recruit and retain the best talent, increased productivity by LGBT employees who feel valued and comfortable at work, and employee relations and morale. Moreover, according to Sears and Mallory (2014), many companies have explained the economic success of LGBT-friendly policies as being due to the variety of ideas and innovations resulting from a diverse workforce. Other benefits of such policies are related to a better ability to serve diverse customers' needs and the aptness to fulfill public sector clients' requirements.

Johnston and Malina (2008, p. 607) explained the possible economic benefits of LGBT-friendly practices and policies by suggesting that they may elicit a "chain of causally linked phenomena within the firm". They describe such a process in the following manner: "a firm managing diversity can recruit more effectively and retain well-qualified employees. These higher-quality employees are better able to identify, understand, and satisfy diverse customers which, in turn, increases firm financial performance." Shan et al. (2017) provide evidence that companies presenting higher levels of corporate sexual equality present higher levels of labor productivity than companies with lower levels of such equality. Pichler et al. (2018) provide evidence of a positive relationship between LGBT-supportive corporate policies and factor productivity and employee productivity.

Based on the above, we expect that a company with LGBT executives will be able to initiate such a virtuous chain, not only because it is more likely to have more progressive LGBT-related policies and practices but also because having this type of executives will signal a more progressive environment in terms of LGBT rights. In effect, the reputational aspect is of the utmost importance in eliciting the chain of phenomena to which Johnston and Malina (2008) refer. As Wang and Schwarz (2010) underline, LGBT-friendly policies allow organizations to create a reputation of being progressive in terms of how LGBT workers are treated, and such a reputation may make the firm more attractive to well-qualified employees among the LGBT community.

Another aspect is the possible effect of LGBT-friendly policies and practices on customers. This effect is related to a firm's reputation regarding how it treats LGBT workers. As Wang and Schwarz (2010, p. 200) suggest, firms with more progressive policies and practices pertaining to LGBT issues may have a better reputation with potential customers of the LGBT community. Patel and Feng (2021) present evidence of a positive influence of LGBT workplace equality policies on customer satisfaction, both directly and through the mediation of marketing capability, although such relations are dampened by demand instability. We consider that a firm with executives who are publicly known as LGBT will, regardless of the actual policies in place, also enjoy a similar reputation. Hence, a similar relation with customers is likely to exist.

Considering LGBT-friendly corporate policies and practices as a CSR issue, its benefits may take different forms. Reviewing and synthesizing the contemporary business literature that focuses on the role of CSR to enhance firm value, Malik (2015) notes that those benefits may influence firm value both directly and indirectly. This author states that firms' superior

quality social and environmental initiatives increase the value of a firm directly by way of their positive influence on stock market returns. The other forms of benefits, such as augmented employee productivity, enhanced operating efficiency, and improved relations with the firm's stakeholders, increase its revenues as well as profitability, which indirectly leads to a higher value of the firm. Given that the market value of a firm "takes into account the long-term impact of managerial decisions on the firm's operating performances, including sales revenues, profits, cash flows, and growth prospects" (Malik 2015, p. 426), an indirect effect on a firm's market values of LGBT executives being on its leadership team, and thus on its better financial performance, is likely to occur. As Wang and Schwarz (2010, p. 200) stated, if LGBT-friendly practices and policies result in financial efficiency gains, the expected market value of the firm should increase.

Hence, we analyze the possible direct and indirect effects of the existence of executives who are publicly known as LGBT on the market value related to the adherence of investors themselves to the values that the ideas of fairness and equality represent or to the acknowledgement by investors of the positive effects directly or indirectly related to financial performance. Investors may acknowledge these benefits and act accordingly.

In line with the above, we present the following three hypotheses:

Hypothesis 1 (H1). *The presence of successful LGBT executives has a direct effect on a firm's value.*

Hypothesis 2 (H2). *The presence of successful LGBT executives has a direct effect on a firm's financial performance.*

Hypothesis 3 (H3). *The presence of successful LGBT executives has an indirect effect on a firm's value, through a positive effect on the firm's financial performance.*

4. Research Design

4.1. Sample and Data

The empirical study relies on the list of 100 leading LGBT executives published by OUTstading and The Financial Times (FT). These two organizations work together to publish the name of the 100 people who they think challenge the presumption that we cannot be openly LGBT and be successful in business. According to the methodology used by OUTstading and FT, everyone ranked in the list needed to be a success in their own right, influential within their sectors, and a role model who is lesbian, gay, bisexual, or transsexual (Sandhu 2015). The criteria include considerations of leadership, a look at where the individual sits within the organization, and how close they are to the group or chief executive (if not the chief executive itself), among others. Everyone also needs to be working in a business that operates as a for-profit organization. All the people included in the list are nominated by peers, and each person has given their permission to be included.

Based on the lists of 100 leading LGBT executives regarding the years 2013 to 2018, we hand-constructed a sample composed only of the publicly listed firms, excluding the non-listed firms, in which each of the LGBT executives are working (hereby identified as LGBT firms). Some of these firms have more than one executive in the aforementioned list, and not all of them appear in all the years, contributing to an unbalanced panel of LGBT firms. We then selected a matched sample of listed firms based on country and size (hereby identified as Non-LGBT firms). To do so, we collected information for all the listed Non-LGBT firms in the same country as each LGBT firm and selected the four observations for which the firm size based on total assets is nearest to the one of the LGBT firm. After eliminating extreme observations (when the distance from the mean was greater than three times the standard deviation), the final sample was composed of 972 firm–year observations.

Table 1 presents the sample distribution by country and by type of firm. LGBT firms contribute 187 firm–year observations during the sample period, representing 19% of the

total sample. Firms from the United States and from the United Kingdom are the most representative, with around 44% and 34% of total observations, respectively.

Table 1. Sample distribution by country and by type of firm.

Countries	LGBT Firms	Non-LGBT Firms	Total
USA	77	346	423
UK	67	263	330
Germany	8	32	40
Canada	7	28	35
France	7	28	35
Switzerland	6	24	30
Australia	5	24	29
Hong Kong	4	16	20
Japan	3	12	15
Finland	1	4	5
The Netherlands	1	4	5
South Korea	1	4	5
All	187	785	972

Table 2 displays the sample distribution by industry considering the Industry Classification Benchmark (ICB). The most representative industries are financial and consumer discretionary industries.

The firm data used to compute the variables included in the empirical study were collected from the Thomson Reuters Datastream. The country variables were collected from the World Bank and from the World Value Survey database.

4.2. Simultaneous Estimation Model

In order to investigate the effect of the existence of LBGT executives on firms' value, either directly or indirectly through its effect on a firm's financial performance, we estimate the following simultaneous equations model:

$$F\_VALUE_{it} = \alpha_0 + \alpha_1 LGBT_{it} + \alpha_2 ROA_{it} + \alpha_3 SIZE_{it} + \alpha_4 LEV_{it} + \alpha_5 GROWTH_{it} + \alpha_6 GDP_{it} + \alpha_7 HOMO_{it} + \varepsilon \quad (1)$$

$$ROA_{it} = \alpha_0 + \alpha_1 LGBT_{it} + \alpha_2 SIZE_{it} + \alpha_3 LEV_{it} + \alpha_4 GROWTH_{it} + \alpha_5 GDP_{it} + \alpha_6 HOMO_{it} + \varepsilon \quad (2)$$

where

Firm value is measured as Tobin's Q, defined as the sum of the market value of equity (share price multiplied by the number of ordinary shares in issue at fiscal year-end) and the book value of debt divided by the book value of total assets. Tobin's Q has been extensively used in economics as a proxy for firm value (e.g., Demsetz and Villalonga 2001; Lang et al. 2003; Campbell and Mínguez-Vera 2008; Adams and Ferreira 2009; Carter et al. 2010; Greene and Jame 2013).

Table 2. Sample distribution by industry.

Country	Basic Materials	Consumer Staples	Financials	Health Care	Industrials	Technology	Telecomun.	Utilities	Real Estate	Consumer Discretionary	Energy	Total
USA	12	18	211	23	39	23	15	17	9	39	17	423
UK	31	31	112	12	34	2	12	21	18	43	14	330
Germany	0	0	22	1	0	2	0	4	2	9	0	40
Canada	2	0	31	0	0	0	0	0	1	0	1	35
France	0	0	20	0	2	3	0	0	1	6	3	35
Switzerland	0	0	28	1	1	0	0	0	0	0	0	30
Australia	4	1	12	0	2	0	1	0	7	2	0	29
Hong Kong	1	0	1	0	1	2	0	0	10	5	0	20
Japan	0	0	9	0	0	3	1	0	0	1	1	15
Finland	2	0	1	0	0	0	1	1	0	0	0	5
The Netherlands	0	0	3	0	1	0	0	0	0	0	1	5
South Korea	0	0	4	0	0	1	0	0	0	0	0	5
India	0	0	1	0	0	0	1	1	0	0	0	3
Total	52	50	454	37	80	36	30	43	48	105	37	972

LBGT is an indicator coded by 1 if the firm has an LGBT executive included in the list of 100 leading LGBT executives published by OUTstading and The Financial Times and 0 otherwise.

ROA is net income before extraordinary items divided by total assets.

SIZE is the natural logarithm of total assets.

LEV is the ratio of long-term debt to total assets.

GROWTH is the mean of sales growth in the last three years.

GDP is the natural logarithm of the GDP per capita as reported by the World Bank.

HOMO is a score that measures the extent to which people do not mind having homosexual people as neighbors, as reported by the World Values Survey.

The simultaneous estimation of those two structural equations has several advantages over the ordinary least squares (OLS) estimation of the single equations because it accounts for the interdependency between firm value and financial performance—the two dependent variables in each regression.

The problem of endogeneity and its underlying omitted variables usually affects researchers' results. The simultaneous estimation model has been used as a possible solution to mitigate that problem. We consider that a board's decision to appoint LGBT executives can be assumed to be an endogenous firm decision. We model our simultaneous estimation supported by this firm-decision condition.

The acceptability of the simultaneous estimation model is assessed by testing the null hypothesis of no systematic difference between the estimated coefficients of the simultaneous model and those of the OLS model (Hausman test), and the null is rejected at the 1% level. The use of a simultaneous estimation model permits the treatment of the correlation between the error terms of the equations in the system (not considered in OLS estimation) as well as the handling of the endogeneity problem. The models are estimated with industry-fixed effects.

Our argument is that firms with LGBT executives included in the 100 leading LGBT executives published by OUTstading and The Financial Times are more likely to signal a more progressive environment in terms of LGBT rights, which investors will reward positively. These firms are also expected to enjoy the benefits mentioned above, both those related to human capital and reputational benefits, which will lead to enhanced financial performance, which, in turn, will have a positive effect on firm value.

5. Research Findings

5.1. Descriptive Analysis

Table 3 reports the descriptive statistics of the variables used in the simultaneous estimation model. On average, Tobin's Q is 0.8142, and it ranges from 0.0191 to 3.8323. The mean value of the variable ROA is 0.0313, and it ranges from −0.1481 and 0.2219. On average, LEV and GROWTH are 0.1661 and 0.0390, respectively. Regarding the country variables, the mean value of GDP is 10.8211, ranging from 10.3533 (South Korea) to 11.3691 (Switzerland). The mean value of HOMO is 0.7745, ranging from 0.17 (South Korea) to 0.86 (Switzerland).

Table 4 presents the correlations between variables. Consistent with previous literature, there is a high positive correlation between the financial performance variable (ROA) and Tobin's Q (F_Value). It is also worth noting that our variable of interest, the existence of LGBT executives, is significantly and positively correlated with ROA and F_Value. This initial finding corroborates the hypotheses proposed in this research.

Table 3. Descriptive statistics of variables.

Variable	Obs.	Mean	Std. Dev.	Min	Max
F_VALUE	972	0.8142	0.7358	0.0191	3.8323
ROA	972	0.0313	0.0460	−0.1481	0.2219
LGBT	972	0.1924	0.3944	0	1
SIZE	972	17.8679	2.1293	10.8611	21.6650
LEV	972	0.1661	0.1409	0	0.6381
GROWTH	972	0.0390	0.1198	−0.4230	0.5451
GDP	972	10.8211	0.2523	7.6059	11.3691
HOMO	972	0.7745	0.0930	0.1700	0.8600

F_VALUE is measured as Tobin's Q, defined as of the sum of the market value of equity (share price multiplied by the number of ordinary shares in issue at fiscal year-end) and the book value of debt divided by the book value of total assets. ROA is net income before extraordinary items divided by total assets. LBGT is an indicator coded by 1 if the firm has an LGBT executive included in the list of 100 leading LGBT Executives published by OUTstading and The Financial Times and 0 otherwise. SIZE is the natural logarithm of total assets. LEV is the ratio of long-term debt to total assets. GROWTH is the mean of sales growth in the last three years. GDP is the natural logarithm of the GDP per capita as reported by the World Bank. HOMO is a score that measure the extent to which people do not mind having homosexual people as neighbors, as reported by the World Values Survey.

Table 4. Correlation table.

	F_VALUE	ROA	LGBT	SIZE	LEV	GROWTH	GDP
F_VALUE	1	-	-	-	-	-	-
ROA	0.683 ***	1	-	-	-	-	-
LGBT	0.179 ***	0.164 ***	1	-	-	-	-
SIZE	−0.461 ***	−0.375 ***	0.075 **	1	-	-	-
LEV	0.442 ***	0.169 ***	−0.018	−0.283 ***	1	-	-
GROWTH	0.095 ***	0.127 ***	−0.041	−0.240 ***	0.014	1	-
GDP	0.007	−0.012	0.005	0.151 ***	−0.003	−0.045	1
HOMO	0.059 *	0.038	0.009	0.041	0.036	−0.003	0.167 ***

F_VALUE is measured as Tobin's Q, defined as of the sum of the market value of equity (share price multiplied by the number of ordinary shares in issue at fiscal year-end) and the book value of debt divided by the book value of total assets. ROA is net income before extraordinary items divided by total assets. LBGT is an indicator coded by 1 if the firm has an LGBT executive included in the list of 100 leading LGBT executives published by OUTstading and The Financial Times and 0 otherwise. SIZE is the natural logarithm of total assets. LEV is the ratio of long-term debt to total assets. GROWTH is the mean of sales growth in the last three years. GDP is the natural logarithm of the GDP per capita as reported by the World Bank. HOMO is a score that measure the extent to which people do not mind having homosexual people as neighbors, as reported by the World Values Survey. ***, **, * indicate statistical significance at 1, 5, and 10 % levels of statistical significance for two-tailed tests.

Regarding the control variables, GDP is the only variable that is not statistically correlated with F_Value. LEV and GROWTH are positively correlated with F_Value, while the SIZE variable is negatively correlated.

5.2. Simultaneous Estimation Results

Table 5 presents the results for the simultaneous estimation regression model. The first part of Table 5 shows the results for the first equation in the model (Equation (1)), which aims to capture the direct and the indirect effects of the independent variables in the firm value (F_VALUE) through their effects on the financial performance indicator (ROA). The second part of Table 5 presents the estimation results for the second equation in the model (Equation (2)), which aims to capture the direct effect of the independent variables on the ROA.

Table 5. Results of the simultaneous estimation.

	Estimate	Std. Error	t Value	*p*-Value
F_VALUE (Equation (1))				
LGBT	0.161	0.034	4.781	0.000
ROA	7.158	0.334	21.416	0.000
SIZE	−0.039	0.008	−4.938	0.000
LEV	0.914	0.112	8.138	0.000
GROWTH	−0.004	0.111	−0.035	0.972
GDP	0.113	0.052	2.173	0.030
HOMO	0.270	0.140	1.922	0.055
_cons	−0.568	0.558	−1.017	0.309
ROA (Equation (2))				
LGBT	0.013	0.003	3.930	0.000
SIZE	−0.004	0.001	−4.866	0.000
LEV	−0.025	0.011	−2.350	0.019
GROWTH	0.010	0.011	0.913	0.361
GDP	0.006	0.005	1.288	0.198
HOMO	0.030	0.014	2.221	0.027
_cons	−0.014	0.054	−0.262	0.793
Industry dummies	YES			
No observations	972			
R2 (Equation (1))	0.719			
R2 (Equation (2))	0.326			

F_VALUE is measured as Tobin's Q, defined as of the sum of the market value of equity (share price multiplied by the number of ordinary shares in issue at fiscal year-end) and the book value of debt divided by the book value of total assets. ROA is net income before extraordinary items divided by total assets. LBGT is an indicator coded by 1 if the firm has an LGBT executive included in the list of 100 leading LGBT executives published by OUTstading and The Financial Times and 0 otherwise. SIZE is the natural logarithm of total assets. LEV is the ratio of long-term debt to total assets. GROWTH is the mean of sales growth in the last three years. GDP is the natural logarithm of the GDP per capita as reported by the World Bank. HOMO is a score that measure the extent to which people do not mind having homosexual people as neighbors, as reported by the World Values Survey. INDUSTRY effects included.

The results of the first equation, in the first part of Table 5, indicate that the coefficient of the LGBT variable is positive and statistically significant (coefficient: 0.161; *p*-value: 0.000), which means the existence of LGBT executives has a direct effect on a firm's value. This finding is consistent with hypothesis 1. Having LGBT executives seems to be valued by investors for its own sake, not only due to its impact on financial performance. We view this finding as consistent with the results of studies that find a positive impact of diversity awards on share prices (Cook and Glass 2014) or of changes in corporate equality index scores on stock prices (Wang and Schwarz 2010).

The results of the second equation, in the second part of Table 5, indicate that the coefficient of the LGBT variable is positive and statistically significant (coefficient: 0.013; *p*-value: 0.000), which means that the existence of LGBT executives also has a direct effect of the ROA. This is consistent with hypothesis 2. It is also consistent with existing literature that finds that LGBT-friendly firms are likely to present higher levels of ROA (Fatmy et al. 2021) and income per employee (Shan et al. 2017).

Additionally, the coefficient of the variable ROA in Equation (1) is positive and statistically significant (coefficient: 7.158; *p*-value: 0.000), meaning that the ROA has a direct effect on the firms' value. Therefore, we may conclude that there is an indirect relationship between the presence of LGBT executives and firm value, which is captured by the financial performance indicator ROA. This finding is consistent with hypothesis 3. Although existing studies have not made an analysis similar to that which we present in this study, we view this finding as consistent with existing literature that presents evidence of a positive association between LGBT policies and firm value (Shan et al. 2017; Pichler et al. 2018; Fatmy et al. 2021). What is lacking in these studies is the examination of whether such association is driven by the impact of LGBT policies on financial performance.

Regarding the control variables, the results of the first equation show the coefficients of the variables LEV, GDP, and HOMO are positive and statistically significant, meaning that more leveraged firms and firms from countries with a higher GDP per capita and/or a higher level of tolerance of LGBT people are associated with a higher firm value. By contrast, the coefficient of the SIZE variable is negative and statistically significant. Regarding the second equation, we find that the coefficients of the variables SIZE and LEV are negative and statistically significant, meaning that larger and more leveraged firms are less profitable. By contrast, firms from countries with a higher level of tolerance of LGBT are positively associated with higher financial performance.

5.3. Additional Analysis

In order to increase the robustness of the results, we also estimate the simultaneous equations model, adding an interaction term of the variables LGBT and Non_HOMO, which measure the extent to which the firms with LGBT executives are based in a country in which people do not like having homosexual people as neighbors. The results, presented in Table 6, show that the effect of LBGT executives on a firm's value, either directly or indirectly through their effect on the firm financial performance, is significantly lower in the countries where people do not like having a homosexual person as a neighbor. This finding is consistent with Fatmy et al. (2021), who, using a US sample, found the positive effect of LGBT policies on firm value and financial performance to be more pronounced for firms located in more liberal states when compared to those located in more conservative states.

Table 6. Results of the simultaneous estimation (additional analysis).

	Estimate	**Std. Error**	**t Value**	***p*-Value**
F_VALUE (Equation (1))				
LGBT	0.442	0.079	5.623	0.000
ROA	7.113	0.332	21.412	0.000
SIZE	−0.039	0.008	−4.942	0.000
LEV	0.893	0.112	7.984	0.000
GROWTH	−0.009	0.110	−0.086	0.932
GDP	0.125	0.051	2.454	0.014
LGBTxNon_HOMO	−1.267	0.323	−3.929	0.000
_cons	−0.496	0.555	−0.893	0.372
ROA (Equation (2))				
LGBT	0.028	0.008	3.669	0.000
SIZE	−0.004	0.001	−4.812	0.000
LEV	−0.026	0.011	−2.424	0.016
GROWTH	0.010	0.011	0.918	0.359
GDP	0.008	0.005	1.632	0.103
LGBTxNon_HOMO	−0.068	0.031	−2.173	0.030
_cons	−0.009	0.054	−0.172	0.864
Industry dummies	YES			
No observations	972			
R2 (Equation (1))	0.723			
R2 (Equation (2))	0.326			

F_VALUE is measured as Tobin's Q, defined as of the sum of the market value of equity (share price multiplied by the number of ordinary shares in issue at fiscal year-end) and the book value of debt divided by the book value of total assets. ROA is net income before extraordinary items divided by total assets. LBGT is an indicator coded by 1 if the firm has an LGBT executive included in the list of 100 leading LGBT executives published by OUTstading and The Financial Times and 0 otherwise. SIZE is the natural logarithm of total assets. LEV is the ratio of long-term debt to total assets. GROWTH is the mean of sales growth in the last three years. GDP is the natural logarithm of the GDP per capita as reported by the World Bank. HOMO is a score that measure the extent to which people do not mind having homosexual people as neighbors, as reported by the World Values Survey. INDUSTRY effects included.

6. Discussion

As predicted, our findings suggest that firms with known LGBT executives outperform their counterparts. By using a simultaneous equations model, based on the results of the two equations considered taken together, we detected that the presence of LGBT executives directly affects a firm's value, and it also has a positive impact on financial performance, which in turn positively impacts the firm's value. This result is consistent with the idea that firms with known LGBT executives are able to attract and retain well-qualified employees, generate organizational commitment on their part, and obtain publicly favorable reputations that allow them to outperform their counterparts in terms of financial performance. As mentioned above, this financial performance is dependent both on human capital aspects (quality and commitment of the workforce) and on reputational aspects (the capacity of attracting customers). We interpret this as evidence of what Johnston and Malina (2008, p. 620) call "employee and customer goodwill" towards sexual orientation and corporate practices and policies encouraging diversity. This finding is consistent with the findings of the few studies that have analyzed the economic benefits of LGBT-friendly policies and practices (Johnston and Malina 2008; Wang and Schwarz 2010; Sears and Mallory 2014; Shan et al. 2017; Pichler et al. 2018).

We also found a significant direct relationship between the presence of LGBT executives and firm value. This finding is consistent with Wang and Schwarz (2010), whose findings suggest that firms with more progressive LGBT-friendly policies in place subsequently enjoy a higher annual share price growth than their counterparts. However, although not contrary to the results of Johnston and Malina (2008), our findings are not entirely consistent with them. Johnston and Malina (2008) examined the impact of the inaugural corporate equality index on firms' stock market value and found that shareholders do not penalize firms for allocating resources to progressive sexual orientation workplace policies. Whereas Johnston and Malina (2008) examined the short-term financial impact of LGBT-friendly policies, Wang and Schwarz (2010) investigated the long-term impact of such policies. However, Wang and Schwarz (2010) have not examined the effect of profitability on market value as we have done. We add to their analysis by considering this mediation. It is possible that the findings of Wang and Schwarz (2010) were driven by profitability, instead of LGBT-friendly policies having a direct impact on firm value.

Our results are also consistent with those of Shan et al. (2017), who found that companies with higher degrees of corporate sexual equality enjoy higher stock returns and market valuation. These researchers have also identified one channel through which companies benefit from higher degrees of corporate sexual equality—higher employee productivity. They suggested that the relationship between corporate sexual equality and firm value would be partially mediated by the relationship between employee productivity and firm performance. However, they have not examined the effects of this higher employee productivity on companies' financial performance. They acknowledged other plausible channels, such as the case of the possible effect of LGBT-friendly policies and practices on consumers. They left this issue for future research.

Our approach was different. In this study, we examined the direct effect of a firm's LGBT-friendliness reputation on their market value, as well as the indirect effect via the effect on financial performance, presumably driven by the effects of a company's reputation of being progressive in terms of how LGBT workers are treated on the quality and commitment of the workforce and its attractiveness to well-qualified employees and customers. We leave the examination of the functioning of these two different channels to future research.

We interpret our results as meaning that the reputational signal for investors of established progressive LGBT-friendly policies, which is consistent with the overall findings in the existing literature, is currently of a similar (or almost similar) magnitude to that of the presence of known LGBT executives in a firm's leadership. The findings of Johnston and Malina (2008) mentioned above may be related to a certain lack of attention to LGBT issues on the part of investors, which, meanwhile, has given way to some attentiveness to such

issues in the past few years. Cook and Glass (2014) found a significant increase in the share price of firms that received certain diversity awards following their announcement, which was interpreted by these authors as meaning that investors view diversity reputation signals as indicating good health for firms. However, they also found that signals associated with the advancement of women are much more likely to be rewarded by investors than those associated with the advancement of racial/ethnic minorities. Given that, among the various elements of diversity, the issue of sexual orientation and identity is the last acceptable prejudice or bias (Day and Greene 2008; Ozeren 2014), it is not all that unexpected that investors were not particularly sensitive to it. This is likely to have changed, however slightly, in the past few years.

It seems as though the rising awareness of sexual orientation and identity issues among policymakers and firms' stakeholders, in general, has made investors more attentive to LGBT issues and/or to the employee and customer goodwill-related benefits firms enjoy by being and/or being perceived as being preoccupied with LGBT rights.

7. Conclusions

Our study contributes to the scant literature on LGBT-friendly firms and the relationship of such friendliness with market value by exploring a hitherto unexplored aspect: that of the presence of LGBT executives in firms' leadership teams. Our findings suggest that having visible LGBT people at the upper echelons is likely to contribute positively to a firm's performance. We suggest that two different channels may be at work: a direct effect of an LGBT-friendliness reputation on market value, and an indirect effect related to the effects of this reputation on financial performance, presumably associated with the impacts of such a reputation on the quality and commitment of the workforce and on the attractiveness to employees and customers. The findings are consistent with the lens of analysis proposed. It seems that the presence of LGBT people in the upper echelons offers a signal to a firm's stakeholders that has effects regarding how they engage with the firm, whether this concerns investors, employees, or consumers.

This study has some practical managerial implications. It can help managers and organizations to become aware of the positive influence of the presence of LGBT people in the upper echelons on a firm's reputation, financial performance, and market value. Firms would well advised to welcome and promote the presence of LGBT people in leadership teams.

However, this study also has limitations, among which are those pertaining to the dependent variable retained, the presence of known LGBT executives on the leadership team of a firm, which we equate with having progressive LGBT-friendly policies and practices in place. Another limitation is that our sample included firms exclusively from developed countries, supposedly with a high recognition of LGBT rights.

Future research should try to distinguish the reputational effects of having such policies in place from the reputational impacts of the presence of LGBT executives. Further research should also extend the analysis conducted in this study to the cases of countries without such recognition and, more generally, with very different socio-cultural contexts.

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Corporate Governance from a Cross-Country Perspective and a Comparison with Romania

Bogdan Aurelian Mihail [1,*] and Dalina Dumitrescu [2]

[1] Doctoral School of Finance, Bucharest University of Economic Studies, 6 Piata Romana, 010374 Bucharest, Romania
[2] Department of Finance, Bucharest University of Economic Studies, 6 Piata Romana, 010374 Bucharest, Romania; dalina.dumitrescu@fin.ase.ro
* Correspondence: bog.mihail@gmail.com

Abstract: This paper investigates corporate governance from a cross-country perspective and makes a comparison with Romania. There are studies that examine the corporate governance issues related to Romanian companies, but these studies provide only qualitative and descriptive accounts of the research topic, with limited cross-country analysis. The present paper complements the literature by producing a quantitative analysis of cross-country corporate governance and makes a comparison with Romania. For this purpose, a set of corporate governance indicators from a large sample of 39 advanced and developing countries was collected for the 2006–2020 period. In terms of corporate governance dimensions, it was found that Romania underperforms other developing countries in the dimensions of director liability and ownership and control, while it outperforms them in the dimensions of corporate transparency, disclosure, and shareholder rights. The results indicate that the stagnant corporate governance scores and the low development level of stock markets stand out as important business challenges for the country. The correlation and regression analyses show that stock market development is closely associated with corporate governance dimensions and, overall, corporate governance scores matter greatly for the economic growth of countries, such as Romania, which can benefit greatly from the improvement of corporate governance codes and practices in the private sector.

Keywords: corporate governance; Romania; protection of minority investors; stock market development; economic growth

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1. Introduction

Corporate governance matters greatly for the efficiency of different business sectors in various countries (Belloc 2012; Donaldson 2013). Modern corporations are generally large and very complex organisations. As their management by owners would not be very feasible or efficient, the corporations hire professional managers to run their companies on the behalf of owners and shareholders. This separation of ownership and control becomes a leading characteristic of modern corporations. However, as the agency theory shows, due to asymmetric information and costly state verification problems, managers can follow their own interests at the expense of the shareholders. Various corporate governance mechanisms were developed to address these problems and improve the efficiency of corporations (Misangyi and Acharya 2014; Tihanyi et al. 2014). It can be argued that corporate governance is not just a micro or firm-specific topic. In contrast, the quality of corporate governance can matter greatly for stock market development and economic growth of countries (Classens 2006; Claessens and Yurtoglu 2012). As a result, conducting cross-country analyses of corporate governance indicators is an important research discussion topic, with major business and policy implications.

The literature has studies examining the issue of corporate governance from an international perspective. For example, Khanna et al. (2006) investigated whether globalisation

is instrumental in the convergence of corporate governance standards across countries and found supportive evidence. However, Doidge et al. (2007) noted that there are still larger differences in corporate governance scores (such as investor protection) of countries. Aguilera and Jackson (2010) worked on a very detailed review study that conducted a comparative cross-country analysis of corporate governance. The authors concluded that the differences in the corporate governance practices and scores can be explained by various factors, such as managerial factors, social and cultural factors, political factors, and institutional factors. Hence, this study is important for the present paper in the sense that it provides a rationale for the comparison of corporate governance scores in Romania to other developing and advanced countries. In another review paper, Claessens and Yurtoglu (2013) provided a comparative analysis of corporate governance in emerging countries. The authors showed that the improvement of corporate governance can affect firm performance positively; however, when the corporate governance score of the country is low, this positivity weakens. In another study, Aggarwal et al. (2007) compared the corporate governance quality of US firms to international firms. The authors found that the US firms outperform foreign firms on average and effect the markets value board and audit committee independence positively. Overall, these studies show that examining corporate governance issues from a cross-country perspective and making comparisons with individual country cases can provide valuable findings on the relevant topics, with important business and policy implications. In this context, the present paper aims to make a comparative analysis of the case of Romania in terms of corporate governance scores.

There are already studies that examine the topic of corporate governance in Romania, its evolution over time, the challenges facing the corporate governance system in the countries, and its comparison to other countries (Badulescu 2008; Sarchizian and Popovici 2019; Tofan and Cigu 2020). These studies generally provide very detailed descriptive and qualitative accounts, whereas the present paper complements them by providing a comparison with other countries. Buşu (2015) notes that Romania has been following the OECD general principles and the EU directives in terms of corporate governance. While the rules and regulations are similar to the international best standards, the country had some challenges in terms of efficient applications of them. For example, on the dimensions of disclosure, transparency, the rights of shareholders, and the responsibilities of the board, Romania performs very poorly relative to the international standards. Shortcomings in the implementation of corporate governance best practices are also acknowledged in other studies (Manolescu et al. 2011; Grosu 2011; Feleagă et al. 2011). Overall, existing literature on Romanian corporate governance provides detailed accounts of its evolution and challenges. However, a quantitative comparison of the Romanian case relative to other countries is not provided in the literature. The present paper fills this research gap by conducting a quantitative analysis of various corporate governance dimensions in a cross-country setting and displaying the importance of corporate governance quality for stock market development and economic growth of countries. For this purpose, a large sample of 39 advanced and developing countries (including Romania) was collected from the World Bank (2021). The quantitative results indicate that Romania has a relatively low corporate governance score and, more importantly, displayed very limited improvement relative to other countries. In addition, regression findings show that stock market development is closely associated with corporate governance dimensions and overall corporate governance score matters greatly for the economic growth of countries. Based on these results, it can be argued that Romania can benefit greatly in terms of stock market development and economic growth by improving its corporate governance standards and implementation. The paper is structured as follows. The next section presents the data and research methods utilised in the study, while the third section presents the empirical results. Finally, the last section concludes the paper.

2. Data and Research Methods

The research topic in this paper is the role of corporate governance and its implications for economic growth and stock market development in a cross-country setting. Romania is a developing country, and the level of stock market development is relatively limited compared to other developing, as well as advanced, countries. There can be various factors leading to this limited development, but examining all of the possible factors and mechanisms is in the scope of the present study. In this context, the paper focuses on the corporate governance dimension as an important factor in affecting stock market development and economic growth. Corporate governance is a broad topic that focuses on the efficient management of the business world regarding the improvement of financial performance and alleviating conflicts of interest in modern corporations (Becht et al. 2003; Bebchuk et al. 2009; Larcker and Tayan 2015). In order to assess these relationships and effects, one can use existing public datasets, such as the OECD Corporate Governance Factbook (OECD 2021). This dataset is very comprehensive and includes detailed information about the corporate governance practices of 50 countries. However, for the purpose of the present paper, a major limitation is that it does not include Romania in the sample. This data availability issue puts a binding constraint on the possible quantitative analysis that the paper can conduct. A public dataset that has information on corporate governance dimensions for Romania is the Doing Business database of the World Bank (2021). This index has information on various dimensions of the business environment in countries. One of these dimensions is the protection of minority rights. This dimension is assessed in the context of the stock markets (the Bucharest Stock Exchange), in the case of Romania, and includes the following items: the conflict of interest regulation, the extent of disclosure, the extent of director liability, the extent of shareholder suits, the shareholder governance, the extent of shareholder governance rights, the extent of ownership and control (which includes sub-items like the CEO duality and independent board members), and the extent of corporate transparency. While these items were examined under the dimension of protecting minority rights, it is seen that they provide detailed information on some corporate governance dimensions, such as CEO duality (Elsayed 2007; Krause et al. 2014), independent board members (Fernandes 2008; Cavaco et al. 2017), non-executive board members (Young 2000; Basco et al. 2019), financial reporting (Lee 2007; Ong 2018), and external auditing (Baker and Owsen 2002; Mennicken and Power 2013) and transparency about management compensation. The corporate governance literature shows that these are very important factors affecting business outcomes and financial performance (Bhagat and Bolton 2008, 2019). Based on this vast literature, the data from the World Bank (2021) are utilised descriptively and quantitatively to make a comparison of corporate governance in Romania with other developing and advanced countries. This variable on the protection of minority investors and its sub-components is presented in Table 1.

In Table 1, the protection of minority investors is the main independent variable that the present paper is interested in. The other variables in the table are the components of this protection variable. All of these variables in Table 1 were used in the descriptive analysis to compare the case of Romania with other developing and advanced countries. Including all of them in the regression analysis would cause multicollinearity issues (because the correlation coefficients are very high among the components); hence, only the protection of minority investors was added into the regression analysis as the main independent variable.

Table 1. Corporate governance: Variable names and definitions (World Bank 2021).

Variable	Definition
Protecting Minority Investors	The score for protecting minority investor benchmark economies, with respect to the regulatory best practice on the indicator set.
Corporate Transparency	The extent of the corporate transparency index measures ans the level of information that companies must share.
Director Liability	The extent of the director liability index measures when board members can be held liable for harm caused by related-party transactions and which sanctions are available.
Disclosure	The extent of the disclosure index measures the approval and disclosure requirements of related-party transactions.
Ownership and Control	The extent of ownership and control index measures the rules governing the structure and change in control of companies.
Shareholder Rights	The extent of the shareholder rights index measures the role of shareholders in key corporate decisions.

Source: World Bank (2021).

With reference to the methodological approach of examining the given variables, two methods were followed. The first method waws to provide a descriptive analysis of the data for Romania and compare the relevant indicators with other developing and advanced countries. For this comparison, a list of 39 countries (13 developing countries including Romania and 26 advanced countries) was collected from the World Bank (2021). These countries were Romania, Albania, Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chile, Croatia, Czechia, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Korea, Malaysia, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Russia, Singapore, Slovak Republic, Slovenia, South Africa, Spain, Sweden, Thailand, Turkey, the UK, and the US. The sample period covered the years from 2006 to 2020 due to data availability. In the descriptive analysis, the evolution of the stock market development and corporate governance indicators were presented in relation to the other countries. In addition, the summary statistics were compared between Romania and other countries, and the relative position of corporate governance in Romania was displayed for the last 2 decades. The second method in the paper was regression analysis of the cross-country data. The paper argues that corporate governance matters because it supports stock market development, and in return, stock market development supports the economic development of countries. In order to check these mechanisms, a growth regression framework was followed (Barro 1991, 2003), where the dependent variable of the GDP growth was predicted using the independent variables of stock market capitalisation ratio and the protection of minority investors, along with some control variables. In terms of the control variables, the growth literature was utilised to select the following variables: investments (Iwaisako and Futagami 2013), savings (Mohan 2006), international trade (Singh 2010), foreign direct investments (FDI) (Chowdhury and Mavrotas 2006), private credit (Law and Singh 2014), and stock market capitalisation (Cooray 2010). In addition, the literature also shows that corporate governance can be an important factor contributing to economic growth (Classens 2006; Claessens and Yurtoglu 2012). As a result, the protection of minority investors was added as the main independent variable. In this context, the relevant regression model was formulated as follows:

$$\begin{aligned} GDP\ Growth_{i,t} = \ & \beta_0 + \beta_1 Investments_{i,t} + \beta_2 Savings_{i,t} + \beta_3 Trade_{i,t} + \beta_4 FDI_{i,t} + \beta_5 Private\ Credit_{i,t} \\ & + \beta_6 Stock\ Market\ Capitalisation_{i,t} + \beta_7 Protection\ of\ Minority\ Investors_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (1)$$

In the above equation, i refers to the country and t refers to the year. The control variables of investments, savings, trade, FDI, private credit, and stock market capitalisation are all represented as ratios to GDP in order to make them comparable across countries.

The main variable of interest becomes the protection of minority rights, which can be considered as a leading corporate governance indicator for countries. The regression models were estimated using the ordinary least squares (OLS) and fixed-effects (FE) regression methods (Wooldridge 2010). The OLS results were presented as the benchmark findings, while the FE results were expected to provide more robust findings since they controlled the unobserved country fixed (i.e., time-invariant) effects in the regressions.

Overall, based on the above discussions, the two working hypotheses of the empirical analysis are stated as follows:

Hypothesis 1. *Corporate governance is positively associated with stock market development.*

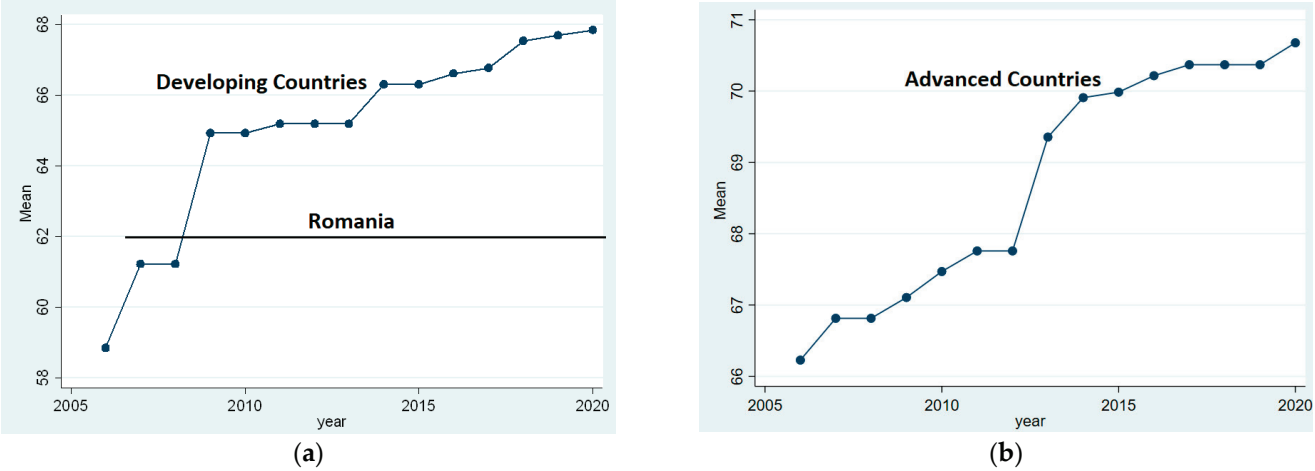
Hypothesis 2. *Corporate governance is positively associated with economic growth rates.*

3. Results

This section presents the results of the paper. As discussed above, the results are presented in two parts. The first part provides a descriptive analysis of the corporate governance developments in Romania, with a cross-country perspective. The second part presents the results of the regression analysis in order to document the association of corporate governance with economic growth.

3.1. Descriptive Analysis

This part presents a descriptive analysis of the corporate governance dimensions for the case of Romania, with a cross-country perspective. The variable definitions provided in Table 1 show that there are various dimensions of corporate governance in the given dataset, including corporate transparency, director liability, disclosure, ownership and control, and shareholders' rights. These indicators were combined under the aggregate index of the protection of minority investors (World Bank 2021). One can use this aggregate index as a proxy for the quality of corporate governance practices in countries. In this context, Figure 1a,b presents the evolution of the average scores for the extent of the minority investor protection in the developing and advanced countries, respectively.



(**a**) (**b**)

Figure 1. The average score for the extent of minority investor protection. (**a**) Developing countries and Romania; (**b**) advanced countries.

It can be seen in Figure 1b that the average corporate governance score for the developing countries displayed an upward trend in the last couple of decades. It increased from around 59 in 2006 to 68 in 2020, out of a maximum score of 100. Interestingly, Romania had a corporate governance score above the average of the developing countries initially. However, as the country did not display any increase in its governance score since 2007, it lagged behind other developing countries since 2009. Given the rising difference in

corporate governance scores between Romania and other developing countries, it can be argued that the country has a relatively poor corporate governance framework compared to other developing countries. As a result, this difference and corresponding relatively poor performance become important policy areas for businesses and the stock market in Romania. When the performance of the advanced countries is examined in panel (b) of Figure 1, it can be seen that these countries also displayed an upward trend in their corporate governance scores during the last couple of decades. Namely, the average governance score for the advanced countries increased from 66 in 2006 to 71 in 2020. These numbers imply that the average corporate governance score has been persistently above in advanced countries compared to developing countries.

In addition to the above two graphs, providing detailed summary statistics for the overall score of minority investors protection and its components would be informative to get a deeper understanding of Romania's relative performance in corporate governance dimensions. In this context, Table 2 presents the summary statistics of the overall index of minority investor protection and its five components (i.e., corporate transparency, director liability, disclosure, ownership and control, and shareholders rights). The results are presented in three panels, i.e., the summary statistics for Romania in Panel A, the summary statistics for Developing Countries in Panel B and the summary statistics for Advanced Countries in Panel C.

Table 2. Summary statistics.

A: Descriptive Statistics—Romania					
Variable	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
Protection of Minority Investors	15	61.752	0.96	58.282	62
Corporate Transparency	7	71.429	0	71.429	71.429
Director Liability	15	40	0	40	40
Disclosure	15	89.333	2.582	80	90
Ownership and Control	7	42.857	0	42.857	42.857
Shareholder Rights	7	83.333	0	83.333	83.333
B: Descriptive Statistics—Developing Countries					
Variable	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
Protection of Minority Investors	180	65.328	13.371	13.98	88
Corporate Transparency	84	67.347	28.013	0	100
Director Liability	180	52.167	24.728	0	90
Disclosure	180	73.833	24.638	0	100
Ownership and Control	84	63.605	22.659	0	85.714
Shareholder Rights	84	75.595	26.567	0	100
C: Descriptive Statistics—Advanced Countries					
Variable	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
Protection of Minority Investors	390	68.746	9.693	36.023	86
Corporate Transparency	182	81.538	11.63	57.143	100
Director Liability	390	56.59	19.545	20	90
Disclosure	390	65.077	23.672	10	100
Ownership and Control	182	67.881	19.426	28.571	100
Shareholder Rights	182	78.48	14.946	33.333	100

When the summary statistics for Romania, developing countries, and advanced countries are examined, some important data properties and cross-country differences can be identified. The upper panel of Table 2 shows that the average score for the protection of minority investors in Romania was 61.752, with a standard deviation of 0.96, during the 2006–2020 period. A closer examination of this corporate governance index reveals that Romania had a score of 58.282 in 2006, which increased to 62 in 2007 and stayed constant at this level for the rest of the sample. Hence, there was a one-time improvement in this score, with no change for the 2007–2020 period. In the case of the corporate transparency index, the average score was 71.429, with a standard deviation of 0. The zero value for the

standard deviation implies that the score for these corporate governance dimensions did not vary during the sample period. In fact, it is seen that there were only seven observations in this case. Hence, the short sample period is an important data constraint avoiding the conduct of quantitative analysis, such as regression models in the case of individual countries. In the case of the director liability dimension, Romania had a mean score of 40, which also did not vary over the sample period. The first panel of Table 1 shows that the average disclosure score was 89.333, with a standard deviation of 2.582. The table shows that this variable increased from 80 to 90, displaying a large improvement in the relevant corporate governance dimension. In addition, the disclosure dimension was the component of corporate governance with the highest score in Romania. In contrast, in case of the ownership and control dimension, it had a very low score of 42.857 in the sample period, showing the poor performance of the country on this important dimension. Lastly, in the dimension of shareholder rights, the average score was estimated as 83.333, which is one of the high-scored components of corporate governance in Romania.

When the corporate governance scores for the developing countries in the sample are examined in the second panel of Table 2, the wide variation in the data stands out, showing the high level of heterogeneity among these countries. It is seen that the average score of corporate governance (as measured by the variable of minority investor protection) is estimated as 65.328, with a standard deviation of 13.371. Therefore, the average of the developing countries is larger than the corporate governance score of Romania. Additionally, there is great variation in this variable, with a minimum value of 13.98 and a maximum value of 88. Hence, the position of Romania can be considered below but close to the mean of developing countries. In the corporate transparency dimension, the average value was estimated as 67.347, with a standard deviation of 28.013. This variable ranged from 0 to 100, showing the wide dispersion in the data. Romania had a higher score with 71.429 in corporate transparency compared to the other developing countries. In the director liability dimension, the average value for developing countries was estimated as 52.167, with a standard deviation of 24.728. This variable ranged from 0 to 90, again showing the wide dispersion in the data. In this case, the performance of Romania was poorer with a score of 40 compared to the other developing countries. In the case of the disclosure dimension, the average value for the developing countries was estimated as 73.833, with a standard deviation of 24.638. This variable also ranged from 0 to 100, showing the wide dispersion in the data. Romania had a higher score with 89.333 in the disclosure dimension compared to the other developing countries. In the case of ownership and control dimension, the average value for developing countries was estimated as 63.605, with a standard deviation of 22.659. This variable ranged from 0 to 85.714, showing the wide dispersion in the data. In this case, Romania had poorer performance with a score of 42.857 compared to the other developing countries. Finally, in the shareholder rights dimension, the average value was estimated as 75.595, with a standard deviation of 26.567. This variable ranged from 0 to 100, showing the wide dispersion in the data. In this case, Romania had a higher score with 83.333 compared to the other developing countries. Overall, the general corporate governance score of Romania was below but very close to the average of other developing countries. In addition, Romania underperformed other developing countries in the dimensions of director liability and ownership and control while it outperformed them in the dimensions of corporate transparency, disclosure, and shareholder rights. Therefore, Romania had a mixed performance relative to the other developing countries, and as is shown in Figure 1, while other developing countries displayed a persistent improvement in their corporate governance scores, Romania maintained a stagnant outlook.

The last panel of Table 2 shows the summary statistics of corporate governance indicators in the case of the advanced countries in the sample. It is seen that the average corporate governance score was estimated as 68.746, with a standard deviation of 9.693. This value was larger than the average in developing countries and Romania. With reference to the corporate governance dimensions, it is seen that the advanced countries had the largest average scores for corporate transparency and shareholder rights, with values of 81.538 and

78.48, respectively. In contrast, the dimensions of disclosure and ownership and control had lower average scores, with values of 65.077 and 67.881, respectively. Finally, the corporate governance dimension with the lowest score for the advanced countries was the director liability, with a value of 56.59. When the average scores for the corporate governance dimensions are compared, it can be found that the advanced countries had larger mean values than the developing countries in all dimensions, except for the disclosure dimension. Overall, Table 2 provides valuable descriptive information about the relative performance of Romania in various corporate governance dimensions compared to other developing countries. The next part of this section conducts a quantitative analysis in order to see how corporate governance is connected to stock market development and economic growth.

3.2. Regression Analysis

The previous part of this section provided a detailed comparison of the corporate governance indicators for Romania in a cross-country setting relative to a large sample of developing and advanced countries. Given that the sample period covered only the 2006–2020 period (i.e., a total of 15 years) due to data availability issues, it is not possible to make a detailed quantitative analysis (such as regression estimations) for the case of individual countries. In other words, the available cross-country dataset does not allow conducting empirical analysis only for the case of Romania. Given this data restriction, we conducted a cross-country analysis in order to display the importance of corporate governance for stock market development and economic growth.

Before moving to the regression analysis, it would be informative to provide the pairwise cross-correlations of the corporate governance indicators with the variables of stock market development and economic growth. In this context, Table 3 presents the Pearson correlation coefficients for these variables. The results are presented in three panels, with the first panel showing the correlation coefficients for the full sample of 39 advanced and developing countries, while the second panel shows the results for the developing countries and the third panel shows the case of advanced countries. It is seen in the upper panel of Table 3 that GDP growth and stock market capitalisation (i.e., the value of listed companies in the stock markets as a ratio to GDP) had a positive and statistically significant (at the 5% level) correlation coefficient, with a value of 0.123. While the size of the correlation coefficient was not very large, it implies that higher levels of stock market development were positively associated with higher economic growth rates. The table also shows that the stock market capitalisation variable had a positive and statistically significant (at the 5% level) with the corporate governance indicator of the minority investor protection index, with a value of 0.468. This value was relatively larger and implies that higher quality of corporate governance practices was positively associated with stock market development. Since, in return, stock market development was positively associated with economic growth, it can be argued that corporate governance can produce positive effects on the economic development of countries.

When the lower two panels of Table 3 were examined, some important differences in the cross-correlation coefficients were documented across developing and advanced countries. It was found that, in the case of the developing countries, the economic growth did not have a statistically significant correlation with any of the other variables. However, in the case of the stock market development, it had a positive and statistically significant correlation coefficient, with a value of 0.606. This number is very large and indicates a strong positive association between corporate governance and stock market development. In addition, stock market development had positive and statistically significant correlation coefficients with the corporate governance dimensions of director liability, disclosure, ownership, and control. In the last panel of Table 3, the correlation coefficients for the advanced countries are presented. It can be seen that the GDP growth had a positive and statistically significant (at the 5% level) regression coefficient with the stock market capitalization and the corporate governance score, with a value of 0.229 and a value of 0.153, respectively. In addition, the stock market development had a positive and statistically

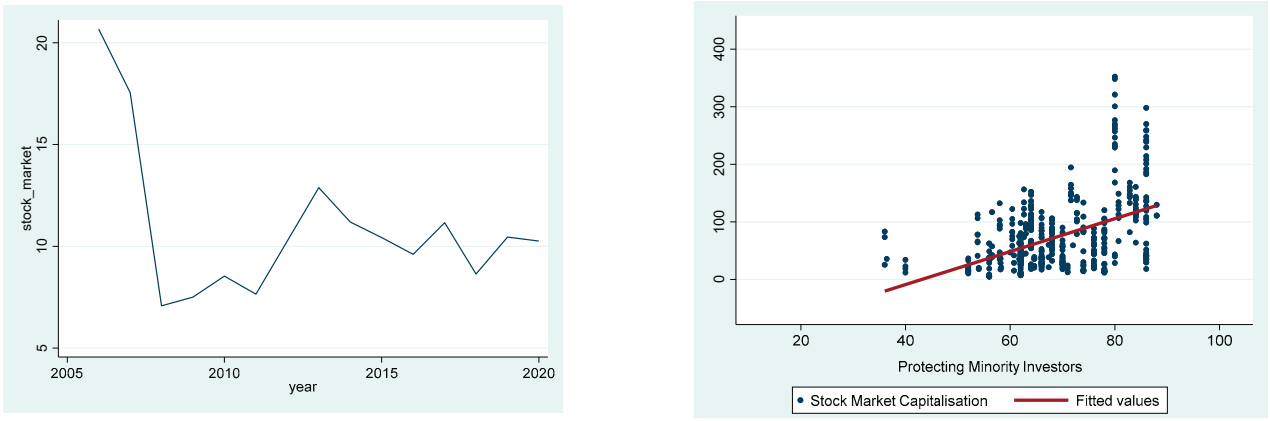
significant regression coefficient with the corporate governance indicator (as measured by the protection of minority rights). Overall, these regression coefficients provide initial evidence for the two research hypotheses that corporate governance is positively associated with both stock market development and economic growth.

Table 3. Pairwise cross-correlations.

Pairwise correlations—Full Sample								
Variables	**−1**	**−2**	**−3**	**−4**	**−5**	**−6**	**−7**	**−8**
(1) GDP Growth	1							
(2) Stock Market Capitalization	0.123 *	1						
(3) Protection of Minority Investors	0.064	0.468 *	1					
(4) Corporate Transparency	−0.021	−0.024	0.415 *	1				
(5) Director Liability	0.047	0.446 *	0.540 *	−0.242 *	1			
(6) Disclosure	0.130 *	0.399 *	0.705 *	0.121 *	0.249 *	1		
(7) Ownership and Control	−0.072	−0.028	0.468 *	0.315 *	0.088	−0.114	1	
(8) Shareholder Rights	−0.019	−0.232 *	0.402 *	0.322 *	−0.132 *	−0.031	0.564 *	1
Pairwise correlations—Developing Countries								
Variables	**−1**	**−2**	**−3**	**−4**	**−5**	**−6**	**−7**	**−8**
(1) GDP Growth	1							
(2) Stock Market Capitalization	−0.027	1						
(3) Protection of Minority Investors	−0.006	0.606 *	1					
(4) Corporate Transparency	0.061	−0.05	0.580 *	1				
(5) Director Liability	−0.034	0.627 *	0.333 *	−0.255 *	1			
(6) Disclosure	0.075	0.306 *	0.708 *	0.002	0.171 *	1		
(7) Ownership and Control	0.043	0.489 *	0.755 *	0.646 *	0.123	0.075	1	
(8) Shareholder Rights	0.021	0.027	0.606 *	0.574 *	−0.278 *	0.146	0.746 *	1
Pairwise correlations—Advanced Countries								
Variables	**−1**	**−2**	**−3**	**−4**	**−5**	**−6**	**−7**	**−8**
(1) GDP Growth	1							
(2) Stock Market Capitalization	0.229 *	1						
(3) Protection of Minority Investors	0.153 *	0.381 *	1					
(4) Corporate Transparency	−0.088	0.033	0.135	1				
(5) Director Liability	0.121 *	0.308 *	0.697 *	−0.359 *	1			
(6) Disclosure	0.119 *	0.475 *	0.785 *	0.462 *	0.332 *	1		
(7) Ownership and Control	−0.126	−0.320 *	0.239 *	−0.097	0.054	−0.201 *	1	
(8) Shareholder Rights	−0.047	−0.451 *	0.155 *	−0.173 *	−0.001	−0.170 *	0.410 *	1

* shows significance at the 0.05 level.

The above findings are important for the case of Romania, as well. Figure 2a shows the evolution of the stock market capitalisation in Romania for the 2006–2020 period. It can be seen that, before the global financial crisis, the stock markets had a size of above 20% of GDP, while this ratio declined around 10% of GDP after the global financial crisis and stagnated at these values. Given that the stock market development levels are larger in other countries (an average of around 70% in the developing countries and 80% in the advanced countries), the 10% can be considered too low for efficient capital markets in Romania. Hence, supporting stock market development can be an important policy area for the country. In return, the improvement of corporate governance practices can be an effective measure to support stock market development and economic growth in the country. Figure 2b shows that, in the full sample, there is a positive association between stock market development and corporate governance scores.



(**a**) (**b**)

Figure 2. Stock markets and corporate governance. (**a**) stock market capitalisation/GDP (%) Romania; (**b**) scatter plot between stock market capitalisation (% of GDP) and the corporate governance index.

After presenting evidence from the analysis of cross-correlations and graphs, the final part of the empirical analysis presents the regression results. Specifically, Table 4 presents the OLS results and Table 5 provides the FE regression results. The presence of multicollinearity was tested for Model (3) using the VIF values, and it was found that the corresponding VIF values were less than 5, thereby showing no presence of serious multicollinearity in the estimations. The results of the OLS regressions indicate that both stock market and corporate governance are statistically significant predictors of the economic growth in the full sample, as well as the sub-samples of advanced and developing countries.

Table 4. OLS regression results.

	(1)	(2)	(3)	(4)	(5)
Variables	**Full Sample**	**Full Sample**	**Full Sample**	**Developing**	**Advanced**
Investment	0.206 ***	0.266 ***	0.265 ***	0.370 ***	0.251 ***
	(0.0326)	(0.0362)	(0.0369)	(0.0728)	(0.0510)
Savings	0.0636 **	0.0186	0.00460	0.0284	−0.0174
	(0.0253)	(0.0243)	(0.0236)	(0.0430)	(0.0293)
Trade	0.000665	−0.000983	−0.00427	0.00555	−0.0100 **
	(0.00303)	(0.00338)	(0.00373)	(0.00585)	(0.00471)
FDI	0.0484	0.0444	0.0544	−0.00899	0.0892 *
	(0.0305)	(0.0346)	(0.0341)	(0.0144)	(0.0481)
Credit	−0.00993 ***	−0.0210 ***	−0.0262 ***	−0.0237 **	−0.0321 ***
	(0.00295)	(0.00390)	(0.00409)	(0.00959)	(0.00619)
Stock Markets		0.0147 ***	0.0115 ***	0.0119 **	0.0172 ***
		(0.00294)	(0.00320)	(0.00499)	(0.00483)
Corporate Governance			0.0773 ***	0.0520 *	0.0886 ***
			(0.0196)	(0.0308)	(0.0249)
Observations	520	425	425	154	271
R-squared	0.223	0.287	0.322	0.226	0.390

Refers to the significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Given that the FE model improves over the OLS model by incorporating the unobserved country effects, the results in Table 5 can be considered more robust. In addition, we conducted a Hausman test to see where the fixed-effects estimation was the preferred method over the random-effects estimation. In the full sample, it was found that increasing stock market development by 10% would lead to 0.22% in the growth rate while increasing the corporate governance index by 10 points would lead to a 1.2% increase in the economic growth rate. It can be seen that these sizes were economically very large as well. In the case of the OLS model, similar statistically significant effects were obtained for the developing countries, while these effects became statistically insignificant in the case of the FE model. Overall, these results were consistent with the findings in the literature

which has found positive effects of better corporate governance on economic growth and development (Classens 2006; Claessens and Yurtoglu 2012). Namely, by improving their corporate governance codes and practices, the economic efficiency of the stock markets can increase. In return, improved business efficiency and stock market development support economic growth. These findings are also consistent with the micro-based studies that find positive performance effects of corporate governance for businesses (Aggarwal et al. 2007).

Table 5. Fixed-effects (FE) regression results.

	(1)	(2)	(3)	(4)	(5)
Variables	**Full Sample**	**Full Sample**	**Full Sample**	**Developing**	**Advanced**
Investment	0.239 ***	0.286 ***	0.338 ***	0.571 ***	0.225 ***
	(0.0392)	(0.0449)	(0.0471)	(0.0881)	(0.0613)
Savings	0.243 ***	0.183 ***	0.151 **	0.0562	0.242 ***
	(0.0530)	(0.0585)	(0.0586)	(0.0975)	(0.0829)
Trade	0.0238 **	0.0292 **	0.0267 **	0.0424 *	0.0236 *
	(0.0111)	(0.0119)	(0.0118)	(0.0241)	(0.0128)
FDI	0.0641 ***	0.0556 ***	0.0534 ***	−0.0148	0.0979 ***
	(0.0133)	(0.0154)	(0.0152)	(0.0247)	(0.0192)
Credit	−0.0415 ***	−0.0499 ***	−0.0540 ***	−0.0516 *	−0.0434 ***
	(0.00939)	(0.0103)	(0.0103)	(0.0264)	(0.0114)
Stock Markets		0.0205 ***	0.0221 ***	0.0160	0.0284 ***
		(0.00608)	(0.00602)	(0.0105)	(0.00719)
Corporate Governance			0.116 ***	0.0380	0.124 ***
			(0.0353)	(0.0703)	(0.0456)
Observations	520	425	425	154	271
R-squared	0.315	0.361	0.378	0.288	0.497
Number of id	39	35	35	12	23
Country FE	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

4. Discussion and Conclusions

This paper has examined the evolution of corporate governance performance in the case of Romania from a cross-country perspective. The literature shows that corporate governance is an important factor for the business efficiency, the development of stock markets, and the economic growth of countries (Classens 2006; Claessens and Yurtoglu 2012). There are various studies that examine the evolution of corporate governance in Romania, including cross-country perspectives (Badulescu 2008; Buşu 2015; Popescu et al. 2015; Tofan and Cigu 2020). However, these studies provide qualitative and descriptive accounts of the research topic. The present study complements the literature by producing a quantitative analysis of the cross-country corporate governance performance in the case of Romania. For this purpose, a specific set of corporate governance indicators from a large sample of 39 advanced and developing countries was collected for the 2006–2020 period. The data indicates that the corporate governance score of Romania stayed constant for the 2007–2020 period, while the average scores for the developing countries increased to a large extent. With reference to the corporate governance dimensions, a mixed picture emerged in the sense that Romania underperformed other developing countries in the case of the dimensions of director liability and ownership and control, while it outperformed them in the case of the dimensions of corporate transparency, disclosure, and shareholder rights. Another important result is that the stock market capitalisation as a share of GDP was around 10% in Romania, which was significantly lower than the other countries (which had around 75% stock market capitalisation ratios). Hence, the stagnant corporate governance scores and the low development level of stock markets stand out as important business challenges for the country. The correlation and regression analyses indicate that improvement of corporate governance indicators can affect both the stock market development and economic growth positively. In conclusion, Romania can benefit greatly from the improvement of corporate governance codes and practices in the country.

In addition to the macroeconomic and development implications of the papers, the results also have managerial implications. A study by Aggarwal et al. (2007) shows that

there can be important cross-country differences in the corporate governance quality and these differences are also reflected in the performance and valuation of companies. These findings, along with the above empirical results, imply that companies can benefit greatly from improving their corporate governance practices, such as transparency (through different policies, such as independent board members and audit committees), disclosure quality (through different strategies, such as financial reporting and investor relations), and shareholder rights. Given these benefits, the regulators can also revise the corporate governance codes and recommendations to follow the best practice examples in the world. While the paper produces important findings, it can still benefit from addressing some shortages and expanding the empirical analysis in future research. For example, the empirical methods can include other regression estimations, such as GMM and instrumental variable (IV) methods. In this way, the endogeneity issues between corporate governance, stock market development, and economic growth would be addressed more effectively. In addition, given that there can be major differences in the existing large cross-country sample, cluster analysis should be in the spirit of Vărzaru et al. (2021).

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The Impact of Board Diversity, CEO Characteristics, and Board Committees on Financial Performance in the Case of Romanian Companies

Bogdan Aurelian Mihail [1,*], Dalina Dumitrescu [2], Carmen Daniela Micu [3] and Adriana Lobda [3]

[1] Doctoral School of Finance, Bucharest University of Economic Studies, 6 Piata Romana, 010374 Bucharest, Romania
[2] Department of Finance, Bucharest University of Economic Studies, 6 Piata Romana, 010374 Bucharest, Romania; dalina.dumitrescu@fin.ase.ro
[3] Department of Masters in Board Practice and Directorship, Henley Business School, University of Reading, Greenlands Campus, Henley-on Thames RG9 3AU, Oxfordshire, UK; carmen.micu@envisia.eu (C.D.M.); adriana.lobda@envisia.eu (A.L.)
* Correspondence: bog.mihail@gmail.com

Abstract: This paper examines the impact of board diversity, CEO characteristics, and board committees on the financial performance of the companies listed on the Bucharest Stock Exchange (BSE). In order to test the influence of these characteristics, detailed data on more than 70 firms are collected by hand, for the 2016–2020 period, and comprehensive regression models are estimated. The findings show that there are positive effects of board diversity especially with regard to the independent board members. In terms of the board committees, the audit committee is found to have a favourable influence. The regression coefficients imply that a 10% increase in the share of independent board members would be associated with a 0.93% increase in ROE. Based on these findings, it can be argued that improving the corporate governance practices of the companies listed on the BSE would increase the performance and the value of these firms.

Keywords: corporate governance; firm performance; board diversity; CEO characteristics; board committees; Romania

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1. Introduction

Corporate governance has a great influence in determining the efficient management of businesses, with a focus on balancing and reconciling the interests of different stakeholders surrounding companies (Solomon 2020). Depending on the focus and perspective of these stakeholders, the specific dimensions of corporate governance can cover very broad topics and issues. In this context, the board characteristics and board diversity are investigated widely in the corporate governance literature in terms of their effectiveness in the monitoring capacity and in addressing agency problems (Rutherford and Buchholtz 2007; Jermias and Gani 2014). Similarly, some studies examine the effects of certain CEO characteristics such as CEO duality (i.e., CEO holding the position of the Chairperson as well), age, gender, and ethnicity (Manner 2010; Kaplan et al. 2012). Moreover, the literature also examines the effects of board committees such as the audit committee or risk committee. For example, Spira and Bender (2004) argue that "The establishment of board sub-committees has been strongly recommended as a suitable mechanism for improving corporate governance, by delegating specific tasks from the main board to a smaller group and harnessing the contribution of non-executive directors" (p. 489). Hence, committees can become another important corporate governance dimension. In addition to these board and CEO-related characteristics, corporate governance also includes other topics such as minority rights (Ginevri 2011), investor relations (Crifo et al. 2019), executive pay (Sarhan et al. 2019), and corporate social responsibility (Widiatmoko 2020). Within this broad

context of corporate governance, a major question emerges: "Which provisions, among the many provisions firms have and outside observers follow, are the ones that play a key role in the link between corporate governance and firm value?" (Bebchuk et al. 2009, p. 783). Then, it is possible to focus on different dimensions of corporate governance and their effects on firm performance. The present paper focuses on three main dimensions of corporate governance identified in the literature and examines their effects on the performance of firms on the BSE. These areas are the board diversity (in terms of the shares of the non-executive, independent, women, and foreigner board members), CEO characteristics (e.g., CEO duality, gender, and ethnicity), and board committees. In this way, the paper provides a comprehensive account of the effects of these corporate governance dimensions on firm performance in Romania.

By examining the case of a transition country, i.e., Romania, with an evolving corporate governance structure, this paper contributes to the relevant literature in terms of conducting a comprehensive examination regarding the effects of various corporate governance characteristics on the financial performance of companies listed on the Bucharest Stock Exchange. There are some studies that examine similar topics on the effects of board characteristics and other corporate governance issues such as Vintilă and Gherghina (2013) and Borlea et al. (2017). While these papers provide valuable information on the research topic, the current study aims to conduct a very comprehensive analysis by incorporating many dimensions of corporate governance based on a recent period of time, that is, 2016–2020. Therefore, the present paper greatly expands the existing literature. The results of the paper are also important for policy and managerial purposes in the sense that the findings of the papers (such as the positive performance effects of independent board members and audit committees) produce important policy recommendations—namely, these results indicate that improving corporate governance practices by having independent board members and audit committees would be favourable for the financial performance of companies in the Bucharest Stock Exchange. In return, the favourable performance of the stock market and high standards of corporate governance practices would be important factors supporting the stock market development, financial development, and economic development of the country.

The paper is organised as follows: The next section provides a review of the prior literature and puts the present paper in context. Then, the third section provides the details of the dataset and research methods used in the empirical analysis. The findings are presented in the fourth section, while the fifth section provides a discussion of limitations and future research. Finally, the last section concludes the paper.

2. Prior Literature

Corporate governance is a very broad topic that covers many different dimensions of business management and relations among different stakeholders. Becht et al. (2003) state that "Corporate governance is concerned with the resolution of collective action problems among dispersed investors and the reconciliation of conflicts of interest between various corporate claim holders" (p. 1). Hence, corporate governance is interested in the problems that arise from agency relations and collective actions surrounding companies. These issues are examined extensively in the literature in terms of both theoretical approaches and empirical analyses. One of the leading theoretical perspectives informing the corporate governance issues is the agency theory. In terms of agency problems, there can be several stages of agency issues within companies. For example, executives are agents of the shareholders or owners, which are the principal. Then, executives can pursue their own interests at the expense of shareholders, which would create principal–agent problems (Sappington 1991). This type of problem leads to the creation of corporate governance mechanisms that would try to address the agency problems and increase the monitoring capacity of shareholders. In this context, the creation of the board of directors, the presence of independent board members, and the establishment of various board committees, such as audit and risk committees, can be leading corporate governance mechanisms. At another

level, the firm can be considered as an agent of the society, which would be the principal. Then, in the cases of social and environmental sustainability, the private interest and costs of the companies might conflict with the interests of society and the environment. In this case, another theoretical perspective, i.e., a stakeholder approach would be needed to address such issues surrounding companies. In the stakeholder theory, the firm would not only consider the effects of its actions in terms of profits but would also consider the effects on people and planet, or society and the environment (Freeman and Reed 1983; Freeman 2015). While from a narrow and short-term perspective, the stakeholder approach might look anti-competitive and hurt profitability, given that the social awareness and regulatory expectations on these societal and environmental issues increase, following a stakeholder approach can be favourable for survival, brand image, reputation, and profitability over the long term. Overall, these discussions show that various theoretical approaches such as the agency theory and stakeholder theory can be used to study corporate governance issues. In addition, these theories also produce some testable hypotheses about the relationship of board characteristics (such as independent board members and board diversity), CEO characteristics, and board committees. The relevant hypotheses are examined extensively by empirical studies, as discussed below.

Within the broad context of corporate governance, the present paper focuses on board diversity, board committees, and CEO characteristics. The relevant empirical literature shows that these points can matter for the monitoring effectiveness of boards, as well as the firm value and financial performance (Carter et al. 2003; Adams and Ferreira 2009; Knyazeva et al. 2013; Krause et al. 2014; Kolev et al. 2019). For example, Carter et al. (2003) examine the case of Fortune 1000 companies in terms of women and minority board members. Their empirical results indicate strong positive associations of gender and ethnic diversity with the financial performance of companies. Regarding this positive association, the authors note that board diversity would increase board independence, and in return, board independence would be a positive factor in terms of increasing board monitoring capacity and effectiveness. In their regression models, the authors use Tobin's Q as the dependent variable. In the regression results, board size and CEO duality are found to be negatively associated with firm performance. In addition, the share of internal or executive board members is also negatively related to Tobin's Q. Then, the presence of both women and minority members on boards is found to be positively associated with firm performance. Moreover, the variable of the average age of the board members does not have a statistically significant regression coefficient. This paper provides a useful regression framework, which is followed in the present paper as well. In another detailed study, Adams and Ferreira (2009) find that female board members are more active participants in board meetings and audit committees. However, the authors note that mandated quotes on female members can create negative effects on firm value. Knyazeva et al. (2013) to control the issue of endogeneity by using the local labour market conditions of the independent board members as an instrument, confirming their positive effects on firm performance. Overall, this literature shows that board diversity in terms of independent board members has positive effects on firm performance, while the effects of other diversity characteristics are mixed. Based on these findings, the first research hypothesis is postulated as follows:

Hypothesis 1. *Independent board members have positive effects on firm performance.*

Another important corporate governance area is the issue of CEO duality, and there is a large body of literature examining this issue. The relevant results are generally mixed. Krause et al. (2014) note that the duality of CEO and Chairperson positions can be examined from different theoretical perspectives such as agency approach, stewardship approach, and managerial power approach. However, these theories do not provide a clear answer on the effects of CEO duality. The empirical studies also produce mixed effects. For example, Baliga et al. (1996) examine 375 companies from Fortune 500 covering the 1980–1991 period and do not find any effects of CEO duality. However, Ballinger and Marcel (2010) examine

the case of 540 events for the S&P companies during the 1996–1998 period and find that the negative impacts of interim CEO changes are weakened by CEO duality. In another detailed empirical study, Krause and Semadeni (2013) study the case of 1053 companies from S&P 1500 and Fortune 1000 and show that the separation of CEO and Chairperson positions have adverse effects after the strong performance but positive impact after the weak performance. Hence, these findings do not find a clear effect of CEO duality on firm performance. Based on these results, the second research hypothesis is stated as follows:

Hypothesis 2. *CEO duality has no effects on firm performance.*

The third corporate governance area that the study examines is the board committees. The board of directors is expected to conduct monitoring and supervisory tasks so that the actions of managers are in line with the interests of shareholders (Khan 2011; Pande and Ansari 2014; Alhossini et al. 2021). However, some of these tasks such as risk management, auditing, and remuneration can require more specific expertise. In this context, boards started to for committees to evaluate these dimensions of their companies. For example, Kolev et al. (2019) provide a detailed literature review and conclude that board committees, such as audit committees, can have favourable effects on firm performance. In another recent study, Lee (2020) examines the case of public US companies for the 2005–2015 period and finds that when independent board members are active in board committees, the firm performance measured by ROA improves. Based on this newly developing literature, the third research hypothesis is given as follows:

Hypothesis 3. *Audit committees have positive effects on firm performance.*

It needs to be noted that more variables and more research hypotheses can be developed given the extensive nature of the literature on corporate governance. However, in order to have a focused scope, the present study is focused on the above three dimensions on board diversity (specifically independent board members), CEO duality, and board committees (specifically audit committees). In addition, as a transitioning country, Romania has been developing its corporate governance codes in line with the EU and OECD practices. For example, the 2015 Code of Corporate Governance document recommends the majority of the non-executive members be independent (BSE 2015). In addition, it suggests that the committees (such as the audit committee) not be chaired by the Chairperson of the board but by an independent member. Specifically, it states that "The Board should set up an audit committee, and at least one member should be an independent non-executive. The majority of members, including the chairman, should have proven an adequate qualification relevant to the functions and responsibilities of the committee . . . The audit committee should be chaired by an independent non-executive member" (BSE 2015, p. 6). Overall, it is seen that Romania is developing important governance codes on the above dimensions. Then, it becomes important to check whether these corporate governance factors produce similar effects in the case of Romania, a transitioning country.

The above topics on board diversity, board committees, and CEO characteristics are also examined in the context of the Bucharest Stock Exchange. For example, Vintilă and Gherghina (2013) examine the effects of board independence and CEO duality. The authors collect firm-level data covering the 2007–2011 period and use Tobin's Q as their dependent variable. Their results indicate that board independence has a negative and non-linear effect in the case of the OLS regression model, whereas there are no statistically significant effects in the case of the fixed-effects regression model. In another study, Vintilă et al. (2015) conduct a more detailed study and find positive effects of board diversity. A more recent study by Borlea et al. (2017) also examines various board characteristics (such as independent board members and audit committees) and their effects on firm performance in the case of Romanian public companies. They note that these specific board characteristics can have positive effects on the financial performance of companies, as they improve the monitoring efficiency of boards and alleviate the corresponding agency problems. The

authors use data only for 2012 and do not find any statistically significant results. The use of only one year in the sample and the relatively small sample size (i.e., only 55 observations) are possible factors in these weak empirical findings. There are also studies that examine similar topics in the case of central and eastern European (CEE) countries (Primecz et al. 2019). For example, Bistrova and Lace (2011) examine the case of CEE countries in terms of leading corporate governance dimensions, including independent board members and CEO duality, and find that there is a positive association with higher governance scores and better stock market performance. In another study, Firtescu and Terinte (2019) examine the case of firms from 11 CEE countries for the 2004–2013 period using the Orbis dataset and find that "independent internal audit committee ... has a positive sign on firm's profitability" measured by ROE and ROA (p. 114). Hence, these studies on CEE also provide quantitative evidence on the importance of corporate governance. The present paper improves over this relevant literature by conducting a more comprehensive empirical analysis covering the 2016–2020 period for the companies listed on the BSE.

3. Data and Research Methods

3.1. Sample Selection and Variable Description

The presents study focused on board diversity (the number of non-executives, independents, females, and foreigners), board committees, and CEO characteristics in Romania. The relevant variables are explained in Table 1. The third column of the table provides some references that use the same variables in their analysis. Regarding the sample selection, data for more than 70 firms in the Bucharest Stock Exchange were collected by hand on these variables—namely, all the firms in the stock market were included in the analysis depending on data available in their annual reports. The sample period covered the last five years of 2016–2020. Hence, the sample size and period coverage are relatively large, to obtain robust findings on the recent corporate governance developments in the Bucharest Stock Exchange.

Table 1. Description of variables.

Variable	Definition	Relevant References
Return on equity	Net profits as a ratio to shareholder equity	Firtescu and Terinte (2019)
Return on assets	Net profits as a ratio to total assets	Firtescu and Terinte (2019)
Tobin's Q	Market value as a ratio to total asset	Vintilă and Gherghina (2013)
Board size	The number of members on the board	Vintilă et al. (2015)
Board age	The average age of board members	Ferrero-Ferrero et al. (2015)
Firm size	Firm turnover or revenue	Vintilă et al. (2015)
Non-executive share	The number of non-executive members as a ratio to board size	Vintilă et al. (2015)
Independent share	The number of independent members as a ratio to board size	Vintilă et al. (2015)
Women share	The number of women members as a ratio to board size	Vintilă et al. (2015)
Foreign share	The number of foreign members as a ratio to board size	Masulis et al. (2012)
Board committees	The number of board committees	Vintilă et al. (2015)
Committee members	The number of members in different board committees	Vintilă et al. (2015)
Ceo age	The age of the CEO	Vintilă et al. (2015)
CEO duality	Takes a value of 1 if the CEO has the dual duty of CEO and Chairperson	Vintilă et al. (2015)

Table 1. *Cont.*

Variable	Definition	Relevant References
CEO women	Takes a value of 1 if women CEO	Vintilă et al. (2015)
CEO foreign	Takes a value of 1 if foreign CEO	

3.2. Econometric Specification

With reference to the research methods, the literature review section showed that regression models are commonly used to examine the effects of different corporate governance dimensions on firm performance. For example, Carter et al. (2003) use a regression model with the dependent variable of Tobin's Q and independent variables of various diversity indicators and CEO characteristics. The present paper also follows a similar regression approach and estimated the following regression model:

$$\begin{gathered} ROA_{it} \text{ or } ROE_{it} \text{ or } Tobin's\ Q_{it} = \beta_0 + \beta_1 Ln(Firm\ Size)_{it} + \beta_2 BoardSize_{it} + \\ \beta_3 Board\ Diversity\ Measures_{it} + \beta_4 CEO\ Characteristics_{it} + \\ \beta_5 Board\ Committees_{it} + \varepsilon_{i,t} \end{gathered} \quad (1)$$

In the above regression model, *i* refers to the company and t refers to the year. The dependent variable was chosen among three performance indicators of ROA or ROE or Tobin's Q. Then, Ln(firm size) and board size were utilised as the main control variables. The regression model also included three sets of independent variables corresponding to the three research hypotheses on the effects of board diversity measures, CEO characteristics, and audit committees. Overall, the paper provides a very rich set of regression models and empirical evidence. In terms of empirical strategy, the pooled OLS methods were utilised. Given the data limitations such as the relatively small number of cross sections (i.e., the number of companies) and low variation on some board characteristics, the panel data methods or dynamic methods were not utilised. These limitations can be addressed in future research as more data points become available.

4. Findings

4.1. Descriptive and Correlation Analyses

The board age is estimated at 52 years, with a standard deviation of 8 years. With reference to the diversity measures, the share of non-executive board members is 68%, while the share of independent board members is 38%, the share of female board members is 21%, and the share of foreign board members is 18%. Therefore, the lowest levels of board diversity are observed on foreigners and women, while the largest diversity level is observed in the non-executive members.

In terms of CEO characteristics, Table 2 shows that the average CEO age is 53 years, with a standard deviation of 12 years. 30% of CEOs in the sample hold the Chairperson position as well. In addition, 11% of CEOs are women and 13% are foreigners. Hence, the gender and ethnic diversity of CEOs is lower, compared with the board diversity, in both dimensions. Table 2 displays that the average number of committees is 1.66, with a standard deviation of 1.28. This variable ranges from 0 to 5 in the sample. The recent set of relevant data can be valuable, as there are no studies that examine the effect of board committees and their members on the firm performance of the companies listed on the BSE, to the best knowledge of the authors. In terms of specific board committees, the data collection process was able to recover information on the existence of an audit committee for 40 companies, so that there were 200 observations in five years of the sample. Then, the average member size in the audit committee is estimated as 2.75, with a standard deviation of 0.78. In the case of other board committees, the total number of observations is smaller, with 110 observations (i.e., for 22 firms) in the case of remuneration committees and 105 observations (i.e., for 21 firms) in the case of nomination committees. In the case of other board committees, the number of observations is smaller than 5 firms (or 20 observations), thereby making

statistical analysis infeasible. The last panel of Table 2 presents the summary statistics for the performance indicators. It is found that the average ROA is 3.2%, while the average ROE is 7.7% and the average level of Tobin's Q is 0.677.

Table 2. Summary statistics.

Descriptive Statistics—Board Characteristics					
Variable	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
Board Size	345	4.971	1.73	1	11
Board Age	260	52.199	8.272	31.667	69.7
Executive Share	345	25.403	24.09	0	100
Non-Executive Share	345	67.585	29.602	0	100
Independent Share	295	38.423	30.427	0	100
Women Share	340	20.466	23.14	0	100
Foreigner Share	345	17.938	30.999	0	100
Descriptive Statistics—CEO Characteristics					
Variable	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
CEO Age	245	52.531	11.465	30	71
CEO Duality	320	0.297	0.458	0	1
CEO Women	330	0.106	0.308	0	1
CEO Foreign	360	0.125	0.331	0	1
Descriptive Statistics—Board Committees					
Variable	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
Number of Committees	305	1.656	1.277	0	5
Audit Members	200	2.75	0.776	1	5
Remuneration Members	110	3.136	0.818	2	5
Nomination Members	105	3.048	0.955	1	5
CSR Members	15	4.667	0.488	4	5
Stakeholder Members	5	3	0	3	3
Risk Members	20	3.25	0.444	3	4
Descriptive Statistics—Firm and Performance Variables					
Variable	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
ROA	319	3.151	9.645	−44.49	77.05
ROE	320	7.662	14.711	−52.8	86.19
Tobins Q	119	0.677	0.664	0	3.94
Size	303	5.33×10^8	1.65×10^9	236,000	1.48×10^{10}
ln_Size	303	18.282	1.97	12.37	23.41

Table 3 presents the correlations of the three sets of independent variables (i.e., board diversity measures, CEO characteristics, and board committees). In the case of the board diversity indicators, only one of the performance indicators, i.e., return on equity (ROE), has statistically significant correlations with some indicators—namely, ROA and Tobin's Q do not display any statistically significant bivariate relationship with the diversity measures. However, in the case of ROE, the shares of both independent and foreign members are positively associated with this performance indicator at the 5% statistical significance level. In the case of the CEO characteristics, ROE is again positively associated with the presence of foreign CEOs. Finally, in the case of board committees, the number of board committees is not correlated with any of the performance indicators in a statistically significant way. However, ROA and Tobin's Q display positive correlations with the number of members in different board committees. Overall, the correlation results in Table 3 provide some initial insights on the possible effects of board diversity in terms of independent and foreign board members and the different committees. Figures 1 and 2 provide some graphical evidence in support of these findings.

Table 3. Correlation coefficients of firm performance.

Pairwise Correlations with Board Diversity Measures									
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
(1) ROA	1.000								
(2) ROE	0.405 *	1.000							
(3) Tobin's Q	−0.064	0.251 *	1.000						
(4) Board Size	0.140 *	0.055	0.097	1.000					
(5) Board Age	0.025	−0.024	−0.030	0.135 *	1.000				
(6) Non_exec Share	−0.035	−0.13 *	0.079	0.261 *	−0.17 *	1.000			
(7) Indep Share	−0.100	0.053	0.181	−0.039	−0.14 *	0.437 *	1.000		
(8) Women Share	0.063	−0.074	−0.054	−0.14 *	−0.15 *	−0.16 *	−0.15 *	1.000	
(9) Foreigner Share	−0.20 *	0.194 *	0.046	0.013	−0.24 *	0.124 *	0.069	−0.15 *	1.000
Pairwise Correlations with CEO Characteristics									
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**		
(1) ROA	1.000								
(2) ROE	0.405 *	1.000							
(3) Tobin's Q	−0.064	0.251 *	1.000						
(4) CEO Age	0.125	−0.049	0.028	1.000					
(5) CEO Duality	0.023	−0.011	−0.040	0.487 *	1.000				
(6) CEO Women	−0.034	−0.043	0.084	−0.104	−0.118 *	1.000			
(7) CEO Foreigner	−0.192 *	0.111 *	−0.000	−0.063	0.131 *	−0.137 *	1.000		
Pairwise Correlations with Board Committees									
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**		
(1) ROA	1.000								
(2) ROE	0.405 *	1.000							
(3) Tobin's Q	−0.064	0.251 *	1.000						
(4) Number of Committees	0.128 *	0.005	0.029	1.000					
(5) Audit Member	0.083	−0.010	0.214	0.339 *	1.000				
(6) Remuneration Member	0.431 *	0.225 *	0.427 *	−0.038	0.780 *	1.000			
(7) Nomination Members	0.263 *	0.019	0.345 *	−0.057	0.691 *	1.000 *	1.000		

* shows significance at the 0.05 level.

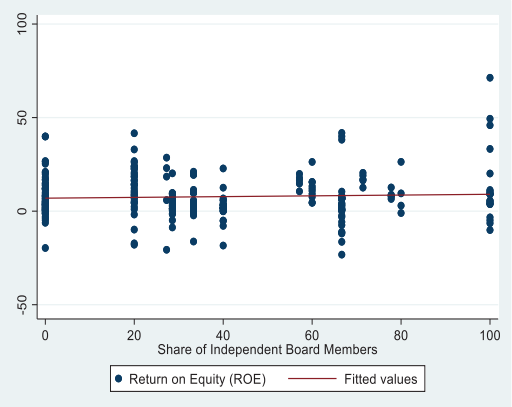

Figure 1. ROE and share of independent members.

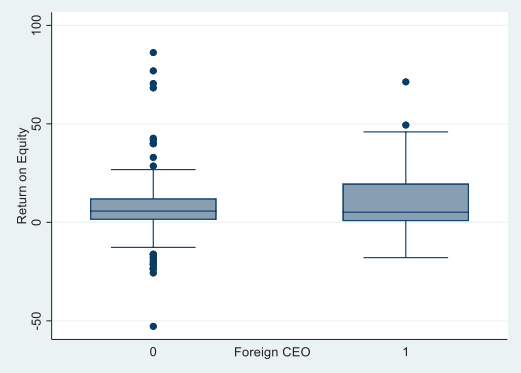

Figure 2. ROE and foreign CEO.

4.2. Regression Analysis

This section presents the regression results. Since the number of independent variables is numerous (i.e., there are 14 independent variables in Table 2), including all of them at the same time can lead to large declines in the degrees of freedom in the regression estimations. In order to lessen this problem, the three sets of independent variables were separately included in the regression estimations. Then, a final regression model was estimated with the selected variables from each group.

Results for the board diversity measures in Table 4 are presented in three panels. The upper panel shows the results for the performance variable of ROA, while the middle panel presents the results for ROE and the lower panel for Tobin's Q. In the case of the ROA variable, the firm size has a positive and statistically significant coefficient, thereby indicating that larger firms perform better in this indicator. As additional results, it is found that the share of foreigners on boards is negatively associated with firm performance, whereas the share of women on boards is positively associated. The relevant regression coefficients are statistically significant at the 5% level. In the case of the middle panel with the performance variable of ROE, it is found that both independent share and foreign share are positively related, with a significance level of 5%. Finally, in the case of Tobin's Q, the lower panel of Table 4 shows that no regression coefficient is statistically significant at the 10% level. When the results across these three performance indicators are compared, it is found that the upper panel with ROA has the highest R square value of 14.4%. Overall, these findings provide supportive evidence on the favourable effects of independent board members, thereby supporting the first research hypothesis. This finding is also consistent with the results in the literature about the positive performance effects of independent board members, such as Knyazeva et al. (2013) and Vintilă and Gherghina (2013).

Table 4. OLS regression results with the board diversity measures.

Linear Regression for ROA							
ROA	**Coef.**	**St. Err.**	**t-Value**	***p*-Value**	**[95% Conf**	**Interval]**	**Sig**
ln_size	1.128	0.256	4.40	0.000	0.623	1.633	***
board_size	0.330	0.360	0.92	0.360	−0.379	1.040	
non_exec_share	0.022	0.015	1.53	0.127	−0.006	0.051	
indep_share	−0.019	0.022	−0.87	0.387	−0.061	0.024	
women_share	0.048	0.023	2.08	0.039	0.002	0.093	**
foreigner_share	−0.056	0.025	−2.26	0.025	−0.104	−0.007	**
Constant	−19.56	4.962	−3.94	0.000	−29.335	−9.780	***
Mean dependent var	3.572		SD dependent var		9.225		
R-squared	0.144		Number of obs		233.000		
F-test	7.047		Prob > F		0.000		
Akaike crit. (AIC)	1673.493		Bayesian crit. (BIC)		1697.650		

Table 4. *Cont.*

Linear Regression for ROE							
ROE	**Coef.**	**St. Err.**	**t-Value**	***p*-Value**	**[95% Conf**	**Interval]**	**Sig**
ln_size	1.054	0.494	2.13	0.034	0.081	2.027	**
board_size	0.633	0.621	1.02	0.309	−0.591	1.857	
non_exec_share	−0.073	0.026	−2.79	0.006	−0.125	−0.022	***
indep_share	0.059	0.030	1.98	0.049	0.000	0.118	**
women_share	−0.014	0.030	−0.48	0.629	−0.073	0.044	
foreigner_share	0.096	0.039	2.47	0.014	0.019	0.173	**
Constant	−13.438	8.025	−1.68	0.095	−29.249	2.374	*
Mean dependent var	7.875		SD dependent var		12.232		
R-squared	0.120		Number of obs		236.000		
F-test	4.165		Prob > F		0.001		
Akaike crit. (AIC)	1834.358		Bayesian crit. (BIC)		1858.605		
Linear Regression for Tobin's Q							
Tobin's Q	**Coef.**	**St. Err.**	**t-Value**	***p*-Value**	**[95% Conf**	**Interval]**	**Sig**
ln_size	0.048	0.031	1.57	0.120	−0.013	0.110	
board_size	0.021	0.048	0.44	0.659	−0.074	0.116	
non_exec_share	0.000	0.003	−0.07	0.945	−0.005	0.005	
indep_share	0.005	0.003	1.51	0.135	−0.002	0.011	
women_share	−0.001	0.003	−0.25	0.805	−0.008	0.006	
foreigner_share	0.000	0.004	0.09	0.928	−0.007	0.007	
Constant	−0.382	0.510	−0.75	0.456	−1.397	0.633	
Mean dependent var	0.788		SD dependent var		0.734		
R-squared	0.061		Number of obs		85.000		
F-test	2.043		Prob > F		0.070		
Akaike crit. (AIC)	196.343		Bayesian crit. (BIC)		213.441		

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 5 repeats the same set of regression estimations for the independent variables of CEO characteristics. In the case of the upper panel with the ROA indicator, the size variable is positively associated with this performance measure, whereas having a foreign CEO is negatively associated. In the case of the ROE and Tobin's Q indicators, the results of the middle and lower panels indicate that none of the CEO characteristics is statistically significant at the 10% level. This is an interesting result, which might arise from the exclusion of important board characteristics in the regression model.

Table 5. OLS regression results with the CEO characteristics.

Linear Regression for ROA							
ROA	**Coef.**	**St. Err.**	**t-Value**	***p*-Value**	**[95% Conf**	**Interval]**	**Sig**
ln_size	1.063	0.312	3.40	0.001	0.448	1.679	***
board_size	0.257	0.386	0.67	0.507	−0.504	1.018	
ceo_duality	1.578	1.168	1.35	0.178	−0.722	3.878	
ceo_women	0.441	1.910	0.23	0.818	−3.322	4.204	
ceo_foreign	−6.695	2.092	−3.20	0.002	−10.815	−2.58	***
Constant	−17.316	6.487	−2.67	0.008	−30.092	−4.54	***
Mean dependent var	3.304		SD dependent var		9.510		
R-squared	0.116		Number of obs		254.000		
F-test	7.225		Prob > F		0.000		
Akaike crit. (AIC)	1844.753		Bayesian crit. (BIC)		1865.977		

Table 5. *Cont.*

Linear Regression for ROE							
ROE	**Coef.**	**St. Err.**	**t-Value**	***p*-Value**	**[95% Conf**	**Interval]**	**Sig**
ln_size	0.775	0.646	1.20	0.231	−0.496	2.046	
board_size	0.092	0.695	0.13	0.895	−1.276	1.460	
ceo_duality	−0.132	1.903	−0.07	0.945	−3.880	3.615	
ceo_women	0.210	2.580	0.08	0.935	−4.871	5.291	
ceo_foreign	5.197	4.126	1.26	0.209	−2.930	13.324	
Constant	−7.729	11.118	−0.69	0.488	−29.627	14.168	
Mean dependent var	7.743		SD dependent var		14.224		
R-squared	0.025		Number of obs		255.000		
F-test	1.121		Prob > F		0.350		
Akaike crit. (AIC)	2082.180		Bayesian crit. (BIC)		2103.428		
Linear Regression for Tobin's Q							
Tobin's Q	**Coef.**	**St. Err.**	**t-Value**	***p*-Value**	**[95% Conf**	**Interval]**	**Sig**
ln_size	0.028	0.040	0.69	0.491	−0.052	0.108	
board_size	0.038	0.047	0.82	0.414	−0.055	0.131	
ceo_duality	−0.028	0.174	−0.16	0.874	−0.374	0.318	
ceo_women	0.207	0.234	0.88	0.379	−0.258	0.672	
ceo_foreign	0.015	0.303	0.05	0.961	−0.587	0.617	
Constant	−0.004	0.809	−0.01	0.996	−1.611	1.604	
Mean dependent var	0.719		SD dependent var		0.696		
R-squared	0.027		Number of obs		96.000		
F-test	0.609		Prob > F		0.693		
Akaike crit. (AIC)	211.293		Bayesian crit. (BIC)		226.679		

*** $p < 0.01$.

Table 6 presents the OLS regression results for the independent variables related to board committees. The number of committees is included as a relevant variable, along with the number of members in the audit and remuneration committees. Since there were not enough observations in the case of other committees, they were not included in the regression model. The results indicate that the audit committee has a positive and statistically significant effect on firm performance in the case of ROA and ROE, while the remuneration committee has a positive and statistically significant effect In the case of ROA and Tobin's Q. These are novel findings in the literature for the Bucharest Stock Exchange. Overall, the results of Table 6 indicate that having audit committees with enough members would improve the financial performance of companies in Romania. Hence, these findings support the second research hypothesis on the positive performance effects of the audit committees. This favourable effect of audit committees is also consistent with the studies in the literature that find similar positive performance effects, such as Aldamen et al. (2012) and Ghafran and O'Sullivan (2013).

Finally, Table 7 shows the results of the full set of independent variables. To save on the degrees of freedom, the leading variables from the other regression models are included in this table. The upper panel has 196 observations, while this number falls to 61 when the audit and remuneration committee variables are included in the regression equation. In addition, this table is estimated only for the ROE variable. In the upper panel, it is found that the share of independent board members is positively related to the firm performance, whereas CEO duality is negatively related. The regression coefficient of 0.093 for the variable of independent board members implies that a 10% increase in the share of independent board members would be associated with a 0.93% increase in ROE. Hence, this effect is economically significant given that the average ROE was 3.2% in the sample. In the lower panel of Table 7, the results indicate that the audit committee has a positive effect on firm performance. Overall, these results also provide supportive evidence on the

positive performance effects of independent board members and audit committees, thereby validating both research hypotheses.

Table 6. OLS regression results with board committees.

Linear Regression for ROA							
ROA	**Coef.**	**St. Err.**	**t-Value**	***p*-Value**	**[95% Conf**	**Interval]**	**Sig**
ln_size	0.403	0.308	1.31	0.195	−0.212	1.019	
number_committees	−0.827	0.819	−1.01	0.316	−2.464	0.809	
audit_member	2.624	0.760	3.45	0.001	1.105	4.142	***
remuneration_members	1.229	0.343	3.58	0.001	0.543	1.915	***
Constant	−10.386	5.073	−2.05	0.045	−20.526	−0.247	**
Mean dependent var	6.373		SD dependent var		5.357		
R-squared	0.415		Number of obs		67.000		
F-test	10.940		Prob > F		0.000		
Akaike crit. (AIC)	388.150		Bayesian crit. (BIC)		399.174		
Linear Regression for ROE							
ROE	**Coef.**	**St. Err.**	**t-Value**	***p*-Value**	**[95% Conf**	**Interval]**	**Sig**
ln_size	1.139	0.559	2.04	0.046	0.021	2.256	**
number_committees	−0.520	1.389	−0.38	0.709	−3.297	2.256	
audit_member	3.342	0.877	3.81	0.000	1.590	5.095	***
remuneration_members	0.161	0.561	0.29	0.775	−0.960	1.281	
Constant	−21.963	6.867	−3.20	0.002	−35.686	−8.241	***
Mean dependent var	8.692		SD dependent var		8.053		
R-squared	0.275		Number of obs		68.000		
F-test	10.403		Prob > F		0.000		
Akaike crit. (AIC)	463.839		Bayesian crit. (BIC)		474.936		
Linear Regression for Tobin's Q							
Tobin's Q	**Coef.**	**St. Err.**	**t-Value**	***p*-Value**	**[95% Conf**	**Interval]**	**Sig**
ln_size	−0.030	0.045	−0.66	0.514	−0.122	0.063	
number_committees	−0.029	0.073	−0.40	0.692	−0.180	0.121	
audit_member	0.056	0.127	0.44	0.663	−0.205	0.316	
remuneration_members	0.205	0.100	2.06	0.050	0.000	0.411	*
Constant	0.673	0.731	0.92	0.366	−0.832	2.179	
Mean dependent var	0.809		SD dependent var		0.434		
R-squared	0.215		Number of obs		30.000		
F-test	2.131		Prob > F		0.107		
Akaike crit. (AIC)	36.767		Bayesian crit. (BIC)		43.773		

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

The above findings are closely related to the theoretical and empirical studies in the literature. The favourable impacts of having independent members on boards and establishing audit committees are consistent with the agency theory and the resource-based view of the firm (Lockett et al. 2009; Panda and Leepsa 2017; Raimo et al. 2021). In addition, the positive effects of independent board members and audit committees in the case of Romania are consistent with the relevant literature that finds similar positive effects of both variables in other countries and Romania (Knyazeva et al. 2013; Vintilă and Gherghina 2013). Similar findings on the effects of board independence and audit committees are also shown in the case of CEE countries by Bistrova and Lace (2011) and Firtescu and Terinte (2019). Hence, the results of the present paper provide supportive evidence about the importance of various corporate governance indicators in the case of Romania.

Table 7. OLS regression results with full set of independent variables.

Linear Regression for ROE							
ROE	**Coef.**	**St. Err.**	**t-Value**	***p*-Value**	**[95% Conf**	**Interval]**	**Sig**
ln_size	0.857	0.609	1.41	0.161	−0.345	2.059	
board_size	1.223	0.826	1.48	0.140	−0.406	2.853	
non_exec_share	−0.170	0.059	−2.86	0.005	−0.287	−0.053	***
indep_share	0.093	0.048	1.96	0.052	−0.001	0.188	*
women_share	0.003	0.043	0.07	0.947	−0.082	0.088	
foreigner_share	0.031	0.049	0.65	0.519	−0.064	0.127	
ceo_duality	−4.661	2.776	−1.68	0.095	−10.138	0.816	*
ceo_women	−1.659	2.690	−0.62	0.538	−6.966	3.648	
ceo_foreign	0.891	5.678	0.16	0.875	−10.311	12.094	
number_committees	−1.589	1.018	−1.56	0.120	−3.599	0.420	
Constant	−1.584	10.595	−0.15	0.881	−22.487	19.318	
Mean dependent var	8.339		SD dependent var		12.260		
R-squared	0.105		Number of obs		196.000		
F-test	1.744		Prob > F		0.074		
Akaike crit. (AIC)	1538.018		Bayesian crit. (BIC)		1574.077		
Linear Regression for ROE							
ROE	**Coef.**	**St. Err.**	**t-Value**	***p*-Value**	**[95% Conf**	**Interval]**	**Sig**
ln_size	−0.386	0.766	−0.50	0.617	−1.925	1.153	
board_size	−0.481	0.857	−0.56	0.577	−2.204	1.241	
non_exec_share	0.122	0.087	1.41	0.166	−0.053	0.297	
indep_share	−0.048	0.065	−0.75	0.457	−0.178	0.081	
women_share	−0.049	0.102	−0.48	0.633	−0.254	0.156	
foreigner_share	0.229	0.130	1.77	0.084	−0.032	0.490	*
ceo_duality	−0.413	2.640	−0.16	0.876	−5.722	4.896	
ceo_women	−4.922	2.707	−1.82	0.075	−10.364	0.520	*
ceo_foreign	−6.773	9.209	−0.74	0.466	−25.289	11.742	
number_committees	1.518	1.516	1.00	0.322	−1.530	4.567	
audit_member	2.713	1.155	2.35	0.023	0.390	5.036	**
remuneration_members	0.126	1.600	0.08	0.938	−3.092	3.343	
Constant	−1.134	17.627	−0.06	0.949	−36.576	34.308	
Mean dependent var	8.898		SD dependent var		8.466		
R-squared	0.351		Number of obs		61.000		
F-test	12.793		Prob > F		0.000		
Akaike crit. (AIC)	432.325		Bayesian crit. (BIC)		459.766		

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

The findings of the present paper have also important managerial and policy implications. Regarding corporations, the implementation of best corporate governance practices such as the employment of independent board members and the establishment of audit committees. The shareholders can strive to implement these policies, as they would greatly benefit from these corporate governance indicators in the case of independent board members and audit committees. However, in the case of CEO duality, there is no robust evidence in terms of negative or positive effects. This finding is also consistent with the results in the literature. From a broad perspective, the results indicate that improving corporate governance practices in the Bucharest Stock Exchange would create positive performance effects for public companies. Hence, the 2015 Code of Corporate Governance by BSE makes useful suggestions about independent board members and audit committees. These recommendations can be strengthened and some specific corporate governance strategies can be made mandatory based on the findings of the present study. In return, higher performance would increase investor attention and inflows, thereby supporting stock market development, financial development, and economic development in the country.

5. Limitations and Future Research

This paper utilises a unique and valuable dataset on the joint-stock companies in Romania to see the possible effects of three corporate governance dimensions (board diversity in terms of independent board members, CEO duality, and audit committees) on financial performance. The paper also produces important quantitative results on the importance of corporate governance for Romania. Hence, it contributes to the relevant literature with evidence from a transitioning country. However, the study also suffers from some limitations that can be addressed in future research. As the data were collected by hand, the number of years and the number of control/independent variables were restricted to some extent. Expanding these dimensions would lead to a larger sample size, as well as more control variables such as liquidity and leverage that can affect firm performance. Moreover, stock performance indicators can also be used as additional dependent variables. Future research can make effort to address these data issues by collecting larger datasets on more variables. In addition to these data limitations, the use of only pooled OLS methods stands out as a methodological limitation. Normally, the data have a panel data nature, which would allow the implementation of various panel data methods, such as fixed effects and dynamic GMM estimations. However, the cross-sectional dimension in the dataset is relatively small, and there is not much variation in the board characteristics of the sample companies. Therefore, it is difficult to obtain strong results in the present sample with other estimation methods. This limitation also restricts the analysis in terms of addressing endogeneity issues. These methodological limitations can also be addressed in future research by using more data years and information on more board characteristics. Another possible extension in future research can be to conduct a cross-country analysis with other transition countries in the same region, in order to investigate if the findings from Romania could be generalised to them.

6. Conclusions

This paper examined the impact of board diversity, CEO characteristics, and board committees on the financial performance of the companies listed on the Bucharest Stock Exchange. The relevant literature on these corporate governance dimensions highlights the finding that board diversity and committees can play important roles in terms of increasing the effectiveness of board monitoring and improving firm value. In addition, the CEO duality might have negative effects on firm performance, as it can restrict the ability of the board to monitor and supervise the activities of executives. In order to test the relevance of these arguments for the case of the companies listed on the BSE, detailed data were collected by hand on these indicators for more than 70 firms covering the 2016–2020 period. Then, descriptive, correlation, and regression analyses were conducted to document the possible effects of board diversity, CEO characteristics, and board committees. The relevant results indicate that there are positive effects of board diversity in terms of independent members on boards. Regarding board committees, the audit committee is found to have positive performance effects. In terms of quantitative sizes, the regression coefficient of 0.093 for the independent board members in the case of the dependent variable of ROE implies that a 10% increase in the share of independent board members would be associated with a 0.93% increase in ROE. In conclusion, the economic effects of the empirical findings are also significant. Based on these findings, it can be argued that improving the corporate governance practices of the companies listed on the BSE would improve the valuation and performance of these firms. There are some research limitations in the present study that can be addressed in future research. The empirical analysis relies on the OLS regression models, while future research can implement more advanced regression methods such as panel data regressions and IV/GMM regressions (Wooldridge 2010). In addition, the dataset can be further improved by incorporating additional firm and board variables, as well as extending the sample period to earlier years.

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An Investigation of the Link between Major Shareholders' Behavior and Corporate Governance Performance before and after the COVID-19 Pandemic: A Case Study of the Companies Listed on the Iranian Stock Market

Rezvan Pourmansouri [1], Amir Mehdiabadi [2], Vahid Shahabi [3], Cristi Spulbar [4] and Ramona Birau [5,*]

[1] Science and Research Branch, Islamic Azad University, Tehran 1477893855, Iran; rezvan.pourmansouri@yahoo.com
[2] South Tehran Branch, Islamic Azad University, Tehran 1477893855, Iran; amir.mehdiabadi@gmail.com
[3] Department of Management and Economics, Science and Research Branch, Islamic Azad University, Tehran 1477893855, Iran; vahid.shahabi@srbiau.ac.ir
[4] Faculty of Economics and Business Administration, University of Craiova, 200585 Craiova, Romania; cristi_spulbar@yahoo.com
[5] Doctoral School of Economic Sciences, University of Craiova, 200585 Craiova, Romania
* Correspondence: ramona.f.birau@gmail.com

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Abstract: One of the basic functions of establishing corporate governance (CG) in companies is improving performance and increasing value for shareholders. Expanding the company's value will ultimately increase the shareholders' wealth. Therefore, it is natural for shareholders to seek to improve their performance and increase the company's value. If CG mechanisms cannot perform this function in companies, they do not have the necessary efficiency and effectiveness and, therefore, cannot improve the efficiency of companies. This article investigated the connection between the power of major shareholders and the modality of CG of companies listed on the Iranian capital market before and after the COVID-19 pandemic. The statistical sample of the research included 120 companies listed on the Tehran Stock Exchange for the selected period from 2011 to 2021. The results showed that the concentration of ownership is harmful to adopting corporate governance (GCG) practices. In particular, the high level of voter ownership concentration weakens the corporate governance system (CGS). The results of this study, which was conducted using panel analysis, revealed that the concentration of ownership impairs the quality of CGS, and major shareholders cannot challenge the power of the main shareholder; it alsonegatively affected the quality of business boards, both during and before the COVID-19 pandemic. The competitiveness and voting rights of the major shareholders negatively affected the quality of board composition before and after the COVID-19 pandemic. The concentration of voter ownership also negatively affected the quality of CGS, both during and before COVID-19, and the competitiveness and voting rights of major shareholders before COVID-19. This concentration positively affected the quality of CGS after the COVID-19 pandemic.

Keywords: corporate governance; ownership concentration; agency theory; COVID-19 pandemic; Iran; global economy; emerging economy; financial management

1. Introduction

The pandemic associated with the coronavirus illness 2019 (COVID-19) caused a multitude of perturbations in every aspect of contemporary life. The possible impact of the coronavirus (COVID-19) pandemic on the global economy was between USD 5.8 trillion and 8.8 trillion—equivalent to 6.4–9.7% of global gross domestic product (GDP)—as approximated by the Asian Development Bank (ADB), May 2020 (Zheng and Zhang 2021). The effect of the virus itself, and the measures necessary to curb it, disrupted consumption

and production (di Mauro 2020); for instance, high mortality rates and complications from the COVID-19 pandemic reduced labor supply, which impeded production.

Similarly, social distancing policies and traffic control measures aimed at reducing transmission and preventing the spread of the coronavirus (COVID-19) infectious disease caused by SARS-CoV-2may have led to a sharp and instantaneous decrease in production in the economy (Zheng and Zhang 2021). The virus also affected the profitability and CGS of companies. As COVID-19 spread, organizations and countries were forced to make changes to their mechanisms to cope with these changes. Companies are moving in a direction that guarantees the profits of their stakeholders. As a result, the strength of the major shareholders and the quality of CG refer to a set of standards for evaluating the company's performance in relation to natural or environmental protection (Gelter and Puaschunder 2020; Patel et al. 2020; Solechan 2020). The aim of CG derives from the agency theory and is based on the presumption of optimizing the value of shares (Al-Gamrh et al. 2020; Cyert et al. 2002). CG is one of the factors in ameliorating economic efficiency and incorporates a set of communications between firm administration (Aspan 2017; Liang et al. 2021; Salehi et al. 2022), board structure (Baysinger and Butler 1985; Naciti 2019), shareholders, and other categories of stakeholders (Short and Keasey 2005; Stapledon and Stapledon 1997).

CGS provides an arrangement for the assessment of a firm's targets, the manner in which evaluations are conducted, and how performance is determined. This structure motivates the obligation to create a business schedule among management and prepare the foundation for effective monitoring (Johnston 2004). Recent research on CG and the understanding of the global differences in CG have emphasized the need for a deep examination of national institutions (Schiehll et al. 2014; Klettner 2021). Local laws of each country create a specific incentive for research, and the national, institutional, and legal environments create clear differences in CG. In markets with powerful shareholder patronage, the corporate perimeter encourages better CGS with the least changeability between organizations (Durnev and Kim 2005; Areneke et al. 2022). This is in contrast to weak law conventions, which can generate market pressures to recover CG via the civil system or promote voluntary acceptance of great governance (Claessens and Yurtoglu 2013; Klapper and Love 2004; Scherer and Voegtlin 2020; Al Amosh and Khatib 2021). Many corporations incorporate CG mechanisms outside those prescribed by legislation or implement those of other corporations (Aguilera and Jackson 2003; Zattoni and Pugliese 2021).

Several researchers have examined the relationship between major shareholder strength and CG quality and have stated that there is always a relationship between them (Pakmaram and Aliabadi 2020; Modares Ahmad and Zohreh 2001) suggested that the character of corporate shareholders is one of the most significant criteria for CG from the perspective of shareholder returns, even though the ranking of institutional ownership in businesses listed on the Tehran Stock Exchange is very high. However, although there is no significant relationship between Iranian institutional shareholders and returns, the results of research in other countries show that this relationship can be positive or negative (Modares Ahmad and Zohreh 2001). The ownership structure in CG has a clear and central position (Abdallah and Ismail 2017; Ducassy and Montandrau 2015). Corporate governance (CG), above all, is concerned with the long-term life of the corporation; in this regard, it aims to support the interests of shareholders against corporation managers and prevent unwanted transfers of wealth between different groups and the squandering of public rights of individual shareholders. Having an appropriate governance system can help to realize the genuine independence of independent auditors and lead to the creation of a transparent information space, from which economic actors can make a more informed resolution. Currently, there is no doubt about the significance and circumstances of CG for the success of companies because this issue has become more vital due to recent events and financial tension among companies (Yeganeh et al. 2010). CG determines the type of ownership structure and the arrangement of the corporation shareholders as a tool to control and exercise governance

in businesses. This dimension can be examined from various perspectives that determine the corporation's ownership type, such as the distribution of ownership, the concentration of ownership and major stakeholders in the firm's composition, and their percentage of ownership. Moreover, the composition of corporate shareholders, such as institutional shareholders, managerial ownership, and private and public shareholders, follows a different pattern. One of the outside (external) control mechanisms that influences CG and is becoming increasingly significant is the emergence of institutional investors (Shekan and Kharrazi 2008). Due to agency problems, corporation managers may not use corporation resources to increase shareholder wealth. At present, experts believe that the ideal solution to this moot point is to improve CG. CG includes criteria that can reduce the power of managers to pursue personal interests by addressing the lack of focus on controlling companies. One of the most effective criteria is the existence of institutional shareholders in businesses, who have great potential to influence managers.

However, what was its effect before and after the COVID-19 pandemic? This research study utilizes an indicator for CG quality that brings up a set of reasonable CG practices beyond what is considered essential by the legal system, and it has been used before in Iran (Akbari et al. 2019; Pakmaram and Aliabadi 2020). Moreover, this research paper tests the communication among ownership structures and the quality of the corporate supervision index. To this end, it focused on the modality of the composition of the board of directors for a sample of 120 Iranian corporations for the period 2011 to 2021. This research study examined selected data considering the impact of the recent COVID-19 pandemic on the Iranian financial market. Moreover, Spulbar et al. (2020) considered that the rating of economic integration is disparate for developed stock markets, compared with emerging markets, such as Iran, while portfolio diversification is a remarkable investment strategy used to manage stock market risks. This study also evaluated the capability of other major shareholders to compete for the superior shareholder surplus power following the previous literature (Akbari et al. 2019; Crisostomo et al. 2020; Konijn et al. 2011).

Therefore, this empirical researchextends previous investigations on Iran regarding the utilization of corporate quality indicators, particularly influential on the quality of the composition of the board of directors, and examines the result of surplus control rights on cash flow rights on the quality of CG; this is accomplished by reviewing the feasible competitiveness of major shareholders other than the major shareholder. Given the role and position of stock market liquidity in the case of investors' decisions, our results revealed that the existence of efficient and strong CG mechanisms reduces the influence and power of controlling shareholders and their involvement in the management of the firms (companies). Therefore, in such a situation, shareholders will be more willing to invest in these companies, and therefore, their selected stock market will be more liquid. As a result, an efficacious corporate governance (CG) mechanism minimizes the extent of its dependence on ownership structure and stock market liquidity. Specifically, highly intensive vote ownership undermines CG. This discovery follows the efficacy of dispossession and super-dense features in the original–original agency model. The influence of ownership structure on board composition indicates that major shareholders of Iranian businesses prefer to supervise management directly and replace board performance without the need for an independent board, which may limit private control profits.

This research paper reveals two essential achievements. First, it highlights the influence of ownership structure, particularly private ownership, on using CG practices and balancing the role of other major dominant shareholders in the context of the emerging market of Iran before and after the recent COVID-19 pandemic. The Tehran Stock Exchange has several features that distinguish it from other capital markets of developing countries. Firstly, the ownership structure in Iran is very stable over time, compared with developing countries. Many large shareholders are family members who stay with the corporation permanently. Therefore, ownership in Iran can be considered generally predetermined and less likely to be internal; thus, this study aims to contribute to the theoretical development of the political economy of CG from an economic standpoint in developing countries such

as Iran. Secondly, Iran is an appropriate case in point for this study, as controlling shareholders or entrepreneurs significantly impact the country's political process and corporate control policies. This research presumably has significant political implications for expansion partners such as the World Bank, which supports the Western version of CG reform regardless of stakeholder policies, with powerful shareholders of a developing economy.

This research also analyzes the negative effect of the COVID-19 pandemic. The novelty of this investigation is that, besides examining the relationship between the behavior of significant shareholders and the performance of CG, it also examines their role in the period before and after the COVID-19 pandemic, a factor that, in previous studies, was less important, and few studies have focused on their impact. Therefore, the goal of this study is to help discuss the impact of the relationship between major shareholders and the CG performance of companies. Existing empirical evidence indicates the existence of such an impact and confirms it; therefore, this article seeks to benefit from additional evidence based on different circumstances and add to the research literature. Recent studies focusing on ownership structure have often covered multiple corporate issues such as corporate value (Bennedsen and Nielsen 2010; Liang et al. 2011), analysis of corporate performance (Elyasiani and Jia 2010), quality of accounting statements, and debt expense (Crisostomo et al. 2020). Nevertheless, few studies have addressed the manner in which the ownership structure of CG mechanisms is modulated (Crisostomo et al. 2020; Sur et al. 2013) and, as far as this research is concerned, no other study has investigated the influence of competitiveness among shareholders other than the first major shareholder in Iran at the time of the COVID-19 pandemic.

Second, this article uses an indicator for the quality of CG that Ghorbani et al. (2015) proposed for Iranian companies, including a set of good measures (Ghorbani et al. 2015). This index is for the expansion of CG indices. This study is in line with the results provided byother several recent studies on CG in Iran and other emerging markets using a modern collection of CG knowledge that is recently available (Ghorbani et al. 2015; Pakmaram and Aliabadi 2020; Crisostomo et al. 2020; Ntim 2013). This is to evaluate whether the power of the largest shareholder has affected CGS quality in the Iranian capital market before and after the global crisis generated by the COVID 19 pandemic. The necessity of conducting this type of research is due to social, political, and economic necessity. Considering that the subject of the present research is based on economic issues, the above research can be considered an economic necessity because recognizing the impact of major shareholders' power and CG quality is important for investors. In addition, the importance of this study can be discussed from two further aspects. From atheoretical point of view, since no research has been performed on the above subject so far, the present research can help the academic development of this research subject; moreover, from a practical point of view, considering that the present study is economically necessary, its findings can be beneficial for investors who intend to invest in Iran and other (emerging) developing countries.

The structure of the rest of this article is as follows: In Section 2, the theoretical foundations and development of research hypotheses are formulated. Section 3 presents the research methods, while Section 4 includes the analysis of the results. Finally, Section 5 provides an overview of these research findings based on conclusions and limitations.

2. Theoretical Foundations and Development of Hypotheses

2.1. Corporate Governance

The recent COVID-19 pandemic generated unprecedented challenges for businesses in terms of CG. With the onset of the epidemic in January 2020, corporate board members could not predict future risks (Kumar and Rao 2021)and Could not take mitigation measures. Additionally, companies may not have been prepared for this stressful situation. Some companies indeed stress testing. However, they are more aimed at academia, and mitigation action plans are not ready to address these risks. Therefore, business boards could not direct corporations to safe ports. In May 2020, the OECD disseminated a survey of 37 countries and their national CG initiatives (Crews 2021). One of the most controversial

issues in the international arena is CG. The disintegration of several companies, hostile takeovers, and anti-social treatment in some companies have enhanced the focus on this issue. The widespread belief that CG can improve corporations' performance and shareholder protection has increased global attention (Rossi et al. 2015; Ngatno and Youlianto 2021; Hermuningsih et al. 2020; Akbar et al. 2020). Therefore, the role of CG is important in several ways. First, the establishment of CG causes scarce resources in the economy to be used efficiently. Second, resources are allocated to efficient investments. Third, CG helps managers focus on improving their firms' performance. Fourth, CG allows the CEO or board to choose the best tools to control scarce resources. Fifth, CG forces institutions to accept regulations. Weak corporate governance(CG) in Asian countries is often recognized as one of the key factors in reducing the growth of stock markets and listed companies during financial tension (Johnson et al. 2000; Lemmon and Lins 2003; Sun and Gao 2020). Consequently, various forms have been commissioned to better promote CG by many sectors, including international organizations, governments, market legislators, and the stock exchange organization. CG includes internal and external mechanisms to reduce representational problems between shareholders and managers owing to the segregation between ownership and management (Jensen and Meckling 1976). Many researchers have made efforts to address the challenges of CG both during health epidemics and post-epidemic.

Hsiao et al. (2022) suggested that CG can diminish the impact of systematic risk during the COVID-19 pandemic. There is no requirement to enhance the proportion of independent directors if board members have a sense of governance and relevant professional background (Hsiao et al. 2022). According to Le and Nguyen (2022), CG principles moderate the connections between the consequences of the COVID-19 pandemic and business continuity, i.e., effective CG principles could accelerate commerce to diminish the adverse effects of the COVID-19 pandemic on business continuity. Moreover, GCG principles could help a corporation elevate its ability to respond to oscillations in the external surroundings of the business by taking appropriate measures (Le and Nguyen 2022). According to Tampakoudis et al. (2022), CG mechanisms pertain differently to borrowers' overplus before and after the COVID-19 pandemic (Tampakoudis et al. 2022). Nurdiani and Anas (2022) indicated that GCG and risk management had significant effects on business performance during the COVID 19 pandemic (Nurdiani and Anas 2022).

GCG supports the board and executives achieve the corporation's goals and interests (Warrad and Khaddam 2020) and allows managers to control corporations, thereby maximizing the value of corporations for their shareholders and employees (Ngatno and Youlianto 2021). Akbar et al. (2020) stated that CG aims to protect shareholders' interests (Akbar et al. 2020). The relevant literature on CG revealed several principles, including clearness and publication of information (Desoky and Mousa 2012), the size of the board of directors, freedom of the board from managers, directors' financial experience, board committees, the role of foreign auditors, and segregation of CEO and chairman (Aggarwal 2013). Moreover, several other studies highlight corporation size, the board size, board financial experience, board meetings (Saleh et al. 2021), internal audit, and internal control (Suyono and Hariyanto 2012), as well as the proportion of non-executive directors, institutional ownership, and ownership (Agyei-Mensah 2016). Batool et al. (2021) argued that the COVID-19-related quarantine had a considerable impact on all sectors of the economy. Zulfiqar et al. (2020) investigated the existence of a possible link between certain indicators such as stock market performance and national governance for a cluster of 25 developed countries over a long time period, from 1996 to 2018. An investigation of the relationship between governance index and stock performance showed that higher governance quality reduces agency and transaction costs, increasing returns for shareholders. Many research studies have provided theoretical discussions and empirical findings on these dimensions of CG. El-Chaarani et al. (2022) argued that CG measures regarding the presence of independent members on the board of directors, high ownership concentration, and absence of political pressure on board members positively affected bank financial performance. CG mechanisms, such as the presence of women on boards, a moderate board size, and

anti-takeover tools, had no significant impact on a bank's performance during a financial crisis (El-Chaarani et al. 2022). In addition, Trivedi et al. (2021) examined spillovers related to market volatility and correlations between several developed and emerging European stock markets. They concluded that recent and past events have significant impacts on present volatility during the sample period from January 2000 to July 2018 (including the time of the global financial crisis of 2007–2008). Almaqtari et al. (2020) suggested that a studyof CG practices in India and GCC countries showed that several businesses still deviate from the stipulations of CG bylaws. Therefore, correctors and policymakers can give more consideration to compliance with these codes (Almaqtari et al. 2020). Grove et al. (2021) stated that CGS must accept its failure in managing the COVID-19 sanitary crisis and that there is a bias toward shareholders, thus ignoring workers (Grove et al. 2021).

Ltifi and Hichri (2021) stated that GCG positively affects social responsibility awareness in corporations, by studying pecuniary institutes' recommendations during COVID-19 (Ltifi and Hichri 2021). Khatib and Nour (2021) argued that, although all characteristics of companies—including corporate performance, governance structure, dividends, and liquidity—have been affected by the COVID-19 pandemic, there is not much difference between before and after the COVID-19 epidemic (Khatib and Nour 2021). Jebran and Chen (2021) considered that businesses may be exposed to at least a single recognized governance mechanism and can learn these governance specifications to be productive during the challenging times of the COVID-19 pandemic. Independent risk management committees, institutional ownership, independent boards, shareholders, and family ownership are several required and effective governance mechanisms, compared with other governance features during the COVID-19 pandemic crisis (Jebran and Chen 2021). The indispensable role of CG lies in synchronizing board actions. It is a control and surveillance system in which the board of directors oversees the work of management to magnify shareholder value (El-Chaarani et al. 2022). Rouf (2017) suggested that real assets, the percentage of female managers, the leadership structure of a firm's board of directors are positively related to the level of voluntary disclosure, and the rate of shares owned by a firm's internal persons is negatively associated with the level of voluntary disclosure (Rouf 2017). In their research, Rossi et al. (2015) stated that CG has become a favorite topic in the international arena. Recent financial scandals (Enron, Tyco, and WorldCom) have enhanced positive views toward the relationship between CG and performance because of its apparent significance for the economic health of corporations and, more broadly, its impact on society (Rossi et al. 2015). The focus of businesses is to enhance revenue and quarterly profits to maintain stock prices. Based on a report by the Congressional Financial Plan Office, the US federal government will spend more than USD 4 trillion by 2020 to maintain the US economy.

Similarly, during the global financial crisis of 2007–2008, CG faced similar challenges in that the board was unable to give sufficient time to complete its tasks. Many board members had no technical background; some had no banking experience. According to May and Mackin (2020), large organizations with leaders and major skilled workforces should be held responsible for corporate failures during theCOVID 19 pandemic. They recognized the need fora change in CG practices because of the inability of the board of directors and consultants to better predict or respond to the crisis (May and Mackin 2020). Other researchers conducted similar empirical studies and emphasized the failure of delegations to deal with the crisis (Gelter and Puaschunder 2020).

2.2. Shareholder Power

This research addresses a significant challenge regarding governance that has engaged corporate legislation researchers and pecuniary economists for a long time (Bruner 2013; Bebchuk 2004)—namely, the power of share holdersin making game-changing decisions in terms of mergers, sale of all assets, or dissolution would address managers' excessive tendency to retain their independence. In addition, the power of shareholders to make decisions related to downsizing, to contract the corporation's size, by ordering cash or

in-kind distribution would address organizational problems, as the power of shareholders to interfere could upgrade the corporation considerably (Hill and Thomas 2015). Thus, shareholder power to make laws-of-the-game decisions would ensure that the subsequence governance related to any other corporate law issue does not appreciably depart from shareholders (Bebchuk 2004; Midttun 2022; Charléty et al. 2019). The basic reason CG fractures need to be addressed by corporate legislation reforms, such as those implemented in recent legislation, is that shareholders of publicly commercialfirms, in general, do not have the power to interfere and change available adjustments. With shareholder power to intermeddle, favorable changes can generally befall without outside legal interposition (Maher and Andersson 2002; Sepe 2016). For instance, shareholders were concerned that recent governance fractures would affect the prism modification aiming to improve procedures by which executive pay is set, requiring a breakaway from the positions of CEOs and board chairs, thus strengthening the independence of directors or auditors (Charléty et al. 2019; Rachagan and Sulaiman 2019). The increase in shareholder supremacy redefined the aim of business corporations as maximizing shareholder riches instead of ameliorating operational efficiency for the benefit of multiple stakeholders. Widyaningsih et al. (2017) stated that the right to cash flow has an affirmative effect on the business value, which is evident in the fact that the value of a firm grows with an increase in the cash flow of controlling shareholders (Widyaningsih et al. 2017).

Recent research shows that the concept of ownership, normally centralized among a small number of major shareholders, has shifted toward an equally significant symbolic contradiction among major controlling shareholders and minority shareholders (Connelly et al. 2010; Luyckx et al. 2022). Furthermore, major shareholders can benefit minority shareholders by supervising managers (Agrianti et al. 2021; Aboud and Yang 2022), but alsobe noxious if they pursue personal aims different from maximizing profits or diminishing valuable management incentives (Burkart et al. 1997; Emuron et al. 2022). Outside the United States, the attendance of several major shareholders with considerable blocks of stock is common (Barca and Becht 2001; Daoud and Kharabsheh 2022). Data from 5232 European companies collected in a report by Faccio and Lang (2002) revealed that 39% of companies have at minimum two shareholders who have, at minimum, 10% of the voting rights, and 16% of the companies have at least three shareholders (Faccio and Lang 2002). Crisostomo et al. (2020) stated that large shareholders and controlling shareholders are comparable to a voting power that reduces equity costs (Crisostomo et al. 2020). Koirala et al. (2020) found that, in Spain, coalitions hurt dividends and interpreted this result as a mechanism for major shareholders to secure private interests in control (Koirala et al. 2020).

By contrast, Shive and Forster (2020) found that coalitions outside the control group positively affect performance in Spain (Shive and Forster 2020). Jiang et al. (2018) surveyed the impact of major investors and corporate investment that large shareholders tend to reduce potential over-investment and enhance future investiture performance. The influence of large shareholders on investiture performance is not different from the corporation's availability of resources. It is more prominent in companies with stronger governance and less information asymmetry, and large shareholders play a governing role. Thus, the corporation was found to be reduced (Jiang et al. 2018). Guthrie and Sokolowsky (2010) argued that companies enhance their revenues in the presence of major foreign shareholders in the range of stock offers but not in their absence. This finding supports several alternative explanations, including differences in incorporation characteristics, development, and strong capital utilization, suggesting that strengthening the power of large shareholders to reduce conflicts between shareholders and management can have unintended consequences of intensifying shareholder conflict in the present and the future (Guthrie and Sokolowsky 2010). Therefore, it is not surprising that theorists have provided competing explanations for the effects of several large shareholders. In one view, several large shareholders oversee managers as well as each other, and as a result, the corporation implements better corporate policies for several large shareholders (La Porta et al. 1999). On the other hand, they form control coalitions and conspire to expropriate minority shareholders (Bennedsen and

Wolfenzon 2000). In his research, Xi (2021) presented the extent to which the COVID-19 pandemic affects the voting behavior of Chinese shareholders. Hisfindings provide strong empirical evidence that Chinese shareholders voted more consciously in the 2020 sample period than in the previous five years, highlighting the potential for shareholder activity in concentrated stock-owned economies. Moreover, some researchers suggested that is more important to contribute to minority shareholder protection during the COVID-19 outbreak by focusing on CG and primary remedies that shareholders may obtain during the current pandemic (Kaya 2021). Arora et al. (2021) considered that corporate social responsibility in the COVID-19 crisis plays a positive role in determining shareholder value, particularly in an emerging market where minority shareholder rights are weak (Arora et al. 2021)

2.3. Development of Hypotheses

Jensen and Meckling (1976) argued that agency theory is the foundation of CG studies, and agency issues also arise from the segregation of ownership from control. In public companies, shareholders (employers) delegate decision-making authority to their directors (representatives). In other words, control, albeit to varying degrees, is detached from ownership (Rahman Saresht and Mazloumi 2006). In terms of agency representation, a prevailing controlling shareholder has a stimulant to shape CGS to extract private advantage (Kang and Shivdasani 1995; Young et al. 2008; Kastiel and Nili 2021). The control system is centralized when ownership is in the hands of major shareholders, and it is decentralized when machetes are distributed. Since an important determinant of the CG mechanism is ownership centralization, allegedly the identity of the controlling owners plays a key role in the performance of ownership (Gursoy and Aydogan 2002; Zheng and Zhang 2021). Major shareholders make non-optimal investment decisions for their benefit through mergers and acquisitions without profit (Smii et al. 2021). Even if they hold managerial positions, major shareholders pressure the passage of anti-seizure laws and reduce the responsibility of their managerial performance (Holderness 2001). This moot point is acute in nationalities with weaker lawful conservation for shareholders and a great concentration of corporate ownership (Yao et al. 2010). Therefore, it can be said that the more independent the combination of the board of directors, the fewer the problems (Hermalin and Weisbach 1991). Therefore, due to the implicit relationship of the board members with the CEO, responsible managers may not be able to perform their supervisory duties effectively. At the same time, managers must take advantage of their position by controlling salary and benefit schemes and job security. Unlike executive directors, non-executive directors are independent of the corporation's management and, therefore, act more effectively in their supervisory role. Thus, from a theoretical viewpoint, the board of directors is composed of a high proportion of non-executive members (Muth and Donaldson 1998). In companies where the main shareholder has more influence, management oversight by current shareholders is more effective, and other control mechanisms are less essential.

Some researchers found a positive correlation between the actual performance of the firms and the concentration of ownership and attributed this relationship to better shareholder oversight (Gutiérrez and Pombo 2009). According to Kao et al. (2019), the size of the board becomes smaller when the ratio of independent managers is greater, and the corporation's performance is better when there is no duality of the executive director in the corporation (Kao et al. 2019). Saona et al. (2020) stated that management of earnings decreases with an increase in controlling shareholders' voting rights (Saona et al. 2020). Yücel and Vural (2022) suggested that, in recent years, performance appraisal in CG practices has become important, and dualities in the structure of the board and increasing the proportion of non-executive board members improve performance (Yücel and Vural 2022). The smaller the shareholder's share of the corporation is, the less benefit there will be from overseeing the manager's behavior, so there will be more focus on stocks, more oversight of the manager's behavior, and less opportunism; that is, the major shareholders of the corporation use their voting power to actively monitor the corporation's operations and decision making (Yeganeh et al. 2010; Abdollahi and Mashayekh 2012). Thus, it can be

argued that the best alternative to the CGS is powerful controlling shareholders who reduce the control exercised by the board. Therefore, an important internal control mechanism should be focused on high voter ownership that replaces the board's function (Bathala and Rao 1995; Bozec and Bozec 2007; Min 2018).

This research emphasizes the board's role in supervising management and preventing managers from extracting private benefits. It is crucial to protect shareholders in companies with weak board ownership. Conversely, in highly concentrated corporations, controlling shareholders have greater capability and fondness for overseeing the CEO. Thus, shareholder control could attenuate the CG structure as a whole, providing them with particular control interests (i.e., it has an influence on expropriation) andweakening the board structure because they can directly control the directors. (Replacement effect).

Hypothesis 1a (H1a). *There is a negative relationship between voter ownership concentration and the quality of board composition before the spread of COVID-19.*

Hypothesis 1b (H1b). *There is a negative relationship between voter ownership concentration and the quality of board composition following the spread of COVID-19.*

Cieslak et al. (2021) stated that the owner's role is reduced with the concentration of voter ownership and additional voting rights (Cieslak et al. 2021). According to Cao et al. (2022), minority shareholders participating in voting processes can play critical oversight roles over management, ameliorate the level of interior control, and diminish management overconfidence (Cao et al. 2022). Lizares (2022) argued that the concentration of ownership is positively correlated with the proportion of independent and non-executive directors on the board and the likelihood of CEO duplicity, indicating that councils are not entirely separate and are likely to have strong efficacy (Lizares 2022). Karim et al. (2021) stated that the impact of board ownership on board effectiveness has been partially confirmed (Karim et al. 2021). Government ownership has a significant positive efficacy from the perspective of the board. However, institutional ownership and family ownership have no important relationship with the effectiveness of the board and the voting system.

The concentration of voter ownership is one of the main tools for gaining power in the corporation (Hagan et al. 2022; Shi and Hoskisson 2021). This research confirmed its first hypothesis that the concentration of voter ownership is based on the standard of the board composition. The shareholder's agreement deviates from the law indicating the contribution of a single vote and the separation between the right to vote and the right to access cash flow, strengthening the largest shareholder's power (Liang et al. 2021; Yan 2021). Such segregation empowers major controlling shareholders and enables them to impound corporation control with minor investment. Therefore, this distinction between voting rights and the right to cash flows enhances the feasibility of exercising private power of interest (Levy 2009). On the other hand, a smaller board size and the presence of audit and payroll committees diminish agency costs to ameliorate shareholder voting rights, international financial reporting standards, and auditor quality (Owusu and Weir 2018).

Hypothesis 2a (H2a). *Competitiveness and the proportion of voting rights held by major shareholders positively affect the quality of corporate boards before the spread of the COVID-19 pandemic.*

Hypothesis 2b (H2b). *Competitiveness and voting rights of major shareholders hurt the quality of corporate boards after the spread of the COVID-19 pandemic.*

Queiri et al. (2021) concluded that elements selected for the board and ownership characteristics affect corporation performance. However, such efficacy has its commentary, similar to other securities markets in developing countries. For example, the proportion of independent boards, number of board meetings, government ownership, and individual ownership focused on corporate performance. Nevertheless, institutional ownership and board size positively affect corporation performance (Queiri et al. 2021). Herlambang

et al. (2017) found that GCG did not have a moderate effect on free cash flow for earnings management but was not significant. GCG had significantly weakened the financial leverage to manage earnings (Tri Wibowo 2021). Mehdi et al. (2017) found that, in emerging countries, the concentration of ownership and the board's independence significantly affect the dividend policy of companies with dual CEOs. Eventually, the results revealed that, during the recent pecuniary crisis, the determination to divide profits is inversely related to the duality of the CEO, the size of the board, and the frequency of board sessions (Mehdi et al. 2017).

Hypothesis 3a (H3a). *There is a negative relationship between the focus on voting ownership and the quality of the corporate governance system before the spread of the COVID-19 pandemic.*

Hypothesis 3b (H3b). *There is a negative relationship between the focus on voter ownership and the quality of the corporate governance system following the spread of the COVID-19 pandemic.*

Yousefnejad et al. (2020) argued that the ability of major shareholders without main shareholders is not enough to challenge their power to shape CGS. This distribution of ownership of an entity creates an owner role among shareholders. There will likely be a contradiction of interest between the largest controlling shareholder and other major shareholders (Yousefnejad et al. 2020). Mazraeh and Bagherifard (2018) suggested that ownership focus directly and considerably influences the relationship between financial efficiency and product market competitiveness (Mazraeh and Bagherifard 2018). Sheykhi (2020) stated that managers' ability affects corporation value, competition in the product market affects corporation value, and CG affects corporation value, as well as the relationship between managers' knowledge and corporation value (Sheykhi 2020)

Hypothesis 4a (H4a). *Competitiveness and the proportion of voting rights held by major shareholders negatively affect the quality of the company's corporate governance system before the spread of the COVID-19 pandemic.*

Hypothesis 4b (H4b). *Competitiveness and the proportion of voting rights held by major shareholders positively affect the quality of the company's governance system following the spread of the COVID-19 pandemic.*

One of the most important forms of depriving managerial rights over the stock market is the deprivation of the right to vote. The board of directors or general assembly of the corporation may decide to sell new shares to increase the corporation's capital. Nevertheless, the sale of new shares may disrupt the corporation's current management structure, violating its goals and objectives. Therefore, when deciding to enhance corporation capital, the voting rights of the new shareholders are perhaps limited in that the previous shareholders can maintain their influence on the management of the corporation as before, in which case the new shares will be published as shares without voting rights. In addition to maintaining its management structure, it can also enjoy the benefits of increasing capital. The corporation's founders are interested to increase their shares' power and management authority by using different strategies. This is achieved either by using different types of preferred stock with special voting rights or by limiting other shareholders' management powers and voting rights. The author called this action of the early shareholders "dual capitalism." The term was chosen because the founders, while attracting capital, also take over the corporation's management. The easiest way to create a dual investment is to develop special voting right or revoke the vote right for some of the corporation's shares (Beheshti and Paseban 2019).

3. Research Methodology

In terms of purpose and descriptive framework, this research was conducted based on the data collection methodology. Data collection was performed using the Exchange

Organization and the Exchange Organization Library. To construct the control variables and the accuracy of the analysts' predictions, the research and accounting database of the Iranian Stock Exchange (Securities Organization) was used. Regarding data analysis, first, Excel software version 2007 was used for the preparation of research variables from raw data, after which SPSS 22 and Eviews 10 statistical software programs were used for data analysis.

The research sample included Iranian companies, and the sample database was considered to be a time series from April 2011 to March 2021. The statistical population was the business companies listed on the Tehran Stock Exchange from 2011 to 2021 that meet the following conditions:

i. Their fiscal year ends on March 20 of each year;
ii. They have not changed their fiscal year during the research time;
iii. The information on their financial statements from 2011 to 2021 should be fully available;
iv. They should not be part of investment and financial intermediation companies (banks and leasing);
v. Trading of the corporation's shares during the research period has not been stopped for more than six months on the Tehran Stock Exchange.

In Table 1, the statistical sample of this research, along with their characteristics, is presented, using a systematic elimination method.

Table 1. Research sample selection method.

Row	Terms and Restrictions	Number
1	All companies listed on the Tehran Stock Exchange.	**349**
2	Companies under review except for investment, holding, and financial intermediation companies.	**(70)**
3	Companies that have been listed on the stock exchange since 2011.	**(51)**
4	The company's stock trading during the research period has been stopped or canceled for more than 6 months on the Tehran Stock Exchange.	**(26)**
5	Their fiscal year does not end on March 20 of each year.	**(32)**
6	Their information and financial statements from 2011 to 2021 are not fully available	**(50)**
	Statistical Sample Selected For This Research 120	

Thus, a total of 120 companies met the above five criteria. Sample companies included coal mining, automobiles and parts, electrical appliances, cement–lime–gypsum, chemicals, base metals, ceramic tiles, non-metallic minerals, steel industry, transportation (warehousing and communications), food (apart from sugar-based products), metal ores, rubber and plastics, equipment and machinery for pharmaceuticals, food (sugar-based products). According to the classification of companies, the distribution of sample companies is given in Table 2. For this study, multivariate regression models with estimates and Eviews10 statistical software were used, resulting in a meaningfulmodel. Regression was tested at a 95% confidence level. Table 2 describes the sample companies in the order of industry. This example is related to CG studies because it included companies with the most visibility and presence in the Iranian market. The sample companies constitute 93% of the total capital of the Iranian Stock Exchange.

Table 2. Sample companies by industry.

Number of Observations		Industry
%	N	
0.9	1	Coal mining
16.7	20	Car and parts
5.9	7	Electrical devices
13.4	16	Cement–lime–gypsum
8.4	10	Chemical
5	6	Basic metals
4.1	5	Tile and ceramics
5	6	Non-metallic mineral
3.3	4	Steel industry
3.3	4	Transportation (warehousing and communications)
6.6	8	Food (other than sugar-based products)
4.16	5	Metal ores
2.5	3	Rubber and plastic
5	6	Equipment and machinery
13.3	16	Pharmaceutical materials
2.5	3	Food (sugar-based products)
100	120	Total

Source: Author's computations.

3.1. Variables

Notwithstanding incrementing investigation on CG, measuring or evaluating the quality of CG is still a challenge. Although this article suggests various approaches (Crisostomo et al. 2020; Jebran and Chen 2021), there is no way to evaluate a CGS. Furthermore, CG practices do not appear to be independent of each other, complicating the correct assessment of CG (Jebran and Chen 2021).

In this research, we used a newly suggested index of CG quality that amalgamates a set of GCG practices highlighted as pertinent topics. Such CG practices (ICGQ) were examined and calculated in various ways, which are outlined in Table 3.

Table 3. Quality scores of corporate governance.

Agent Name	Operational Definition
Use of non-executive members on the board	Fewer than the ratio of non-executive members to total members than the ratio calculated for all companies one year, 0 otherwise 1
CEO stability	Change in CEO in the last two years 0 otherwise 1
Rotation of Institute Partners	No change in partners signing the corporation's auditor's reportage in the last two years 0 otherwise 1
Being a shareholder with the right to control	No shareholders have the right to control 0; otherwise, 1 (shareholders who have more than 50% of the corporation shares)
Concentration of ownership	More free float stocks of the corporation than the average free float stocks of all companies, zero; otherwise, 1
Dealing with affiliates	The ratio of transactions with affiliates of the corporation is higher than the average of all companies, zero; otherwise, 1

Source: Author's computations.

CG scores were created over time. A corporation with higher scores was considered to have a powerful CG, and as a result of these high scores, CG increased. If the corporation scores decreased, the CG also decreased (Ghorbani et al. 2015).

Regarding the composition of the board, in this investigation, two methods were used: First, a particular indicator was calculated for the quality of the board's composition (BOARDC), highlighting the separation of CEO and chairman and the ratio of external managers. ICGQ and BOARDC were dependent variables in particular suggestion models (1) to (8). Criteria for ownership structure (OWNSTR) were arranged in models (1), (2), (5), and (6). Ownership concentration was measured by the ratio of voting rights to the largest shareholder (VOC). Based on Hypothesis 1, the ownership focus was expected to negatively affect the quality of the board's composition, so private control interests (effects of expropriation) and, in particular, the quality of the board's design (replacement effects) were assumed. Second, competitiveness and the right to vote of the holders were analyzed. The difference between the right to vote and the right to money circulation increased the use of private control interests, which led to a negative impact on the quality of CGS (effects of expropriation) and, in particular, the quality of board composition. The role of management (effects of replacement) that existed before the COVID-19 pandemic and had a positive impact afterward. As suggested in the cited research articles, this investigation analyzed some of the corporation's possible CG factors.

In terms of total assets (ROA), leverage of each industry and year (Lev), and market value of book value (BTM), the rationale for corporate growth opportunities (GOPPs) is that a corporation with rather an investiture opportunity needs supplementary funding. Hence, the quality of CGS becomes rather appropriate for accessibility to exterior funds (Yeganeh et al. 2010). The essence of corporate growth opportunities (GOPPs) is that a corporation with rather investiture opportunities needs more funding, so the quality of CGS is related to achieving more external funds. Growth opportunities (GOPPs) based on the report of the average q corporation, i.e., the ratio of the market value of the corporation (total equity to market value plus debt to book value) was obtained at book value (Ghorbani et al. 2015; Pakmaram and Aliabadi 2020). Impact of competition power (CONTEST) livestock variable for competition in the product market means that if the market competition is higher than the middle of the sample, it equals one. Otherwise, it equals zero, similar to the Herfendel–Hirschman index (HHI), presented in Equation(1).

$$HHI = \sum_{i=j}^{N} \left(\frac{SALES_{i.j}}{\sum_{i=j}^{N} SALES_{i.j}} \right)^2 \quad (1)$$

where *SALESi*, and *j* is the total sales of corporation *i* in industry *j*.

3.2. Models

The multiple regression method was used in order to investigate the effect of the power of major shareholders and the quality of CG in member companies of the Iranian capital market. Following the literature, we used a cross-sectional econometric model (OLS) to verify the existence of a relationship between perspectives of the original model representation model. This method was used when the independent variables were correlated with each other and with the dependent variable. Therefore, the following regression analysis was used: In Model (1), we evaluated the correlation between voter ownership and BOARDC (a) before and (b) after COVID-19. OWNSTR stands for VOC concentration, and the right to turn money (segregation) is found in the estimates of a particular model.

In models (2) and (3), we evaluated the competitiveness and equity ratios of major shareholders with the quality of the BOARDC (a) before and (b) after COVID-19. The focus of VOC, or the difference between the right of control and the right of circulation (segregation), is found in the estimates of a particular model. Book value vs. market

value (BTM) and competitiveness (CONTEST), as well as the median debt leverage of each industry and year (Lev), were also included.

$$BOARDC_{i,t} = \beta_0 + \beta_1 CONTEST_{i,t} + \beta_2 ROA_{i,t} + \beta_3 GOPP_{i,t} + \beta_4 SIZE_{i,t} + \beta_5 BTM_{i,t} + \beta_6 VOC_{i,t} + \beta_7 LEV_{i,t} + \mu_{i,t} \quad (2)$$

$$BOARDC_{i,t}(COVID19) = \beta_0 + \beta_1 CONTEST_{i,t} + \beta_2 ROA_{i,t} + \beta_3 GOPP_{i,t} + \beta_4 SIZE_{i,t} + \beta_5 BTM_{i,t} + \beta_6 VOC_{i,t} + \beta_7 LEV_{i,t} + \mu_{i,t} \quad (3)$$

where

BOARDC: Quality of board composition before the COVID-19 pandemic;
BOARDC (COVID-19): Quality of board composition after the COVID-19 pandemic;
VOC: The concentration of voter ownership or the difference between the right of control and the right of circulation (segregation) found in the estimates of a particular model;
BTM: Book value vs. market value;
CONTEST: Competitiveness;
Lev: the median debt leverage of each industry and year;
ROA: Return on assets;
GOPP: Growth opportunity (Q-Tobin);
SIZE: Corporation size. Competitiveness and voting rights of major shareholders on the quality of corporate boards.

In models (4) and (5), we evaluated the influence of voter ownership concentration on the quality of CGS (ICGQ) (a) before and (b)after COVID-19. Similar to Model (1), OWNSTR stands for VOC or the difference between the right of control and the right of circulation (segregation) in a particular model's estimates. Book value vs. market value (BTM) and the median leverage of each industry and year (Lev) were also included.

$$ICGQ_{i,t} = \beta_0 + \beta_1 OWNSTR_{i,t} + \beta_2 ROA_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 BTM_{i,t} + \beta_5 VOC_{i,t} + \beta_6 LEV_{i,t} + \mu_{i,t} \quad (4)$$

$$ICGQ_{i,t}(COVID19) = \beta_0 + \beta_1 OWNSTR_{i,t} + \beta_2 ROA_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 BTM_{i,t} + \beta_5 VOC_{i,t} + \beta_6 LEV_{i,t} + \mu_{i,t} \quad (5)$$

where

ICGQ: (CG quality index) before the COVID-19 pandemic;
ICGQ (COVID-19):(CG quality index) after the COVID-19 pandemic;
OWNSTR: Voting ownership concentration;
VOC: The concentration of voter ownership or the difference between the right of control and the right of circulation (segregation) found in the estimates of a particular model;
BTM: Book value vs. market value;
Lev: The median debt leverage of each industry and year;
ROA: Return on assets;
SIZE: Corporation size.

In models (6) and (7), we evaluated the influence of competitiveness among shareholders and their voting rights on the quality of CGS (ICGQ) (a) before and (b) after COVID-19. With a similar approach to model (2), we used the VOC value or the difference between the right of control and the right of circulation (segregation) found in the estimates of a particular model. Book value vs.market value (BTM) and competitiveness (CONTEST), as well as the median debt leverage of each industry and year (Lev), were also included.

$$ICGQ_{i,t} = \beta_0 + \beta_1 CONTEST_{i,t} + \beta_2 ROA_{i,t} + \beta_3 GOPP_{i,t} + \beta_4 SIZE_{i,t} + \beta_5 BTM_{i,t} + \beta_6 VOC_{i,t} + \beta_7 LEV_{i,t} + \mu_{i,t} \quad (6)$$

$$ICGQ_{i,t}(COVID19) = \beta_0 + \beta_1 CONTEST_{i,t} + \beta_2 ROA_{i,t} + \beta_3 GOPP_{i,t} + \beta_4 SIZE_{i,t} + \beta_5 BTM_{i,t} + \beta_6 VOC_{i,t} + \beta_7 LEV_{i,t} + \mu_{i,t} \quad (7)$$

where

ICGQ: (CG quality index) before the COVID-19 pandemic;
ICGQ (COVID-19):(CG quality index) after the COVID-19 pandemic;

BTM: Book value vs. market value;
CONTEST: Competitiveness;
Lev: The median debt leverage of each industry and year;
ROA: Return on assets'
GOPP:growth opportunity (Q-Tobin);
SIZE: Corporation size, competitiveness, and voting rights of shareholders

In all models, subtitle t refers to the period, subtitle i relates to the corporation, and t I, μ is a random error term.

4. Results

Table 4 shows the descriptive statistics of the main variables from 2011 to 2020. The CG quality index (ICGQ) is approximately 50%, and the board composition quality index (BOARDC) is approximately 44%. On average, the largest shareholder (VOC) vote is 62.5%.

Table 4. Descriptive statistics.

	Mean	Median	Std. Deviation	Variance	Skewness	kurtosis	Minimum	Maximum
BOARDC	0.442	0.4000	0.248	0.062	0.514	2.426	0.000	1.000
ICGQ	0.504	0.571	0.177	0.032	−0.083	2.669	0.000	1.000
ROA	0.149	0.122	0.154	0.024	0.636	3.912	−0.403	0.830
OWNSTER	74.533	78.240	17.823	317.671	−1.465	5.916	0.000	100.000
GOPP	1.389	0.695	2.378	5.655	8.014	104.498	0.023	42.824
Size	14.601	14.360	1.587	2.519	0.941	4.243	10.352	20.7686
BTM	0.459	0.379	0.506	0.257	0.692	52.470	−5.668	6.379
VOC	0.625	0.600	0.230	0.053	−0.989	4.208	0.000	1.000
Contest	0.057	0.0202	0.099	0.010	2.805	10.833	0.000	0.578
Lev	0.549	0.550	0.218	0.048	0.373	5.804	0.0127	2.077

Source: Author's computations.

The ICGQ is an indicator of the quality of CG, while BOARDC is an indicator of the quality of the board composition. VOC is the concentration of voter ownership held by the original voting shareholder. GOPP stands for growth opportunity, which Q-Tobin replaces. SIZE is the size of the corporation that Ln of total assets returns. ROA is the ratio of net income to total assets, Lev is the average debt leverage per industry and year, BTM is book value vs. market value, and CONTEST is the impact of competitive power. Based on the results, the median of the VOC variable is 0.62, which means that 62% of the data are fewer than this value, and the rest are more than this value. A significant point that can be deduced from the comparison of mean and median is the issue of the normality of data. One of the most important parameters of data dispersion is the standard deviation. An important point inferred from the standard deviation is to determine which variables to include in the regression model. As can be seen in the table, the standard deviation of the variables is not zero, so the studied variables can be entered into the model. If the skewness coefficient is zero, the society is perfectly symmetrical. If the skewness coefficient is positive, there is skewness to the right, and if it is negative, there is skewness to the left. For example, the skewness coefficient of the OWNSTER variable is −1.465, which means this variable has a skewness to the left and deviates from the center of symmetry by this amount.

In Table 5, which is associated with Hypothesis 1 (a, b), the influence of deviation between the concentration of voter ownership and the quality of board composition is presented before and after the spread of the coronavirus (COVID-19) pandemic. The two panels A and B present no simple pattern across all columns. Voter ownership concentration

(OWNSTR) negatively affects the quality of BOARDS, both during and before COVID-19. In Table 6, related to Hypothesis 2 (a, b), the results of the impact of competitiveness and the proportion of voting rights of major shareholders on the quality of corporate boards before and after the spread of the COVID-19 pandemic are shown. Competitiveness and the ratio of voting rights held by major shareholders had positive effects before the pandemic and negative effects after the COVID-19 pandemic on the quality of BOARDS. In Table 7, corresponding to Hypothesis 3 (a,b), the results of the influence of the concentration of ownership and voting rights on the quality of the CGS (ICGQ) before and after the coronavirus are shown. Both panels A and B indicate that OWNSTR negatively affects the quality of the CGS (ICGQ) both during and before the COVID-19 pandemic. In Table 8, which corresponds to Hypothesis 4 (a, b), the results of the influence of competitiveness and the proportion of voting rights of major shareholders on the quality of the governance system before and after the pandemic are presented. Competitiveness and the balance of voting rights held by major shareholders negatively affect the CGS (ICGQ) quality before and after the COVID-19 pandemic.

Table 5. The influence of voter ownership concentration on the quality of board composition.

	Panel A Focus on Voter Ownership with Quality Board Composition (BOARDC Dependent Variable)				**Panel B Focus on Voter Ownership with Quality Board Composition (BOARDC Dependent Variable, t(COVID19))**			
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
OWNSTR	−0.000330	0.000133	−2.488490	**0.0130** ***	−0.002255	0.001144	−1.971485	**0.0511** **
ROA	0.176427	0.023272	7.580986	**0.0000** ***	0.081724	0.11929	0.685082	0.4947
SIZE	−0.059858	0.005308	−11.27613	**0.0000** ***	−0.027179	0.031311	−0.868031	0.3872
BTM	0.014133	0.002347	6.022361	**0.0000** ***	0.012782	0.02914	0.438641	0.6618
VOC	0.524603	0.004156	126.2221	**0.0000** ***	0.462856	0.117364	3.94378	**0.0001** ***
LEV	0.043618	0.009272	4.704356	**0.0000** ***	−0.129234	0.119981	−1.077116	0.2837
C	0.951786	0.076985	12.3632	**0.0000** ***	0.755173	0.511478	1.476451	0.1426
R-squared	0.892934				0.780858			
Adjusted R-squared	0.878906				0.540571			
F-statistic	4.546123				3.249687			
Prob(F-statistic)	0				0			
Durbin-Watson stat	1.420179				1.846892			

** 5% error level—*** 1% error level. Source: Author's computations. BOARDC = quality of board composition. OWNSTR = voting ownership focus. VOC = the concentration of voter ownership or the difference between the right of control and the right of circulation (segregation) in the estimates of a particular model. BTM = book value vs. market value. Lev = the median debt leverage of each industry and year. ROA = return on assets. SIZE = corporation size.

Table 6. The influence of competitiveness and the ratio of voting rights of major shareholders on the quality of companies' board of directors.

	Panel A Competitiveness and Voting Ratio of Shareholders with Quality of Board Composition (BOARDC Dependent Variable)				**Panel B Competitiveness and Voting Rights of Shareholders at the Quality of Board Composition (BOARDCi Dependent Variable, t (COVID19))**			
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
CONTEST	0.164051	0.062045	2.644066	**0.0083** ***	−0.003457	0.001655	−2.088243	**0.0390** **
ROA	0.156039	0.047384	3.293087	**0.0010** ***	0.00069	0.000357	1.934444	**0.0556** **
GOPP	0.006596	0.001857	3.551047	**0.0004** ***	6.12×10^{-6}	3.29×10^{-6}	1.861164	**0.0653** *
SIZE	−0.065024	0.016762	−3.879329	**0.0001** ***	−0.000189	9.65×10^{-5}	−1.961205	**0.0523** **
BTM	0.018473	0.003402	5.42967	**0.0000** ***	0.000197	0.000101	1.95523	**0.0530** **
LEV	0.04952	0.018667	2.65287	**0.0081** ***	−0.000690	0.000343	−2.009072	**0.0469** **
VOC	0.527337	0.011954	44.11278	**0.0000** ***	−0.499685	0.000166	−3012.976	**0.0000** ***
R-squared	0.877633				0.896678			
Adjusted R-squared	0.861454				0.925696			
F-statistic	54.24642				435585.1			
Prob(F-statistic)	0				0			
Durbin-Watson stat	1.828048				2.466942			

* 10% error level—** 5% error level—*** 1% error level. Source: Author's computations. BOARDC = quality of board composition. VOC = the concentration of voter ownership or the difference between the right of control and the right of circulation (segregation) in the estimates of a particular model. BTM = book value vs. market value. CONTEST = competitiveness. Lev = the median debt leverage of each industry and year. ROA = return on assets. GOPP = growth opportunity (Q-Tobin). SIZE = corporation size, competitiveness, and voting rights of major shareholders that affect the quality of corporate boards.

Table 7. The influence of concentration of ownership on quality voting of the corporate governance system.

	Panel A Focus on Quality Voting Ownership of the CGS (ICGQ Dependent Variable)				**Panel B Focus on Quality Voting Ownership of the CGS (ICGQ i, t Dependent Variable (COVID19))**			
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
OWNSTR	−0.002196	0.000357	−6.158051	**0.0000** ***	−0.000192	4.93E−05	−3.887164	**0.0002** ***
ROA	−0.131906	0.0468	−2.818503	**0.0049** ***	−0.039119	0.015687	−2.493714	**0.0141** **
SIZE	0.087161	0.007492	11.63398	**0.0000** ***	0.017565	0.005515	3.185025	**0.0019** ***
BTM	−0.027654	0.00949	−2.913823	**0.0037** ***	0.005782	0.005294	1.092051	0.2771
VOC	−0.209908	0.018737	−11.20307	**0.0000** ***	−0.520680	0.052557	−9.906922	**0.0000** ***
LEV	−0.045797	0.040476	−1.131480	0.2581	−0.017467	0.010322	−1.692135	**0.0934** *
C	−0.411747	0.122881	−3.350778	**0.0008** ***	0.657571	0.107096	6.139985	**0.0000** ***
R-squared	0.636737				0.839485			
Adjusted R-squared	0.58914				0.80892			
F-statistic	13.37757				17.70184			
Prob(F-statistic)	0				0			
Durbin-Watson stat	2.064031				2.393695			

* 10% error level—** 5% error level—*** 1% error level. Source: Author's computations. ICGQ (CG quality index). OWNSTR = voting ownership focus. VOC = the concentration of voter ownership or the difference between the right of control and the right of circulation (segregation) in the estimates of a particular model. BTM = book value vs. market value. Lev = the median debt leverage of each industry and year. ROA = return on assets. SIZE = corporation size.

Table 8. Competitiveness and the ratio of voting rights of major shareholders to the quality of the corporate governance system.

Panel A Competitiveness and Voting Rights of Shareholders with the Quality of CGS (ICGQ Dependent Variable)					Panel B Competitiveness and Suffrage Ratio of Shareholders with the Quality of CGS (ICGQ i, t Dependent Variable (COVID19))			
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
CONTEST	−0.449032	0.187456	−2.395396	**0.0168** **	0.186225	0.010815	17.21896	**0.0000** ***
ROA	−0.115109	0.048364	−2.380062	**0.0175** **	−0.019173	0.005586	−3.432342	**0.0007** ***
GOPP	−0.002432	0.003831	−0.634766	**0.5257**	0.000799	0.000343	2.330926	**0.0206** **
SIZE	0.095248	0.007994	11.91471	**0.0000** ***	0.00513	0.001068	4.804947	**0.0000** ***
BTM	−0.033118	0.010306	−3.213410	**0.0014** ***	0.013962	0.004144	3.369069	**0.0009** ***
VOC	−0.204448	0.019363	−10.55869	**0.0000** ***	−0.306397	0.01906	−16.07566	**0.0000** ***
LEV	−0.062223	0.041446	−1.501281	0.1336	−0.019036	0.003505	−5.431583	**0.0000** ***
C	−0.658868	0.121741	−5.412059	**0.0000** ***	0.686374	0.018735	36.63659	**0.0000** ***
R-squared	0.627461				0.896109			
Adjusted R-squared	0.578207				0.794005			
F-statistic	12.73909				47.33754			
Prob(F-statistic)	0				0			
Durbin-Watson stat	1.992852				2.54523			

** 5% error level—*** 1% error level. Source: Author's computations. ICGQ = quality of corporate governance. BTM = book value vs. market value. CONTEST = competitiveness. Lev = the median debt leverage of each industry and year. ROA = return on assets. GOPP = growth opportunity (Q-Tobin). SIZE = corporation size, competitiveness, and voting rights of shareholders.

Based on the results presented in Table 5 for Prob., the F-statistic in both panels A and B is less than 0.05, and it can be deduced that the first model is significant for this hypothesis at a confidence level of 0.95. Additionally, the coefficient of determination (adjusted R^2) for panel A is 0.87, which shows that the independent variable and control variables explain 87% of the changes in the dependent variable. For panel B, this value is 0.54, indicating that the independent and control variables explain changes in 54% of the dependent variable. Considering that the *p*-value for the coefficient of the OWNSTR variable is less than 0.05, the first hypothesis of the research is not rejected at the confidence level of 0.95. This reflects the negative impact of voter ownership concentration on the quality of board composition, both during and before COVID-19. In general, from the report above, it can be concluded that the influence of voter ownership concentration on the quality of business boards with the error level of 0.05 is significant and negative. See Figures 1–8.

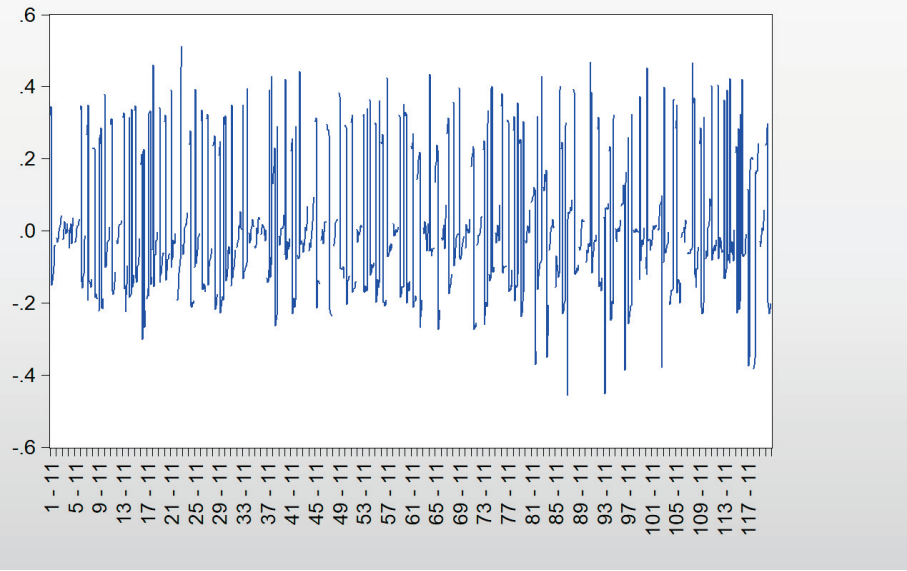

Figure 1. The influence of voter ownership concentration on the quality of board composition before the COVID-19 pandemic. Source: Author's computations.

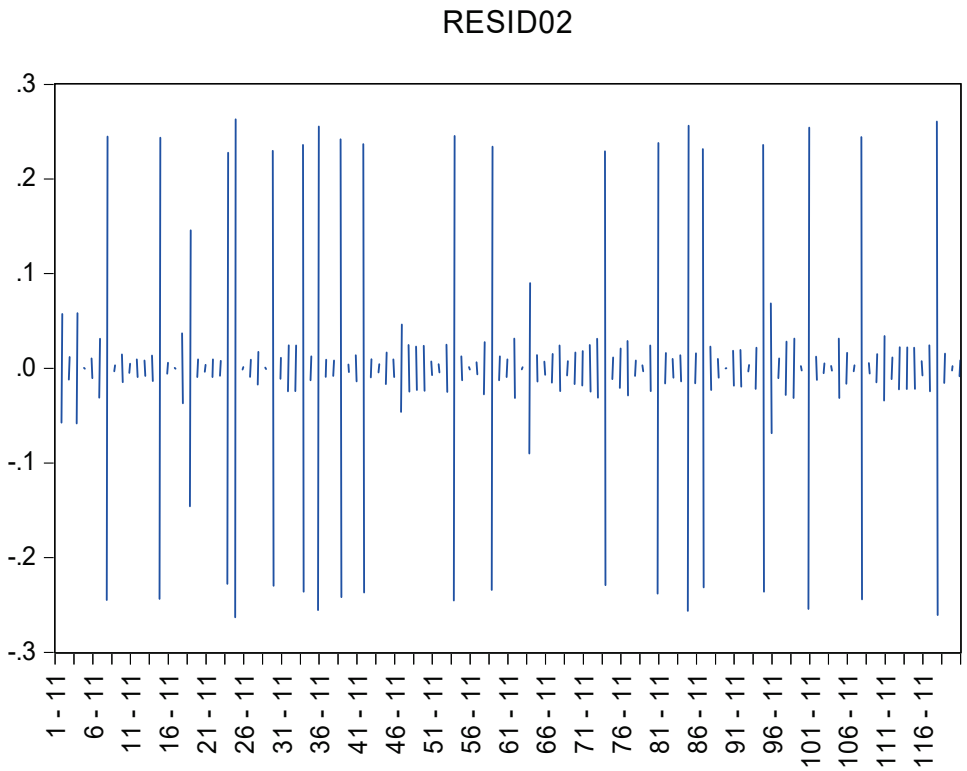

Figure 2. The influence of voter ownership concentration on the quality of board composition after the COVID-19 pandemic. Source: Author's computations.

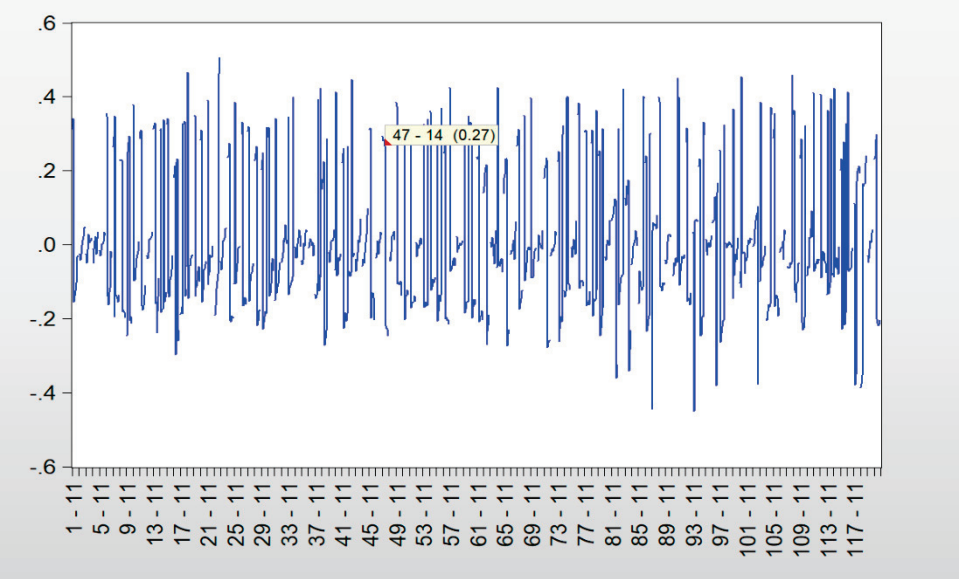

Figure 3. The influence of competitiveness and voting rights of major shareholders on the quality of corporate boards before the COVID-19 pandemic. Source: Author's computations.

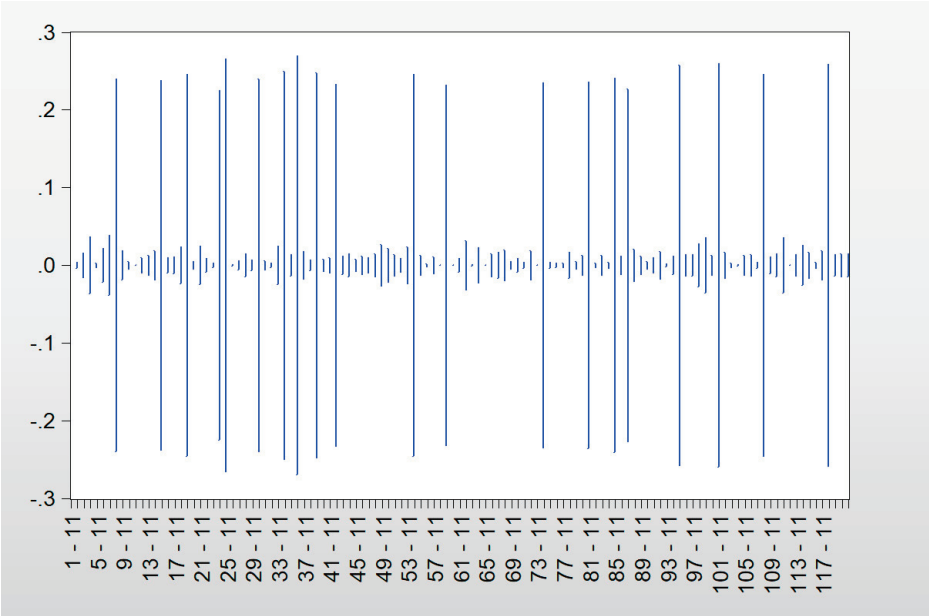

Figure 4. The influence of competitiveness and voting rights of major shareholders on the quality of corporate boards after the COVID-19 pandemic. Source: Author's computations.

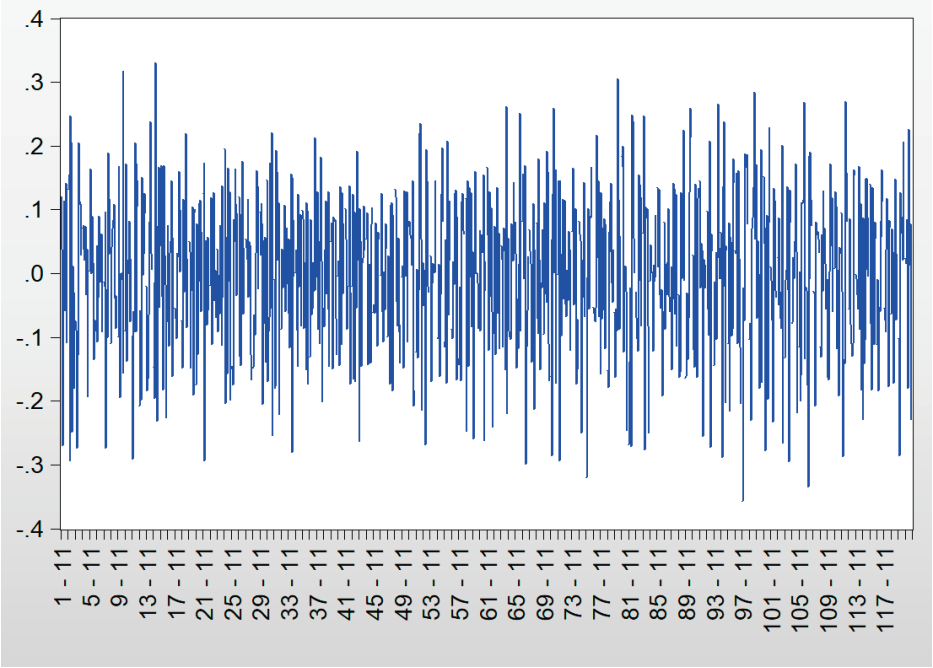

Figure 5. The concentration of quality voting ownership before CGS. Source: Author's computations.

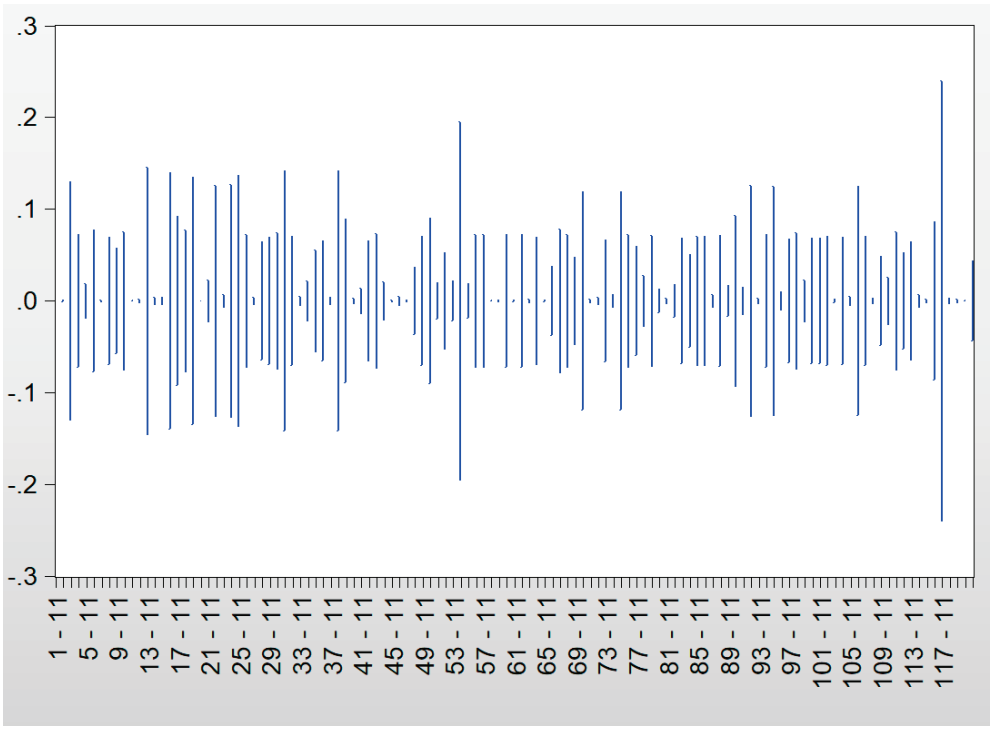

Figure 6. The influence of concentration of voting ownership on the quality of CGS after the COVID-19 pandemic. Source: Author's computations.

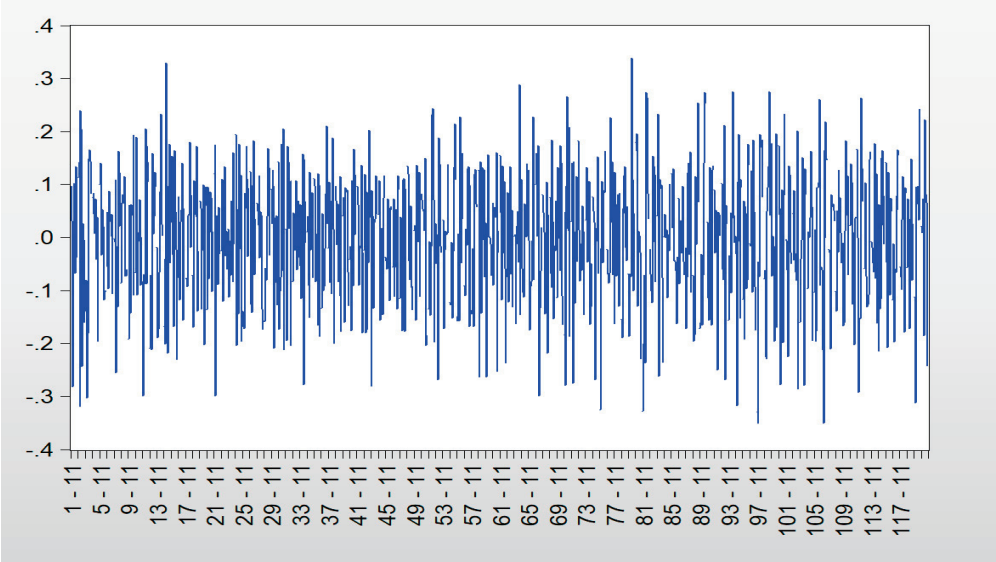

Figure 7. The influence of competitiveness and voter ratio of major shareholder holders on the quality CGS before the COVID-19 pandemic. Source: Author's computations.

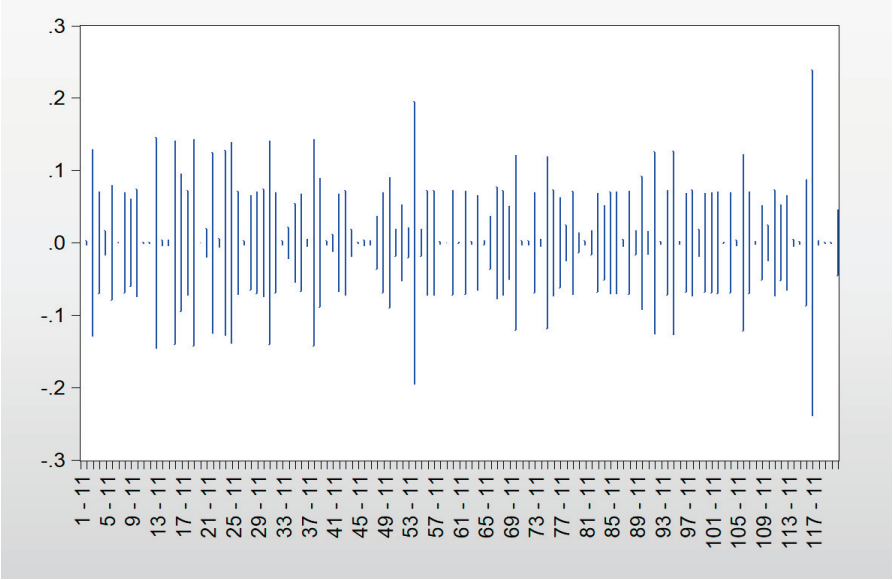

Figure 8. The influence of competitiveness and voting rights of major shareholders on the quality of CGS after the COVID-19 pandemic. Source: Author's computations.

As can be seen, the graphs before and after the COVID-19 pandemic are in the same direction.

Based on the report of the results listed in Table 6 for Prob., the F-statistic is less than 0.05 in both panels A and B, and it could be inferred that the second model should be considered for this hypothesis at a confidence level of 0.95. The coefficient of determination (adjusted R2) for panel A is 0.86, which indicates that the independent variable and control variables explain 86% of changes in the dependent variable, and for panel B, this value is 0.92, which shows that the independent variable and control variables explain 92% of the changes in the dependent variable. Given that the *p*-value for the coefficient of the variable CONTEST and VOC is less than 0.05, the second hypothesis of the research is not rejected at the confidence level of 0.95. This indicates the negative impact of the proportion of voting rights held by shareholders on the quality of the board's composition, both during and before the COVID-19 pandemic. In general, based on the report above, it can be said

that the competitiveness and voting rights of the major shareholders before the COVID-19 pandemic had a positive effect but a negative effect after the pandemic on the quality of the board of directors.

Based on the report of the Prob (6) results, the F-statistic is less than 0.05 in panels A and B. It can be said that the third model should be considered for this hypothesis at the 0.95 confidence level. Additionally, the coefficient of determination (adjusted R2) for panel A is 0.58, indicating that the independent and control variables explain 58% of the changes in the dependent variable. For panel B, this is 0.80, which shows that the independent variable and the control variables explain 80% of the changes in the dependent variable. Considering that the *p*-value for the coefficient of the OWNSTR variable is less than 0.05, the third hypothesis of the research is not rejected at the 0.95 confidence level. This shows that both before and after the COVID-19 pandemic, the concentration of voting ownership negatively affects the quality of CGS.

Based on the report of the results in Table 8 for Prob, the F-statistic is less than 0.05 in both panels A and B; it could be deduced that the second model is significant for this hypothesis at a confidence level of 0.95. Additionally, the coefficient of determination (adjusted R2) for panel A is 0.57, which shows that the independent variable and control variables explain 57% of the changes in the dependent variable. For panel B, this is 0.79, indicating that the independent variable and control variables explain 79% of changes in the dependent variable. Given that the *p*-value for the coefficients of the variables CONTEST and VOC is less than 0.05, the fourth hypothesis of the research is not rejected at the confidence level of 0.95. This indicates the negative impact of voting rights on shareholders with the quality of the CGS, both at the time of COVID-19 and before, which is consistent with the results of Table 6; moreover, the ability to compete before the COVID-19 pandemic has a negative impact on system quality, which turned into a positive impact after the pandemic.

Table 5 shows that the concentration of voter ownership is intense and consistent with previous outcomes. The efficacy of the quality of board composition, which has any potential shareholder advantage in competing for power, prevails. The largest major shareholder seems to rely on specific CG mechanisms other than the board of directors, the composition of which can be complex and costly for managers to oversee. As can be seen from the COVID-19 table estimates, which reveal a negative effect, the board composition quality cannot be effectively offset by the proportion of voting rights held by major shareholders, assuming a non-significant coefficient of competitive power competition. As can be seen from the estimates in Table 7, the concentration of voting ownership negatively affects the quality of CG. In the results presented in Table 8, notably, the negative influence of the voting power of the largest major shareholder (VOC) is very strong. It neutralizes the ability of the other major shareholder to compete for its strength, thus forming CG. It is strong enough to secure its interests, and as can be seen, the ability to compete before the COVID-19 pandemic negatively affects CGS but has a positive effect after the COVID-19 pandemic.

5. Conclusions and Limitations

In many developed countries, corporate governance among different groups evolves in parallel with investor relations. In many large companies, this governance is moving in a direction that can meet the expectations of shareholders. In recent years, the board of directors, ina large number of companies, is closer to its shareholders each day. Therefore, to maintain the process of their activities in complex and changing environmental conditions, enterprises have to have systems and mechanisms in their structure that enable them to react quickly to environmental changes and, thus, continue to operate effectively. The new coronavirus (COVID-19) pandemic has continued to present unmanageable challenges and has earnestly influenced all businesses worldwide, mainly the activities of listed companies. This study presented the development of foregone research in which a set of CG variables was considered to examine their relationship to the power of major shareholders. In this

research, we analyzed how certain matters related to ownership structure—namely, the broadcast of power between major shareholders—affect the quality of CG. In this study, recent data on Iranian companies' CG were used. This study analyzed how several issues relevant to ownership structure, i.e., the distribution of power between main shareholders, influence the quality of CG in a significant emerging market. Iran is an appropriate case because it offers weak legal protection to investors, unlike other developing countries, including the Persian Gulf countries, and the ownership of Iranian companies is very concentrated.

Hence, it can be concluded that the concentration of ownership is a sign of the small presence of small shareholders among the shareholders of companies. In these companies, a small number of owners are usually involved in the management of business affairs and typically have considerable influence over management. This significant influence on the management of the corporation's affairs and its management can force the management to move in a direction that is not in the interest of small shareholders. Therefore, small shareholders are not willing to invest in this category of companies, as the risk of losing their capital is very high. Additionally, major owners are more reluctant to bring in more micro-investors. Similar to the entry of small investors into the corporation, their controlling power will be reduced.

This distribution of ownership creates an owner–owner conflict among shareholders. Although the impact of similar discussions on the value of corporations has widely been studied, there is still a need for new investigations on the efficacy of these antitheses in the design of corporate control mechanisms and the quality of CG. This paper used a new set of CG information about Iranian companies that have recently become available, and based on these comprehensive data and new suggestions presented in Iranian articles, the CG quality index (Modares Ahmad and Zohreh 2001; Saleh et al. 2021; Shekan and Kharrazi 2008; Sheykhi 2020), taking into account a set of GCG practices, was provided that extend beyond the requirements of the legal system.

The results of this study show that the concentration of ownership is detrimental to GCG practices. In particular, high levels of voter ownership concentration undermine the CGS. These findings are consistent with the effects of appropriation and alternatives to the CEO representation model (Aggarwal 2013; Sun and Gao 2020; Charléty et al. 2019; Rachagan and Sulaiman 2019). Ownership focuses on board composition, so the negative impact means that large shareholders of Iranian companies tend to have direct control over management and replace board performance without the need for an independent board that may restrict use. The interests of private governance reduce the problems of representation in companies, maximize the interests of shareholders, take into account stakeholders' interests, increase efficiency and effectiveness, and allocate resources in the best possible way, which are the main goals of every country's economy. Companies are looking to achieve this in most countries today by improving CG. Therefore, it is suggested that to achieve the above goals, the stock exchange ought to provide the ground for proper governance in companies. One of the most important areas is encouraging or even requiring shareholder intervention in the corporation's affairs. Recognizing the obstacles and reasons for the lack of motivation of shareholders to intervene in the affairs of companies, it is necessary to create the necessary incentives or legislation to remove those obstacles. The results show that the concentration of ownership negatively affects the quality of CGS, and the major shareholders cannot challenge the power of the main shareholders.

Based on the results regarding the expropriation hypothesis, the more voting shareholders there are, the less inclined they are to implement CG. Implementing an efficient CG practice is not a priority for these shareholders. This investigation also showed that motivation to control personal interests increases with the difference between the voting right and the turnover of the main shareholder. In addition, it affects BOARDS, and major shareholders' competitiveness and voting rights involve BOARDS before the COVID-19 pandemic and positively affect BOARDS after the COVID-19 pandemic. OWNSTR also negatively affects ICGQ during and before the COVID-19 pandemic, and major sharehold-

ers' competitiveness and voting rights also negatively affect ICGQ before the COVID-19 pandemic and positively after the pandemic.

This study showed that transparency and disclosure of CG regulations ought to be sufficient. Listed companies must meet all requirements of CG mechanisms; thus, the present study has significant implications for stock markets and policymakers in developing countries. It focused on CG monitoring mechanisms that ought to be implemented by companies listed on the Iranian Stock Exchange. Regulators and policymakers need to review existing CG rules and increase disclosure and compliance levels. Some companies still deviate from the requirements of CG regulations. Accordingly, policymakers can give more consideration to compliance with these codes. This study provided insights into CG mechanisms, especially in developing countries. Based on the findings of the present study, several suggestions can be made, which include the following:

- Managers and investors are advised to supervise properly implementing CGS mechanisms and focus more on appropriate functioning;
- The present research can be reexamined using another set of CG mechanisms (e.g., managerial ownership, family ownership, ownership concentration, etc.) and the results compared with the current developments;
- In the report on the size and industry of corporations listed on the Tehran Stock Exchange, a detailed investigation of the present research ought to be carried out based on separate samples of the two groups;
- It is suggested that further studies be performed by considering the different characteristics of CG, such as the financial knowledge of board members and its relationship with intellectual capital;
- Corporations listed on the Tehran Stock Exchange were studied in this paper, so it is suggested that this issue be examined in OTC companies in future research;
- The above research can be reviewed with other possible statistical methods, along with the addition of other effective variables, and with more observations in the coming years;
- Companies ought to define voting rights for shareholders based on turnover. This method gives more voting rights to more active shareholders because these shareholders are more aware of the characteristics and potential of the corporation;
- Companies ought to indirectly use shareholders' votes to elect the board of directors and members of the corporation's internal control (use of representatives). Therefore, companies ought to increase the authority of internal auditors to access information on the corporation's cash flow to increase information transparency;
- The board of directors' authority in controlling the cash flow ought to be limited to the approval of the auditors and the internal control system;
- Companies ought to use a weighted voting system so that the number of their shares weights each shareholder's vote.

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The Effects of CSR Report Mandatory Policy on Analyst Forecasts: Evidence from Taiwan

Tzu-Yun Tseng [1,*] and Nien-Su Shih [2]

[1] Department of Public Finance, University of Feng Chia, Taichung 40724, Taiwan
[2] Department of Accounting, University of Feng Chia, Taichung 40724, Taiwan; nsshih@fcu.edu.tw
* Correspondence: tytseng@fcu.edu.tw

Abstract: The Taiwanese government altered its corporate social responsibility (CSR) report management policy from voluntary disclosure and assurance of CSR reports to partial mandatory disclosure and partial mandatory assurance. This paper examines this policy's effects on analyst forecast. The empirical results showed that the mandatory disclosure policy on CSR reports significantly increased analyst forecast accuracy and reduced analyst forecast dispersion. Furthermore, the study found that analyst forecast accuracy was further increased when CSR reports were forced to undergo accountant assurance than those without mandatory accountant assurance which means that the mandatory assurance policy on CSR reports significantly further increased analyst forecast accuracy.

Keywords: corporate social responsibility reports; mandatory disclosure; mandatory assurance; analyst forecast accuracy; analyst forecast dispersion

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1. Research Motivation and Purpose

The disclosure of financial reports by enterprises mainly allows investors to understand the business value of the enterprise through information in their financial statements. They also help businesses attract investment and obtain funds needed for enterprise development. However, the information on their past financial statements only reflects historical operating performance, which is inadequate in helping investors and stakeholders carry out better decision-making analysis. Recently, the rising awareness on environmental protection, corporate social responsibility (CSR), and sustainable management has attracted global attention. The methods on improving the transparency of corporate non-financial information disclosure and the means to provide investors with forward-looking information that exposes the economic resources and activities of enterprises, strengthens the accountability of enterprises, and integrates financial and non-financial information have become important issues for business operations.

The continuous expansion of the securities market in recent years has allowed the market to provide a vast amount of information on enterprises for investors to compare and judge; but not all market investors have sufficient time and ability to analyze the operation and financial status of each company. In this regard, analysts play the role of the company's information provider. Analysts have sufficient professional capabilities, information sources, and time advantage to provide investors with a more detailed and clear market and company information. They are also able to point out clear and sound investment recommendations for investors. Therefore, analysts act as a communication bridge between the company and the external investors. Investors often use the latest financial forecast reports provided by brokerage analysts as an important investment reference. Dhaliwal et al. (2014) found evidence that financial information and CSR disclosures can be substituted for each other to reduce the cost of equity capital. Lang and Lundholm (1996) pointed out that financial analysts play the role of key information intermediaries in capital markets. It is believed that when a company provides complete and transparent disclosure, it results in greater efficiency of information intermediaries, and

increased accuracy and reduced errors of financial analysts' forecasts (Lang and Lundholm 1996; Hope 2003).

At present, regarding the management of CSR reports, most countries adopt voluntary disclosure or voluntary assurance; therefore, the current literature is mostly based on voluntary disclosure or voluntary assurance. Some studies discussed the determinants of companies' voluntary disclosure of CSR (Alfraih and Almutawa 2017; Zhou 2019), the impact of voluntary disclosure of CSR on company value (Anderson and Frankle 1980; Al-Tuwaijri et al. 2004; Griffin and Sun 2013; Plumlee et al. 2015; Kamran et al. 2020), and the benefits of voluntary disclosure of CSR (Dhaliwal et al. 2011). Meanwhile, others focused on voluntary CSR report assurance; some explored the determinants of CSR report assurance (Simnett et al. 2009; Kolk and Perego 2010; Velte 2020), and the effects and benefits of voluntary assurance of CSR reports (Casey and Grenier 2015; Quick and Inwinkl 2020; Reverte 2020).

Past studies have well explored the relationship between disclosure of CSR and analyst forecasts. The study by Dhaliwal et al. (2012) used CSR reports as a proxy variable for non-financial disclosure information and found that companies that compiled CSR reports improved the analysts' earnings forecast accuracy. Further, Casey and Grenier (2015) found that CSR assurance is associated with lower cost of equity capital and lower analyst forecast errors and dispersion. However, the samples in the former provided CSR reports voluntarily, while those in the latter sought CSR report assurance voluntarily. The empirical results of these two studies may have endogenous doubts; that is, their samples are not perfect random samples, and the observed research results may have been produced by a self-selection mechanism, and were not entirely causal. Therefore, it is believed that there is still room for research on this issue.

Unlike most countries that adopt a voluntary CSR report policy, Taiwan's management policy on CSR reports ranges from voluntary disclosure and assurance to partial mandatory disclosure and assurance. The Financial Supervision and Management Commission (FSMC) of Taiwan issued the "Taiwan Stock Exchange (TWSE) Corporation Rules Governing the Preparation and Filing of Corporate Social Responsibility Reports by TWSE Listed Companies" in 2014. This stipulates that certain companies (listed under food, chemical, and financial and insurance industries, companies with 50% or more of their revenue derived from food and beverages, or those with a capital stock that is not less than TWD 10 billion) should refer to the Global Reporting Initiative's latest version of sustainability reporting guidelines, industry supplemental guidelines, and other applicable criteria based on industry characteristics when publishing their previous year's CSR report. In addition to the partial mandatory disclosure management policy for CSR reports, Taiwan's authority also proposed the partial mandatory assurance policy for CSR reports to improve their quality. This indicates that firms belonging to the food industry and those who derive not less than 50% of their revenue from food and beverages should further submit their reports to accountants for quality assurance (please see Appendix A for the complete regulations). Therefore, Taiwan's capital market is a suitable environment for CSR management policy research.

At present, most literature on CSR-related issues focuses on either voluntary disclosure or voluntary assurance. In this paper, Taiwan's partial mandatory disclosure and mandatory accountant assurance policies are explored using samples that were mandated to follow the said policies. In the context of voluntary CSR disclosure, Dhaliwal et al. (2012) found that CSR report disclosure improves the accuracy of analyst earnings forecasts. In the case of voluntary CSR assurance, Dhaliwal et al. (2012) found that CSR report disclosure improves the accuracy of analyst earnings forecasts. In the case of voluntary CSR assurance, Casey and Grenier (2015) found that CSR assurance is associated with lower analyst forecast errors and dispersion. In the absence of mandatory regulations on CSR reports, voluntary disclosure and voluntary assurance of CSR reports are both the result of a company's strategic choice. Unlike previous literature that discussed voluntary disclosure of CSR reports or voluntary assurance of CSR reports on analyst earnings forecasts separately, this study discusses the effects of both mandatory disclosure and mandatory assurance of

CSR reports on analyst earnings forecasts. The specific research questions of this paper are as follows: Can Taiwan's mandatory disclosure management policy on CSR reports improve the accuracy of analysts' forecasts (decrease the dispersion in analyst forecasts) on companies that are subject to mandatory disclosure of CSR reports? Can Taiwan's mandatory assurance management policy on CSR reports further improve the accuracy of analysts' forecasts (decrease the analyst forecast dispersion) on companies that are forced to take their CSR reports to an accountant for assurance?

This paper differs from current CSR-related studies that are based on voluntary disclosure or voluntary assurance that possibly have endogenous problems. This study contributes to the literature by enhancing the understanding on the effects of mandatory CSR disclosure and assurance policy on analyst forecasts in Taiwan, which has an emerging market setting, relatively weak corporate governance, and family-controlled business dominance. Previous literature has shown that corporate governance and country institution are determining factors for voluntary CSR disclosure (Alfraih and Almutawa 2017; Zhou 2019). It has been shown that compared with non-family businesses, family businesses have less incentive to provide CSR guarantees voluntarily (Peng 2020). It is therefore essential to determine whether it is necessary to regulate non-financial disclosure or assurance in a mandatory manner for countries with poor corporate governance or family-controlled businesses. In this regard, Taiwan's experience can be used as a reference for other countries—especially for emerging markets with relatively weak corporate governance mechanisms or family-controlled business dominance—when formulating corporate social responsibility reporting management legislation.

The remainder of the paper proceeds as follows: Section 2 reviews the literature and offers several testable hypotheses; Section 3 discusses the research sample and research models; Section 4 analyzes the statistical results of the main analysis; and Section 5 provides the conclusion of this study.

2. Literature Review and Research Hypothesis Construction

2.1. CSR Report Disclosure and Analyst Forecast

In financial markets, analysts are crucial information intermediaries (Livnat and Zhang 2012). Traditional financial statements may not be enough to demonstrate the company's value fully; thus, analysts seek new financial metrics and other non-financial information to measure the company's worth (Sveiby 1997). Extensive disclosure helps financial analysts produce valuable new information, such as more precise forecasts and buy/sell recommendations, thereby increasing demand for their services (Healy and Palepu 2001).

Investors and the public in the capital market are gradually valuing CSR-related activities; thus, CSR information may become an essential factor that could affect the value of the company. The studies by Anderson and Frankle (1980) and Griffin and Sun (2013) found that the market responded positively to companies who voluntarily disclosed CSR-related information. This indicates that CSR disclosure has information connotations. Moreover, Al-Tuwaijri et al. (2004) and Plumlee et al. (2015) found that companies that expose environment-related information have higher corporate value after controlling financial performance. As a whole, CSR-related activities can affect the company's value and financial performance by allowing investors to obtain some useful information from non-financial information disclosure as a reference for decision making. Hsu et al. (2019) suggest that investors and analysts consider CSR when assessing the information in earnings-related corporate disclosures.

Analysts mainly collect relevant information publicly or privately. The improvement of information transparency can reduce information asymmetry between companies and analysts, and can enable analysts to better understand a company's future prospects and changes in earnings, thereby improving the accuracy of earnings forecasts (Lang and Lundholm 1996) and promoting consensus among analysts on future earnings (Han and Manry 2000).

Several studies have explored the relationship between CSR disclosures and analysts. Dhaliwal et al. (2012) examined the relationship between disclosure of non-financial information and analyst forecast accuracy using firm-level data from 31 countries. They used the issuance of stand-alone CSR reports as a proxy for disclosure of non-financial information. They found that the issuance of stand-alone CSR reports is associated with lower analyst forecast error. Dhaliwal et al. (2011) found that CSR disclosure not only attracts more analysts and institutional investors, but also reduces analyst forecast errors, leading to lower costs of equity funds. This suggests that when analysts make earnings forecasts, they may use CSR reports as supplementary financial information to aid in forecast operations. Garrido-Miralles et al. (2016) investigated the effects of voluntary sustainability reporting in analysts' earnings forecasts as a driver for sustainable development. They provided evidence that there is a statistically significant negative association between the absolute forecast earnings error and the publication of a sustainability report. Nichols and Wieland (2009) found that analysts' forecasts revised to non-financial information become more accurate, and forecast error declines when companies issue non-financial disclosures. They suggested that non-financial disclosures improve the quality and quantity of information in capital markets and appear to enhance the value of analysts' services.

Overall, under the voluntary disclosure of CSR report setting, most previous studies agree that CSR reports revealing non-financial information activities may affect corporate value and that CSR information may be useful for analysts during the earnings forecast process. However, the scope of CSR is broad and has different aspects. Companies selectively disclose CSR information under a voluntary disclosure setting, and managers may issue non-financial disclosures for strategic purposes. Lu and Abeysekera (2021) found that the market positively reacts to strategic CSR disclosures, but the market fails to perceive whether such disclosures are credible. Hsu et al. (2019) pointed out that firms with adverse CSR performance exhibit lower disclosure quality and earnings persistence.

Companies may freely release relevant information based on strategic considerations by voluntary disclosure of CSR report setting. In contrast, mandatory CSR report disclosure is based on regulations. In Taiwan, companies mandated to disclose CSR reports shall prepare an annual corporate social responsibility report for the preceding year by referring to the Global Reporting Initiatives (GRI) Standards published by the GRI Sector Disclosure and other applicable rules according to its sector features. Moreover, these companies shall submit the CSR reports to the competent authority and announce their CSR reports on the same platform (the TWSE Corporation's Market Observation Post System). Hence, under the mandatory disclosure of CSR reports, the presentation of information will be more consistent, conducive to interpretation and comparison.

Therefore, this study suggests that the mandatory disclosure management policy on CSR reports can increase the quality and quantity of public information disclosure. This can help improve the accuracy of analyst forecasts for firms who are forced to disclose their CSR reports. Based on this, the following hypothesis is proposed:

Hypothesis 1a (H1a). *The mandatory disclosure management policy on CSR reports can improve the analysts' forecast accuracy.*

A single company may have many analysts paying attention to it. If analysts' forecasts differ greatly among each other, it indicates that there is great uncertainty in the corporate information environment (Imhoff and Lobo 1992; Payne and Robb 2000). A high uncertainty may make some analysts incapable of determining the truthfulness in the information, leading to a highly variable forecast result (Herrmann and Thomas 2005).

In an environment of voluntary disclosure, empirical research supports that non-financial information disclosure can reduce the dispersion of analysts' earnings forecasts (Lang and Lundholm 1996; Aerts et al. 2008; Nichols and Wieland 2009). However, under a voluntary disclosure setting, managers could issue non-financial disclosures for strategic

purposes, and such disclosures may lack credible information about the firm's future performance, hence increasing uncertainty about the firm's prospects.

The literature shows that the degree of analyst dispersion may also be affected by the quality of financial disclosures. For example, Swaminathan (1991) found that since the US Securities and Exchange Commission imposed several regulations on companies to disclose information, this indirectly improved the quality of corporate financial reports and reduced the degree of analyst dispersion. Mandatory CSR report disclosure is based on regulations. Preparing a CSR report must follow the GRI framework. Moreover, a CSR report should be announced on the same platform, i.e., the TWSE Corporation's Market Observation Post System. These measures allow analysts to obtain consistent information, resolving uncertainty about the firm's future prospects and consistent future earnings forecasts. This could lead to reduced analysts' forecast dispersion. In reference to this, the following hypothesis is proposed:

Hypothesis 1b (H1b). *The mandatory disclosure management policy on CSR reports can decrease the dispersion in analyst forecasts.*

2.2. CSR Report Assurance and Analyst Forecast

In order to improve the credibility of financial reports, independent agencies or organizations are now required to verify the appropriateness of their information. The same applies to independent CSR reports. In order to improve the credibility of the report, companies can use the services of a third-party independent organization to verify the integrity of information and reduce information asymmetry (Wallace 2004). Simnett and Nugent (2007) advocated that in order to increase stakeholder's trust in organizational commitments, the most important method is to seek third-party certification or assurance.

Assurance is the process of testing the credibility of a CSR report by a third-party unit to enhance the integrity and transparency of information and to improve the way information is collected. It builds the trust of stakeholders and increases the level of internal participation of the company by affirming the appropriateness and reliability of the information in the report.

The International Federation of Accountants (IFAC) with the assistance of the International Auditing and Assurance Standards Board (IAASB) issued the International Standard on Assurance Engagements 3000 (ISAE3000). It provides a general framework for assurance engagements and is used by third-party assurance providers as the standard for non-historical financial information. In Taiwan, the Standard on Assurance Engagements No. 1 was drafted based on the ISAE3000 and was implemented on 9 June 2015 by the ROC Accounting Research and Development Foundation. This shows that third-party assurance services are now emerging in Taiwan.

Internationally, assurance of CSR reports is still mainly voluntary. According to Simnett et al. (2009), a company's decision to deliver the sustainability reports and its choice of assurance provider depend on company, industry, and country-related factors. The empirical results of the study showed that companies seeking to enhance the credibility of their reports and build their corporate reputation are more likely to have their sustainability reports assured, although it does not matter whether the assurance provider comes from the auditing profession. Moreover, companies operating in a stakeholder-oriented country are more likely to choose the auditing profession as their assurance provider. Kolk and Perego (2010) considered national institutional factors and found that companies in a stakeholder-oriented country and that have weak governance mechanisms are more likely to deliver CSR report for assurance. Velte (2020) investigated the determinants and consequences of corporate social responsibility assurance and found that internal corporate governance, country-related governance, and specific financial determinants such as reporting, firm size, and industry sensitivity have a positive impact on CSR assurance adoption.

Based on the above literature, the determinants of a company's decision to have its CSR report undergo assurance are credibility, reputation, and country characteristics. It is

generally recognized that the credibility of information that has been confirmed or audited is far more reliable than that that has not been confirmed or audited (Libby 1979; Pany and Smith 1982; Hodge 2001). Credibility and reliability are important factors (Edgley et al. 2010), similar to how external audits provide higher credibility and reliability for financial statements (Simnett et al. 2009). An environmental report certified by a third party has higher disclosure quality than those without certification (Moroney et al. 2012). Furthermore, the certification of an environmental report enhances users' confidence in it (Hodge et al. 2009).

The assurance of a CSR report can not only increase credibility but can also bring other benefits. Casey and Grenier (2015) provided an empirical examination of the CSR assurance market in the United States. Their results showed that unlike their international counterparts, US finance and utilities firms are not likely (more than firms in other industries) to obtain CSR assurance despite facing significant social and environmental risks. As these industries are highly regulated in the United States, regulatory oversight may be acting as a substitute for CSR assurance. Moreover, CSR assurance is associated with lower cost of equity capital along with lower analyst forecast errors and dispersion. Furthermore, the reductions in cost-of-capital and forecast dispersion are significantly higher when an accounting firm performs the assurance. These results have implications for companies that are considering CSR assurance and accounting firms in developing and marketing their CSR assurance services. Reverte (2020) examined whether the European Directive 2014/95/UE in Spain would result in investors positively valuing the voluntary assurance of sustainability reports by listed companies from 2014 to 2017. The result showed that investors reward firms that adopt external sustainability assurance. Furthermore, they observed that investors value to a great extent those assurance statements with a broader scope, a high/reasonable level of assurance, and better quality. Stuart et al. (2020) found that investors viewed the management's willingness to obtain independent assurance on disclosures as a positive ethical signal; thus, assurance complements disclosure of CSR activities by adding protection against the impact of negative events.

Regrettably, the above research samples are from companies that voluntarily sought assurance. Their results may have been affected by self-selection bias factors. To prevent or lessen the external factors affecting the empirical results, the present study utilized random sampling and considered the special circumstances of Taiwan.

Based on the above literature, in addition to the role of a CSR report as a supplement to financial information, CSR report assurance can improve the quality of the report, increase its credibility, and improve the information environment. It can also help analysts in their forecasting operations. Therefore, we expect that compulsory compilation of CSR reports may increase the company's non-financial information and augment the transparency of information. In addition, it is believed that the mandatory assurance of CSR reports by an accountant could further improve the credibility of the reports and the company as well. Hence, the mandatory assurance policy can reduce analysts' forecast bias. Therefore, the following hypothesis is proposed:

Hypothesis 2a (H2a). *The mandatory assurance management policy on CSR reports can further improve the analyst forecast accuracy.*

Under the mandatory CSR assurance policy, the CSR report should obtain a confident opinion issued by an accountant to increase the quality of information disclosure. Therefore, we expect that the mandatory policy can reduce the dispersion of analysts' forecasts and propose the following hypothesis:

Hypothesis 2b (H2b). *The mandatory assurance management policy on CSR reports can further decrease the dispersion in analyst forecasts.*

3. Research Design

3.1. Research Sample

The purpose of this research is to explore the impact of partial mandatory disclosure and mandatory assurance policies on CSR reports since 2015 on analyst forecasts. For this study, data from both the pre- and post-mandatory disclosure management policies (from 2012 to 2019) were collected. The inclusion criteria were as follows: (1) the firm was subjected to mandatory disclosure by policy regulations; and (2) it has never disclosed any CSR reports before the mandatory disclosure policy. The purpose is to control the samples under the same CSR mandatory disclosure mechanism to avoid interference from other factors.

Since Taiwan's mandatory disclosure regulations on CSR reports were first implemented in 2014, the 2014 CSR reports were released in 2015. Therefore, all CSR reports submitted in 2014 were voluntary disclosures. This study used the CSR report disclosure data from the TWSE Corporation's Market Observation Post System to select the sample. This study compared the companies that issued CSR reports in 2015 with those that issued them in 2014 to select the samples that should disclose CSR reports in accordance with the CSR report mandatory disclosure regulations (101 companies). As the banking and insurance industry has a number of significant differences in terms of industrial characteristics and accounting systems, this study did not include 13 companies belonging to the banking and insurance industry. Finally, this study did not include 3 companies with incomplete data. After the sample selection process, a total of 85 companies were initially considered eligible. Data on analyst forecasts and variables on the 85 companies were then collected. In 2015, there were 874 listed companies on the TWSE. The sample of this study accounts for about 10% of the total listed companies. Table 1 shows the industry distribution of sample companies. Since not every company has analyst tracking and analyst forecasts every year, analyst earnings forecasts are a kind of irregular data. Finally, a total of 5349 analyst forecast data were utilized for empirical analysis. The sample data source was obtained from a database maintained by the Taiwan Economic Journal (TEJ), a leading credit analysis research agent. In this study, financial information and analyst forecast data were taken from the TEJ IFRS Finance database.

Table 1. Industry distribution of sample companies.

Industry	Number	Industry	Number	Industry	Number
Food	17	Rubber	1	Trade department store	1
Plastics	3	Electronics	9	Photoelectric	1
Textile	4	Semiconductors	3	Biotechnology and medical industry	1
Electrical cables	1	Building materials construction	4	Electronic channel	1
Chemical	21	Shipping	1	Other	11
Paper	2	Tourism	4	Total	85

3.2. Research Models and Variable Definitions

The first objective of this research is to explore the effects of Taiwan's mandatory disclosure management policy on CSR reports on analyst forecasts; that is, to determine whether the policy improved the accuracy of analyst forecasts (H1a) and decreased the dispersion in analyst forecasts (H1b) of companies mandated under said policy. To test H1a and H1b, we established Models (1) and (2), as follows:

$$\begin{aligned} AFA_{i,t} &= \beta_0 + \beta_1 CSRMD_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 STDROE_{i,t} + \beta_4 ROA_{i,t} \\ &+ \beta_5 STDEPS_{i,t} + \beta_6 LOSS_{i,t} + B_7 FOOD_{i,t} + B_8 CHEMICAL_{i,t} + \varepsilon_{i,t} \end{aligned}, \quad (1)$$

$$\begin{aligned} AFD_{i,t} &= \beta_0 + \beta_1 CSRMD_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 STDROE_{i,t} + \beta_4 ROA_{i,t} \\ &+ \beta_5 STDEPS_{i,t} + \beta_6 LOSS_{i,t} + B_7 FOOD_{i,t} + B_8 CHEMICAL_{i,t} + \varepsilon_{i,t} \end{aligned}, \quad (2)$$

where: AFA is analyst forecast accuracy. AFD is analyst forecast dispersion. CSRMD is CSR report mandatory disclosure policy. SIZE is firm size, STDROE is the standard deviation of return on equity, ROA is return on assets, STDEPS is the standard deviation of earnings per share, LOSS is firm loss dummy variable. FOOD is food industry dummy variable. CHEMICAL is chemical industry dummy variable. ε is an error term. i denotes firms (i = 1, 2, . . . , N), t denotes year (t = 1, 2, . . . , T).

The definitions of variables are as follows:

Analyst forecast accuracy (AFA): this study uses the following equation to measure AFA. Note that the (-1) indicates that the larger the AFA, the higher the accuracy of the analyst forecast.

$$AFA_{i,t} = (-1)\frac{\left|FORECAST_{i,t} - EPS_{i,t}\right|}{PRICE_{i,t-1}}$$

where: $FORECAST_{i,t}$ is the average number of the analysts' earnings per share (EPS) forecasts for each sample company in period t. $EPS_{i,t}$ is the actual earnings per share of each sample company in period t. $PRICE_{i,t-1}$ is the closing stock price of each sample company in period $t-1$.

Analyst forecast dispersion (AFD): AFD is defined as the standard deviation of earnings forecasts issued by individual analysts. AFD is usually regarded as a measure of uncertainty about future earnings, and it represents the degree of consistency of analysts' opinions on the company's future outlook (Barron and Stuerke 1998; Imhoff and Lobo 1992). It was calculated using the following equation. Note that AFD measures the degree of dispersion, and that the higher the AFD, the higher the degree of dispersion of analyst forecasts.

$$AFD_{i,t} = \frac{STD(FORECAST_{i,t})}{PRICE_{i,t-1}}$$

where: $STD(FORECAST_{i,t})$ is the standard deviation of the analysts' earnings per share (EPS) forecasts for each sample company in period t. $PRICE_{i,t-1}$ is the closing price at the end of the previous period.

CSR reports mandatory disclosure policy (CSRMD): the period before the implementation of a mandatory disclosure policy on CSR reports was set to 0 (i.e., 2012–2014), and the period after the issuance of the policy was set to 1 (i.e., 2015–2019).

Firm size (SIZE): measured by the logarithm of the company's total assets at the beginning of the period. In general, large-scale companies have a relatively high reputation and can easily attract investors' attention. Moreover, the potential benefits of investing in large companies are relatively large, making it easier to attract analysts (Atiase 1985; Hope 2003).

Standard deviation of return on equity (STDROE): measured using the firm's return on equity in the last 5 years. If a company's earnings volatility becomes relatively unstable in the long run, it will decrease the accuracy of analyst forecasts (Kross et al. 1990). This increases the cost of analysts' information collection and reduces their incentives, which in turn leads to increased analyst forecast errors and dispersion (Lang and Lundholm 1996).

Return on assets (ROA): the level of company profitability also affects analyst forecast accuracy (Eames and Glover 2003). In this study, it was measured by dividing the earnings before interest after tax by the total assets.

Standard deviation of earnings per share (STDEPS): measured by the standard deviation of earnings per share in the last 10 years. That is, the EPS data were collected from 2002 to 2019 to calculate the standard deviation of EPS in the past 10 years.

Firm loss dummy variable (LOSS): if a company is in a state of loss, earnings management may occur (Hayn 1995), affecting information transparency and the accuracy of analyst forecasts. Therefore, this study included a firm loss dummy variable as a control variable. If a company reported a loss in the current period, it was set to 1; otherwise, it was set to 0.

Food industry dummy variable (FOOD) and chemical industry dummy variable (CHEMICAL): Article 2 of Taiwan's policy entitled "Taiwan Stock Exchange (TWSE) Corporation Rules Governing the Preparation and Filing of Corporate Social Responsibility Reports by TWSE Listed Companies" stipulates the scope of listed companies that should prepare CSR reports. The first of these points out that at the end of the most recent fiscal year, companies belonging to the food industry, chemical industry, and financial and insurance industry should prepare a CSR report. Since financial and insurance companies are not within the scope of this research, the industry effects were controlled by adding two industry dummy variables, namely: FOOD for food industry which was set to 1, with the rest set to 0; and CHEMICAL for chemical industry which was also set to 1, with the rest set to 0.

The second objective of this research is to explore the effects of Taiwan's partial mandatory assurance management policy on CSR reports; that is, to determine whether this policy can further improve analyst forecast accuracy (H2a) and decrease analyst forecast dispersion (H2b) of companies mandated under this policy. To test H2a and H2b, we established Models (3) and (4), as follows:

$$\begin{aligned} AFA_{i,t} &= \beta_0 + \beta_1 CSRMD_{i,t} + \beta_2 CSRMD_{i,t}{*}CSRMA_{i,t} + \beta_3 CSRMA_{i,t} + \beta_4 SIZE_{i,t} + \\ &\beta_5 STDROE_{i,t} + \beta_6 ROA_{i,t} + \beta_7 STDEPS_{i,t} + \beta_8 LOSS_{i,t} + \beta_9 FOOD_{i,t} + \beta_{10} CHEMICAL_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (3)$$

$$\begin{aligned} AFD_{i,t} &= \beta_0 + \beta_1 CSRMD_{i,t} + \beta_2 CSRMD_{i,t}{*}CSRMA_{i,t} + \beta_3 CSRMA_{i,t} + \beta_4 SIZE_{i,t} + \\ &\beta_5 STDROE_{i,t} + \beta_6 ROA_{i,t} + \beta_7 STDEPS_{i,t} + \beta_8 LOSS_{i,t} + \beta_9 FOOD_{i,t} + \beta_{10} CHEMICAL_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (4)$$

CSRMA is CSR report mandatory assurance policy. It was set to 1 if the company mandatorily took its CSR report to the accountant for assurance; if not, it was set to 0. The remaining variables are the same as Model (1). In Model (3), if the coefficient of CSRMD is positive and the coefficient of CSRMD*CSRMA is also positive, it means that there is a further improvement in the analyst forecast accuracy of the company forced to have its CSR report undergo accountant assurance. In Model (4), if the coefficient of CSRMD is negative and the coefficient of CSRMD*CSRMA is also negative, it means that there was a further decrease in the analyst forecast dispersion of the company forced to have its CSR report undergo accountant assurance.

4. Empirical Results and Discussion

4.1. Descriptive Statistical Analysis

Table 2 provides the descriptive statistics of the research variables. Originally, there were 5349 individual analysts' earnings forecasts for the 85 sample companies. After the average earnings forecasts for each company were computed, a total of 402 entries of data were obtained.

The mean of AFA was −0.0423, which indicates that the difference between analyst forecast EPS and actual EPS accounted for an average of 4.23% of the initial stock price. The mean of AFD was 0.0225, which indicates that the average degree of dispersion accounted for 2.25% of the initial stock price. The SIZE was measured by the logarithm of the total assets at the beginning of the period; its mean was 7.5671. The mean of the variables related to profitability, such as ROE standard deviation (STDROE), ROA, EPS standard deviation (STDEPS), and reported loss (LOSS), were 5.5157, 5.3822, 1.4933, and 0.0896, respectively. Most of the observations in the sample were profitable and only 8.96% showed a loss.

Table 2. Descriptive statistics.

Variable	Mean	Maximum	Minimum	Standard Deviation
AFA	−0.0423	0	−1.13	0.09457
AFD	0.0225	0.95	0	0.05415
CSRMD	0.6617	1	0	0.47372
CSRMA	0.2438	1	0	0.42990
SIZE	7.5671	9.53	6.16	0.67399
STDROE	5.5157	32.72	0.16	5.27339
ROA	5.3822	44.26	−19.38	5.49512
STDEPS	1.4933	8.76	0.18	1.57472
LOSS	0.0896	1	0	0.28590
FOOD	0.2353	1	0	0.42449
CHEMICAL	0.2824	1	0	0.45048

Notes: AFA is analyst forecast accuracy. AFD is analyst forecast dispersion. CSRMD is CSR report mandatory disclosure policy dummy variable. CSRMA is CSR report mandatory assurance policy dummy variable. SIZE is firm size. STDROE is the standard deviation of return on equity. ROA is return on assets. STDEPS is the standard deviation of earnings per share. LOSS is firm loss dummy variable. FOOD is food industry dummy variable. CHEMICAL is chemical industry dummy variable. Observation number is 402.

The results of the correlation analysis are shown in Table 3. Multicollinearity in regression analysis is regarded as harmful only when correlations exceed 0.7 (Tabachnick and Fidell 2007). Here, the correlations between the independent variables included in the regression analysis were all less than 0.506. In addition, all variance inflation factor (VIF) values for independent variables employed in the regressions shown in Tables 3–5 were smaller than 1.99 and far lower than the critical value of 10 (Tabachnick and Fidell 2007), indicating that multicollinearity is negligible in the estimated equations.

Table 3. Pearson correlation analysis.

	CSRMD	CSRMA	SIZE	STDROE	ROA	STDEPS	LOSS	FOOD	CHEMICAL
CSRMD	1								
CSRMA	0.002	1							
SIZE	−0.036	−0.445 **	1						
STDROE	−0.016	−0.068	−0.035	1					
ROA	−0.062	0.187 **	−0.140 **	−0.015	1				
STDEPS	0.022	−0.045	0.150 **	0.497 **	0.122 *	1			
LOSS	−0.015	−0.097	−0.054	0.261 **	−0.506 **	0.106 *	1		
FOOD	0.000	0.677 ***	−0.229 ***	−0.066 *	0.038	−0.087 **	−0.02	1	
CHEMICAL	0.000	−0.348 ***	−0.057	−0.145 ***	0.048	−0.155 ***	−0.053	−0.348 ***	1

Note: ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

4.2. Empirical Results

The empirical results are shown in Table 4.

In Model (1), the CSRMD coefficient was positive with a 0.01 level of significance, indicating that analysts' earnings forecast accuracy increased when the mandatory disclosure policy was implemented. This shows that the policy improved the accuracy of earnings forecasts; therefore, H1a is supported. As for control variables, the values of firm size (SIZE), standard deviation of return on equity (STDROE), and firm loss (LOSS) were significantly negatively correlated with the analyst forecast accuracy (AFA). This means that firms with a bigger size, a higher standard deviation of return on equity, and an operating loss tend to decrease the analyst forecast accuracy. The chemical industry dummy variable (CHEMICAL) was significantly positively correlated with AFA which means that the analyst forecast accuracy for the chemical industry is higher than for other industries. The chemical industry is a highly polluting industry and is regulated by more regulations. Therefore, it provides more information, which is beneficial to analysts' predictions.

Table 4. Empirical results.

	Model (1)	Model (2)		Model (3)	Model (4)
	AFA	AFD		AFA	AFD
Variable	Coefficient	Coefficient	Variable	Coefficient	Coefficient
C	0.0038 (0.32)	−0.0491 *** (−7.53)	C	−0.0133 (−1.19)	−0.0314 *** (−4.51)
CSRMD	0.0109 *** (4.76)	−0.0033 ** (−2.48)	CSRMD	0.0076 *** (2.75)	−0.0045 ** (−2.49)
			CSRMD * CSRMA	0.0077 * (1.71)	−0.0032 (−1.23)
			CSRMA	0.0052 (1.22)	−0.0056 ** (−2.21)
SIZE	−0.0039 *** (2.66)	0.0083 *** (9.81)	SIZE	−0.0013 (−1.03)	0.0064 *** (7.58)
STDROE	−0.0018 *** (−4.04)	0.0007 *** (3.51)	STDROE	−0.0019 *** (−4.44)	0.0007 *** (3.43)
ROA	−0.00003 (−0.11)	0.0005 *** (3.14)	ROA	−0.0002 (−0.70)	0.0004 *** (3.16)
STDEPS	0.0025 ** (2.05)	−0.0004 (−0.61)	STDEPS	0.0024 ** (1.99)	−0.0003 (−0.46)
LOSS	−0.0461 *** (−5.97)	0.0051 * (1.71)	LOSS	−0.0462 *** (−6.08)	0.0046 (1.64)
FOOD	0.0008 (0.31)	−0.0035 ** (−2.34)	FOOD	−0.0054 * (−1.78)	0.00005 (0.02)
CHEMICAL	0.0051 ** (2.40)	−0.0052 *** (−3.86)	CHEMICAL	0.0078 *** (3.42)	−0.0077 *** (−4.86)
Adj-R^2	0.19	0.35	Adj-R^2	0.29	0.44
Obs.	402	402	Obs.	402	402
Firms	85	85	Firms	85	85

Note: ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

In Model (2), the CSRMD coefficient was negative with a 0.01 level of significance, indicating that the degree of dispersion of analyst earnings forecasts was reduced when the mandatory disclosure policy was implemented. This means that the policy decreased the dispersion of analyst earnings forecasts; therefore, H1b is supported. As for control variables, the values of firm size (SIZE), standard deviation of return on equity (STDROE), return on assets (ROA), and firm loss (LOSS) were significantly positively correlated with the analyst forecast dispersion (AFD). Both industrial dummy variables (FOOD, CHENICAL) were significantly negatively correlated with AFD which means that the analyst forecast dispersions for the two industries are lower than for other industries. The two industries are regulated by more regulations, so more information is provided, which is conducive to the consistency of analysts' forecasts and reduces the degree of dispersion of forecasts.

In Model (3), the coefficient of CSRMD was positive and significant, indicating that analysts' earnings forecast accuracy increased when the mandatory disclosure policy was implemented. The coefficient of CSRMD*CSRMA was also positive and significant, indicating that the compulsory accountant assurance policy further improved analysts' forecast accuracy. H2a is supported. In addition, the CSRMA coefficient was also positive, indicating that the mandatory assurance management policy on CSR reports increased the analyst earnings forecast accuracy. It implies that accountant assurance increased the credibility of CSR reports which helped analysts make predictions and improve the accuracy of earnings forecasts. However, the result of the CSRMA coefficient was not significant.

Table 5. Empirical results—further analysis.

	Model (5)	Model (6)		Model (7)	Model (8)
	AFA	AFD		AFA	AFD
Variable	Coefficient	Coefficient	Variable	Coefficient	Coefficient
C	0.0024 (0.04)	−0.0441 *** (−7.35)	C	−0.0336 (−1.27)	0.0022 (0.17)
CSRMD	0.0100 (0.59)	−0.0027 (−0.84)	CSRMD	0.0076 ** (2.07)	−0.0090 *** (−4.05)
CSRMD*MDG	0.0086 * (1.45)	−0.0009 * (−1.56)	CSRMD * CSRMB	0.0107 ** (2.00)	0.00003 (0.00)
MDG	0.0047 (0.29)	−0.0014 (−0.47)	CSRMB	0.0070 (1.28)	−0.0095 *** (−3.16)
SIZE	−0.0066 (−1.02)	0.0080 *** (11.04)	SIZE	0.0019 (0.59)	0.0023 (1.40)
STDROE	−0.0019 ** (−2.49)	0.0007 *** (4.47)	STDROE	−0.0025 *** (−3.99)	0.0007 ** (2.39)
ROA	0.0004 (0.54)	0.0002 (1.47)	ROA	−0.0010 *** (−3.04)	0.0006 *** (2.79)
STDEPS	0.0011 (1.59)	−0.0002 (−1.58)	STDEPS	0.0019 (1.38)	0.0006 (0.87)
LOSS	−0.0853 *** (−5.37)	0.0122 *** (4.09)	LOSS	−0.0381 *** (−5.60)	0.0059 (1.44)
FOOD	0.0034 (0.28)	−0.0025 (−1.58)	FOOD	−0.00007 (−0.01)	−0.0011 (−0.64)
CHEMICAL	0.0072 (0.65)	−0.0039 *** (−3.10)	CHEMICAL	0.0080 ** (2.02)	−0.0033 * (−1.74)
Adj-R^2	0.10	0.41	Adj-R^2	0.43	0.42
Obs.	531	531	Obs.	241	241
Firms	106	106	Firms	46	46

Note: ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

In Model (4), the coefficient of CSRMD was negative and significant, indicating that the degree of dispersion of analyst earnings forecasts was reduced when the mandatory disclosure policy was implemented. The CSRMD*CSRMA coefficient was also negative, which is consistent with the inference of H2b. This means that Taiwan's mandatory assurance management policy on CSR reports further reduced the dispersion of analyst earnings forecasts; however, this result was not significant. Moreover, the CSRMA coefficient was negative with a 0.05 level of significance. This means that the mandatory assurance management policy on CSR reports decreased the analyst earnings forecast dispersion. It also implies that accountant assurance increased the credibility of CSR reports, which allowed analysts to make predictions and decrease the dispersion of earnings forecasts.

This study provides empirical results under the mandatory provisions on CSR reports. First, the empirical results of this study showed that the mandatory disclosure management policy on CSR reports enables improvement in the accuracy of analyst earnings forecasts and reduction in the dispersion of analyst earnings forecasts. Therefore, this study argues that the mandatory disclosure management policy on CSR reports can improve the information transparency of the capital market. Some studies pointed out that corporate governance is one of the important factors affecting a company's voluntary disclosure of CSR reports (Alfraih and Almutawa 2017; Zhou 2019). Therefore, based on the results of this study, we argue that countries with less complete corporate governance mechanisms should consider adopting a mandatory disclosure management policy on CSR reports. Next, this study explores whether the mandatory assurance management policy on CSR reports can further improve the accuracy of analyst earnings forecasts and reduce the dispersion of analyst earnings forecasts. The results showed that the mandatory assurance management policy on CSR reports can further improve the accuracy of analyst earnings forecasts. It can also further reduce the dispersion of analyst earnings forecasts, but the

effect was not significant. This may be because the effects of the mandatory disclosure management policy on CSR reports and the mandatory assurance management policy on CSR reports are similar, so the incremental effects of the mandatory assurance policy on CSR reports are not so significant. Taking the effect of the mandatory assurance policy on CSR reports into consideration alone, the policy can improve the accuracy of analyst earnings forecasts, but it was not significant, and reduce the dispersion of analyst earnings forecasts. On the whole, the mandatory assurance policy on CSR reports has a positive effect on analyst earnings forecasts. Peng (2020) pointed out that family-controlled companies are not willing to undertake assurance for their CSR reports voluntarily. Therefore, based on the results of this study, we argue that countries with family-controlled business dominance should consider adopting a mandatory assurance management policy on CSR reports.

4.3. Further Analysis

4.3.1. Further Analysis for Hypotheses 1a and 1b

The first purpose of this paper is to explore the impact of Taiwan's partial CSR report mandatory disclosure policy on analysts' earnings forecasts. The sample firms are companies that have mandatory disclosure of CSR under the regulation. To improve the robustness of hypotheses H1a and H1b, this study further uses six company characteristics (asset size, net sales, ROA, ROE, debt ratio, Tobin's Q) to match a control group among companies that have never issued CSR reports by the propensity score matching (PSM). A total of 48 companies were successfully matched. Then, we collected analyst earnings forecast data for the 48 companies. Among them, 27 companies with a significant amount of missing data were excluded. The remaining 21 companies served as the control group. Then, we adopted the difference-in-difference method to compare the experiment group (companies with mandatory disclosure of CSR) and control group (companies that have never issued CSR reports) to see the effect of CSR report mandatory disclosure policy. By employing the difference-in-difference research design, according to the regulation of mandatory disclosure of CSR setting, we can significantly alleviate the endogenous problem. Models (5) and (6) were established as follows:

$$\begin{aligned} AFA_{i,t} &= \beta_0 + \beta_1 CSRMD_{i,t} + \beta_2 CSRMD_{i,t}{*}MDG_{i,t} + \beta_3 MDG_{i,t} + \beta_4 SIZE_{i,t} + \\ &\beta_5 STDROE_{i,t} + \beta_6 ROA_{i,t} + \beta_7 STDEPS_{i,t} + \beta_8 LOSS_{i,t} + \beta_9 FOOD_{i,t} + \beta_{10} CHEMICAL_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (5)$$

$$\begin{aligned} AFD_{i,t} &= \beta_0 + \beta_1 CSRMD_{i,t} + \beta_2 CSRMD_{i,t}{*}MDG_{i,t} + \beta_3 MDG_{i,t} + \beta_4 SIZE_{i,t} + \\ &\beta_5 STDROE_{i,t} + \beta_6 ROA_{i,t} + \beta_7 STDEPS_{i,t} + \beta_8 LOSS_{i,t} + \beta_9 FOOD_{i,t} + \beta_{10} CHEMICAL_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (6)$$

CSRMD is CSR report mandatory disclosure policy. The period before the implementation of the mandatory disclosure policy on CSR reports, CSRMD, is set to 0 (i.e., 2012–2014), and the period after the issuance of the policy, CSRMD, is set to 1 (i.e., 2015–2019). MDG is a mandatory disclosure group dummy variable. For companies that are forced to disclose CSR reports, MDG is set to 1; for companies that have never issued CSR reports, MDG is set to 0. CSRMD*MDG is the interaction term of CSRMD and MDG. The remaining variables are the same as Model (1).

The empirical results are listed in Table 5. In Model (5), the dependent variable is AFA. The coefficient of CSRMD*MGD is significantly positive at the 10% level, indicating that for companies that were forced to disclose CSR reports, compared with companies that have never issued CSR reports, the analyst earnings forecast accuracy improved after the CSR report mandatory disclosure policy. H1a (the mandatory disclosure management policy on CSR reports can improve the analysts' forecast accuracy) is supported. In Model (6), the dependent variable is AFD. The coefficient of CSRMD*MDG is significantly negative at the 10% level, indicating that for companies that were forced to disclose CSR reports, compared with companies that have never issued CSR reports, the dispersion in analyst earnings forecasts decreased after the CSR report mandatory disclosure policy. H1b (the mandatory disclosure management policy on CSR reports can decrease the dispersion in analyst forecasts) is supported.

4.3.2. The Comparisons between Accountant Assurance and Other Third-Party Assurance

The second objective of this research is to determine whether Taiwan's mandatory assurance management policy on CSR reports can further improve analyst forecast accuracy and decrease analyst forecast dispersion of companies mandated under this policy.

Simnett et al. (2009) pointed out that companies seeking to enhance the credibility of their reports and build their corporate reputation are more likely to have their sustainability reports assured, although it does not matter whether the assurance provider comes from the auditing profession. They also found that companies operating in stakeholder-oriented countries are more likely to choose the auditing profession as an assurer. Pflugrath et al. (2011) pointed out that CSR messages are more credible when they are convincing and authenticated. They found that in the United States, such guarantees are most valuable when done by professional accountants.

The present study further compared the effects of accountant assurance with third-party assurance, so samples that did not submit CSR reports for assurance were not included (39 firms). Models (7) and (8) were established to compare the effects of accountant assurance with those of third-party assurance.

$$\begin{aligned} AFA_{i,t} &= \beta_0 + \beta_1 CSRMD_{i,t} + \beta_2 CSRMD_{i,t}{*}CSRMB_{i,t} + \beta_3 CSRMB_{i,t} + \beta_4 SIZE_{i,t} + \\ &\beta_5 STDROE_{i,t} + \beta_6 ROA_{i,t} + \beta_7 STDEPS_{i,t} + \beta_8 LOSS_{i,t} + \beta_9 FOOD_{i,t} + \beta_{10} CHEMICAL_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (7)$$

$$\begin{aligned} AFD_{i,t} &= \beta_0 + \beta_1 CSRMD_{i,t} + \beta_2 CSRMD_{i,t}{*}CSRMB_{i,t} + \beta_3 CSRMB_{i,t} + \beta_4 SIZE_{i,t} + \\ &\beta_5 STDROE_{i,t} + \beta_6 ROA_{i,t} + \beta_7 STDEPS_{i,t} + \beta_8 LOSS_{i,t} + \beta_9 FOOD_{i,t} + \beta_{10} CHEMICAL_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (8)$$

CSRMB is CSR report mandatory assurance by an accountant. If a company takes the CSR report to an accountant for assurance, then CSRMB was set to 1; if it takes the CSR report to other third parties, then CSRMB was set to 0. The remaining variables are the same as Model (1).

The results are shown in Table 5. In Model (7), the coefficients of CSRMD and CSRMD*CSRMB were both positive and significant, indicating that, compared to third-party assurance, accountant assurance can further improve the accuracy of earnings forecasts. The CSRMB coefficient itself was also positive which means that, compared to third-party assurance, accountant assurance increased the accuracy of earnings forecasts; however, the effect was not statistically significant.

In Model (8), the CSRMD was negative and significant while the CSRMD*CSRMB coefficient was insignificant which means that, compared to third-party assurance, accountant assurance cannot further reduce the dispersion of analyst earnings forecasts. The CSRMB coefficient itself was negative with a 0.01 level of significance. This means that compared to third-party assurance, accountant assurance decreased the analyst forecast dispersion more significantly.

When we compare accountant assurance with other third-party assurance, the results showed that accountant assurance itself can increase the accuracy of analyst forecasts (but not significantly) and significantly reduce the degree of dispersion of analysts' forecasts. It reveals that the effects of accountant assurance in increasing the analysts' forecast accuracy and reducing the analysts' forecast dispersion are more obvious than that of third-party assurance. The reason may be that analysts believe that CSR report assurance provided by accountants is more credible than that by other third-party providers. This also implies that analysts are less familiar with third-party assurance providers.

5. Conclusions

This study takes 85 listed companies in the TWSE that are forced to disclose CSR reports as a research sample and discusses the impact of a CSR report mandatory disclosure policy on analyst earnings forecasts. For some of the companies forced to disclose CSR reports, they are further forced to submit CSR reports to accountants for assurance. Therefore, this study further explores the impact of a CSR report mandatory assurance policy on analyst earnings forecasts. The results show that Taiwan's partial mandatory disclosure

and mandatory assurance policies have positive effects on analyst forecasts. Based on the empirical results, this paper suggests the following:

For the national government: the government of Taiwan must continue instituting mandatory disclosure and authentic assurance of CSR reports as Taiwan's stock market is an emerging capital market. Through the management of the CSR reports, a company's non-financial information and transparency can be improved, and it helps analyst predictions. In the long run, it will be beneficial to the development of the capital market. Therefore, we suggest that at present, only some companies must compulsorily disclose or assure CSR reports. In the future, the management authority can further demand other companies that meet other conditions to compulsorily disclose and assure CSR reports.

For companies: at present, only some companies are forced to disclose and assure their CSR reports. It is expected that more companies will be required to compulsorily disclose or assure their CSR reports in the future to improve information transparency and credibility. Facing the future trend of CSR report mandatory disclosure and mandatory assurance policies, companies should be prepared for CSR management, disclosure, and assurance.

For third-party assurance providers: the result of this paper showed that if the CSR report is subjected to assurance via accountants, then the effects of increasing the analysts' forecast accuracy and reducing the analysts' forecast dispersion are more significant; analysts seem to have more confidence in the CSR reports convinced and authenticated by accountants. We suggest that third-party assurance providers should continue to increase their credibility to strive for CSR report assurance business.

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Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Taiwan Stock Exchange Corporation Rules Governing the Preparation and Filing of Corporate Social Responsibility Reports by TWSE Listed Companies (Date: 26 November 2014).

Note: The criteria for compulsory disclosure of CSR report companies are listed in Article 2 and the criteria for compulsory assurance of CSR report companies are listed in Article 5. Both articles are shown below.

Article 2

Where a listed company is under one of the following circumstances, it shall prepare and file a corporate social responsibility report in Chinese according to these Rules.

1. At the end of the most recent fiscal year, the company falls into the food industry, chemical industry and financial and insurance industry prescribed in the Taiwan Stock Exchange Corporation Key Points for Classifying and Adjusting Categories of Industries of Listed Companies.
2. The financial report for the most recent fiscal year submitted pursuant to Article 36 of the Securities and Exchange Act indicates that no less than 50% of the company's revenue is derived from food and beverage.

3. The financial report for the most recent fiscal year submitted pursuant to Article 36 of the Securities and Exchange Act indicates that the company's capital stock has achieved no less than NT$10 billion.

The term "financial report" referred to in paragraphs 2 and 3 means the consolidated financial report prepared in accordance with the "regulations governing the preparation of financial reports by specific industries" made and promulgated by the competent authorities. If a listed company has no subsidiary, the financial report means an individual financial report.

Article 5 (part)

The corporate social responsibility reports prepared by the food industry and the listed companies prescribed under Subparagraph 2, Paragraph 1, Article 2 of the Rules shall obtain a CPA's letter of opinion issued according to the rules published by the Accounting Research and Development Foundation, ROC.

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Board Characteristics and the Insolvency Risk of Non-Financial Firms †

Florian Maier and B. Burcin Yurtoglu *

WHU—Otto Beisheim School of Management, 56179 Vallendar, Germany; florian.maier@whu.edu
* Correspondence: burcin.yurtoglu@whu.edu
† The paper is based on the Master's thesis of Florian Maier submitted to the MSc Finance Programme at the WHU—Otto Beisheim School of Management. We thank three referees for their suggestions on a previous version of this manuscript.

Abstract: How do board characteristics influence the risk of bankruptcy? We study this question by estimating classic Z-Score models using panel data comprising 2519 listed non-financial firms from 29 European countries over the 2012–2020 period. We found that board independence is associated with lower risk of bankruptcy. In contrast, employee representatives have an adverse effect on board monitoring capacity and are predicted to increase bankruptcy risk. The presence of female directors and foreign directors on board—two indicators of board diversity—reduce bankruptcy risk. While board independence and diversity decrease bankruptcy risk in financially non-distressed firms, they have the opposite effect in financially distressed firms. These findings are statistically and economically significant and hold, at least in part, under alternative specifications. Our findings demonstrate the need for governance regulators, credit rating agencies, financial institutions, firms and investors to lend more weight to board composition, especially under the conditions of impending financial distress.

Keywords: corporate governance; board independence; board diversity; bankruptcy risk; Europe

JEL Classification: G15; G30; G32; G33; G34; G39

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1. Introduction

On the 25 June 2020, Wirecard—a company regarded as Europe's fintech champion, with a place in the DAX index and a stock market value over USD 28 billion—announced that it was to file for insolvency (McCrum 2020). However, the pressure had already started to mount one year prior after the publication of an article by the Financial Times in 2019, accusing the Wirecard management of engaging in adverse and self-serving behavior and artificially inflating revenues (McCrum 2019). The role of the company's top executives in this scandal and the failure of the board to monitor their activities have since been discussed (McCrum and Storbeck 2022). Formally, Wirecard did not comply with two specifications of the German Governance Code; those being that no supervisory board committees were formed until the first quarter of 2019 and that the chairman of the supervisory board was also the chairman of the audit committee (Jo et al. 2021), thus, raising questions about the composition and governance of Wirecards's supervisory board.

Corporate scandals, such as the downfall of Wirecard, have put German and European regulators under pressure and have raised the question of whether stronger corporate governance mechanisms, including a more effective board role, could prevent corporate insolvency (CGLytics 2020). We study this question with the goal of identifying which board characteristics affect the probability and the predictability of insolvency. Most prior research on predicting insolvency risk rely on financial and accounting data (Altman 1968; Ohlson 1980; Turetsky and McEwen 2001; Campbell et al. 2008; Traczynski 2017; Closset and Urban 2019), with limited emphasis on boards' potential impact.

Board characteristics can affect the probability of bankruptcy through at least two channels. First, as the recent Wirecard scandal suggests, financial and accounting data can be manipulated to conceal the true financial health of a company. Effective boards can potentially improve the accuracy of the financial and accounting information investors and regulators need to assess the true condition of the firm. Second, and more generally, boards can improve, by properly exercising their monitoring and advisory roles, the efficacy of management's response to distress.

We study empirically whether board characteristics correlate with the risk of bankruptcy by estimating classic Z-Score models using panel data comprising 2519 listed non-financial firms from 29 European countries over the 2012–2020 period. Specifically, we investigate whether board independence; CEO duality; the presence of employee representatives on board; and directors' tenure are related to bankruptcy risk. We also study board diversity in terms of the percentage of female and foreign directors and director age.

We report that board independence is associated with lower risk of bankruptcy. In contrast, employee representatives can have an adverse effect on board monitoring capacity and are predicted to increase insolvency risk. Our findings are indecisive for CEO duality and director tenure. Furthermore, we document that the presence of female directors and foreign directors on board reduce bankruptcy risk. These findings are statistically and economically significant and, at least in part, hold under various robustness checks. Directors' age also lowers insolvency risk, although the results are not as robust. We also study whether the influence of board independence and diversity changes under different financial stability conditions. While board independence and diversity decrease bankruptcy risk in financially non-distressed firms, they have the opposite effect in financially distressed firms.

These findings confirm and extend existing research on the link between corporate governance and bankruptcy risk. They are also in line with theoretical considerations on the tradeoffs faced by companies between the knowledge and independence of directors, and their advisory and monitoring roles (Tirole 2010; Adams and Ferreira 2007). For practitioners, these results suggest that managers, shareholders, policy makers, and other stakeholders should consider the overall positive influence of board independence and diversity on the ability to mitigate bankruptcy risk when choosing board governance structures and weighing the tradeoffs a firm faces under its unique economic setting.

This paper proceeds as follows. Section 2 provides a literature review and the motivation for our analysis. Section 3 explains our methods and data. Section 4 presents our results. Section 5 concludes the paper.

2. Literature Review and Motivation

Major theoretical perspectives on corporate governance and organizational behavior, such as Agency Theory (AT) and Resource Dependence Theory (RDT) (Boyd 1995), stress the importance of board composition for firm behavior and firm performance. In particular, the independence and diversity of boards take a prominent position in theoretical and practical considerations. Various factors may contribute towards a board's weakness in carrying out its functions (Tirole 2010). One such weakness lies in the tradeoff between knowledge and independence, weighing the advice and monitoring functions of the board against each other. While inside or non-independent directors can be more friendly to management and therefore less likely to fire managers in case of failure, their higher degree of inside information of the firm can make them better advisors. Under certain conditions, a less independent board may even be optimal to shareholders because they may induce the CEO to share more information with the board (Adams and Ferreira 2007). This tradeoff is emphasized when a firm faces financial distress, as shown by Fich and Slezak (2008), who examined financially distressed firms and documented how board characteristics including board size, board independence, and board ownership reduce bankruptcy. Overall, these findings are consistent with the notion that boards with these characteristics induce more effective monitoring. There is also evidence that board

characteristics may have a differential impact on the bankruptcy risk of different types of firms. For example, Darrat et al. (2016) report that larger boards reduce the risk of bankruptcy only for complex firms and that the proportion of inside directors on the board is inversely associated with the risk of bankruptcy in firms that require more specialist knowledge and that the reverse is true in technically unsophisticated firms.

Another source of weak boards discussed by Tirole (2010) is that of insufficient action. As demonstrated by Adams and Ferreira (2009), board gender diversity can mitigate this concern by increasing engagement and attendance of directors in board meetings and monitoring committees.

In addition, RDT offers a different view on the board of directors. Namely, by viewing it as a source of unique resources and know-how of the firm's external environment, thus highlighting the importance of board independence and diversity (Pfeffer and Salancik 1978). For example, more independent directors can contribute expertise that is unaffected by internal firm policy or sentiment. Moreover, foreign directors can share a more unique intercultural perspective, increasing the board's decision-making quality when voting on internationally relevant strategic decisions.

Furthermore, recent political and practical developments raise the question of whether the push for more board independence and board diversity can significantly influence corporate decision-making and oversight capacity and thereby lower the risk of bankruptcy. The importance of these board characteristics becomes especially relevant parallel to stakeholder demands towards improved governance. Policy makers and regulators are also keen to understand the drivers of corporate downfall.

Europe provides a promising setting to study the relation of board characteristics and bankruptcy risk due to differences in jurisdictions across countries, which stem partly from ownership structures and partly from historical, political, and social path dependencies (Davies et al. 2013). For instance, some countries in our sample have a single board system, while others have a dual-tier board system; some countries provide a statutory right or collective agreements to employee representation at the board-level, while others (e.g., Belgium, Italy, and UK) do not. To mitigate concerns over low comparability between countries due to differences in accounting and bankruptcy regulations, we here study only countries from the European Economic Area (EEA) and listed firms. Thereby economic conditions are comparable, and all firms are required to report under International Financial Reporting Standards (IFRS), ensuring similar accounting practices.

Accounting-based prediction models of insolvency have established a strong link between financial variables and corporate insolvency risk (Altman 1968; Ohlson 1980; Turetsky and McEwen 2001). Meanwhile, management failure has been found to be the most common source of financial distress (Whitaker 1999; Wruck 1990). Correspondingly, AT and RDT state that board independence and board diversity influence the monitoring ability of the board of directors. These theoretical considerations raise the question of whether board independence and board diversity influence the board's ability to prevent management failure and thereby mitigate insolvency risk. The following part discusses how these specific board characteristics may affect the insolvency risk and provide a graphical summary of the main arguments using Figure 1.

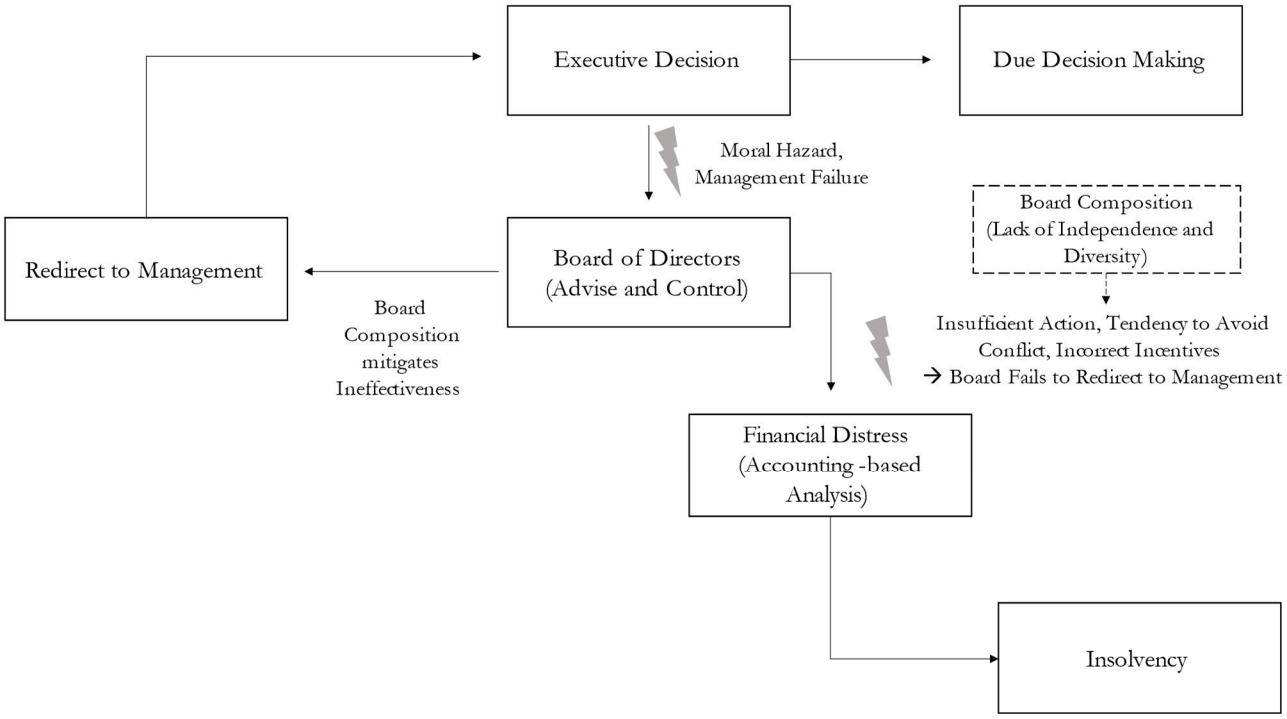

Figure 1. Board Characteristics and Insolvency: Figure summarizes the theoretical considerations to the question of whether board independence and board diversity influence a board's ability to prevent management failure and thereby mitigate insolvency risk.

Board Independence: Management and finance literatures postulate that independent directors function as more effective referees of management decisions than inside board members (Fama and Jensen 1983; Weisbach 1988; Zahra and Pearce 1989). Independent directors are argued to have more experience and expertise and less dependence on management and are therefore credited to improving board monitoring ability (Bathala and Rao 1995), especially in firms with dominant shareholders operating in countries with weak legal shareholder protection (Dahya et al. 2008). However, inside directors can also be a key source of firm-specific knowledge and expertise (Raheja 2005). In addition, management-friendly boards may also be optimal because a CEO is less reluctant to share sensitive and potentially difficult information, thereby potentially limiting the board's influence (Adams and Ferreira 2007; Boone et al. 2007). Hermalin and Weisbach (1998) pose the question of whether boards chosen by the CEO can still be effective monitors.

While there have been a large number of empirical studies relating board independence to firm performance, such studies deliver mixed results, often due to the endogenous nature of this relation (Adams 2017). Research on how board independence correlates with insolvency risk is, however, limited. Fich and Slezak (2008) study a sample of 781 US firms over the period from 1991 to 2000 and find that smaller and more independent boards are more effective in avoiding bankruptcy when a company is already in financial distress, suggesting that board independence increases board monitoring ability, especially in times of crisis. Cao et al. (2015) confirm these findings in a study of US firms cited in the SEC Accounting and Auditing Enforcement Releases (AAER). They study how board size, board independence, and board gender diversity may affect the risk of insolvency and find that the effect of these board characteristics is larger in the post-AAER period. In this sense, the AAER citing is regarded as negative signaling, leading to significant share price drops and pressuring management. Darrat et al. (2016) report that larger boards reduce the risk of bankruptcy only for complex firms and that the proportion of inside directors on the board is inversely associated with the risk of bankruptcy in firms that require more specialist knowledge and that the reverse is true in technically unsophisticated firms. Li et al. (2008)

study non-financial firms listed in China and report that a higher board independence constitutes a lower probability of financial distress and that the effect of independent directors is more significant during financial crises. Based on the theoretical foundations and consistent with previous empirical evidence, we formulate our first hypothesis:

Hypothesis 1 (H1). *A higher percentage of independent directors lowers the risk of insolvency.*

CEO Duality: Board independence has been linked to CEO duality (i.e., the CEO also chairs the board). Such concentration of power can lower board independence and impair board monitoring ability (Jensen 1993). In addition, firms with CEO duality are postulated to be more exposed to information asymmetries (Gul and Leung 2004). At the same time, RDT and stewardship-based theories (Donaldson and Davis 1991) suggest that CEO duality may lead to a more unified leadership, which may enable quick decision-making and translate into benefits for firms in highly competitive and dynamic environments. The prevalence of CEO duality varies across countries. For example, almost half of the S&P 500 firms in the United States combine the two roles (Sun 2019); however, codes of best practice and large institutional investors largely discourage CEO duality in the United Kingdom. As a result, only about 15% of UK-listed firms have CEO duality. Germany prohibits CEO duality altogether (Davies et al. 2013). CEO duality has not been shown conclusively either to improve or to constrain firm performance (Krause et al. 2014). Based on these considerations, we formulate:

Hypothesis 2 (H2). *CEO duality decreases the risk of insolvency.*

Employee Representation: The representation of employees on boards is an important form of employee participation in many European countries. Employee representation can increase board monitoring ability and can add value in coordinating efforts within firms, at least up to a certain threshold (Fauver and Fuerst 2006). A study of Swedish companies confirms the positive influence of employee representation on the board but questions the influence those representatives can exert on managerial decision-making (Levinson 2001). In addition, labor representation has been found to increase cash flows and profits and decrease M&A risk-taking and idiosyncratic risk. Furthermore, it is reported that direct employee influence, opposed to indirect influence, can be a powerful tool to mitigate agency conflicts (Lin et al. 2018).

In contrast, Gorton and Schmid (2004) studied a sample of German firms and found that labor representation on boards may divert companies' objective function from focusing on shareholder value to ensuring employee interests, such as high staffing. The presence of employee representatives can also hinder information flow in line with the notion of friendly boards (Adams and Ferreira 2007). In this context, labor representatives could make executives reluctant to share sensitive information with the board, in fear of being fired or in fear of that information carrying through to lower levels of the workforce. Thus, while the evidence on the influence of employee representatives on firm performance is mixed, it suggests that employee representation can hinder the board's ability to act in crisis situations and to mitigate insolvency risk. Moreover, employee representatives may amplify the bargaining power of labor unions and the workforce and may undermine shareholder interests, thereby augmenting insolvency risk. Therefore:

Hypothesis 3 (H3). *A higher presence of employee representatives on the board will increase the risk of insolvency.*

Tenure: There are two conflicting effects stemming from director tenure: (i) longer director tenure is likely to lead to a more substantial commitment, experience, and competence; however, (ii) directors with longer tenure are also more likely to befriend and less likely to monitor management (Vafeas 2003). Empirically, directors with longer tenures are found to engage in more board committees and have higher insider ownership (Vafeas

2003) and perhaps, thereby, improve firm performance (McIntyre et al. 2007), with some studies documenting non-linearities in this relation (Huang and Hilary 2018; Livnat et al. 2019). Based on these considerations, we formulate:

Hypothesis 4 (H4). *Longer director tenure will decrease the risk of insolvency.*

Board Diversity

Gender: Gender diversity in boards is often seen as a driver of firm values and firm performance through higher diversity and lower discrimination. If diverse teams function better than homogenous teams, a more gender diverse board is likely to increase firm performance (Kahane et al. 2013) and lower the risk of insolvency. This view is supported by Kim and Starks (2016) who found that newly appointed female directors add a higher degree of new skills to the incumbent board than newly appointed male directors and generally possess a more unique set of skills. According to RDT, such changes lead to more effective boards and lower the risk of insolvency (Boyd 1990). The addition of female directors can also lead to a higher turnover of less productive male board members (Hermalin and Weisbach 2003).

While a vast amount of empirical research documents a positive, negative, or no relationship between board gender diversity and measures of firm value and performance (Kirsch 2018; Bui et al. 2020), studies that were able to exploit an exogenous variation in female director appointments report a robust positive effect of female board representation on firm performance, especially when woman directors are actively involved in governance via membership of board committees (Green and Homroy 2018). Thus, we hypothesize that higher board gender diversity is likely to lower the risk of insolvency.

Hypothesis 5 (H5). *A higher percentage of female directors will reduce the risk of insolvency.*

Nationality: A further component of board diversity is the fraction of international directors on the board. It can be argued that international directors bring a more diverse set of opinions and experiences and represent the interests of international shareholders, thereby increasing the monitoring quality of the board (Lee et al. 2018). However, research on this aspect of board composition has been limited, especially with respect to insolvency risk. To test the relation between foreign directors and the risk of insolvency, we formulate:

Hypothesis 6 (H6). *A higher percentage of foreign directors will reduce the risk of insolvency.*

Director Age: Directors' age can be a source of diversity on boards; however, compared with other dimensions (i.e., gender, nationality, and ethnicity), it has attracted limited attention in the study of boards. Age is a dynamic proxy of a director's life experience (Mannheim 1949) and encompasses various elements that influence the formation of personal values during their lifespan (Rhodes 1983). Whether an age-diverse board provides comprehensive resources and expertise or leads to communication breakdown and conflicts remains an open question (Talavera et al. 2018). The evidence on director age diversity and firm performance is mixed, with some studies reporting a positive (McIntyre et al. 2007) and others reporting a negative association (Tsui et al. 1995; Williams and O'Reilly 1998). We do not expect a significant impact of director age on the likelihood of financial distress.

Hypothesis 7 (H7). *Average director age will have no significant effect on the risk of insolvency.*

Financially distressed vs. non-distressed firms: Prior research has argued that board behavior and the management–board relationship can change in times of crisis. For example, otherwise friendly boards could transform into unfriendly boards due to fear of personal liability in case of bankruptcy (Tirole 2010). Consistent with this argument, Fich and Slezak (2008) report the strong predictive power of board governance attributes for bankruptcy conditioning on financial distress. Additionally, previous literature has provided evidence

that directors considerably increase engagement in times of crisis, usually in conjunction with significant share price drops (Vafeas 1999; Cao et al. 2015). We therefore formulate:

Hypothesis 8 (H8). *Under conditions of financial distress, board independence and board diversity will increase the risk of insolvency.*

3. Methodology and Data

In this section, we first present our measure of the risk of insolvency. Section 3.2 details our econometric model. Sections 3.3 and 3.4 report our covariates and data sources, respectively.

3.1. Insolvency Risk

We follow Altman (1968) to operationalize the bankruptcy risk as our dependent variable. The use of Altman's Z-score has been considered by most researchers and practitioners as an effective tool to predict the health of companies. Despite criticisms (e.g., Hillegeist et al. 2004), it has shown to be accurate in empirical studies conducted over the last twenty decades and remains an established tool for assessing the health of companies (Altman et al. 2017). Alternatives to Altman's Z-score is Ohlson's O-score, which uses accounting information and credit ratings that reflect subjective default probabilities provided by credit rating agencies (Blume et al. 1998; Molina 2005). Credit ratings are often used to relate exogenous events, such as acquisitions, to insolvency risk (Aktas et al. 2021; Karampatsas et al. 2014).

The Altman model utilizes a multiple discriminant analysis of a comprehensive vector of financial ratios and thereby provides a holistic view of a company's financial strength (Aktas et al. 2012). In contrast to alternatives based on accounting information, such as Ohlson's O-score (Ohlson 1980), the Z-score employs market values.

Five categories of variables are employed by the Z-score model: liquidity, profitability, leverage, solvency, and activity ratios. To determine the variables with the most significant predictive power of bankruptcy, Altman (1968) considers (i) the statistical significance and relative contributions of each independent variable, (ii) the inter-correlations between the relevant variables, (iii) the predictive accuracy of the various profiles, and (iv) the credibility of the respective analyst. The model defines specific cutoff points to determine the bankruptcy risk of a given firm. Firms with a Z-score below 1.81 are expected to file for insolvency within one year, while firms with a Z-score above 2.99 are not likely to face bankruptcy within one year. The range between 1.81 and 2.99 is defined as a "grey zone".

Altman (1968) proposes the following multidimensional model of bankruptcy prediction:

$$\text{Z-Score} = 1.2x_1 + 1.4x_2 + 3.3x_3 + 0.6x_4 + 1.0x_5,$$

where x_1 represents the ratio of working capital to total assets, x_2 the ratio of retained earnings to total assets, x_3 the ratio of EBIT to total assets, x_4 the ratio of book value of equity to total liabilities, and x_5 represents sales to total assets ratio.

Empirical studies of the Z-score model confirm the model's higher effectiveness in short-term bankruptcy prediction over a time horizon of one year prior to bankruptcy (Reisz and Perlich 2007). Altman et al. (2017) examine the predictive power of the model in an international context, including 31 European and 3 non-European countries and confirm its accuracy of up to 75% in certain countries, while alternatives exhibit outperformance in other countries. This finding indicates significant country-specific differences when predicting bankruptcy, explained by different accounting and bankruptcy regulations. Grice and Ingram (2001) verify the Z-score model with regards to time and industry sensitivity and find that the predictive power of the deployed financial ratios may change over time and is sensitive to industry classification. Thus, when using the Altman Z-score as a measure of financial distress, it is important to include industry- and country-specific control variables.

3.2. Econometric Model

We use the following regression specification, with standard errors clustered on firm-level.

$$\text{Z-Score}_{i,t} = \beta_0 + \boldsymbol{\beta_1} \times \boldsymbol{BC_{i,t}} + \boldsymbol{\beta_2} \times \boldsymbol{X_{i,t}} + f_t + g_j + h_k + \varepsilon_{i,t}$$

Here $\boldsymbol{BC_{i,t}}$ is either a single board characteristic or a vector representing them together; $\boldsymbol{X_{i,t}}$ is a vector of covariates, which we assume to be exogenous; f_t are time effects; g_j are industry dummies defined at the two-digit SIC level; and h_k are country dummies. We also conduct sensitivity analyses using firm-random effects and firm-fixed effects specifications to control for unobserved differences across firms.

We provide estimates pooled across countries and give equal weight to each firm, rather than equal weight to each country. Pooling results across countries involves making the strong assumption that different board governance elements have a similar importance in different countries. At the same time, pooling can help to make sense of results in a multi-country study.

3.3. Covariates

BC comprises both variables on board independence and board diversity. Board independence is operationalized by the percentage of independent directors, the percentage of employee representatives, a CEO/Chairman duality dummy, and director tenure. Independent directors are defined as non-executive directors, who do not have any connections to other stakeholders, thereby excluding executive and gray directors. Employee representatives are defined as directors representing the non-executive employees of the firm (e.g., union representatives). The CEO/Chairman duality dummy indicates whether the CEO is also the chairman of the board of directors (1 if the CEO is chairman, 0 otherwise). Any companies incorporated in countries with a dual board system exhibit a CEO/Chairman dummy of 0. A CEO/Chairman duality dummy of 1 is considered to decrease board independence. Director tenure is defined as the number of years the respective director has occupied his current role. Across firm years it is possible that the director has assumed several different roles, in which case every role is considered as a separate tenure.

Board diversity is represented by the fraction of female directors, the fraction of foreigners, and the average director age. Director gender and age are identified using the personal director information provided by BoardEx. Foreigners are defined as directors that have a different nationality than the country in which the firm is incorporated.

Many firm characteristics are potentially associated with both our outcome variable (Z-score) and with board governance. Failure to control for these characteristics (covariates) can lead to omitted variable bias. Therefore, to reduce potential omitted variable bias, we include the following set of firm specific covariates in vector ***X***—Firm Size: ln(total assets) to control for the effect of firm size on the Z-score; Quick ratio: current assets/current liabilities; Leverage: total liabilities/total assets; Sales growth: percentage growth in sales revenue over the last fiscal period; and Capex: capital expenditures/total assets. We also use the natural logarithm of board size as a further control variable. All financial and firm-specific control variables were calculated using lagged values to mitigate potential endogeneity. Table 1 summarizes the definitions of variables.

Table 1. Definitions of Board and Firm Characteristics.

Variable	Definition
Board Characteristics	
% Independent Directors	Number of independent directors/Board size
CEO Duality	1 if Chairman is CEO, 0 otherwise
% Employee Representatives	Number of Employee representatives on board/Board size
Tenure	Years in current role: Role end year–Role start year
% Female Directors	Number of female directors/Board size
% Foreign Directors	Number of foreign directors/Board size
Age	Average age of directors
Other Covariates	
ln(Board Size)	Natural logarithm of number of directors on board
Firm Size	Natural logarithm of total assets in year $t-1$
Quick Ratio	Current assets/Current liabilities in year $t-1$
Leverage	Total liabilities/Total assets in year $t-1$
Sales Growth	$(\text{Sales}_t/\text{Sales}_{t-1})-1$
Capex	Capital Expenditures/Total assets in year $t-1$
Financial Crisis Dummy	1 if year = 2011, 2012, 2013, 2020, 0 otherwise

Footnote: the definitions of the explanatory variables used to measure the board composition of the sampled firms. Variables expressed as a fraction of board size are multiplied by 100.

3.4. Data

The data were collected from the databases BoardEx Europe and Compustat Global, provided by the Wharton Research Data Services (WRDS). *BoardEx* Europe provides personal and employer details of directors. In the first step, the datasets were cleaned of duplicate observations and observations of private firms and financial firms. In the next step, all non-board members were dropped from the dataset. In addition, all executive directors of firms in countries mandating a two-tier board system were dropped. This is to ensure that only the supervisory board is included in the study and not the management board, in the case of dual-tier countries. In the case of firms incorporated in single-tier countries all board members were included. After these steps, BoardEx dataset provided information on 185,669 director–year and 19,877 firm–year observations over a period from 2011 to 2020 spanning our sample period.

To compute the Z-score, two *Compustat Global* databases were used. First, the Fundamentals Annual dataset, from which financials were extracted, and second, the Securities daily dataset, in order to calculate equity market values. The Securities daily dataset was cleaned of duplicate observations and private and financial firms. Next, year-end (only 31 December) values were used to compute the market values for each firm. The Fundamentals annual dataset was also cleaned along similar lines. Table 2 reports the means and standard deviations of the Z-score together with the board characteristics by country and of the full sample.

Table 2. Z-Score and Board Characteristics.

Country	N	Z-Score		% Independent Directors		CEO Duality		% Employee Representation		Tenure		% Female Directors		%Foreign Directors		Age	
		Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Austria	257	2.66	1.41	31.90	20.14	0	0	14.13	15.51	4.55	2.2	14.58	12.64	12.09	16.3	56.61	4.02
Belgium	675	2.93	4.94	22.57	19.25	0.04	0.19	0	0	4.18	2.18	21.36	15.34	17.02	20.45	57.31	4.32
Croatia	30	3	1.71	3.38	6.68	0	0	9.39	4.93	2.88	1.33	21.58	17.72	3.52	6.39	53.91	4.53
Cyprus	93	1.59	3.02	25.20	23.32	0	0	0	0	3.22	1.89	16.77	14.02	34.52	20.04	52.91	6.13
Czech Republic	35	3.38	1.33	0.52	2.17	0	0	9.75	12.72	1.48	0.81	15.27	14.47	6.46	12.46	49.01	4.85
Denmark	469	9.23	20.11	35.04	19.13	0	0	19.24	18.21	3.79	2.43	17.76	13.04	19.79	21.77	56.35	3.70
Estonia	18	1.97	0.61	0	0	0.44	0.51	0	0	6.03	1.29	9.52	8.37	4.11	4.75	50.47	3.20
Faroe Islands	16	3.47	4.97	30.10	21.86	0	0	0	0	3.80	2.34	18.33	13.5	23.65	27.04	53.53	5.02
Finland	912	3.31	4.25	53.67	19.7	0	0.07	0.35	2.62	3.04	2.1	24.65	14.61	13.8	19.87	55.52	4.63
France	3631	2.54	4.57	29.36	22.36	0.55	0.5	2.07	5.37	4.88	3.46	27.25	17.04	8.95	15.36	56.49	6.13
Germany	3013	3.5	6.2	12.93	20.11	0	0	12.5	18.34	4.20	2.79	14.37	16.49	10.36	16.92	56.37	6.25
Great Britain	2279	3.32	15.07	41.19	39.14	0	0.07	0	0	3.20	2.88	20.03	32.12	37.04	40.19	57.02	7.09
Greece	234	2.01	1.71	26.16	14.99	0.2	0.4	2.06	5.72	5.19	3.43	6.87	7.94	7.14	10.44	59.31	7.48
Hungary	67	2.20	1.01	45.60	23.02	0.18	0.39	0.15	1.22	4.96	2.54	6.43	10.29	8.37	10.80	56.86	7.00
Ireland	250	2.51	4.36	31.21	19.93	0.02	0.14	0	0	4	2.99	10.23	11.08	29.57	29.41	56.92	4.24
Island	34	69.7	48.03	43.68	18.11	0	0	0	0	3.37	2.46	41.30	13.76	15.08	14.01	54.59	3.08
Italy	1332	2.57	3.92	38.43	18.83	0.16	0.37	0	0	3.93	2.74	25.08	15.19	6.75	15.91	56.38	4.76
Luxembourg	217	3.78	4.63	29.78	23.57	0.23	0.42	0	0	5.13	4.43	11.72	14.77	60.42	28.64	57.35	5.25
The Netherlands	735	2.71	4.87	35.51	20.44	0.4	0.49	0.01	0.37	3.47	1.94	15.88	14.18	33.09	28.74	57.24	5.09
Norway	980	7.44	19.76	36.03	26.54	0	0.05	9.74	14.97	3.20	2.51	40.12	11.82	14.18	18.51	54.18	4.95
Poland	389	4.02	9.47	28.59	21.06	0	0	1.46	5.69	2.81	2.16	13.75	14.40	4.54	10.03	51.15	7.65
Portugal	334	1.28	1.53	16.38	17.99	0.25	0.43	0	0	4.96	4.14	13.26	14.35	8.95	14.83	56.19	5.22
Romania	26	3.83	2.88	31.15	16.26	0	0	0	0	1.60	1.14	19.33	12.12	28.85	16.8	52.18	4.34
Serbia	10	2.08	0.20	25.33	6.66	0	0	0	0	3.88	1.7	4.29	6.90	37.57	10.56	49.00	2.69
Slovak Republic	8	3.18	0.36	0	0	1	0	0	0	3.83	0.67	10.83	8.12	20.32	4.53	56.03	2.37
Slovenia	20	4.18	1.19	0	0	0	0	11.88	15.25	3.29	1.95	35.28	26.34	22.29	32.92	49.42	4.58
Spain	852	1.76	3.86	24.04	18.66	0.24	0.43	0	0	4.34	2.76	15.72	12.25	7.89	13.96	59.53	6.48
Sweden	1717	7.91	17.44	51.44	20.41	0	0	8.82	12.08	3.72	2.31	28.25	14.16	10.39	16.23	56.22	3.89
Switzerland	1244	3.99	7.75	25.25	28.82	0.05	0.21	0	0	4.65	2.97	10.86	11.77	27.8	27.67	58.59	3.96
Full Sample	19877	3.88	10.77	31.52	26.95	0.15	0.36	4.27	11.05	4.04	2.92	21.11	19.25	16.33	24.91	56.54	5.81

Footnote: means and standard deviations of the Z-score and board characteristics by country and in the full sample.

After merging the Compustat Global Securities and Fundamentals datasets with the BoardEx data, we computed all explanatory, dependent, and control variables. We dropped observations for which no Z-score could be determined and winsorized all financial variables at 1% and 99% of their respective distributions to mitigate the potential influence of outliers. We also lost observations because some variables were defined involving their lagged values so that we were able to employ 16,565 firm years in the regressions.

4. Results

4.1. Tests of Hypotheses 1–8

Table 3 reports the results of the regression analysis utilizing data from 2012 to 2020 in the pooled sample of 29 countries. Columns (1)–(7) report coefficients on individual board characteristics when they are estimated in isolation from other board characteristics. In Column (8) we report regression results when all board characteristics are used together to explain the Z-score. All regressions include year, industry, and country dummies, the firm-specific covariates (listed in Table 1), and a constant. We suppressed the coefficients of all variables except for the hypothesized board governance variables. Across all specifications the firm-specific covariates take on expected signs and are meaningfully related to Z-scores. While not hypothesized, the natural logarithm of board size, one of our control variables, captures a consistently positive and highly significant coefficient suggesting larger boards are negatively associated with bankruptcy risk.

Table 3. Board Governance and Risk of Insolvency.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
% Independent Directors	**0.0179 *** (0.005)**							**0.0117 ** (0.005)**
CEO duality		0.0956 (0.198)						0.193 (0.194)
% Employee Representation			−0.0276 (0.018)					−0.0198 (0.018)
Tenure				0.0104 (0.036)				0.0216 (0.043)
% Female Directors					**0.0217 *** (0.006)**			**0.0209 *** (0.007)**
% Foreign Directors						**0.0210 ** (0.009)**		**0.0205 ** (0.009)**
Age							0.0315 (0.0277)	0.027 (0.030)
Adj.-R^2	0.169	0.169	0.168	0.168	0.169	0.170	0.169	0.173

Footnote: coefficients from pooled regressions for 2012–2020 of Z-score on board governance characteristics and firm-specific covariates (listed in Table 1), with year, industry, and country fixed effects and constant term (coefficients are suppressed). The number of observations for each regression is 16,565. Financial variables are winsorized at 1% and 99%. Standard errors are in parentheses. ** and ***, respectively, indicate significance levels at 5% and 1% levels. Significant results (at 5% level or better) are in **boldface**.

Column (1) reports that board independence lowers insolvency risk. The coefficient on the fraction of independent directors on board is 0.0179 and it is significant at the 1% level. A one-standard deviation increase in the fraction of independent directors is associated with a lower risk of bankruptcy with a 0.48 unit increase in the Z-score (0.0179×26.95), which corresponds to almost one-eight of the sample mean of this variable (3.88).

Columns (2)–(4) report the coefficients on CEO Duality, fraction of employee representatives on board, and director tenure, respectively. While CEO Duality and Tenure have positive coefficients, employee representation has a negative coefficient. However, none of these three coefficients translate into statistically significant associations with the Z-score at the conventional levels. We thus conclude that Hypotheses 2–4 are not supported by empirical evidence.

In Column (5) we observe that the fraction of female directors on the board captures a highly significant coefficient consistent with Hypothesis 5. The magnitude of this coefficient (0.0217) is also economically meaningful. A one standard deviation increase in the fraction of female directors on the board is associated with a lower risk of bankruptcy with a 0.42 unit increase in the Z-score (0.0217 × 19.25). We observe a similar association of the fraction of foreign directors on the board with the risk of bankruptcy. Column (6) shows that the coefficient on this dimension of board diversity is 0.021 is statistically significant at the 5% level and suggests a 0.52 unit increase in the Z-score as the fraction of foreign directors increases by one standard deviation (0.0210 × 24.91). Hence this result lends empirical support to Hypothesis 6.

Hypothesis 7 posits no significant association between the average director age and the risk of insolvency. In Column (7) we observe that the variable Age captures a positive coefficient, albeit insignificantly. Therefore, Hypothesis 7 is supported by our empirical analysis.

The explanatory power of regressions (1)–(7) is around 16.8%. In Column (8), where we use all board governance variables together, the adjusted R^2 increases to 17.3%. Untabulated regressions show that much of the explanatory power is derived from country and industry fixed effects and that the adjusted R^2 drops to a narrow range of [0.04–0.05] when the country and industry dummies are excluded from the regressions.

In Column (8) we use all board governance characteristics in the same regression equation. The specification is otherwise identical to regressions reported in Columns (1)–(7). We observe that the fraction of independent directors, the fraction of female directors, and the fraction of foreign directors continue to have significant associations with the Z-score, whereas the remaining board characteristics remain statistically insignificant. The magnitudes of the coefficients change, but only marginally, suggesting that the significant results obtained in columns (1)–(7) are not due to the potential correlation of omitted board characteristics and that each of these three variables captures distinct aspects of board structure and diversity.

Hypothesis 8 posits that under financial distress board behavior and the management–board relationship can change so that under conditions of financial distress, board independence and board diversity increase the risk of insolvency. We report the tests of H8 in Panels A and B of Table 4, which use the same specification as Table 3 but restrict the sample to firms with Z-scores < 1.81 (Panel A) and separately to firms with Z-scores > 1.81 (Panel B), following the definition of financial distress suggested by Altman (1968). Columns (1), (5), and (6) of Panel A show that the fraction of independent directors, the fraction of female directors, and the fraction of foreign directors continue to have significant associations with the Z-score with higher coefficient sizes. The size of the coefficient on the fraction of foreign directors on board (0.0323, p-value < 0.001) goes up substantially compared to its size in the full sample (0.021, p-value < 0.05). These changes suggest that the relevance of these board characteristics is magnified for financially non-distressed firms. Interestingly, in Table 4 the variable Tenure captures a statistically significant coefficient with a negative sign, which contradicts H4, but provides partial empirical evidence to H8 in that it provides further support to the notion that the condition of financial distress affects the way board governance variables are associated with the Z-score. The remaining board governance characteristics (CEO duality, fraction of employee representatives, and director age) remain insignificant. In Column (8) we use all board governance variables together in a single regression and find that board independence loses statistical significance. This is an important change, suggesting that independent directors may turn out to be ineffective for financially non-distressed firms.

Table 4. Board Governance and Risk of Insolvency for Non-distressed and Distressed Firms.

Panel A. Board Governance and Risk of Insolvency for Non-Distressed Firms								
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
% Independent Directors	**0.0196 ** (0.007)**							0.0122 (0.008)
CEO duality		0.1030 (0.274)						0.275 (0.268)
% Employee Representation			−0.0163 (0.022)					−0.0060 (0.023)
Tenure				**−0.1100 ** (0.045)**				−0.0872 (0.054)
% Female Directors					**0.0243 *** (0.008)**			**0.0226 *** (0.008)**
% Foreign Directors						**0.0323 *** (0.012)**		**0.0308 ** (0.012)**
Age							0.0070 (0.038)	0.0197 (0.042)
Adj.-R^2	0.233	0.232	0.232	0.232	0.233	0.235	0.232	0.237
Panel B. Board Governance and Risk of Insolvency for Distressed Firms								
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
% Independent Directors	0.0022 (0.0027)							0.0025 (0.0028)
CEO duality		−0.0826 (0.1070)						−0.1330 (0.105)
% Employee Representation			−0.0133 * (0.0070)					−0.0133 * (0.0072)
Tenure				**0.0644 *** (0.0224)**				**0.0609 *** (0.0198)**
% Female Directors					−0.0005 (0.0038)			−0.0002 (0.0037)
% Foreign Directors						−0.00726 (0.0045)		−0.0075 * (0.00458)
Age							0.0105 * (0.0145)	0.0008 (0.0139)
Adj.-R^2	0.515	0.515	0.516	0.515	0.515	0.516	0.516	0.520

Footnote: coefficients from pooled regressions for 2012–2020 of Z-score on board governance characteristics and firm-specific covariates (listed in Table 1), with year, industry, and country fixed effects and constant term (coefficients are suppressed). The sample in Panel A is restricted to 10,882 firm-years of financially non-distressed firms, defined as a Z-score > 1.81 as suggested by Altman (1968). In Panel B, the sample is restricted to 5683 firm-years of financially distressed firms, defined as a Z-score < 1.81. Financial variables are winsorized at 1% and 99%. Standard errors are in parentheses. *, **, and *** respectively indicate significance levels at 10%, 5%, and 1% levels. Significant results (at 5% level or better) are in **boldface**.

Panel B of Table 4 repeats the same exercise for financially distressed firms. We observe that none of the board independence and board diversity measures correlate significantly in this sub-sample. However, Tenure stands out as the only significant board characteristic that lowers the insolvency risk. Overall, the results in Table 4 differ from Table 3 both in terms of the size and significance of key board governance variables, suggesting that financially distressed firms are likely to need a different board configuration than financially non-distressed firms. Thus, these results lend considerable support to H8.

4.2. Alternative Specifications

In our econometric specification we assume exogeneity, which requires, among other things, that current ***BC*** does not influence future ***X***. In many corporate finance applications, including our setting, this condition is unlikely to be strictly satisfied, but it may still be a reasonable approximation. First, prior findings suggest that firm characteristics weakly predict some key board characteristics, such as board independence (e.g., Boone et al. 2007; Linck et al. 2008) and female representation on boards (e.g., Oliveira and Zhang 2022). Second, Bhargava and Sargan (1983) suggest that assuming exogeneity is more reasonable if one uses firm-random effects (firm-RE) or firm-fixed effects (firm-FE) specifications to address unobserved heterogeneity, has a short time dimension, and a time-persistent variable of interest. Both firm-FE and firm-RE will be inconsistent if there are omitted time-varying covariates that are correlated with both the outcome variable and the board characteristics.

All three specifications, pooled OLS, firm-FE, and firm-RE, assume that board characteristics and covariates are uncorrelated with the error term, including cross correlation across time (the "strict exogeneity" assumption). The RE and pooled OLS models make a second, stronger assumption that the firm effects are uncorrelated with the covariates in all time periods, which is unlikely to be a realistic assumption in our setting. Hence, given sufficient time variation in board characteristics, the firm-FE is the preferred specification. However, board characteristics vary slowly within a firm over time, which limits the statistical power of the firm-FE specification. Thus, we consider both firm-FE and firm-RE as useful alternatives to pooled OLS specification. More formally, in (untabulated) tests we find that Hausman tests generally, though not uniformly, favor the firm-FE specifications.

We report the estimates using the firm-FE and firm-RE models in Table 5. Columns (1) and (2) use the full sample, Columns (3) and (4) use the sample of financially non-distressed firms, and Columns (5) and (6) use the sample of distressed firms. The firm-FE results in the full sample show that some of the board characteristics including the fraction of independent directors, female directors and foreign directors, which have a statistically significant association with the Z-score in the pooled OLS specification, become smaller in magnitude and also weaker in terms of statistical significance. In the firm-RE specification (Column (2)), the fraction of independent directors and the fraction of female directors are statistically significant, albeit with a much smaller magnitude of their coefficients compared to the pooled OLS model. In the firm-RE model CEO Duality is also significant; however, with a negative coefficient, suggesting that firms with CEO Duality have higher bankruptcy risk.

Table 5. Board Governance and Risk of Insolvency with Alternative Specifications.

	(1)	(2)	(3)	(4)	(5)	(6)
	Full Sample		**Non-Distressed**		**Distressed**	
	Firm-FE	**Firm-RE**	**Firm-FE**	**Firm-RE**	**Firm-FE**	**Firm-RE**
% Independent Directors	0.0059 (0.005)	**0.0136** *** **(0.004)**	0.0078 (0.006)	**0.0162** *** **(0.005)**	0.0035 (0.002)	0.0015 (0.002)
CEO duality	0.0001 (0.409)	**−0.725** ** **(0.335)**	0.3820 (0.685)	*−0.955 ** *(0.525)*	−0.1150 (0.168)	0.1380 (0.136)
% Employee Representation	**−0.0258** ** **(0.018)**	−0.0027 (0.013)	−0.0176 (0.024)	0.0059 (0.017)	−0.0144 (0.010)	0.0090 (0.006)
Tenure	−0.0330 (0.041)	−0.0425 (0.036)	0.0041 (0.056)	−0.0669 (0.049)	0.0136 (0.021)	**0.0477** *** **(0.018)**
% Female Directors	*0.0112 ** *(0.006)*	**0.0144** *** **(0.005)**	**0.0175** ** **(0.008)**	**0.0171** ** **(0.007)**	*−0.0056 ** *(0.003)*	−0.0015 (0.002)
% Foreign Directors	−0.0011 (0.006)	0.0035 (0.004)	0.0068 (0.009)	**0.0175** ** **(0.007)**	0.0043 (0.003)	*−0.0038 ** *(0.002)*
Age	**0.0437** ** **(0.022)**	*0.0342 ** *(0.019)*	**0.1040** *** **(0.034)**	**0.0645** ** **(0.028)**	−0.0154 (0.010)	*−0.0143 ** *(0.008)*
R^2	0.030	0.055	0.023	0.115	0.483	0.273

Footnote: coefficients from firm-fixed effects (columns (1) and (3)) and firm-random effects (Columns (2) and (4)) specifications for 2012–2020 of Z-score on board governance characteristics and firm-specific covariates (listed in Table 1), with year, industry, and country fixed effects, and constant term (coefficients are suppressed). Columns (1) and (2) use the full sample. Columns (3) and (4) use the sample of financially non-distressed firms (Z-score > 1.81) and Columns (5) and (6) use the sample of distressed firms (Z-score < 1.81). Industry and country dummies drop in the firm-fixed effects specification. Financial variables are winsorized at 1% and 99%. R^2 is the within R^2 for the firm-fixed effects specification and the between R^2 for the firm-random effects specification. Standard errors are in parentheses. *, **, and ***, respectively, indicate significance levels at 10%, 5%, and 1% levels. Significant results at 5% level or better (10% level or better) are in **boldface** (*italics*).

Columns (3) and (4) study the sample of financially non-distressed firms. In the firm-FE model (Column (3)), we observe that the fraction of female directors is statistically significant at the conventional level; however, board independence and foreign directors do not correlate significantly with the Z-score. In the firm-RE model in Column (4), we again confirm that the percentage of independent, female, and foreign directors is statistically significant. In both specifications directors' age is significantly associated with lower bankruptcy risk.

In Columns (5) and (6), we study the sample of distressed firms. It is worth noting that none of the board governance and board diversity measures has an economically and statistically meaningful association with the Z-scores of firms in this sample both with firm-FE and firm-RE specifications. Director tenure in the firm-RE specification is an exception, suggesting that directors with longer tenure are likely to lead to a lower insolvency risk. These results are substantially different for the pooled OLS results and also indicate fundamental differences in the potential impact of board independence and board diversity for financially distressed and non-distressed firms.

It is also worth noting that the explanatory power of firm-FE (within-R^2) and firm-RE (between-R^2) are substantially lower compared to the adjusted-R^2 in the pooled OLS. This difference demonstrates that a large part of the predictive power of the regression model is due to cross-sectional differences across firms, due to unobservable firm-specific attributes.

In (untabulated) regressions we also conduct significance tests for the coefficients of interest using standard errors clustered on industry-level and generally confirm our prior findings using all three specifications.

5. Conclusions

Prior research provides evidence that financial and accounting variables have strong predictive power for the insolvency risk of companies. However, relatively little research has been conducted to analyze whether board characteristics contribute to the predictive power of such models. We seek here to contribute towards this literature using a cross-country sample of European companies, a rich dataset on board governance, and a robust empirical setting with panel data and extensive covariates, including controls for some other aspects of governance.

The findings of our empirical analysis can be summarized under three main points. First, the independence of board members can facilitate board-monitoring capacity and mitigate insolvency risk, but firms must recognize and balance the tradeoff between knowledge and independence when determining board composition. Second, board diversity clearly helps firms prevent bankruptcy by introducing unique resources and expertise to firms. These results speak to efforts to introduce legislative action to address gender imbalance in the European Union (European Commission 2012, 2022) and strengthen the business case for board diversity. Finally, the effectiveness of board independence and diversity characteristics in mitigating insolvency risk depends on the financial stability of a given firm, underlining the ambivalent nature of these factors.

Collectively, we provide evidence that observable board governance characteristics enhance the predictive power of models of insolvency risk. At the same time, our alternative specifications using firm fixed and firm random effects highlight the need to consider the role of hard to observe and often firm-specific factors that may systematically shape board composition in the background (Hermalin and Weisbach 1998, 2003; Adams 2017). In our study these factors are further augmented by the heterogeneity of the dataset with respect to both country and industry affiliation. Our results highlight the need for scholars and practitioners, such as governance regulators, credit rating agencies, and financial institutions, to better understand the drivers of board composition, especially for firms under different conditions of financial distress.

Further research can be conducted to assess whether our results were driven by particular subsamples. This exercise can be conducted to by splitting the sample into countries or groups of countries based on institutional characteristics, such as legal origin, strength of enabling institutions, or degrees of economic development. Following prior research (Cathcart et al. 2020), it is also meaningful to split the sample into industries, such as manufacturing versus services, or large versus small firms, high-growth versus low-growth firms, or old versus young firms. Similarly interesting would be an analysis of the role of boards in different stages of financial distress and also through economic cycles (Huang et al. 2011).

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Sustainability Initiatives and Failure Risk of a Firm: How Are They Linked?

Kertu Lääts and Oliver Lukason *

School of Economics and Business Administration, University of Tartu, 51009 Tartu, Estonia
* Correspondence: oliver.lukason@ut.ee

Abstract: This paper studies the link between corporate sustainability and failure risk. The two competing hypotheses rely on the controversies in the theoretical and empirical literature linking sustainability and financial performance. Analysis of a sample of Estonian non-listed companies of all sizes indicates that firms engaged in more sustainability initiatives exhibit a higher risk of failure in the short run. The results remain robust for different sustainability initiatives and periods, while being exclusively determined by firms active locally, not on foreign markets.

Keywords: corporate sustainability; environmental; social; failure risk; financial performance

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1. Introduction

In the past decades, a myriad of studies have been conducted about the interconnection of corporate sustainability (CS) and financial performance (FP) (Bătae et al. 2021; Akben-Selcuk 2019; Alshehhi et al. 2018; Friede et al. 2015; Orlitzky et al. 2003; Margolis and Walsh 2003), with substantially varying results. Such diversity partly originates from the lack of theoretical consensus on whether sustainability initiatives should enhance performance (e.g., Rodriguez-Fernandez 2016; Yu and Zhao 2015; Baird et al. 2012; Margolis and Walsh 2003). The theoretical explanations have varied from applying prominent frameworks such as agency or stakeholder theory (e.g., Baird et al. 2012), to more practical explanations by means of financial theory (e.g., Peylo and Schaltteger 2014). While various proxies of FP have been applied to test the association with CS empirically, the extant literature is relatively quiet about the connection between CS and failure risk (FR) as a complex indicator of FP. Still, very recent theorizations exist in this domain (e.g., Amankwah-Amoah and Syllias 2020).

During the recent decade, various studies have looked at the link of CS and FP among large and listed companies. However, the worldwide trend to be greener and pay more attention to the sustainability of society has spread not only in the latter firm segment, but also among the unlisted micro-, small- and medium-sized enterprises (SMEs). Most of the empirical studies have focused on Western countries, while studies about CS activities and practices in Eastern Europe have remained in a considerable minority (Horváth et al. 2017a).

Relying on the theoretical fragmentation and research mostly on the example of certain firm types in specific environments, this study aims to provide empirical proof of how different sustainability initiatives are linked with firm failure risk. For that purpose, we apply a sample of unlisted firms of all sizes from the population of Estonian firms, for which information about environmental and social sustainability initiatives has been collected from their websites based on a known taxonomy. Firm failure risk is portrayed with a universal robust model, which enables predicting financial resilience with an acceptably high accuracy. The results provide an answer to the theoretical postulate by Amankwah-Amoah and Syllias (2020) in the short run context and oppose the mainstream empirical findings on the interconnection of FP and CS.

2. Literature Review

2.1. Theories about the Link of Corporate Sustainability, Performance and Failure Risk

Various studies investigating the relationship between financial performance (FP) and corporate sustainability (CS) have relied on organizational theories or applied some business-related logic. Probably the most commonly used organizational theory applied in relevant studies is stakeholder theory (Bătae et al. 2021; Akben-Selcuk 2019; Rodriguez-Fernandez 2016; Baird et al. 2012; Tagesson et al. 2009), which provides the general framework between CS and FP, taking into consideration the interests of organizations' various stakeholders. The implication of CS on FP portrayed by the stakeholder theory is not straightforward, although a positive effect has been assumed in the long run in case all stakeholders' interests have been met (Baird et al. 2012). Another prominent theory, the resource-based view, has similarly suggested that the link between CS and FP is presumably positive (Bătae et al. 2021; Akben-Selcuk 2019; Friede et al. 2015; Orlitzky et al. 2003; Margolis and Walsh 2003). In turn, the studies describing this phenomenon through the lens of agency theory (Akben-Selcuk 2019; Lee and Lee 2019; Krüger 2015) are skeptical about the clearly positive nature of the link, pointing out that CEOs might be overinvesting in CS for the sake of their own reputation, rather than for the benefit of a company. The latter has also been referred to as the value-destroying theory (Yu and Zhao 2015). In addition, Bénabou and Tirole (2010), in their discussion on the benefits, costs and limits of socially responsible behavior, consider the possibility of a short term bias, i.e., the incentives of managers drive them to maximize short run profit rather than focusing on the long run and broader perspective. In addition, in the context of developing and emerging economies, investors could be more concerned about FP than long term sustainability and corporate responsibility (Akben-Selcuk 2019; Aras et al. 2010). Indeed, besides the traditional selection of views about the link of CS and FP, an explanation in both theoretical and empirical literature of finance is that sustainability investments might just not pay off, especially when made in excess amounts (e.g., Peylo and Schaltteger 2014).

The empirical validation of the above-mentioned underlying theories seems to reveal conflicting findings, i.e., the relationship is either positive, neutral or negative. The variation in findings should also be contextualized in respect to which measures of FP and CS were used (Margolis and Walsh 2003), but also which other components of the study design (including statistical methods and population of firms) were applied. For instance, Ye et al. (2021), based on the review of earlier study designs, outlined the complexity of the interconnection of the two phenomena, i.e., FP and CS. Still, positive associations between CS and FP seem to dominate (Bătae et al. 2021; Akben-Selcuk 2019; Rodriguez-Fernandez 2016; Yu and Zhao 2015; Tagesson et al. 2009). The positive link explained that more CS leads to better FP, either reflected through market or accounting-based measures. On the other hand, some studies found the connection to be only partly positive (Cho et al. 2019), neutral (Nelling and Webb 2009) or even negative (Bătae et al. 2021; Krüger 2015; Moore 2001). Baird et al. (2012), for instance, found substantial variation in the effect directions through different industries. Another important aspect is that different CS initiatives have led to varying results for the same firms implementing them (see, e.g., the empirical results in Han et al. 2016; Bătae et al. 2021).

However, as already referenced above, another important question is which timeframe researchers are considering, namely whether the positive effect of CS is observable in the short and/or long run. Generally, in the long run, there are higher expectations about the positive effect, and in the short run, the effect could be negative (Aras et al. 2010; Bénabou and Tirole 2010) or neutral (Nelling and Webb 2009) as well. There is extant empirical evidence showing a negative effect in the short run, which turns positive in the course of time (e.g., Kuo et al. 2021).

The previous periodization logic has been adopted by theories linking CS and failure risk (FR) as well. A recent theoretical conceptualization by Amankwah-Amoah and Syllias (2020) postulated that in the short run, there are potential negative effects of environmental initiatives, and thus, they will increase the risk of business failure, while in the long run,

the effect is, in turn, positive. The latter relies on the inherent interconnection of FP and FR. Since the first multivariate failure prediction model by Altman (1968), such forecast tools have usually included FP measures as predictors (e.g., Dimitras et al. 1996), while performance decline has been found both theoretically and empirically occurring in failing firms (Lukason and Laitinen 2019). Annual and accumulated profitability, liquidity and solvency have historically been among the most common predictors, whereas lower values increase failure risk (Altman et al. 2017), i.e., make a firm less financially resilient. The latter is logically motivated by mounting losses and drainage from liquid assets as a consequence (Beaver 1966; Scott 1981). As CS initiatives demand investments and/or increase costs but the positive effects of those initiatives have not yet manifested (i.e., translated into improvement in performance), the probable short term outcome is poorer FP and derived from that, higher FR as well.

2.2. Specific Empirical Findings through the Lens of Meta-Studies

As extensive analyses of past empirical findings about the interconnection of CS and FP have been conducted in the form of meta-analyses (Alshehhi et al. 2018; Friede et al. 2015; Margolis and Walsh 2003; Orlitzky et al. 2003), this section relies on those studies rather than providing a track of individual empirical papers. The meta-analyses summarizing the findings of previous empirical articles (see Table 1) mainly suggest that the relation between CS and FP is positive (Alshehhi et al. 2018; Friede et al. 2015; Orlitzky et al. 2003), while a remarkable share of neutral and negative associations exists as well (Margolis and Walsh 2003).

Table 1. Overview of meta-analyses on the corporate sustainability (CS) and financial performance (FP) relationship.

Author and Year	Number of Studies	FP Instrument	Nature of CS and FP Relation	Remarks
Alshehhi et al. 2018	132	Accounting and market based	Positive (78%)	Mostly a positive relationship, while some studies report a negative, mixed or no significant relationship. The variation is explained by the usage of different research methodologies.
Friede et al. 2015	1902	Accounting and market based	Positive (90%)	Social aspects correlate with FP more strongly than environmental aspects.
Margolis and Walsh 2003	127	Accounting and market based	Positive (50%)	Focuses only on social performance. Link between social performance and FP has mostly a positive/slightly positive and to lesser extent neutral or negative effect. Nature of the link is context dependent.
Orlitzky et al. 2003	52	Accounting and market based	Positive correlation, bidirectional	Social performance has higher correlation than environmental performance.

The focus of meta-studies has been diverse, highlighting the correlation of either the social, environmental, economic or some other dimensions of CS with FP. The study by Alshehhi et al. (2018) looked at three sustainability dimensions (environmental, social and economic) together and found a quite high 78% positive effect on FP over all studies. Similarly, Friede et al. (2015) reported based on an extensive review of previous studies a very high share (namely 90%) of positive effects of social, environmental and governance

CS dimensions on FP. The study by Margolis and Walsh (2003) focusing on social dimension's effects on FP concluded that the relationship could be positive, neutral, negative or insignificant, depending on the context. Orlitzky et al. (2003) applied both the environmental and social dimensions, outlining that social CS had a higher positive correlation with FP than environmental CS. Therefore, despite the dominant positive effect, the available empirical literature still lacks a final consensus on how FP and CS are interlinked (including differences in the studied timeframe), and thus, it is logical to assume the same for the empirically unstudied linkage of CS and FR, as the latter can be viewed as a complex indicator of FP.

2.3. Competing Hypotheses

The track of theoretical and empirical literature in earlier sections of the paper provides controversial foundations for whether firms with (more) sustainability initiatives could witness higher or lower failure risk. One strand of research saw CS initiatives mainly to improve FP (e.g., Orlitzky et al. 2003; Bătae et al. 2021) and derived from that also lower FR, while in turn, contrary propositions exist either focusing directly on the association of CS and FR (Amankwah-Amoah and Syllias 2020) or viewing the interrelation of CS and FP (Moore 2001; Bénabou and Tirole 2010). The latter fragmentation could be contingent on which exact study designs were applied in respective research (e.g., Ye et al. 2021; Sardana et al. 2020; Peylo and Schaltteger 2014; Lawrence et al. 2006). Still, in empirical research, more evidence has been found about the positive association of CS and FP (see, e.g., Friede et al. 2015 for the list of relevant studies), while to the knowledge of the authors no profound empirical research is available about the link between different CS initiatives and FR. Relying on the aforementioned motivation, we postulate two competing hypotheses, of which only one can be accepted:

H1a. *Firms with more CS initiatives are at a higher risk of failure in the short run.*

H1b. *Firms with more CS initiatives are at a lower risk of failure in the short run.*

Several considerations concerning the hypotheses should be pointed out. First, the application of a single hypothesis (postulating either a negative or positive association) is not a suitable option as in case of rejection it would not be disclosed whether the relationship is either opposite or neutral (i.e., insignificant). Second, we contextualize this research on the short run timeframe, as the theoretical literature has suggested to differentiate between the short and long timelines of effects (Bénabou and Tirole 2010; Baird et al. 2012) and the available empirical research usually focuses on shorter periods (e.g., Cho et al. 2019; Lee and Lee 2019; Aras et al. 2010; Tagesson et al. 2009; Moore 2001). Moreover, the long term payoff could be revealed in an undeterminable timeline and impacted by a vastly larger variety of additional factors (Böckin et al. 2022; Alshehhi et al. 2018; Peylo and Schaltteger 2014), making it either extremely difficult or even impossible to model reliably. Last, focusing on two groups of firms, namely those with(out) CS initiatives, would seriously oversimplify the real world, because firms vary remarkably in respect to the magnitude of applied initiatives. Some companies might "fashionably" apply a single initiative, while others would redesign the whole corporate strategy to account for CS. Thus, relying on theoretical explanations about the relationship of CS and FR, we extended the empirical strategy to account for the number of CS initiatives implemented by firms.

There is various extant evidence available that firms functioning in foreign markets might be intensively engaged in sustainability initiatives (e.g., Taherdangkoo et al. 2017; Arora and De 2020), while a positive effect from initiatives on exporting has often been reported (e.g., Villena and Souto-Pérez 2016; Lu et al. 2020). Exporters have also been found to be more productive than firms functioning domestically (Wagner 2007). The latter facts would suggest that the rejection of H1a could be more likely in case of exporters, which have better financial means to more purposefully implement initiatives. In turn, for firms functioning domestically, the implementation of initiatives could be more random and less likely to enhance financial well-being. Therefore, in the empirical portion of the paper the

two competing hypotheses should be additionally validated in separate subsamples of (non-)exporters.

3. Study Design

As unlisted firms, especially SMEs, usually do not provide sustainability information in their annual reports (Lääts et al. 2017), a different information source has to be used to collect the relevant data. The two main available options include primary data by means of questionnaires and secondary data by means of different disclosures. This study implemented the latter option by considering the published information on firms' websites. Sustainability disclosures in the web are a usual source of information in the relevant literature (e.g., Lodhia 2010; Moure 2019). Still, it should be acknowledged that while questionnaires can always be subject to a response bias, websites can be subject to a publishing bias, i.e., relevant information might have been left undisclosed. The latter should be differentiated from the disclosure bias (Fischer and Verrechia 2004), as that concerns annual reports, which unlike websites still follow certain international or local guidelines. It is reasonable to assume that the publishing bias is distributed randomly, i.e., it is not inherent to some specific type of firms.

This paper is based on a sample of firms from Estonia, which was obtained during research conducted in early 2020 and fully reported in Pajur and Saaroja (2020). Therefore, the sample's formation particulars and collection of sustainability information described herewith is a summary of the detailed track provided in Pajur and Saaroja (2020). To avoid firm selection bias, the sample was collected by Pajur and Saaroja (2020) by using four different sources as follows. First, the Google-based search with different sustainability keywords was conducted to find firms having relevant notifications on their website. Second, the first search was complemented with firms achieving a CSR label in Estonia. Third, the latter searches were complemented with national award-winning Estonian firms. Finally, firms not present in the first three pools were complemented with those present in the Estonian Competitiveness Chart. The latter four-step sampling strategy resulted in 452 firms that had some sustainability-related information on their websites.

The final sample in this study included 421 observations, as for 31 firms additional information about dependent and control variables was not fully available. Because of the versatility of sample composition, this potentially provides a representative perspective of Estonian firms posting their sustainability initiatives on websites. It should also be pointed out that the majority of Estonian VAT-responsible firms either did not have a website or had one listing only basic information, without any focus on sustainability.

The sample was balanced over different firm characteristics (see also Table 2), with none of the firm types dominating. Namely, the breakdown of firms through size groups was as follows: 140 micro-, 106 small-, 102 medium- and 73 large-sized firms. Out of the sample, 37.5% of firms were majority foreign-owned, while for the rest domestic owners dominated. The highly aggregated sectoral breakdown was as follows: agriculture and mining 5, manufacturing 88, construction 45, sales 132, services 151. The average age of a firm in the sample was 19 years (SD = 11.5), therefore evenly representing entities from young to old. Thus, the threat that the analysis would be firm context-specific was minimized.

Table 2. Breakdown of the sample by different characteristics.

Characteristic	Breakdown
Aggregate sectoral	5 firms agriculture and mining, 88 manufacturing, 45 construction, 132 sales, 151 services
Size	140 firms micro, 106 small, 102 medium, 73 large
Age	86 firms < 10 years, 138 10 $\leq$ years < 20, 197 20 $\geq$ years
Foreign ownership	263 non-foreign owned, 158 foreign owned

The dependent variable (see Table 3) of the study focused on failure risk (coded as FR), and the most-cited recent universal tool by Altman et al. (2017) was applied in this study. Specifically, the model with the largest number of control variables to account for various firm-specific risks was applied from that study (see Model 8 in Altman et al. (2017, p. 154) in the last column of the respective table). The latter logistic regression model from Altman et al. (2017) includes four classical and widely used financial ratios, namely working capital to total assets, retained earnings to total assets, earnings before interest and taxes to total assets and book value of equity to total debt. Besides these financial ratios, the model includes various controls, respectively portraying year dummies, size, age, country risk, and industry dummies. The respective model has a high precision (by means of area under the curve) in the Estonian context, and thus, there is no need to apply a comparative local model. Moreover, using a well-established universal failure risk determination tool helps to generalize the study's results to other environments. The input needed to calculate the Altman et al. (2017) model's values in this study originated from Bureau van Dijk's Amadeus database.

Table 3. Variables of the study.

Code	Content and Calculation
	Dependent
FR	Failure risk calculated from Altman et al.'s (2017) model #8 multiplied by 100 from year 2019 or 2018 noted as a subscript
	Independents
ENSU	Number of environmental sustainability initiatives of the company {0, . . . , 9}
SOSU	Number of social sustainability initiatives of the company {0, . . . , 7}
SUSUM	Number of environmental and social sustainability initiatives of the company {0, . . . , 16}
	Controls
SIZE	Ordinal variable to reflect micro, small, medium or large firm {1, . . . , 4}
AGE	Firm age in years from foundation at the end of 2019 or 2018 divided by 100
SAGRI	Binary variable if a firm belongs to NACE sec. A
SMAN	Binary variable if a firm belongs to NACE sec. B, C, D or E
SCONS	Binary variable if a firm belongs to NACE sec. F or L
SSALE	Binary variable if a firm belongs to NACE sec. G
FOWN	Binary variable if a firm is >50% foreign owned

Note: Service sector serves as a base category in the analysis.

The three independent variables focused on the sustainability initiatives the firm had implemented. In Pajur and Saaroja (2020), the sustainability initiatives disclosed on the websites were classified based on their content to detailed categories of sustainability (9 for environmental and 7 for social) by using the well-known Global Reporting Initiative standards. A similar approach has been applied in earlier research (Horváth 2017; Horváth et al. 2017b). In this study, the number of different environmental (coded as ENSU) and social (coded as SOSU) sustainability initiatives was applied. In addition to using ENSU and SOSU separately, the summed count of initiatives was applied (SUSUM = ENSU + SOSU). The latter provided a holistic view of the linkages, as specific initiatives could potentially lead to varying results, which in turn could differ from the results obtained from the full complex of initiatives. The collection of CS information by Pajur and Saaroja (2020) was conducted in the beginning of 2020 to enhance the comparability with the fiscal year 2019 financial performance, while in order to enhance reliability, the coding protocol was established and the respective process administered by two researchers. The number of different environmental sustainability initiatives (ENSU) ranged from 0 to 9, while it was from 0 to 7 in respect to social sustainability (SOSU) in this study. Derived from the latter, SUSUM ranged from 0 to 16.

Relying on past research (e.g., Akben-Selcuk 2019; Barbosa et al. 2022; Arora and De 2020) and in order to disclose various contextual variations, multiple controls were appended to the study. These can be followed in Table 3 and portray the size (coded as SIZE), age (AGE), foreign ownership (FOWN) and high-level sectoral (SAGRI, SMAN,

SCONS, SSALE) contexts of the firms, while for the latter the service sector remains as the base category.

As the aim was to find out whether the greater volume of either or summed initiatives leads to higher or lower failure risk, ordinary least squares regression (OLS) was applied in SPSS statistical package. For that purpose, we used failure risk calculated from the year 2019 financial data as our base model. In order to find out whether the results were not subject to a single year bias, the same analysis was repeated with year 2018 failure risk, as most of the initiatives were expected to have started earlier than in 2019. In addition, the usage of samples could result in a portion of observations having a strong influence on the final estimates. Thus, we conducted additional bootstrapping with 50 samples by using the year 2019 failure risk to find out the effect of subsamples on the final results. Because of the high significant correlation (0.74 with $p < 0.001$) between ENSU and SOSU, we ran separate regressions with these independent variables rather than applying them in a single regression. Indeed, it is logical that firms involved in more sustainability initiatives might focus on both social and environmental contexts. Moreover, the latter organically enabled obtaining "pure" results of how both of those independent variables associate with failure risk. Lastly, we broke the sample in two based on whether the firm was an exporter or not and reran the regressions with year 2019 data. The latter originated from the fact that exporters could be more active investors in sustainability initiatives (e.g., Sardana et al. 2020).

4. Empirical Results

The descriptive statistics are provided in Table 4. Firms in the sample usually reported a few sustainability initiatives, as the means for ENSU and SOSU are respectively 2.05 and 1.38, summing the same value for SUSUM to be 3.43. The medians equaling zero for ENSU and SOSU point to the fact that firms chose either of those initiatives, rather than focusing on both simultaneously.

Table 4. Descriptive statistics of independent and dependent variables.

Statistic	FR_{2019}	FR_{2018}	SOSU	ENSU	SUSUM
N	421	421	421	421	421
Mean	0.056	0.054	1.38	2.05	3.43
Std. Deviation	0.098	0.090	2.10	2.91	4.69
Median	0.018	0.019	0	0	1.00
Minimum	0	0	0	0	0
Maximum	0.87	0.59	7.00	9.00	16.00
N	421	421	421	421	421

In turn, the median value of 1 for SUSUM indicates that the majority of firms were focusing at least on one initiative. Still, the high standard deviations for those three variables reflected a remarkable fluctuation in the number of initiatives. Both failure risks, i.e., FR_{2019} and FR_{2018}, calculated based on the financial reports reflect a low threat of corporate collapse and high financial resilience. Indeed, many of the entities included in the sample were top ranking Estonian firms. The descriptive statistics of control variables are not provided herewith, as the frequencies of their classes were already disclosed in the study design section.

Tables 5–7 document the results for the OLS regressions composed with either ENSU, SOSU or SUSUM as independent variables and FR_{2019} or FR_{2018} as the dependent variable. For all regressions, the higher number of CS initiatives indicates a significant increase in firms' failure risk, although it should be pointed out that the p-values for ENSU were much lower than for SOSU for both years (i.e., 2018 and 2019), therefore reflecting a weaker link in the case of the latter independent variable. Still, for SOSU, the results remained under the universally acceptable threshold of $p < 0.05$ as well. The year 2019 results were reconfirmed with the previous year's failure risk (FR2018), reflected through

specific columns in Tables 5–7. In addition, the bootstrapping of FR_{2019} revealed that the coefficients of independent variables did not change signs, indicating that the sample of firms is relatively homogenous. Therefore, the findings can be considered reasonably robust, i.e., the periodization and sampling are likely not to affect the findings.

Table 5. Models with ENSU as the independent variable (N = 421).

	FR_{2019}			FR_{2018}			BS FR_{2019}	
Variable	**U. Coef.**	**S. Coef.**	***p*-Value**	**U. Coef.**	**S. Coef.**	***p*-Value**	**Lower**	**Upper**
Constant	−0.029		0.010	−0.037		0.000	−0.050	0.010
ENSU	0.006	0.192	0.000	0.005	0.174	0.000	0.004	0.010
SIZE	0.041	0.458	0.000	0.038	0.460	0.000	0.033	0.053
AGE	0.006	0.007	0.878	0.049	0.064	0.149	−0.100	0.113
SAGRI	−0.021	−0.024	0.571	−0.013	−0.016	0.703	−0.052	0.003
SMAN	−0.012	−0.049	0.302	−0.008	−0.037	0.426	−0.036	0.006
SCONS	0.016	0.049	0.272	0.021	0.074	0.093	−0.016	0.052
SSALE	−0.024	−0.111	0.020	−0.021	−0.109	0.020	−0.038	−0.004
FOWN	−0.035	−0.172	0.000	−0.020	−0.108	0.019	−0.055	−0.015
R^2		0.297			0.323			

Note: U. and S. refer to (un)standardized coefficients, BS to bootstrapping.

Table 6. Models with SOSU as the independent variable (N = 421).

	FR_{2019}			FR_{2018}			BS FR_{2019}	
Variable	**U. Coef.**	**S. Coef.**	***p*-Value**	**U. Coef.**	**S. Coef.**	***p*-Value**	**Lower**	**Upper**
Constant	−0.032		0.005	−0.040		0.000	−0.052	−0.001
SOSU	0.006	0.123	0.010	0.004	0.101	0.030	0.001	0.010
SIZE	0.043	0.483	0.000	0.040	0.486	0.000	0.035	0.054
AGE	0.002	0.003	0.949	0.048	0.061	0.170	−0.113	0.113
SAGRI	−0.029	−0.032	0.453	−0.019	−0.023	0.583	−0.070	−0.002
SMAN	−0.006	−0.026	0.590	−0.004	−0.017	0.725	−0.037	0.020
SCONS	0.015	0.046	0.307	0.021	0.071	0.111	−0.012	0.040
SSALE	−0.020	−0.096	0.047	−0.019	−0.096	0.043	−0.045	−0.004
FOWN	−0.031	−0.151	0.001	−0.016	−0.086	0.064	−0.047	−0.013
R^2		0.282			0.309			

Note: U. and S. refer to (un)standardized coefficients, BS to bootstrapping.

Table 7. Models with SUSUM as the independent variable (N = 421).

	FR_{2019}			FR_{2018}			BS FR_{2019}	
Variable	**U. Coef.**	**S. Coef.**	***p*-Value**	**U. Coef.**	**S. Coef.**	***p*-Value**	**Lower**	**Upper**
Constant	−0.030		0.009	−0.038		0.000	−0.056	−0.024
SUSUM	0.004	0.180	0.000	0.003	0.158	0.001	0.000	0.005
SIZE	0.041	0.461	0.000	0.038	0.465	0.000	0.031	0.047
AGE	0.001	0.001	0.977	0.046	0.059	0.182	−0.016	0.229
SAGRI	−0.025	−0.027	0.512	−0.016	−0.019	0.642	−0.053	0.012
SMAN	−0.009	−0.038	0.425	−0.006	−0.027	0.565	−0.028	0.013
SCONS	0.016	0.049	0.272	0.021	0.074	0.095	−0.003	0.054
SSALE	−0.022	−0.102	0.033	−0.019	−0.101	0.033	−0.046	−0.006
FOWN	−0.035	−0.172	0.000	−0.020	−0.106	0.022	−0.048	0.008
R^2		0.293			0.319			

Note: U. and S. refer to (un)standardized coefficients, BS to bootstrapping.

Based on the additionally calculated marginal effects (with the dependent FR2019), ENSU's change (dy/dx = 0.0065) affected FR more than SOSU's (dy/dx = 0.0057). Similar to single initiatives (i.e., ENSU or SOSU), the total number of initiatives (SUSUM) had a positive coefficient and was significant in respective regressions (see Table 7). In the case instead of SUSUM, the joint effect of two sustainability initiatives in the form of

ENSU×SOSU was applied, it also remained significant at $p < 0.001$ with a positive sign. This indicates that besides the total number of initiatives, their joint effect led to the same conclusion. The explanatory power of regressions by means of R^2 was around 0.3, while in empirical economics the given figure has usually been lower (Eisenhauer 2009). Friede et al. (2015) reported that for 1902 empirical studies analyzed, the average correlation of sustainability initiatives was only 0.118. In Friede et al. (2015), only 2 meta studies out of 25 with a relatively small number of papers (respectively 22 and 31 papers) reported a 0.3 correlation between the two phenomena, while those analyzing more than 100 papers all reported the correlation to be below 0.2 (and several even below 0.1). The correlations in this study were respectively 0.30 between ENSU and FR_{2019}, and, 0.24 between SOSU and FR_{2019}. Thus, the results obtained in this study indicate the strength of association to be well above the majority of what the extant literature has found. Still, by classical statistical standards, the correlations in this study can be considered weak, as the breakeven between weak and moderate has been noted to be 0.3 (see Gerber and Finn 2005). The models were free from multicollinearity threat, as the highest correlation between variables (independent and control) did not exceed 0.4 threshold in this study.

The control variables in both regressions indicate that larger firms (SIZE) were in higher and foreign-owned firms (FOWN) were in lower failure risk. The latter can be logically explained by better capitalization of entities, where a cross-border parent is present. Concerning the variable SIZE, a probable explanation is that as there was a significant increase in sustainability initiatives through firm size categories (the SUSUM medians being respectively 0, 1, 2 and 6 from micro to large firms' categories), the costs of initiating and keeping them demanded more resources, therefore reducing performance. A noteworthy finding is that the standardized coefficient of SIZE is in all regressions much larger than for the independent variable (either SOSU, ENSU or SUSUM). Other controls are mostly insignificant throughout the composed regressions.

As a separate analysis, the sample was broken in two, depending on whether the firm was an exporting entity in 2019 (N = 234) or not (N = 187). The parametric ANOVA and non-parametric median tests clearly point to the fact that exporters included in the sample were characterized by significantly more sustainability initiatives. For instance, the mean and median for SUSUM for exporters were 4.1 and 1.0, respectively, while the same figures for non-exporters were 2.6 and 0, respectively. The succeeding regression analyses in the two sub-populations led to the following results. First, when the regressions were repeated in the exporters' pool, none of the independent variables (ENSU, SOSU, SUSUM) were significant. Second, in the pool of non-exporters, in turn all of the three independent variables were significant and the association was more pronounced when compared with those documented in Tables 5–7. Thus, the positive association of failure risk and sustainability initiatives was dominatingly determined by the same phenomenon among firms active in the local market. Indeed, in most countries, the latter firms make up the vast majority of the firm population.

5. Discussion of Findings

The median values presented in Table 4 indicate that an average firm is not paying attention to both initiatives at the same time, while it has implemented one initiative of either kind. Therefore, the analyzed firms could on an average be considered modestly focused on sustainability. Similar to previous research (e.g., Lawrence et al. 2006; Aras et al. 2010; Kantcheva 2016; Lääts et al. 2017), the additional analysis of sustainability initiatives by firm size groups showed that smaller companies tend to have lower interest in sustainability initiatives. As the studied sample can be considered to a certain extent shifted towards firms that were likely to have implemented at least some sustainability initiatives, it could be deduced from the latter that sustainability initiatives are not widespread in the general population of Estonian SMEs.

The results enable accepting H1a postulating the higher short run failure risk of firms engaged in more sustainability initiatives, while the latter holds in the case of all initiatives,

i.e., for environmental, social and combined sustainability initiatives. Respectively, H1b postulating the opposite of H1a is therefore rejected.

The results support theories postulating poorer performance of more sustainable firms, at least in the short run perspective. In particular, the theoretical concept of Amankwah-Amoah and Syllias (2020) postulating that more focus on sustainability potentially increases failure risk in the short run was validated with the current study. In addition, the results were in line with the value-destroying theory (Yu and Zhao 2015) and short term managerial-incentives-based explanation by Bénabou and Tirole (2010), who concluded that managers who need to satisfy owners' profit expectations and who are awarded for that tend to choose financial aims ahead of sustainability objectives. More generally, the latter is in accordance with the agency-theory-based explanations of the negative effect (Akben-Selcuk 2019; Lee and Lee 2019; Krüger 2015). A practical explanation could point to the fact that sustainability initiatives just do not pay off financially, at least in the short run (Peylo and Schaltteger 2014). More generally, this could be explained with the theoretical perspectives of obfuscation and selective disclosure pointing out that favorable developments are quickly and excessively presented, in order to reduce the negative effects from underperformance (Lukason and Camacho-Miñano 2019). Indeed, this phenomenon could be especially characteristic to start-up firms, which have not exceeded the break-even point to be profitable.

The findings contrasted a considerable amount of empirical research (Alshehhi et al. 2018; Friede et al. 2015; Orlitzky et al. 2003) presenting the more likely positive effect of sustainability initiatives. The usually applied FP measures (e.g., profitability ratios) capture firms' performance in a less complex way compared to aggregate indicators such as failure or survival probability. In addition, it has been long established that financial performance of a firm can be affected by a large number of internal and external determinants (e.g., Hansen and Wernerfelt 1989; Rumelt 1991). Failure prediction models (including the one applied in this study) usually include a variety of financial indicators, accompanied by other firm-specific and environmental characteristics. The composition logic of such models also positions different firms in a ranking in comparison to each other. Thus, the given approach is less vulnerable to limitations inherent to single financial indicators, the values of which can be more random in time and contingent on specific context.

Of specific findings, the results were robust in respect to which sustainability initiatives were considered. Some earlier studies (e.g., Han et al. 2016; Bătae et al. 2021) indicated a conflicting behavior of different sustainability investments, while this study's results are less radical. Namely, only the strength of the association of different initiatives varies, more environmental sustainability initiatives leading to a larger increase in failure risk when compared with social ones. Indeed, such a finding could be explained by a certain financial logic, as environmental initiatives might per se demand larger investments, which in turn translate into respective costs.

The study indicates that in the pool of independent and control variables, sustainability initiatives are one of the few having a significant relationship with failure risk. From the control variables, size and foreign ownership were systematically linking to failure risk, respectively the former positively and the latter negatively. In addition, the standardized coefficient of size indicates it to be a more important predictor of failure risk than the sustainability performance. While such an interconnection itself is not surprising, an unusual feature was that the increase in firm size led to greater failure risk. As indicated earlier, this might be explained by the fact that as the majority of studied firms were financially quite well off, because otherwise they probably might not have had funds for sustainability investments at all, then ceteris paribus, larger firms that made more sustainability investments also reduced their short term financial performance more.

An additional important finding concerned the exporting activities of the analyzed firms. Firms engaged in exporting showed no significant association with any of the variables reflecting sustainability initiatives. This could mean that in the target markets of Estonian firms, of which the Nordic countries are the most prominent (Vissak and Masso 2015), high attention was paid to sustainability initiatives. As many of the exporting firms

are foreign-owned, often by owners originating from their target market, putting these two facts together could organically mean that Nordic-owned firms with Nordic markets are rather homogenously sustainable. Indeed, firms in Nordic countries have been long known to be the frontrunners in sustainable development (see e.g., Sustainability for all 2021). In turn, in the case of firms with local market orientation, the initiatives do not seem to pay off in the short run. It might be that firms voluntarily engaged in initiatives are automatically less well off when compared with their competitors, which without a state's regulatory pressure might be very reluctant to adopt sustainability in their business models, partly because Estonian customers do not seem to value sustainability enough (Kantcheva 2016).

6. Conclusions

This paper looked at the association of different corporate sustainability initiatives and firm failure risk with a sample of Estonian firms of varying sizes. As the main scientific conclusion, we would postulate that frequent adherence to sustainability initiatives could increase firms' failure risk, at least in the short run. Of course, the latter does not mean that such firms would be in an actual threat of failure.

Whether the initiatives pay off in the long run, will remain an avenue of future research. In addition, while this paper focused on the association, one should acknowledge the challenges connected to setting up a study design to outline both the short and long term causal effects of initiatives. For instance, one would probably need factual information about the change of customer preferences to buy a certain product or service because of increased sustainability of a firm. In addition, the profitability analysis of sustainability initiatives would demand precise information about the money invested in those activities, which is usually not available through public financial information, especially for SMEs. A limitation of this paper to be resolved in future studies is that it looked only cross-sectionally at the relationship between sustainability initiatives and firm failure risk to validate a specific theoretical concept and resolve the controversies in earlier theoretical and empirical literature. For the portrayal of a longitudinal causal relationship one would need, besides the proper variables, their dynamic reflection over a lengthy timeframe. Still, multiple years and bootstrapping applied in this study provided sufficiently strong evidence that firms at least denoting their greater commitment to sustainability might not be as well off financially as their counterparts in the short time horizon.

Multiple practical implications can be derived from the results. First, corporate managers should acknowledge that performance declines due to (over)investing in sustainability initiatives could be the likely reality. Thus, a proper profitability analysis of the implementations by the firm's management should be a rule rather than an exception. A challenging facet of the latter is to forecast the long term revenues and costs of sustainability investments, while the latter could benefit from the fact that firm valuation methodologies have advanced enough in the "start-up era", in which classical discounted cash flow approaches have been deemed to be insufficient. Probably, firms should choose one or a few most beneficial and feasible initiatives rather than implementing a wide range, which they cannot handle, therefore leading to value destruction. Corporate stakeholders (e.g., creditors and suppliers) should be aware that excess focusing on sustainability should be taken conservatively, as firms' classical financial indicators (e.g., liquidity and profitability as an input to failure risk calculation) could be impacted negatively by that tendency. Namely, the nice façade of a firm might not match the interior. Public sector institutions that are determining and monitoring sustainability strategies the corporate sector is subject to should carefully consider not to exaggerate with the additional burden of activities set on firms.

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CSR and Firm Risk: Is Shareholder Activism a Double-Edged Sword?

Konstantinos Bozos [1], Timothy King [2] and Dimitrios Koutmos [3,*]

[1] Accounting and Finance Department, Leeds University Business School, University of Leeds, Leeds LS2 9JT, UK
[2] School of Accounting and Finance, University of Vaasa, 65200 Vaasa, Finland
[3] Department of Accounting, Finance, and Business Law, College of Business, Texas A&M University-Corpus Christi, Corpus Christi, TX 78412, USA
* Correspondence: dimitrios.koutmos@tamucc.edu; Tel.: +1-361-825-5700

Abstract: Few can argue with the notion that corporations should at least consider corporate social responsibility (CSR) to better understand the impact of their operations on society. However, recent empirical tests suggest CSR has an ambiguous impact on firm performance. To shed new light on this debate, we examine the extent to which voting support for nonbinding shareholder-initiated CSR proposals is empirically linked to changes in firms' underlying systematic risks. Using a rich dataset of proposals in the US from 1998 to 2011, we contribute several novel findings. First, we show that shareholder voting support is nonlinearly linked to changes in systematic risk. Specifically, proposals with low voting support increase risk while those with high support decrease risk. This nonlinearity is particularly pronounced for consumer-sensitive firms that cater primarily to individual consumers rather than for firms in non-consumer-sensitive industries that produce goods or services meant for industrial or governmental use. Second, the 2007–2009 financial crisis exacerbated increases in firms' systematic risks for proposals with low voting support. Our results, which highlight asymmetry regarding firms' CSR initiatives, remain robust when controlling for firm-specific factors as well as shifts in investor sentiment. From a risk management perspective, our findings suggest that CSR initiatives need strong shareholder support to realize benefits from the so-called 'risk-reduction hypothesis'.

Keywords: corporate social responsibility; nonbinding voting; shareholder activism; systematic risk

JEL Classification: G32; G34; M14

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1. Introduction

Do corporate social responsibility (CSR) activities impact firm risk? Recent interest in CSR has kindled debate as to why firms choose to engage in CSR initiatives. A growing belief is that while CSR can provide a competitive advantage it also carries significant risks (Albuquerque et al. 2019; Cao et al. 2019; Cheung 2016; Flammer 2015; Lins et al. 2017; Margolis et al. 2009; Servaes and Tamayo 2013). Nevertheless, it appears that the debate pertaining to CSR exacerbates frequently when highly publicized negative events, such as the BP oil spill in the Gulf of Mexico in 2010 and the Volkswagen emissions scandal in 2015, come to light and afflict society and the economy.

While interest in CSR has risen over the years, relatively little is understood as to how and when CSR activities impact a firm's underlying systematic risk. While recent studies typically document a negative relationship between CSR engagement and risk (Albuquerque et al. 2019; Hong et al. 2019; Jo and Na 2012; Kim et al. 2014), we argue that the risk implications of CSR are in fact more nuanced than previously shown. In particular, we conjecture that the association between CSR and risk is likely nonlinear and varies with

the nature of the industry, economic conditions, and the degree and identity, respectively, of shareholder support for activist proposals.

The objective of our study is to examine the extent to which voting support for shareholder-initiated nonbinding CSR proposals (Cai and Walkling 2011; Cuñat et al. 2012; Ertimur et al. 2010; Flammer 2015; Iliev and Vitanova 2019; Levit and Malenko 2011) is empirically linked to changes in firms' underlying systematic risks. Understanding this relationship is important since investors, consumers, regulators and special interest groups are exerting an increasingly higher degree of pressure on firms to consider the social impacts of their operations, which goes beyond mere compliance with the law (Cai and Walkling 2011; Cheung 2016; den Hond et al. 2014; Lev et al. 2010; Lins et al. 2017). Thus, there are likely to be both significant opportunities as well as risks associated with firms' CSR activities (Albuquerque et al. 2019; Cao et al. 2019; Jo and Na 2012; Kim et al. 2014; Lins et al. 2017; Rangan et al. 2015; Servaes and Tamayo 2013).

Our study draws inspiration from the philosophical dichotomy in views regarding the responsibility of management towards its stakeholders. One broad perspective is that the only stakeholders of primary concern to management are firm shareholders and, insofar as the firm operates within the law, it must utilize firm resources to increase its profits (Friedman 1970). The opposing view is that a firm's stakeholders consist not only of shareholders but also society at large. Thus, a firm has a fiduciary duty to contribute positively to the well-being of its society. While few can argue that firms should at least consider CSR and the societal impact of their actions, the complexities surrounding adoption of CSR initiatives, along with the diverse and, at times, contradictory proponents calling for it, make CSR an ever-moving target for management (Bird et al. 2007).

Motivated by dichotomous views on CSR, the prevailing consensus in the extant empirical literature is that CSR activities provide insurance-like benefits for firms (Godfrey et al. 2009). For example, Adhikari (2016) finds that less socially responsible firms tend to attract greater analyst coverage and Cui et al. (2018) show an inverse relation between CSR engagement and, respectively, information asymmetry and reputational risks. However, it is not clear if firms' motivations for engaging in CSR are altruistic or economic in nature (Rangan et al. 2015). Consistent with the so called 'risk-reduction hypothesis'[1] (e.g., Cai et al. 2016), Jo and Na (2012) show that CSR engagement may lead to reductions in firm risks for controversial industry sectors such as alcohol, tobacco and gambling. Kim et al. (2014) argue that CSR engagement may mitigate future crash risk while Flammer (2015) argues that although CSR proposals may not always be beneficial to a firm, there is a tendency for adoptions of close-call shareholder-initiated nonbinding proposals to generate positive announcement returns and superior accounting performance.

While CSR activities may be linked to a firm's underlying risk, understanding the nature of this linkage is empirically challenging. One challenge pertains to the complexity of CSR activities and how they should be valued. For instance, stakeholder assessments vary across time and are conditioned upon a wide range of factors that are also industry-specific (Ertimur et al. 2010). Thus, CSR activities have multifaceted risk management implications, which make it difficult to ascertain how CSR can impact firm risk. However, what does seem apparent is that failing to meet stakeholder expectations for CSR activities can lead to executive dismissals or other such dire consequences (Del Guercio et al. 2008), and may eventually convey negative signals to the market, leading to loss of firm value.[2] As mentioned, a rather acute example of how firm managers faced consequences for negligent decisions that afflicted the broader global economy and society is the Volkswagen emissions scandal. This resulted in the departure of then-CEO Martin Winterkorn and seven other top executives facing criminal charges in the US (Kentish 2017), a loss of approximately $56 billion in firm value, a $15.3 billion commitment to buy back or retrofit US diesel cars enforced by the regulator, reduced investment in R&D, and downgrades in the company's credit ratings by major rating agencies (Moody's, Fitch and Standard and Poor's). This chain reaction of events negatively impacted the firm's cost of capital (Reiter and Behrmann 2017; Ewing and Mouawad 2015; Sloat 2015).

In a novel approach to investigating how CSR is linked with firm risk, we examine shareholder-initiated proposals in the US (e.g., Cai and Walkling 2011; Cuñat et al. 2012; Ertimur et al. 2010; Flammer 2015; Levit and Malenko 2011; Iliev and Vitanova 2019). We argue that such proposals can serve as an important theoretical and empirical laboratory for gauging the extent to which voting support for CSR initiatives is linked to changes in a firm's underlying systematic risks. Prior research establishes that nonbinding shareholder-initiated proposals, which are voted on at firms' annual general meetings (AGMs), constitute an important channel through which shareholders can convey their views or concerns to firm management. These proposals thus afford shareholders an empowering mechanism through which they can induce changes in firm governance and corporate operations (Cuñat et al. 2012; Flammer 2015; Levit and Malenko 2011).[3] Despite their nonbinding nature, such shareholder-initiated proposals cannot be dismissed casually or on mere grounds that they are misaligned with managerial objectives (Del Guercio and Hawkins 1999; Flammer 2015).

While a growing body of extant studies examine the impact of CSR initiatives on shareholder wealth or on underlying firms' stock prices and attempt to show support for or against CSR depending on its impact, there is relatively less discussion pertaining to the impact of CSR-centered nonbinding proposals. As Flammer (2015) notes, first, it is not clear whether CSR proposals are always beneficial to the firm and, second, it appears that only close-call CSR proposals are positively tied to firm performance. As mentioned, such proposals are nonbinding or precatory in nature, yet they cannot casually be ignored by managers given that they reflect shareholder expectations or concerns, which may intensify if left unheeded. For example, Del Guercio and Hawkins (1999) show that high voting support in nonbinding proposals is an important signal of institutional shareholder discontent and a significant predictor of the likelihood of a proxy contest attempt initiated by pension funds. The latter of these two points is particularly interesting because it suggests that voting support is likely to be an important determinant of shareholder wealth when nonbinding proposals are initiated. This is something that has received relatively less attention in the literature and serves as a motivation for our study. In addition, we are further motivated by the rise in shareholder activism among institutional investors, such as hedge funds and pension funds, which use nonbinding proposals as a low-cost medium for initiating change or expressing dissatisfaction.[4]

In this present study, we question whether shareholder proposals supported by institutional investors, given their various levels of voting support and despite their presumed good intentions, can adversely impact underlying firms' systematic risks. We argue that this question—which is of direct relevance to activist shareholders as well as firm managers—is important, yet, to the very best of our knowledge, has not received extensive empirical attention. Our study thus sheds new light on the linkages between CSR and firm systematic risk using these shareholder-initiated proposals. Specifically, we conjecture that shareholder voting support may act as a 'double-edged sword', whereby low or high voting support for nonbinding shareholder proposals is linked nonlinearly to firms' underlying systematic risks. As we discuss more, we focus on systematic risk since this is the component of firm risk that is undiversifiable, regardless of whether institutional investors have access to greater information and resources or the capacity to invest across a broader range of asset classes given the lower transaction costs they face.

To test our research question, we implement a novel research design using nonbinding shareholder-initiated proposals to examine risk/price reactions around proposal votes. We adapt the market model, in line with Grullon et al. (2002) and Grullon and Michaely (2004), to detect shifts in systematic risk before and after a shareholder proposal is voted on during the AGM. We then test whether CSR voting support explains the estimated shifts in systematic risk. Thus, our approach helps us mitigate issues with endogeneity that may obfuscate causal interpretations of the effect of CSR on firm risk. For example, since we can control for pre-event observable and unobservable characteristics including pre-event firm risk, we can obtain unbiased causal estimates regarding how investors evaluate systematic

risk in the context of CSR. This allows us to uncover nuances in the CSR-risk relation across industries and time.

From our analysis, we show the following. First, that shareholder voting support serves as an indicator for CSR commitment and maintains a nonlinear and inverse U-shaped relation to systematic risk. CSR proposals with low levels of voting support (commitment) are linked to increases in systematic risk. As CSR commitment rises (high voting support), systematic risk declines. Second, we show that the 2007–2009 financial crisis only seems to exacerbate this nonlinearity, but the nature of the relation is robust; specifically, there are increases in systematic risk for proposals with low CSR commitment (low voting support) while systematic risk declines with high CSR commitment (high voting support). Finally, we show that the nonlinearity between voting support and systematic risk is particularly more pronounced for consumer-sensitive industries—firms that produce goods or services meant for individual customers rather than for industrial or governmental use (Lev et al. 2010).

These findings make several theoretical contributions to our understanding of the CSR-risk relation. First, we elucidate upon the growing body of literature that explores the risk implications of CSR activities. This body of literature posits a negative and linear relation between CSR engagement and firm risk. Jo and Na (2012) find that CSR engagement is associated with lower firm risk, especially for firms in controversial industry sectors. Kim et al. (2014) show CSR engagement is associated with lower downside risk. Albuquerque et al. (2019) show that systematic risk is lower in firms with higher CSR scores. Hong et al. (2019) find that firms with stronger CSR performance have lower litigation risk. We contribute to this literature by presenting a new stylized fact in CSR; specifically, and using shareholder proposals, we reveal a concave relation between voting support and changes in systematic risk, whereby surpassing the voting support threshold of approximately 39–45% is necessary in order for a firm to see a reduction in its systematic risk. In other words, while previous research identifies that CSR engagement may be associated with lower firm risks, we demonstrate that the impact of CSR engagement on firms' risk is in fact more nuanced.

Second, since we examine CSR in the context of firms' nonbinding shareholders proposals, we also contribute to a budding literature on shareholder voting. Several studies focusing on firm value effects serve as motivation for why we use nonbinding shareholder proposals to quantify the CSR-risk relation. Cuñat et al. (2012) and Flammer (2015) find that close-call CSR proposals typically create value for shareholders while Cao et al. (2019) find that non-targeted firms react to close-call proposals at peer firms. Cai and Walkling (2011) and Iliev and Vitanova (2019) focus on say-on-pay proposals and find they can add or destroy firm value contingent upon a firm's executive pay arrangements. Separately, a small number of studies seek to make inferences about the likelihood of proposals being adopted based on the extent of shareholder voting support. Ertimur et al. (2010) find that proposals receiving higher voting support are more likely to be implemented. Levit and Malenko (2011) add that the identity of the activist shareholder matters for the likelihood of a proposal being implemented.

Building on this literature, and to the best of our knowledge, this study is the first to focus on the risk implications of CSR shareholder voting. Our empirical findings, which show that CSR proposals have significant implications for systematic risk that depend on the degree of voting support as well as firm and industry heterogeneous factors, are of particular relevance to activist shareholders. Such shareholders, who may have good intentions for CSR, may inadvertently increase the risk of the underlying firm if they initiate proposals that garner low levels of support. While we empirically confirm this here, the theoretical reasons as to why this may happen are not readily apparent and make for interesting future research. One plausible reason is that low voting support, which can otherwise lead to a dismissal of the proposal by firm management, can raise the information asymmetry of the firm and lead to higher systematic risk. This explanation aligns with the conclusions of Cui et al. (2018), who find that CSR engagement leads to decreases in information asymmetry. However, Cui et al. (2018) do not formally test whether levels of

voting support are related to this information asymmetry. Finally, our findings also serve as a cautionary note for firm managers as well as activist shareholders. In particular, since the results of our study both validate and challenge current theories on CSR, we show that the risk-reduction hypothesis can only hold when there is a high degree of CSR commitment.

The rest of this paper proceeds as follows. Section 2 presents the theoretical background and develops the study hypotheses. Section 3 describes the data and presents the methodological framework. Section 4 presents and discusses the results. Finally, Section 5 concludes.

2. Theoretical Development

'Don't be evil'. This long served as Google's signature credo until its corporate restructuring under the conglomerate Alphabet Inc. in October 2015 when it was replaced with 'Do the right thing'. Behind credos such as these is the notion that business enterprises are expected to contribute positively to the general welfare of society and not merely ensure they are compliant with relevant laws and statutes. In similar spirit, Forbes annually publishes a list of companies with the best CSR reputations.[5] Moreover, there has been a surge of consulting companies over the years that actively monitor and measure the reputations of managers across global firms in areas pertaining to CSR; for example, the Reputation Institute, a Boston-based consulting firm, measures the CSR impact of companies around the globe.[6]

These observations serve to highlight the current debate in the CSR literature, which centers on whether CSR engagement is in shareholders' interests and whether it enhances returns. The classical view, which is rooted in the shareholder primacy norm and plays a large role in how students across business schools are taught about the role of managers, generally maintains that the firm's sole responsibility is to its shareholders and that it is free to legally operate in ways that maximize shareholder value.

The call for CSR among various stakeholders has grown remarkably in recent years. An emergent view, which is gaining more attention, is that firms have a responsibility beyond shareholders and legal requirements to other constituents and stakeholders that can be affected by a firm's operations. Such a view motivates CSR initiatives and has led to a rise in independent ratings of the CSR 'worthiness' of publicly traded firms. Such ratings are publicly available or covered by the media and, over the years, investors are becoming more sensitized to CSR issues and to any possible negative externalities that may arise from firm operations. This trend is partly attributable to the growing use of the internet as a tool for companies to publicize information about their operations and for stakeholders to proactively highlight CSR issues that need to be addressed. Indeed, companies increasingly expend considerable financial and managerial resources to communicate their CSR initiatives with stakeholders (Wanderley et al. 2008). From a managerial perspective, communicating such initiatives helps managers to solidify their firm's reputation. Ultimately, this may lead to tangible benefits to the firm such as reductions in the implied cost of capital through the goodwill that is cultivated between the firm and its stakeholders (Dhaliwal et al. 2011; El Ghoul et al. 2011). Some studies even document how CSR can actually improve firms' credit ratings (Attig et al. 2013) or can improve analyst forecast accuracy (Dhaliwal et al. 2012).

The question of why CSR activities can improve a firm's visibility, thereby resulting in improved coverage among credit rating agencies or analysts, was addressed recently by Cui et al. (2018). In their study, they argue that the Modigliani and Miller (1963) proposition, which postulates that investors have access to the same quality of information as firm managers, may not hold in reality and that CSR engagement can mitigate the information asymmetry that lies between stakeholders and managers. The findings by Cui et al. (2018) complement previous studies that show that CSR activities can raise firms' reputations (Albinger and Freeman 2000), can distinguish low- from high-performing firms (Clarkson et al. 2008; Dhaliwal et al. 2011; Lys et al. 2015), and can improve the information quality that managers provide to stakeholders (Kim et al. 2012).

As mentioned, despite the possible benefits associated with CSR engagement, classical views on this subject do not necessarily support such initiatives as a means to optimizing the well-being of firms. Friedman (1970) proposes the agency cost view, which considers CSR activities as generally inconsistent with shareholder wealth maximization. This view is consistent with the shareholder primacy norm, which asserts that managers have a legal obligation to prioritize the needs of shareholders. Such a view is consistent with Adam Smith's 'invisible hand' doctrine, which argues that individuals, and, by extension, businesses and governments, do not have access to complete and perfect knowledge and therefore cannot be 'do-gooders' without the risk of creating ill-fated consequences for society (Friedman 1970; Silverstein 1987). The belief that CSR is not value relevant is also echoed in the *charity hypothesis* (Lys et al. 2015), which suggests that firms engage in CSR initiatives not because they are value relevant but because they have a duty to society. A contrasting view is the *investment hypothesis* (Porter and Kramer 2002), which posits that CSR activities improve perceptions of a company by stakeholders, thereby enhancing corporate reputation, which can lead to improvements in firm value and reductions in risk through a reputation effect (El Ghoul et al. 2011). Broadly related is the *information hypothesis* (Lys et al. 2015), which suggests that firms that predict strong future financial performance invest relatively more in CSR. Doing so conveys positive information to the market regarding future firm performance. However, whilst the investment and information hypotheses both associate CSR with positive financial performance, the direction of causality is opposite, with only the *investment hypothesis* suggesting that CSR can directly improve firm performance.

Thus far, extant studies have struggled to disentangle relations between CSR and firm performance and, given the mixed findings, it remains unclear as to whether firms should engage in CSR and, if so, to what extent.[7] Even if CSR is taken to be beneficial ex-post, inconclusive evidence exists as to whether benefits accruing to firms exceed costs of implementation (Margolis et al. 2009 and references therein). Moreover, from the perspective of society, asymmetric information makes it difficult for stakeholders to evaluate if a firm meets their expectations regarding CSR. Importantly, although CSR communications by the firm may decrease information asymmetries for investors to some extent, they may also be perceived to be selective, lack accuracy and be prone to bias. Thus, activists are therefore thought to play an important role in mitigating informational asymmetries regarding a firm's CSR activities (McWilliams and Siegel 2011).

One source of this ambiguity stems from an inability to define CSR in universally accepted and precise terms, with diverse stakeholders prioritizing and stressing different aspects according to individual preferences (Sheehy 2015). For instance, managers may promote their specific achievements and activities as being consistent with being socially responsible, leading to substantial cross-firm and cross-industry heterogeneity in CSR reporting (Sheehy 2015). In addition, stakeholder expectations of firms' CSR activities may be shaped by industry practice (Schuler and Cording 2006; Jo and Na 2012), which may themselves be driven by collective firm lobbying efforts to prioritize specific aspects of CSR that are less costly for member firms to implement (den Hond et al. 2014).

Furthermore, it is unclear which channels drive relations between firm financial and CSR performance as well as what the direction of the causality is between CSR and firm performance (Horváthová 2010; Surroca et al. 2010). A reason for this relates to difficulties in empirical research design. This is because it is a challenge for empiricists to identify how CSR shapes firm risk while coping with potential endogeneity issues that may arise from unobserved heterogeneity, simultaneity, and reverse causality (Wintoki et al. 2012).

Some examples of the aforementioned are as follows. First, unobserved heterogeneity may arise because CSR activities can be correlated with other aspects of firm performance that impact firm risk. Second, causality between CSR and firm risk may be bidirectional. For instance, firms that pursue CSR activities may realize lower systematic risk simply because of investor preferences for, and customer loyalty to, CSR active firms (e.g., Cheung 2016). Adopting CSR initiatives may also enhance a firm's corporate reputation and lower a

firm's financial risk (Hammond and Slocum 1996). Third, simultaneous endogeneity could arise if changes in risk are jointly determined with CSR activities over the firm year.

In this study, we posit that nonbinding shareholder proposals serve as an empirical laboratory for gauging the impact of CSR on firm risk. It is also of interest to test whether the so-called risk-reduction hypothesis that the extant literature documents actually holds when you consider the fact that various nonbinding proposals carry different levels of voting support. From a theoretical point of view, establishing relations between voting support and systematic risk can shed more light on the information asymmetry arguments which, among others, Cui et al. (2018) cite.

We argue herein that a plausible reason for CSR's 'risk-reduction' benefits arise when there is strong support from shareholders for an initiative. Nonbinding proposals with low voting support, which can otherwise lead to a dismissal of the proposal by firm management, can raise the information asymmetry of the firm and lead to higher systematic risks. The risk effects of CSR engagement thus add a key dimension to our understanding as to whether CSR 'adds value' to shareholder wealth and under what circumstances the risk-reduction hypothesis actually holds. Furthermore, since industry differences are likely salient in how CSR activities are expected to impact society (Schuler and Cording 2006; Jo and Na 2012) we further consider that the impact of activist CSR proposals on firm risk should be asymmetric across industries; with industry serving as a conditioning factor that guides managers as to how much managerial effort and firm resources to direct to CSR, as well as conditioning stakeholder expectations. For example, several studies (Hillman and Keim 2001; Lev et al. 2010; Servaes and Tamayo 2013) offer empirical support that industry matters and that firms operating in consumer-sensitive industries that engage in CSR can actually realize stronger revenue growth. Moreover, in specific industries, information transparency regarding CSR likely serves a more important role in reducing information asymmetries between the firm and investors and that this may be associated with reductions in firm risk (Jo and Na 2012).

Finally, we conjecture that the effects of nonbinding CSR proposals by activist shareholders on firm risk are also conditional on the general economic environment. The ill-effects of economic recessions are well-documented in prior studies, which show how such periods are associated with drops in consumer sentiment and resources, unemployment, reduced efficiency, moral hazard, and poor firm performance (Greenwald and Stiglitz 1988; Pearce and Michael 2006; Richardson et al. 1998). With respect to the crisis of 2007–2009 in particular, den Butter (2012, p. 127) points out that severe credit deficits and illiquidity emerged as soon as the general environment moved from one of mutual trust to one of mutual distrust. Thus, in such an environment, with the general level of trust between corporations, institutions and capital markets plummeting (Lins et al. 2017), information asymmetry widens, thus raising costs of capital. Since trust is central in the relationship of any firm with its stakeholders, Lins et al. (2017) argue that a firm's social capital (resulting from its investment in CSR activities) should therefore become even more relevant during periods of unexpectedly low trust. Along the same vein, we posit that CSR initiatives should have a relatively more direct and pronounced effect in reducing information asymmetry during recessionary periods compared to periods of economic stability and growth.

3. Data and Methodological Framework

3.1. Description of Sample Data

We source data on nonbinding shareholder-initiated environmental, social and governance (ESG) proposals targeting US firms from the shareholder proposals database managed by the Institutional Shareholder Services (ISS). This database provides us with a rich dataset capturing all 'voted on' shareholder proposals submitted to firms listed in the Standard and Poor's 1500 index from 1998 to 2011. This sampled time frame is important because it encapsulates the 2007–2009 financial crisis, a time when aggregate investors' risk aversions and opportunity costs of capital rose sharply as economic activity decelerated.

We begin with an initial sample of 4482 ESG-focused proposals. We are careful to include only ESG proposal 'events' in which only a singular proposal is voted on at an AGM. This treatment is important to mitigate possible confounding effects arising from multiple proposals being voted on at the same AGM. For instance, two (or more) proposals may convey a dissimilar impact on pre- and post-vote changes in sampled firms' systematic risks, thereby impeding our ability to obtain unbiased estimates of changes in firm systematic risk. Our final sample (which excludes such events) consists of 2115 nonbinding proposals. To this data set we match company financials from Compustat North America, price data from the Center for Research in Security Prices (CRSP) and market sentiment indexes from Bloomberg. For illustrative purposes and for each sampled year, Table A1 in the Appendix A includes a random subsample of firms that made it into our final sample along with the nature of the proposal, a link to the proxy statement and the percentage vote for the proposal.

We classify each firm in our cross-industry sample as belonging to one of nine broad industry categories (based on two-digit SIC codes): (1) Basic Industries; (2) Capital Goods; (3) Construction; (4) Consumer Goods; (5) Energy; (6) Finance; (7) Transportation; (8) Utilities; (9) Others. Our rich sample data include details such as company name, the date of the annual general meeting (AGM), the proposal sponsor, a description of each proposal (which we use to identify ESG proposals), and the vote percentage.

Throughout our analysis, we are careful to distinguish between consumer-sensitive vs. non-sensitive industries by employing a dummy variable to classify firms as belonging to a consumer sensitive industry if they operate in (4) Consumer Goods industry (based on four-digit SIC codes: 0000-0999; 2000-2399; 2500-2599; 2700-2799; 2830-2869; 3000-3219; 3420-3429; 3523; 3600-3669; 3700-3719; 3751; 3850-3999; 4813-4899; 5000-5079; 5090-5099; 5130-5159; 5220-5999; 7000-7299; 7400-9999) or in (6) Finance (6000-6999), by assigning a value of one to these firms.

Table 1 outlines the distribution of the nonbinding CSR proposals and firms in our sample by year, industry and percentage of voting support at the AGM. In Panel A we observe that proposals are fairly well distributed over time within our sample, with the highest volume of proposals taking place in the year 2008 and the lowest in 1998. These proposals are also distributed rather evenly across larger and smaller firms over the sample period, with the median total assets of sampled firms being approximately USD 9 billion. In Panel B of Table 1, and consistent with other findings, we observe that the majority of CSR proposals (N = 1107; 52.34%) come from firms operating within the broader consumer goods sector, followed by the finance sector (N = 311; 14.70%). This is to be expected because the more 'consumer sensitive' sectors reasonably attract more activist shareholders (Lev et al. 2010).

However, all major sectors are well represented in the sample, with numerous CSR proposals in the utilities, transportation and the basic industries sectors as well. The largest firms appear to come from the finance sector, with median total assets of approximately USD 70 billion. Finally, in Panel C, we illustrate the distribution of CSR proposals with respect to the level of shareholder voting support received at the respective AGM. The concentration of voting support for shareholder proposals lies in the lower brackets (0–10% up to 40–50%). This is to be expected since, in relative terms, it is uncommon for a nonbinding shareholder proposal to immediately gather full voting support across shareholders. As mentioned in Notes (2) and (3), respectively, usually activist shareholders will employ nonbinding proposals as a low-cost method for communicating their dissatisfaction to firm management or to initiate changes. Unlike management-initiated binding proposals, management decides whether or not to implement shareholder-initiated nonbinding proposals, regardless of the degree of voting support they may have. Nevertheless, in the context of CSR initiatives, nonbinding proposals have become an empowering mechanism for activist shareholders seeking to initiate changes (Levit and Malenko 2011).

Table 1. Data Sample Description: Activist CSR Proposals. The table illustrates the distribution and key summary statistics of the 2115 activist-initiated CSR proposals in our sample. Panel A describes the distribution of proposals per year, along with median pre-proposal betas and size for all firms in our sample. Panel B describes the distribution of proposals by industry, along with median pre-proposal betas and size for all firms in our sample. Finally, Panel C describes the distribution of proposals by levels of voting support received.

Panel A: Distribution of Firms—Proposals by Year

Year	N	Percent	Median Beta	Median Total Assets ($ mil)
1998	72	3.40	0.776	6216.9
1999	103	4.87	0.512	5842.8
2000	115	5.44	0.570	5127.0
2001	114	5.39	0.573	7799.1
2002	127	6.00	0.703	4929.6
2003	174	8.23	0.906	6613.2
2004	157	7.42	0.927	10,752.0
2005	142	6.71	1.023	10,435.4
2006	169	7.99	0.949	11,322.6
2007	187	8.84	0.976	9514.1
2008	203	9.60	1.013	9856.6
2009	200	9.46	1.091	8467.0
2010	176	8.32	1.063	12,097.2
2011	176	8.32	1.002	15,215.0
Total/Overall	2115	100.0	0.915	8997.1

Panel B: Distribution of Firms—Proposals by Industry

Industry	N	Percent	Median Beta	Median Total Assets ($ mil)
(1) Basic industries	130	6.15	1.054	6091.0
(2) Capital Goods	37	1.75	0.843	2479.3
(3) Construction	55	2.60	1.568	5938.6
(4) Consumer Goods	1107	52.34	0.888	5496.3
(5) Energy	85	4.02	0.971	17,812.0
(6) Finance	311	14.70	1.058	69,896.0
(7) Transportation	132	6.24	1.039	18,775.0
(8) Utilities	232	10.97	0.646	15,592.5
(9) Others	26	1.23	0.914	20,281.0
Total	2115	100.00	0.915	8997.1

Panel C: Distribution of Firms—Proposals by Level of Voting Support

Voting Threshold	N	Percent	Mean % in Favor	Median % in Favor
$0\% \leq$ Votes in Favor $< 10\%$	676	31.96	6.20	6.00
$10\% \leq$ Votes in Favor $< 20\%$	255	12.06	13.91	13.00
$20\% \leq$ Votes in Favor $< 30\%$	200	9.46	25.15	25.00
$30\% \leq$ Votes in Favor $< 40\%$	219	10.35	35.36	35.00
$40\% \leq$ Votes in Favor $< 50\%$	249	11.77	45.27	45.00
$50\% \leq$ Votes in Favor $< 60\%$	192	9.08	55.32	55.00
$60\% \leq$ Votes in Favor $< 70\%$	147	6.95	64.86	64.00
$70\% \leq$ Votes in Favor $< 80\%$	106	5.01	75.04	74.90
$80\% \leq$ Votes in Favor $< 90\%$	49	2.32	84.61	84.90
$90\% \leq$ Votes in Favor $\leq 100\%$	22	1.04	95.17	95.50
Total	2115	100.00	31.27	27.00

3.2. Methodological Framework for Measuring Systematic Risk

Do nonbinding shareholder proposals pertaining to CSR issues lead to changes in the systematic risks of underlying firms? Furthermore, since various nonbinding proposals presented before firm management are inherently associated with varying degrees of voting support, does this play a role in changes to firms' systematic risks? While standard event study methodologies normally estimate the information content of firm announcements and or other news by calculating abnormal returns using some market model benchmark, we take a different approach here. Unlike ordinary events that mainly influence cash flows, and whose information content can be estimated by a standard event study, we conjecture that CSR issues may cause changes in both the risk and returns of individual securities. As a matter of fact, Brown et al. (1988) showed that many events cause the variance of returns to shift due to a temporary (or permanent) shift in systematic risk, so that the use of common methods may fail (Boehmer et al. 1991).

If news about the CSR proposal has an impact on a firm's systematic risk beyond what can be discerned from cash flow analysis, estimation parameters (factor loadings) calculated unconditionally during the estimation (pre-announcement) period will be biased and cannot be used in the event window (post announcement) because betas are time-dependent (and shift across time). In contrast to most event studies that use pre-announcement parameters to estimate post-announcement returns, our aim is to actually model possible shifts in systematic risk. To therefore address whether an event impacts risk we need to reformulate the market model to allow betas to change over the event. To accomplish this, we follow Grullon et al. (2002) and Grullon and Michaely (2004) and adopt a type of market model approach that accommodates a dummy variable, D, to test for shifts in systematic risk before and after a shareholder proposal is voted on during the AGM:

$$r_{it} - r_{ft} = a_i + a\Delta_i D_t + b_i\left(r_{mt} - r_{ft}\right) + b\Delta_i D\left(r_{mt} - r_{ft}\right)_t + \varepsilon_t \quad (1)$$

In this framework, the dummy variable, D, takes a value of 1 for $t \geq T_0$ and 0 otherwise. In this case, T_0 denotes the day which a nonbinding shareholder proposal is brought before the AGM meeting to be voted on. The returns of the underlying sampled firm i at time t are denoted by r_{it}; the returns on the market portfolio, r_{mt}, consist of value-weighted returns on all CRSP firms; r_{ft} is the daily holding period return on the 1-month treasury bill rate.

We estimate (1) for the 126 days surrounding the day, T_0, when the shareholder proposal is brought before the AGM.[8] The coefficient of principal interest is b (beta), which signifies firm i's degree of systematic risk. The dummy variable, D, allows for empirical testing of the model following day T_0 in order to decipher whether there are any shifts in systematic risk. Thus, while b_i represents beta prior to T_0, $b\Delta_i$ is the change in the underlying firm's beta following T_0.

As is discussed in the proceeding section, and to gain a multifaceted view of the behavior of firms' systematic risks following T_0, we estimate (1) and compare results for nonbinding proposals that occur (a) during economic growth versus recessionary periods and (b) for low-consumer-sensitivity versus high-consumer-sensitivity firms. In addition, we combine (a) and (b) for a subsection of our analysis and examine systematic risk changes for low-consumer-sensitivity firms during economic growth versus expansionary periods and compare these results with systematic risk changes for high-consumer-sensitivity firms during growth versus expansionary periods.

Finally, our analysis also allows for interaction effects in voting support on systematic risk. This allows us to fully gauge how nonlinearities in voting support can affect systematic risk across firms with low and high consumer sensitivity, respectively, and across economic growth and recessionary periods. Taking this multifaceted analytical approach enables us to better understand, first, how nonbinding shareholder proposals affect underlying firms' systematic risks and, second, what role voting support plays. These findings are expected to be useful to activist shareholders as well as managers of firms who are presented with such CSR-related proposals during an AGM. Theoretically, they are also expected to contribute

broadly to the CSR literature while specifically providing a test for the aforementioned risk-reduction hypothesis that is often cited as a reason for CSR initiatives.

4. Empirical Results

In Table 2, we present a preliminary univariate analysis of changes in systematic (beta) risk following the activist shareholder proposals in our sample. For the purposes of the analyses, we split our sample across three key dimensions of interest; specifically, *Economic Activity* (Economic Growth and Economic Recession, respectively), *Consumer Sensitivity* and *Voting Support*. By splitting our sample accordingly, we are providing a multifaceted view of how firms' systematic risks shift with nonbinding shareholder proposals pertaining to CSR.

Table 2. Univariate Analysis: Changes in Beta Risk Following Activist CSR Proposals. The table illustrates univariate *t*-tests of mean changes in beta risk following activist CSR proposals across the key dimensions of the study. Panel A tests mean changes in firm risk (beta) between high and low levels of voting support (vertically) and between the periods of Growth and Recession (horizontally). Panel B tests mean changes in firm risk (beta) between high and low levels of voting support (vertically) and between Low- and High-Consumer-Sensitivity Industries (horizontally). Finally, Panel C tests mean changes in firm risk (beta) between high and low levels of voting support (vertically) and all possible combinations of (low-high) consumer industry, growth and recession (horizontally). T-statistics are in brackets. * and ** denote significance at the 10% and 5%, levels, respectively.

Panel A: Changes in Beta by Economic Activity and Voting Support					
	Economic Growth	**Economic Recession**	**Diff.**	***t*-Test**	**Total**
Low Voting Support	0.016	0.072	0.056 *	(1.816)	0.025
High Voting Support	0.048	0.016	−0.032	(−0.808)	0.041
Diff.	0.032	−0.056			0.016
t-test	(1.404)	(−1.248)			(0.797)
Total	0.031	0.038	0.007	(0.271)	0.033
Panel B: Changes in Beta by Industry Consumer Sensitivity and Voting Support					
	Low Consumer Sensitivity	**High Consumer Sensitivity**	**Diff.**	***t*-Test**	**Total**
Low Voting Support	0.046	0.013	−0.033	(−1.333)	0.025
High Voting Support	−0.010	0.064	0.074 **	(2.071)	0.041
Diff.	−0.056	0.051 **			0.016
t-test	(−1.578)	(2.033)			(0.797)
Total	0.019	0.039	0.020	(0.930)	0.033
Panel C: Changes in Beta: Three-way Intra-Group Comparisons					
	Low Consumer Sensitivity		**High Consumer Sensitivity**		
	Economic Growth	**Economic Recession**	**Economic Growth**	**Economic Recession**	
Low Voting Support	0.031	0.126	0.008	0.043	
High Voting Support	−0.009	−0.013	0.073	0.031	
Diff.	−0.041	−0.138 *	0.065 **	−0.011	
t-test	(1.029)	(1.752)	(2.352)	(0.185)	

In Panel A, we examine differences in the *Changes in Beta Risk* across *High-* and *Low- Consume- Sensitivity* industries and between the period of the most recent economic Recession (2007–2009) with the rest of the sample.[9] In addition, in Panel B, we also compare mean changes in beta risk across proposals that garner *High* and *Low Voting Support*[10]

and across periods of *Economic Growth* versus *Recession*. In Panel C, we run intra-group comparisons across *Consumer Sensitivity* and *Voting Support*.

Examining the results, notable increases in mean *Changes in Beta Risk* appear to exist between *Recession* and *Growth* but this is only evident for *Low Voting Support*. In addition, beta risk increases more in cases of *High* rather than *Low Voting Support*, but this is only evident for *High-Consumer-Sensitivity* industries. Finally, we observe significant increases in *Changes in Beta Risk* across *High-* and *Low-Consumer-Sensitivity* industries, but this seems to manifest in cases of *High Voting Support*. As we will demonstrate soon, this finding hides important nuances in the data; when allowing for nonlinearities in voting support, we show that a concave relation between voting support and changes in beta risk, whereby surpassing the voting support threshold of approximately 39–45% is required for a firm to realize a reduction in its systematic risk. This is a novel stylized fact that we document in our study that contributes to the CSR literature and, more broadly, the CSR-risk relation.

In Table 2 Panel D we also perform three-way univariate comparisons by first grouping the nonbinding CSR proposals in our sample by industry (*High-* and *Low-Consumer-Sensitivity*) and subsequently cross-comparing mean *Changes in Beta Risk* over *Economic Activity* and *Voting Support*. The results suggest that in *Low-Consumer-Sensitivity* industries, *Voting Support* reduces *Beta Risk* but more so during the Recession. In *High-Consumer-Sensitivity* industries, *Voting Support* increases *Beta Risk*—notably more so during periods of *Economic Growth*. As a result, our univariate analysis shows some preliminary evidence that aggregate economic conditions, the inherent level of an industry's sensitivity to CSR issues, and the degree of voting support for a CSR proposal, respectively, will have an impact on changes in firms' beta risks.

However, to provide a more holistic and multifaceted view, and, for the sake of robustness testing in the presence of potential confounding effects, we also implement a multivariate cross-sectional model in which we control for covariates that are well-known in impacting shifts in firms' beta risk (which serves as the dependent variable). The results are presented in Panel A of Table 3, which presents pairwise correlations of all the variables (beta risk along with control variables). *Investor Sentiment* is the mean 6-month percentage from the American Association of Institutional Investors (AAII) survey, calculated as (Bullish)/(Bullish + Bearish). This variable matches the dependent variable of each sampled firms' (T0, T126) time window. Similarly, we control for the 6-month average of the CBOE implied volatility index (VIX) during the event window (T0, T126) for each of the sampled firms.

In addition to these aggregate investor sentiment measures, we also include firm-level controls including the following: firm size (*Sales* (in log)), using the natural logarithm of sales revenue 1-year prior to the CSR proposal (Compustat item SALE at Y-1); leverage (Total Debt/Equity); the ratio of total debt (items DLTT + DLC) to the book value of equity (item SEQ), also at Y-1; the typically used proxy for *Tobin's Q*, measured as the ratio of firm market value to the book value of assets at Y-1. For this proxy, the market value of assets is the sum of the book value of assets (Compustat item AT) and the market value of common stock (items PRCC_F $\times$ CSHO), less book value of equity (item SEQ) minus preferred stock and deferred taxes and net of post-retirement benefits when available (items PSTKL–TXDITC–PRBA).

To account for mean reversals in risk as well as for the persistence in beta, we also control for the 6-month average firm beta prior to the CSR proposal (*Beta Risk-6m*). While a number of pairwise cross-correlations between the model variables are significant at 1%, 5% and 10%, they do not exceed the critical values and hence do not raise concerns about collinearity. Meanwhile, all summary statistics of the model variables in Panel B suggest that variable observations rest within their expected ranges, reducing the possibility that our findings are driven by outliers.

Table 3. Correlation Matrix and Summary Statistics. The table presents the Pearson correlation coefficients and key summary statistics for all the variables used in the main regressions for the 2115 activist CSR proposals in our sample. *Change in Beta Risk* is the change in the underlying firm's beta between the two 6-month periods surrounding the CSR proposal, estimated as in Grullon and Michaely (2004). *Investor Sentiment* is the mean 6-month percentage from the American Association of Institutional Investors (AAII) survey calculated as (Bullish)/(Bullish + Bearish) during the 6 months after each CSR proposal. *VIX Index 6m Average* is the 6-month average of the CBOE implied volatility index (VIX) during the 6 months after each CSR proposal. *Recession* is a dummy variable, which takes the value of 1 if a proposal was initiated during the NBER recession period (December 2007 until June 2009) or 0 otherwise. *Turnover* is the natural logarithm of sales revenue 1 year prior to the CSR proposal (Compustat item SALE at Y-1). *Leverage* is the ratio of total debt (items DLTT + DLC) to the book value of equity (item SEQ) at Y-1. *Tobin's Q* is the ratio of firm market value to the book value of assets at Y-1: the market value of assets is the sum of the book value of assets (Compustat item AT) and the market value of common stock (items PRCC_F × CSHO) less the book value of equity (item SEQ) minus preferred stock and deferred taxes, net of post-retirement benefits, when available (items PSTKL–TXDITC–PRBA). *Beta Risk-6m* is the 6-month average firm beta prior to the CSR proposal. *Vote for Percentage* is the percentage of votes in favor of a proposal. Our sample includes only 'events' at which a singular activist-initiated ESG proposal was voted on. Finally, *HCS Industry* is a dummy variable equal to 1 if a firm belongs in a consumer-sensitive industry (consumer goods or finance) and 0 otherwise, as in Lev et al. (2010). *, ** and *** denote significance at 10%, 5%, and 1% levels, respectively.

Panel A: Matrix of Pairwise Correlations

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Change in Beta Risk	1.000									
2. Investor Sentiment	−0.040 *	1.000								
3. VIX Index 6m Average	0.012	−0.251 ***	1.000							
4. Recession	0.006	−0.210 ***	0.492 ***	1.000						
5. Turnover	−0.013	−0.083 ***	−0.030	0.026	1.000					
6. Leverage	0.009	0.006	0.008	−0.014	0.010	1.000				
7. Tobin's Q	−0.045 **	0.045 **	−0.094 ***	−0.087 ***	0.013	−0.036 *	1.000			
8. Beta Risk-6m	−0.343 ***	−0.127 ***	−0.048 **	0.157 ***	−0.023	0.042 *	−0.060 ***	1.000		
9. Vote for Percentage	0.001	−0.135 ***	0.054 **	0.118 ***	−0.206 ***	0.014	−0.097 ***	0.125 ***	1.000	
10. HCS Industry	0.020	0.003	−0.031	−0.021	0.001	0.009	0.215 ***	0.031	0.016	1.000

Panel B: Summary Statistics

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
Mean	0.033	0.548	22.753	0.191	8.747	3.142	1.681	0.964	0.313	0.670
5th Percentile	−0.594	0.395	12.847	0.000	6.300	0.288	0.948	0.247	0.035	0.000
Median	0.032	0.530	23.671	0.000	8.761	1.749	1.371	0.915	0.270	1.000
95th Percentile	0.658	0.720	32.026	1.000	11.071	12.146	3.562	1.848	0.770	1.000
SD	0.471	0.100	6.601	0.393	1.441	22.074	0.832	0.508	0.247	0.470
N	2115	2115	2115	2115	2115	2115	2115	2115	2115	2115

Satisfied with these diagnostics, we proceed in Table 4 by estimating OLS regression coefficients for a number of model specifications. In the first column, we regress all control variables including fixed year and industry effects against *Changes in Beta Risk*, thereby establishing a 'baseline' model of satisfactory explanatory power. *Investor Sentiment* is negatively related with *Changes in Beta Risk*, as is expected. This is because periods of bullishness (rises in sentiment) are typically linked with declines in firms' systematic risks. In addition, *Tobin's Q* is also negatively related with *Changes in Beta Risk*. Finally, prior betas (*Beta Risk-6m*) are negatively related to *Changes in Beta Risk*. This reflects mean reversion in stock price dynamics and, ultimately, the time series behavior of beta (high betas are followed by low betas and vice versa).

Table 4. Model Estimates. The table presents coefficient estimates of standard OLS regressions where the dependent variable is the *Change in Beta Risk*, the change in the underlying firm's beta between the two 6-month periods surrounding the CSR proposal, estimated as in Grullon and Michaely (2004). *Investor Sentiment* is the mean 6-month percentage from the American Association of Institutional Investors (AAII) survey calculated as (Bullish)/(Bullish + Bearish) during the 6 months after each CSR proposal. *VIX Index 6m Average* is the 6-month average of the CBOE implied volatility index (VIX) during the 6 months after each CSR proposal. *Turnover* is the natural logarithm of sales revenue 1 year prior to the CSR proposal (Compustat item SALE at Y-1). *Leverage* is the ratio of total debt (items DLTT + DLC) to the book value of equity (item SEQ) at Y-1. *Tobin's Q* is the ratio of firm market value to the book value of assets at Y-1: the market value of assets is the sum of the book value of assets (Compustat item AT) and the market value of common stock (items PRCC_F × CSHO) less the book value of equity (item SEQ) minus preferred stock and deferred taxes, net of post-retirement benefits, when available (items PSTKL–TXDITC–PRBA). *Beta Risk-6m* is the 6-month average firm beta prior to the CSR proposal. *Recession* is a dummy variable that takes the value of 1 if a proposal was initiated during the NBER recession period (December 2007 until June 2009) or is 0 otherwise. *High-Consumer-Sensitivity Ind. (HCS)* is a dummy variable that equals 1 if a firm belongs in a consumer-sensitive industry (consumer goods or finance) or 0 otherwise, as in Lev et al. (2010). *Vote for Percentage (Vote)* is the percentage of votes in favor of a proposal. Models 1–4 present coefficient estimates of control variables and the three variables of interest. Model 5 introduces the squared term $Vote^2$, to capture non-linearities. The geometric figure of equation in Model 5 is a parabola with the following PDE: $\partial/\partial x\ (-0.3923x^2 + 0.3083x + 0.1624z + 0.0338\omega + \ldots + 0.7065) = 0.3083 - 0.7846x$. The equation has a global maximum at $\partial/\partial x = 0{:}x \approx 0.3929$ (i.e., Percent Voting for). All models include year and industry fixed effects whose coefficients are suppressed for brevity. Robust standard errors are clustered at the firm level. T-statistics are in parentheses. ***, **, and * denote significance at the 10%, 5%, and 1% levels, respectively.

DV: Change in Beta Risk	Model 1 (Controls)	Model 2 (Recession)	Model 3 (HCS)	Model 4 (Vote %)	Model 5 (Vote %^{2})
Constant	0.8041 ***	0.8542 ***	0.8331 ***	0.8060 ***	0.7065 ***
	(5.266)	(5.400)	(5.374)	(5.150)	(3.592)
Investor Sentiment	−0.4473 ***	−0.4246 ***	−0.4236 ***	−0.4132 ***	−0.0593
	(−3.627)	(−3.476)	(−3.480)	(−3.376)	(−0.332)
VIX Index	−0.0026	−0.0053 ***	−0.0053 ***	−0.0053 ***	−0.0019
	(−1.596)	(−2.767)	(−2.765)	(−2.746)	(−0.564)
Turnover	−0.0096	−0.0106	−0.0106	−0.0094	−0.0194 **
	(−1.233)	(−1.349)	(−1.348)	(−1.179)	(−2.309)
Leverage	0.0005 *	0.0005 **	0.0005 **	0.0005 **	0.0007 ***
	(1.932)	(2.035)	(2.057)	(2.033)	(2.610)
Tobin's Q	−0.0363 ***	−0.0350 ***	−0.0407 ***	−0.0399 ***	−0.0390 ***
	(−2.995)	(−2.881)	(−3.252)	(−3.208)	(−2.714)
Beta Risk-6m	−0.3355 ***	−0.3481 ***	−0.3500 ***	−0.3513 ***	−0.4172 ***
	(−9.634)	(−9.620)	(−9.667)	(−9.661)	(−9.969)
Recession	-	0.0941 ***	0.0945 ***	0.0925 ***	0.0338
		(3.088)	(3.102)	(3.026)	(0.922)
High-Consumer-Sensitivity Ind. (HCS)	-	-	0.0466 **	0.0461 **	0.1624 **
			(2.167)	(2.147)	(2.561)
Vote for Percentage (Vote)	-	-	-	0.0331	0.3083 **
				(0.899)	(2.141)
Vote for Percentage^2 (Vote^2)	-	-	-	-	−0.3923 **
					(−2.153)
Year Effects	No	No	No	No	Yes
Industry Effects	No	No	No	No	Yes
R^2	0.131	0.136	0.138	0.138	0.181
R^2 Adj.	0.129	0.133	0.134	0.134	0.170
F	16.819	14.812	13.079	11.623	5.501
N	2115	2115	2115	2115	2115

In the next three columns (Models 2–4), we add the following three main-effects variables: *Recession*, a dummy capturing the 2007–2009 financial crisis, a high-consumer-sensitivity (*HCS*) industry dummy, and *Vote for Percentage (Vote)*, respectively. The effects of *Recession* and *HCS* are both positive and significant at 1% and 5%, respectively. This suggests that, ceteris paribus, *Changes in Beta Risk* are positive during recessionary periods and for high-consumer-sensitivity firms. Finally, in Model 5 we introduce the squared term of *Vote* in order to detect nonlinearities in the risk-voting support relation. The coefficient for *Vote* is positive (0.3083) while the coefficient for $Vote^2$ is negative (−0.3923). Both are significant at 5%. This result implies that the above relationship is inverse U-shaped. Thus, while low voting support can lead to the dismissal of the proposal by firm management (thereby raising information asymmetry) a strong degree of support from shareholders can actually reduce beta risk and can realize 'risk-reduction' benefits. Based on the coefficient estimates of Model 5, the critical level of *Vote* above which risk reduction are observed is approximately 39.29%. This is calculated as the root of the following partial differential equation (PDE):

$$\frac{\partial}{\partial x}\left(-0.3923x^2 + 0.3083x + 0.1624z + 0.0338\omega + \ldots + 0.7065\right) = 0 \Rightarrow 0.3083 - 0.7846x = 0 \Rightarrow x \approx 0.3929$$

In Table 5, we expand the previous analysis to allow nonlinear interactions between all three main effects variables (*Voting Support*, *Recession* and *HCS*) to test whether the effects of *Vote* on *Changes in Beta Risk* are indeed asymmetric across different types of firms and between economic conditions. For exposition and simplicity, in column 1 we replicate Model 5 above without tabulating control variables. In columns 2 (Model 6: $HCS \times Vote^2$) and 3 (Model 7: $Recession \times Vote^2$) we run interaction regressions of the simple and quadratic terms of *Vote* with the two conditional dummy variables (*HCS* and *Recession*). While the results are generally consistent, the quadratic interaction effects are also significant at 5%, supporting the inverse U-shaped relationship between *Vote* and *Changes in Beta Risk*, but only for high-consumer-sensitivity (*HCS* = 1) firms and only for proposals during the period of growth (*Recession* = 0). These findings suggest that in high-consumer-sensitivity industries and during adverse economic times, only strong CSR support of activist shareholder initiatives can reduce systematic risk. On the contrary, weak support may in fact accentuate information asymmetries and can lead to adverse risk effects. Model 8 in the last column presents three-way interaction effects across *Vote*, *HCS* and *Recession* and confirms the above result in a more stringent empirical setting. According to the coefficient estimates of HCS × Growth × Vote and HCS × Growth × $Vote^2$, which are positive (0.5227) and negative (−0.5543) and significant at 1% and 5%, respectively, the inverse U-shape relationship between activist CSR voting support and risk is most pronounced for high-consumer-sensitive industries and during periods of economic growth—the critical level for *Vote* being 47.14%. These findings both validate and challenge extant CSR findings, such as the risk-reduction hypothesis, and pave the way for future research in better understanding when and under what conditions the risk reduction postulation holds.

Finally, as a further sensitivity procedure, we illustrate all results in Figures 1–3 by means of response and marginal effects plots of the (quadratic) main effects and interaction terms. In Figure 1, the graph on the left plots the nonlinear prediction of the *Change in Beta Risk* for all levels of *Vote* according to the estimates of Model 5. The graph on the right illustrates the marginal effects (∂y/∂x) of *Vote* on *Change in Beta Risk* evaluated across all levels of *Vote*, along with 90% confidence intervals and the histogram of our sample as distributed across all levels of *Vote*. The marginal effects plot clearly supports that the effect (slope) of *Vote* on *Change in Beta Risk* is:

- Positive and significant for low levels of voting support, especially for votes up to 28%. This effect applies to approximately 51% of our sample and suggests that low voting support can accentuate firm beta risk;

- Negative and significant for high levels of support, especially for votes over 52%. The effect is applicable to about 24% of proposals in our sample and in line with our expectation that the risk-reduction hypothesis applies in cases of high support for CSR proposals;
- Inconclusive for the intermediate levels. When *Vote* is between 28% and 52% (about 25% of the proposals in our sample) confidence lines cross both sides of the 0 reference line. Therefore, caution is to be exercised when interpreting the effects of such intermediate levels of voting support on firm beta risk.

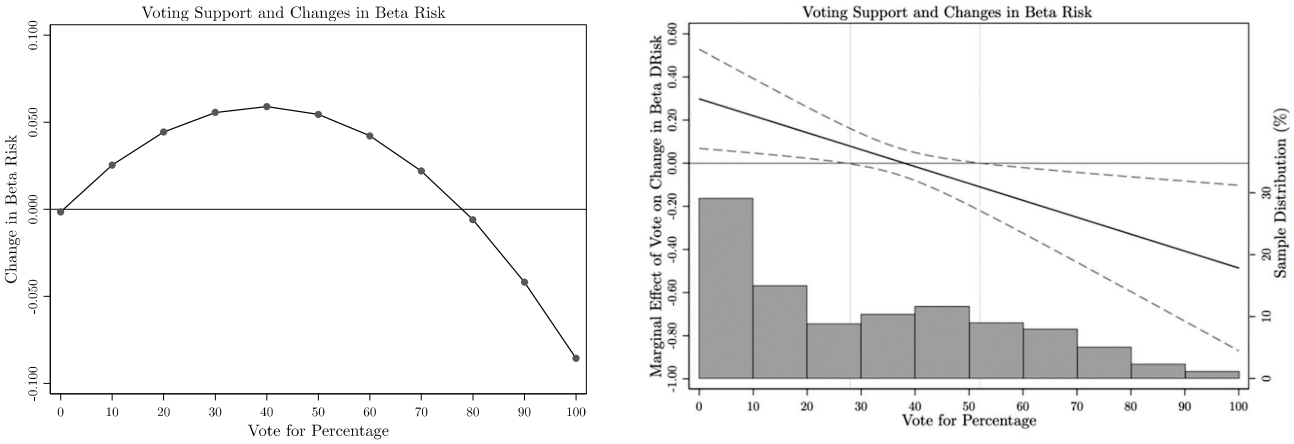

Figure 1. Main Effects Plots.

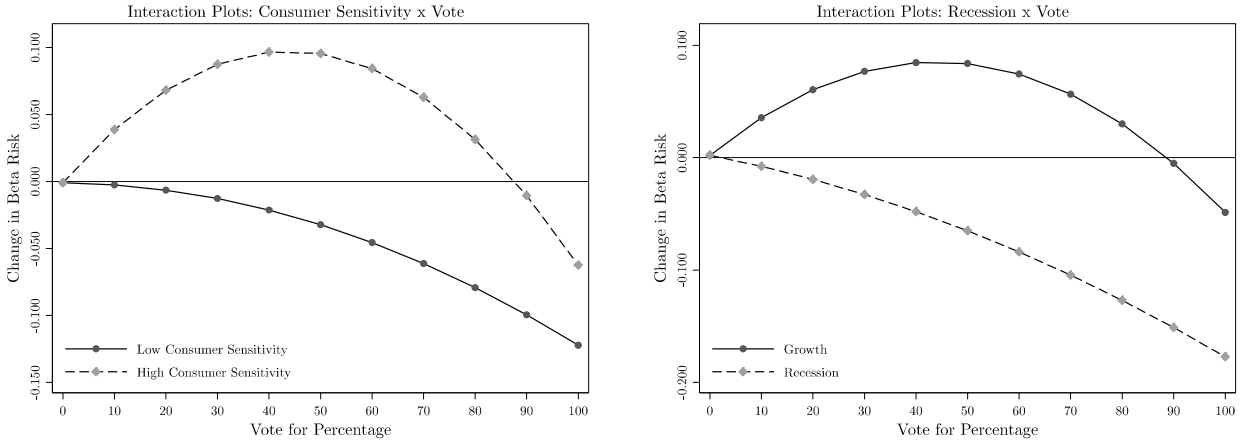

Figure 2. Two−Way Nonlinear Interaction Plots.

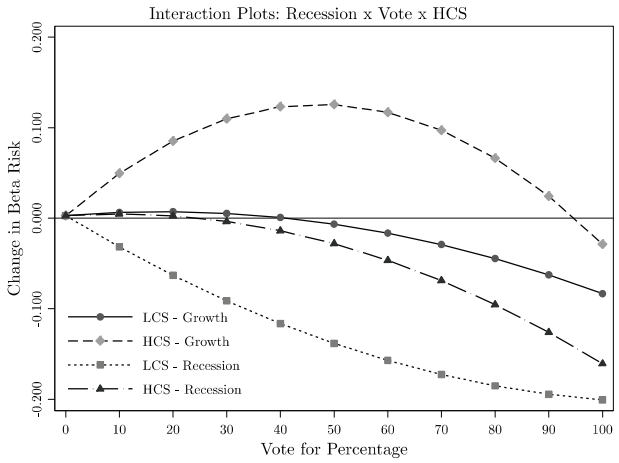

Figure 3. Three−way Nonlinear Interaction Plots.

Table 5. Nonlinear Interactions: Model Estimates. The table presents coefficient estimates of moderator regressions where the dependent variable is Change in Beta Risk, the change in the underlying firm's beta between the two 6-month periods surrounding the CSR proposal, estimated as in Grullon and Michaely (2004). All control variables are as in Table 4. Model 5 is replicated from Table 4 for comparison and illustrates the key (baseline) estimates of the four primary variables of interest: Recession (Growth), High-Consumer-Sensitivity Industry: HCS (Low-Consumer-Sensitivity Industry: LCS), Vote and Vote^2 (squared term of vote). Models 6 and 7 show the coefficient estimates of the interaction effects between Vote and the HCS (LCS) and Recession (Growth) indicator variables. Model 8 presents the coefficient estimates of all three-way interactions across Vote (Vote^2), HCS (LCS) and Recession (Growth). All models include year and industry fixed effects, whose coefficients are suppressed for brevity. Robust standard errors are clustered at the firm level. T-statistics are suppressed for brevity. *** and ** denote significance at the 10% and 5% levels, respectively.

DV: Change in Beta Risk	**Model 5 (Vote %^{2})**	**Model 6 HCS × Vote %^{2}**	**Model 7 Recession × Vote %^{2}**	**Model 8 Three-Way Interactions**
Controls (as in Table 4)	Yes	Yes	Yes	Yes
Constant	0.7065 ***	0.7568 ***	0.6866 ***	0.7369 ***
Recession	0.0338	0.0347	-	-
High-Consumer-Sensitivity Industry (HCS)	0.1624 **	-	0.1650 ***	-
Vote	0.3083 **	-	-	-
Vote^2	−0.3923 **	-	-	-
Low-Consumer-Sensitivity Industry (LCS)×:				
Vote	-	−0.0039	-	-
Vote^2	-	−0.1174	-	-
HCS×				
Vote	-	0.4474 **	-	-
Vote^2	-	−0.5089 **	-	-
Growth×:				
Vote	-	-	0.3777 **	-
Vote^2	-	-	−0.4285 **	-
Recession×:				
Vote	-	-	−0.0894	-
Vote^2	-	-	−0.0900	-
LCS×				
Growth × Vote	-	-	-	0.0489
Growth × Vote^2	-	-	-	−0.1351
Recession × Vote	-	-	-	−0.3610
Recession × Vote^2	-	-	-	0.1575
HCS×				
Growth × Vote	-	-	-	0.5227 ***
Growth × Vote^2	-	-	-	−0.5543 **
Recession × Vote	-	-	-	0.0397
Recession × Vote^2	-	-	-	−0.2031
Year Effects	Yes	Yes	Yes	Yes
Industry Effects	Yes	Yes	Yes	Yes
R^2	0.181	0.183	0.183	0.185
R^2 Adj.	0.170	0.171	0.171	0.171
F	5.501	5.297	5.590	5.236
N	2115	2115	2115	2115

Overall, the results are quite clear and consistent with our predictions, while the empirical estimates correspond well to our range of data. Therefore, the nonlinear effects,

the turning point, the initial risk increase, and the following reduction are all observed for values within our sample.

The illustration of the marginal effects helps further clarify the nature of the risk-voting support relation. In particular, and as seen in Figures 2 and 3, while for low-consumer-sensitivity industries and during the recession all levels of CSR support are effective towards mitigating risk and reducing information asymmetries, in periods of economic growth or for high-consumer-sensitivity industries a voting threshold of over ~47% needs to be surpassed for beta risk to begin to decline.

5. Conclusions

Nonbinding shareholder proposals constitute an important channel for activist shareholders by which they can express dissatisfaction to firm managers or initiate changes within the firm. Our study uses a rich sample of nonbinding shareholder proposals across industries in the US for the period 1998–2011. This sampled time frame is important because it encapsulates the 2007–2009 financial crisis, a time when aggregate investors' risk aversions and opportunity costs of capital generally increased as economic activity decelerated.

Using our econometric analysis to gauge firms' systematic risks before and after CSR-related shareholder proposal votes, we show that voting support serves as an indicator for CSR commitment and is nonlinearly related to systematic risk. In particular, we find that CSR proposals with low levels of voting support, or commitment, are linked with increases in systematic risk. As CSR commitment rises (high voting support), systematic risk declines. Interestingly, our results suggest that economic crises periods only seem to exacerbate this nonlinearity. Finally, we show how this nonlinearity between voting support and systematic risk is particularly more pronounced for consumer-sensitive industries—firms that produce goods or services meant for general customers rather than for industrial or governmental use (Lev et al. 2010).

Our findings present a new stylized fact that is important to the CSR literature. Specifically, there is a concave relation between voting support and changes in systematic risk whereby surpassing the voting support threshold of approximately 39–45% is necessary for a firm to see a reduction in its systematic risk. This finding is of theoretical importance in terms of how we potentially test and interpret the risk-reduction hypothesis, which so far does not account for how 'levels of CSR support' can affect firm risk. This is important to highlight because activist shareholders may inadvertently increase the risk of the firm for all shareholders if they bring forward proposals that garner low voting support. Our newly documented stylized fact aligns with the conclusions of Cui et al. (2018), who find that CSR engagement leads to decreases in information asymmetry. In our study, however, we shed new light on this finding by showing that high levels of support for CSR engagement are needed to possibly reduce information asymmetry.

Finally, as the debate on the impact of CSR on shareholder wealth continues to evolve over time, we should expect to see future studies examining the intricacies underlying the risk-reduction hypothesis. Our study takes an important first step in this direction by demonstrating that CSR matters for firm risk and that market assessments of CSR depend on industry and on the degree of voting support for nonbinding shareholder proposals. Our study emphasizes that more nuanced research is required that can disentangle complex relationships between CSR and firm performance in order to advance our understanding and inform industry practitioners including managers, investors, policy makers and wider stakeholders as to how CSR is linked to firms' systemic risks.

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Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Table A1. Sample of Activist CSR Proposals.

Year	Firm (Industry)	Proposal (Link to SEC Proxy Statement)	Vote for Percentage
1997	Baker Hughes Inc. (*Energy*)	Implement MacBride Principles	16
1998	Nalco Chemical Co. (*Basic Industries*)	Endorse Ceres Principles	13
1999	Tosco Corp. (*Energy*)	Conduct Annual Pollution Prevention Preview	4
2000	Ameren Corp. (*Utilities*)	Reduce Radioactive Emissions	11
2001	Alcoa Inc. (*Basic Industries*)	Review/Report on Global Standards	11
2002	Chevron Corp. (*Energy*)	Report on Global Climate Change Risk	10
2002	Cooper Companies Inc. (*Consumer Goods*)	Issue Sustainability Report	22
2003	National Fuel Gas Co. (*Utilities*)	Take Steps to Eliminate Workplace Discrimination	8
2004	Ruby Tuesday Inc. (*Consumer Goods*)	Report on Gene-Engineered Food	12
2005	Baker Hughes Inc. (*Energy*)	Implement MacBride Principles	24
2006	Leggett & Platt Inc. (*Consumer Goods*)	Adopt Sexual Orientation Anti-Bias Policy	25
2007	MDU Resources Group Inc. (*Utilities*)	Issue Sustainability Report	35
2008	The Hershey Company (*Consumer Goods*)	Report on Steps Against Child Labour	2
2010	Gentex Corp. (*Consumer Goods*)	Report on Sustainability, Including Climate Change	33
2011	Regions Financial Corp. (*Finance*)	Report on Political Donations and Policy	42

Notes

1 In the context of CSR, the risk-reduction hypothesis holds that CSR engagement can serve to reduce firms' risks.

2 Activist shareholders may employ 'high-cost' or 'low-cost' methods to induce changes within a firm or to express their dissatisfaction. While high-cost methods, reserved for large market participants such as hedge funds, entail establishing significant ownership stakes within the firm and conducting proxy fights to secure board seats, low-cost methods involve the sponsoring of nonbinding shareholder proposals or the withholding of votes in director elections (Del Guercio et al. 2008; Ertimur et al. 2010). Firms that ignore shareholder proposals, especially those that have strong support, can suffer negative investor attention. For example, in the past, the California Public Employees' Retirement System (CalPERS) maintained a focus list of firms that ignore shareholder proposals with a majority of votes. This name-and-shame approach has, as of 2011, been gradually phased out in favor of a more mutually engaging approach with companies that would otherwise be on this list (see https://www.calpers.ca.gov/page/investments/governance/corporate-engagements/focus-list-program) (accessed on

1 March 2001). In a similar vein, CFO.com regularly publishes information on shareholder proposals and the responses of firm management.

[3] In accordance with Securities and Exchange Commission (SEC) Rule 14a-8, shareholders can submit proposals to be voted on in annual shareholder meetings and these can either be adopted by the board of directors, in part or in whole, or can be dismissed in their entirety regardless of the amount of voting support they receive (see https://www.sec.gov/interps/legal/cfslb14i.htm) (accessed on 1 February 2001).

[4] TIAA-CREF is an example of a firm that has been very active in the past two decades through their use of 'high cost' and 'low cost' methods of inducing change within a firm (see Note 2). Specifically, when utilizing low-cost methods of shareholder activism, they have an established record on using nonbinding shareholder proposals to successfully implement desired changes (Cai and Walkling 2011; Uysal and Tsetsura 2015).

[5] The 2017 list, for example, is available here: https://www.forbes.com/sites/karstenstrauss/2017/09/13/the-10-companies-with-the-best-csr-reputations-in-2017/#5e416097546b (accessed on 1 March 2001). A naive Google search of 'Forbes best CSR reputations' followed by a year produces search results that indicate *Forbes*' selection of companies for that given year that exemplified CSR leadership.

[6] One of the indicators which the Reputation Institute looks for in companies is CSR leadership abilities. They contend that ' . . . companies with CEOs and senior executives who take a stand on critical, often controversial, issues tend to outperform companies that remain silent . . . ' More information on how they measure the reputations of firms is available here: https://www.reputationinstitute.com/why-ri (accessed on 7 March 2001).

[7] The Berle–Dodd debate epitomizes this ongoing controversy between shareholder and stakeholder views of firms' responsibilities (Windsor 2008). While Berle argued that public policy should provide a well-defined fiduciary duty for firm managers, Dodd argued for public policy that incorporates community responsibilities. As Windsor (2008) indicates, Dodd's views can be regarded as precursor to many of the modern-day corporate social responsibility and stakeholder theories that are being discussed in the literature.

[8] For the sake of robustness, we replicated the entire analysis of our study using time windows such as 63 days (3 months) and 252 days (12 months) and conclude qualitatively similar findings. These findings are not tabulated for the sake of brevity but are available upon request.

[9] The sample range for the economic recession is from December 2007 to June 2009. This is consistent with the dates identified by the National Bureau of Economic Research (NBER), available online here: http://www.nber.org/cycles.html (accessed on 1 February 2000).

[10] Based on our in-sample median of 27 percent in favor.

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Article

CSR, Risk Management Practices, and Performance Outcomes: An Empirical Investigation of Firms in Different Industries

Nitya Singh [1] and Paul Hong [2,*]

[1] Department of Management, Perdue School of Business, Salisbury University, Salisbury, MD 21804, USA
[2] John B. and Lillian E. Neff College of Business and Innovation, The University of Toledo, Toledo, OH 43606, USA
* Correspondence: paul.hong@utoledo.edu

Abstract: This article presents a research model that defines how external drivers impact financial performance outcomes, and the role played by strategic practices (especially CSR) in reducing the negative impact of such external influences. Applying strategic orientation theory, risk management theory, and CSR theory as the encompassing theoretical rationale, the conceptual framework defines the research idea and the research model provides the empirically testable model that identifies key variables with valid instrument measures. The results indicate that although external supply chain risk drivers do negatively impact a firm's financial performance, the influence of these risk events can be mitigated if firms adopt focused strategic practices. The results highlight the significant role played by CSR strategic practices in enabling firms to develop resilience from disruption events. In our research model, CSR, as an organizational linkage practice, is positioned in between upfront strategic flow and back-end performance flow. It suggests that CSR success is only possible when CSR is implemented broadly throughout organizational processes. Based on the empirical results, lessons and implications are presented for theoretical and managerial insights and future research.

Keywords: corporate social responsibility; risk management practices; performance outcome; strategy; supply chain

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1. Introduction

In recent years there has been an increased research attention on environmental, social, and governance (ESG)-focused investing, wherein socially conscious investors are identifying companies based on their behaviors within the ESG categories (Avramov et al. 2022; Gillan et al. 2021; Zhao et al. 2019). Organizations have accordingly responded to such changes in investor behaviors and stakeholder expectations with a renewed emphasis on corporate social responsibility (CSR) to fulfill ESG requirements (Roberts and Dowling 2002). Corporate social responsibility aims to create and deliver value for firms to a larger world beyond customers who purchase their products and services (Lindgreen and Swaen 2010; Matten and Moon 2004). Naturally, the debate on CSR business practices centers on "doing what is right" and "achieving the right results" (Matten and Moon 2004; Latapí Agudelo et al. 2019). Successful CSR implementation requires effective translation of CSR intention (e.g., social and environmental goals), business processes, and comprehensive performance outcomes (Singh and Hong 2020; Wang et al. 2016; Bozos et al. 2022).

As firms try to integrate CSR goals into expanded shareholder expectations (e.g., environmental, equity, and governance issues), the scope of risk management is naturally enlarged (Baker et al. 2021; Shakil 2021; Singh 2021). CSR is a positive flow to build up and support a business reputation, whereas risk management is a proactive business flow to mitigate potentially harmful and damaging effects of business (Parajuli et al. 2017; Sawik 2017; Kim et al. 2021). In this sense, both CSR and risk management are very closely related. Consequently, firms increasingly regard CSR as an important element of their

strategic and operational business processes to fulfill ESG goals (Brower and Rowe 2017; Liu et al. 2021; Zhao et al. 2019). Porter and Kramer (2006) therefore suggest that the role of CSR within an organization should now be considered within more innovative frameworks than it traditionally has been. Accordingly, scholars have started to focus on identifying how CSR can enable firms to achieve superior customer satisfaction, improved financial performance, and empower an organization to develop a sustainable competitive advantage (Roberts and Dowling 2002; Roehrich et al. 2014).

Emerging research on supply chain risk management (SCRM) considers how firms plan to reduce the impacts of supply chain disruptions on business processes and overall performance outcomes (Choudhary and Sangwan 2019; Nooraie and Parast 2016; Parajuli et al. 2017). In the context of rising complex and uncertain supply chain risks, firms find it quite challenging to integrate CSR and risk management into their strategic and operational processes, with empirical research in this area still rare (Baker et al. 2021; Kim et al. 2021; Shakil 2021; Singh and Hong 2020). Furthermore, research on the impact of CSR on organizational outcomes, such as reputation and financial performance, has been inconclusive (Aguilera-Caracuel and Guerrero-Villegas 2018). As more firms operate using their global production and marketing network, more research is called for in relation to supply chain risk management practices (Albuquerque et al. 2019; Bhattacharya et al. 2021; Singh 2021).

In response to such a current research trend, this article aims to examine how firms effectively implement CSR (1) to mitigate supply chain disruption events, (2) to achieve competitive performance outcomes, and (3) to fulfill socially desirable goals. We first develop a conceptual framework that provides the theoretical rationale of this study. This paper is organized in the following sequence. A research model presents key variables that interact through business processes to achieve desirable performance outcomes. For an empirical investigation, this study uses an original benchmark instrument that tests the key relationships and reports the findings of firms of different industries from Asia, North America, Latin America, and Europe. Based on the empirical results, lessons and implications are presented for theoretical and managerial insights and future research. The main contribution of this article is how firms use CSR as a critical linkage mechanism between strategic planning processes and operational implementation practices. The results are to achieve multiple organizational goals—economic, environmental, and social dimensions.

2. Conceptual Framework

A conceptual framework describes how key ideas are related. Conceptual frameworks are developed based on theoretical rationale and thus provide the basis for a further literature review and analysis (Hong et al. 2019; Nader et al. 2022; Flaig et al. 2021; Zhang 2013). Figure 1 presents three theoretical bases and key concepts such as drivers, risk-mitigating practices, CSR practices, and performance outcomes. Three theory streams provide the research context and research design. First, strategic orientation theory (SOT) explains how firms choose their long-term business direction which provides their overall purpose and business principle (Day and Wensley 1983; Chaganti and Sambharya 1987). SOT is useful in understanding how firms choose their set of principles to guide their organization-wide activities in the long term to aim for a competitive advantage in their target markets (Saebi et al. 2017; Brower and Rowe 2017). Second, risk management theory (RMT) suggests how firms adopt their proactive approaches to anticipate and prepare for the potential risk factors in prudent and realistic business action programs (Aven 2016; Ho et al. 2015). RMT explains how firms choose their practices related to utility, regression, and diversification to mitigate the negative impacts of risk drivers on organizational outcomes (Bolton et al. 2011; Hoyt and Liebenberg 2011; Tang and Musa 2011).

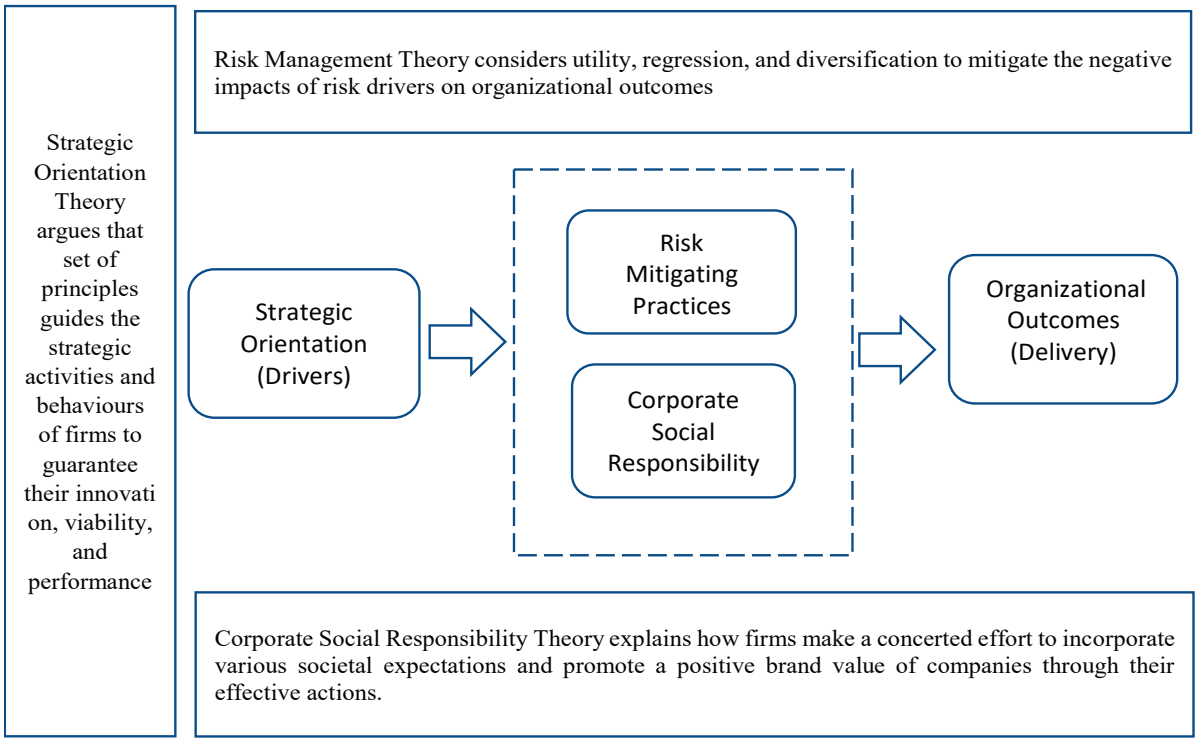

Figure 1. Conceptual Framework.

Third, CSR theory explains the role of CSR in relation to other business practices that are critical to achieving desirable organizational outcomes (Matten and Moon 2004). CSR considers how firms make a concerted effort to integrate societal expectations into their business processes and promote a positive brand value of companies (Singh and Hong 2020; Wang et al. 2016; Latapí Agudelo et al. 2019). In summary, a conceptual framework (Figure 1) shows a general model of how firms incorporate strategic intent, risk management requirements, and corporate social responsibility dimensions into their overall business practices. In the next two sections, we conduct a literature review to identify gaps within the literature and follow it up by developing a specific research model that shows how firms pursue their value propositions into viable practices and desirable performance outcomes.

3. Literature Review

Recent supply chain literature has examined how firms manage diverse risks within their supply chain through their risk-resilient capabilities (Khan and Burnes 2007; Kwak et al. 2018; Nader et al. 2022; Parker and Ameen 2018; Zimon and Madzík 2020). The numerous types of risks are classified into different categories in the form of offshoring risk, quality risk, safety performance risk, managerial performance risk, and product risk, and firms considered and devised systematic responses (Baryannis et al. 2019; Brusset and Teller 2017; Zimon and Madzík 2020; Fan and Stevenson 2018).

The earlier discussion suggests that scholars have not only attempted to characterize the term SCRM but also assessed how these risks impact firm performance, and consequently attempted to develop strategies to mitigate supply chain risk (Parajuli et al. 2017; Sawik 2017; Bradley 2014; Nooraie and Parast 2016). Scholars further argue that it is important to identify the negative impact of disruption events on a firm's supply chain, as well as identify strategies adopted by these firms to mitigate the negative influences of such disruption events (Shen and Li 2017; Revilla and Saenz 2017). They ultimately suggest that a supply chain disruption orientation by itself does not necessarily translate into supply chain risk resilience. It is also important for firms to identify capabilities and strategies that

are sustainable and can proactively enable them to mitigate the negative influences of these disruption risks.

Although numerous perspectives have been developed on how firms can develop risk resilience, a research area that has garnered significant attention is how organizations integrate their strategic intent with operational practices to adopt CSR as a vital mechanism to mitigate the impacts of supply chain disruptions and sustain their reputation (Gillan et al. 2021; Kim et al. 2021; Liu et al. 2021; Singh 2021). The core argument is that CSR can be a strategic orientation that promotes vibrant innovation and flexible responsiveness to market changes and thus sustain competitive advantage (Cannon et al. 2020; Du et al. 2011; Nyuur et al. 2019; Porter and Kramer 2006). However, the lack of credible and conclusive evidence about the vigorous roles of CSR on broad organizational outcomes calls for more empirical research in this area (Aguilera-Caracuel and Guerrero-Villegas 2018; Cannon et al. 2020; Dupire and M'Zali 2018). In response to such research needs, this article aims to provide a sound research model that defines relevant variables and examines how firms effectively adopt CSR to achieve desirable organizational outcomes with empirical tests.

4. Research Model and Hypothesis Development

4.1. Supply Chain Risk and Organizational Impact

As organizations function in an increasingly globalized and uncertain business environment, supply chain disruptions have started to emerge as one of the most significant factors impacting firm performance, reputation, and profitability (Singh and Singh 2019; Dubey et al. 2019; Punniyamoorthy et al. 2013). Supply chain disruption can therefore be categorized as supply chain risk events that negatively impact organizational performance at several levels. Such disruptions can occur both upstream and downstream of the organizational value chain (Park and Singh 2022). "From the point of view of a buying firm, the upstream supply chain can be viewed as an organization" (Bode and Wagner 2015). Choi and Hong (2002) reframed this concept into a supply chain context and suggested that an upstream supply chain comprises several suppliers, several tiers of suppliers, and the extent of the dispersion among members within the network. Scholars have therefore argued that from a supply chain disruption perspective, it is important to identify the role played by suppliers, and how small failures at their end may magnify supply chain risk factors for the buyer firm (Kim et al. 2019; MacKenzie et al. 2014).

Risk incidences emanating from disruption at the supplier end are therefore conceptualized in this article as supply chain risk drivers that have a negative impact on a firm. The ability of firms to manage resources and reconfigure them according to the environmental setting is extremely important for a firm's survival and long-term financial performance (Sirmon et al. 2007; Davis et al. 2009; Singh and Hong 2020). Therefore, scholars have argued that due to these factors, network-based supply chain disruptions negatively impact a firm's financial performance (FO) (Zsidisin et al. 2016). Such supply chain risk events also have a tangible and direct impact on the strategic activities that firms undertake as part of their regular operations (Singh and Hong 2020). Kaplan (2008) further suggests that the cognitive behavior of decision-makers is influenced by the frames that individuals operate in, and hence it can be argued that these frames are impacted by the organizational environment. Supply chain risk drivers (SCRD) therefore also negatively impact firms' practices, including strategic innovative practices (SIP). Thus, the following hypotheses are stated as:

H1a. *Supply chain risk drivers are negatively related to financial outcomes.*

H1b. *Supply chain risk drivers are negatively related to strategic innovative practices.*

Supply chain risk drivers may also divert the attention of organizational members to focus more on the detrimental risk events rather than societal concerns, and therefore they also negatively impact organizational CSR activities (Singh 2021; Lim 2020; Zhou and Ki 2018). Furthermore, as organizations witness incidences of supply chain disruption events, they develop an institutional memory that enables them to effectively respond to such

disruption activities (Maitland and Sammartino 2015; Osiyevskyy and Dewald 2015; Khatri and Ng 2000). Therefore, as firms encounter incidences of supply chain disruption events, they not only improve upon their existing risk management practices but also develop new risk management practices. Hence, it can be argued that supply chain risk drivers positively impact risk management practices (RMP). Thus, the following hypotheses are stated as:

H1c. *Supply chain risk drivers are negatively related to CSR organizational practices.*

H1d. *Supply chain risk drivers are positively related to risk management practices.*

4.2. Strategic Innovative Practices and Their Impact on Organizational Practices

Within the strategic management literature, scholars have long argued that strategic practices have a direct impact on organizational performance. Child (1972) suggested that organizations do not simply react to their environment, but dynamically interact with it through the actions of top managers. Therefore, firms may develop a competitive advantage by developing competencies that are incrementally innovative relative to other organizations but in aggregate play an important role in enabling firms to develop dynamic capability (Golgeci and Ponomarov 2013; Barney 1991). Hence, in pursuit of competitive advantage, firms focus on developing strategic practices that aim to develop capabilities within the organization that can help reduce business risk, and enhance corporate reputation, while simultaneously achieving superior financial performance. Long-term innovative strategic practices thus consider how the organization can prepare for current and future risk events, and therefore play an important role in enabling the firm to develop risk management capabilities (Hussy 1999; Agarwal and Ansell 2016). Furthermore, such innovative strategic practices also aim to ensure that organizations are able to develop and enhance their reputation among customers, who as a result of positive firm perception are willing to continue to purchase products and services from these firms (Louro and Cunha 2001; Saeidi et al. 2015). Strategic innovation practices are therefore more likely to engage in socially respectful activities which are closely related to the goals of CSR practices (Lin-Hi and Blumberg 2018; Ham and Kim 2019; Carroll 1979; Hou 2019). Strategic practices also intend to bring value to organizations through constructive changes within the organization by enabling the firm to improve various aspects of its value chain that enhance productivity, reduce costs, and effectively develop and retail products that result in positive financial outcomes (Certo et al. 2006; Seifzadeh and Rowe 2019; Lestari et al. 2020). Thus, the following hypotheses are stated as:

H2a. *Strategic innovative practices are positively related to risk management practices.*

H2b. *Strategic innovative practices are positively related to CSR organizational practices.*

H2c. *Strategic innovative practices are positively related to financial outcomes.*

4.3. Impact of Risk Management Practices

As firms function in a dynamic business environment, the high uncertainty resulting from business disruptions creates ambiguity about the value and utility of existing resources to generate capabilities that aid in recovering from disruption. A firm that is able to effectively utilize its resources in a dynamic environment will have a better chance of developing capabilities to reduce the impact of disruption events (Craighead et al. 2007; Scheibe and Blackhurst 2018). Such strategic practices assist decision-makers within an organization to mount an effective and rapid response to manage the adverse impact of business disruption events that have both reputational and financial impacts on a firm.

From an organization's perspective, corporate reputation represents the stakeholders' overall evaluation of a company (Kim et al. 2019), and particularly demonstrates the extent to which organizational stakeholders identify the company as being good or bad (Lin-Hi and Blumberg 2018). When attributing a positive or negative reputation to a company, stakeholders look at several aspects such as the firm's past corporate activities,

and extrapolate from these activities their assumption of the company's future behavior (Lin-Hi and Blumberg 2018). One aspect of corporate activity that has steadily gained in relevance as having a positive impact is CSR practices. Carroll (1979) defined CSR as "the social responsibility of a business which includes the economic, legal, ethical, and discretionary expectations that society has of organizations at a given point in time". This idea was further extended by Snider et al. (2003) who argued that "CSR implies that companies have a moral obligation to the society in which they operate to behave ethically, beyond the limits of legal requirements, and beyond their obligations to traditional stakeholders, such as employees, consumers, vendors, and the local community" (Snider et al. 2003, p. 175). Thus, the following hypothesis is stated as:

H3a. *Risk management practices are positively related to CSR organizational practices.*

The ability of firms to manage resources and reconfigure them according to the environmental setting is extremely important for organizational growth and long-term financial performance (Sapienza et al. 2006; Sirmon et al. 2007; Davis et al. 2009). As the environment under which firms operate cannot be controlled, organizations must contend with various risks during the normal course of business operations. Risk management practices are therefore strategic initiatives adopted by companies to reduce the negative influence of broad, rare, and adverse supply chain events that have a negative impact on the organization's operational and business capability (Ho et al. 2015). Risk management practices are therefore strategic initiatives adopted by firms to reduce the negative impact of environmental uncertainty on firm performance, thereby reducing costly errors and preventing damaging wastes of organizational resources, and ultimately have a positive impact on organizational financial outcomes. Thus, the following hypothesis is stated as:

H3b. *Risk management practices are positively related to financial outcomes.*

4.4. Influence of CSR Practices on Firm Financial Performance

In recent years the role of CSR as a strategic business tool to achieve tangible business outcomes has become better understood by both practitioners and academics alike (Zhao et al. 2019). A common consensus that has emerged among scholars is that by adopting and effectively implementing CSR practices, firms can exhibit increased customer satisfaction, improved reputation, and develop a sustainable competitive advantage (Roberts and Dowling 2002). Scholars have further identified that the adoption of CSR practices has a direct impact on corporate reputation. Research shows that when customers are provided an option of choosing between two competing products with similar price points and quality levels, they tend to prefer products from organizations that have made the strategic choice of adopting CSR practices (Saeidi et al. 2015). These arguments lead us to suggest that CSR practices adopted by organizations enable the company to achieve tangible benefits, and therefore assist the firm in mitigating the negative impact of business disruption events on corporate reputation.

As firms have expanded the scope of their CSR initiatives, academic research focusing on the wide-ranging impact of CSR practices on business organizations has also increased. Significant work on this topic was performed by Cruz and Matsypura (2009) and Cruz (2013), when they attempted to bridge the theoretical gap between CSR practices, supply chain risk, and SCRM practices. These scholarly works suggest that organizations with CSR practices can decrease operational inefficiencies, production costs, and business risk, while simultaneously enabling the firm to increase sales, enter new markets, and improve brand value. A direct impact of these benefits is the organizational ability to decrease costs, lower risk, and improve profitability (Cruz 2013). Therefore, it can be argued that CSR organizational practices enable the creation of a positive environment for the organization, allowing it to offsets risks from potential supply chain disruption events and therefore exhibit positive financial outcomes. Thus, the following hypothesis is stated as:

H4. *CSR organizational practices are positively related to financial outcomes.*

5. Methodology

5.1. Research Methodology

The study adopts quantitative methodology which involves the development of a survey instrument and the use of covariance-based structural equation modeling (CB-SEM) to examine the hypothesized relationships. The first step that we adopted in this study was to develop the relevant constructs through a comprehensive literature review. We used the existing literature base to develop the model identified in Figure 2 and create the survey instrument (Moore and Benbasat 1991; Bagozzi et al. 1991; Churchill 1979). We adopted a questionnaire-based survey method as it allows us to increase the generalizability of the results by testing the relationships between various constructs on a large sample base (Miller 1992; Straub et al. 2004). The unit of analysis in our study is the firm level.

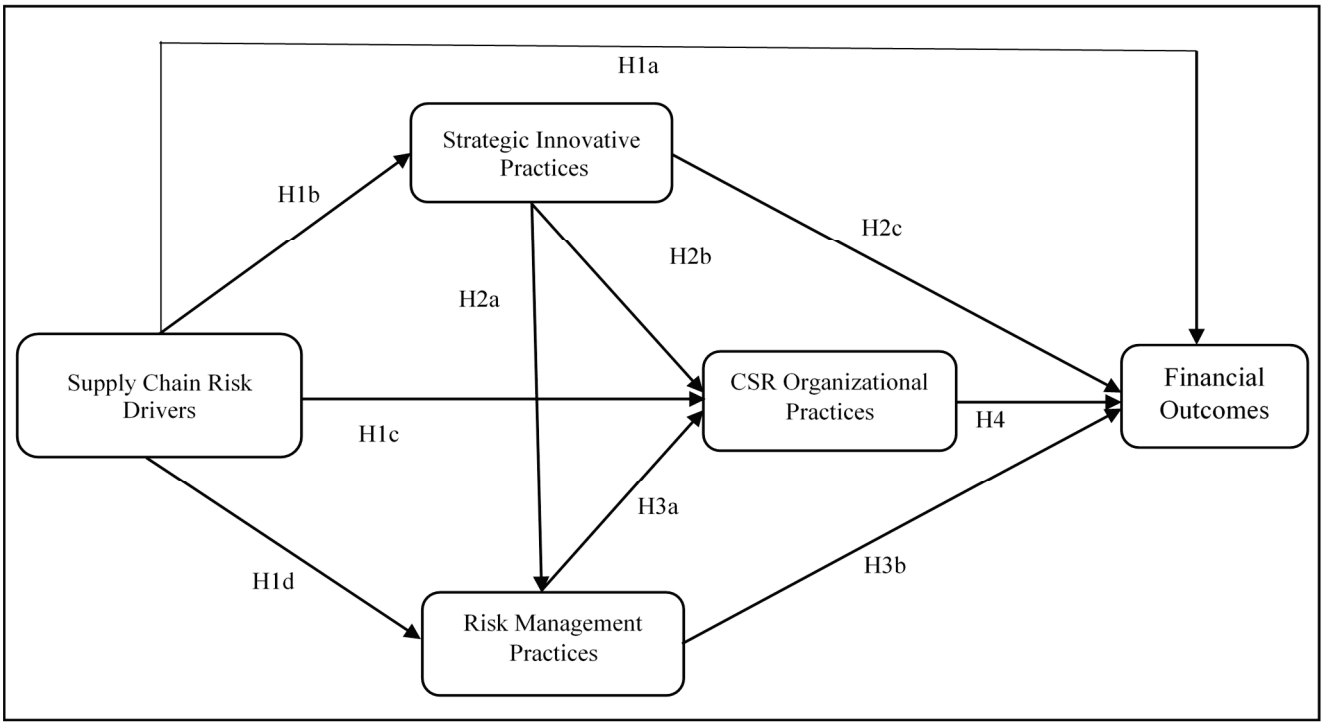

Figure 2. Theoretical Model.

5.2. Data Collection and Sample Characteristics

Items for the constructs were developed from established scales altered to the context of our study (Singh and Hong 2020; Singh 2021). The survey adopted a 5-point Likert scale to capture respondent feedback on various constructs ranging from 1 (strongly disagree) to 5 (strongly agree). The starting point for data collection was Lexis-Nexis Academic. SSIC codes were used to identify managers from the target industry and develop a database of 1728 managers. For key informants criteria, the selected survey respondents were senior and middle management professionals who had experience in supply chain management, risk management, and strategy development for their respective organizations (Kumar et al. 1993). We then contacted all the managers, shared with them the topic of our research, and solicited their willingness to participate in our research. To test the quality of the model and ensure the reliability and validity of measurement scales, we also conducted a pilot study with 40 executives from the industry. After obtaining adequate respondents from the pilot study, we tested for reliability and validity. The scale exhibited acceptable accuracy as the observed corrected item total correlation (CITC) scores were greater than 0.3, and the Cronbach alpha values were greater than 0.7. We also assessed the scores of factor loadings (Hair et al. 2010).

Having refined the survey instrument, we proceeded toward the final data collection. We uploaded the survey onto Qualtrics and shared the survey link with all the potential respondents. To ensure a high response rate, continuous communication was maintained with all likely respondents during the data collection time period (Dillman 2007). Such continuous engagement resulted in us receiving feedback from 328 managers, giving us a response rate of 18.98%. To check the distribution of missing responses, Little's MCAR test was applied (Little 1988) and the analysis showed that values in the database were missing completely at random ($p > 0.05$). This study followed Lin and Wu (2014) in checking for normality of the data distribution and outliers. Using the currently acceptable methodological practices (Hair et al. 2010; Li 2013), responses that had missing data were removed from the final database. Mahalanobis distance was used to check for outliers within the data. The Mahalanobis distance scores were between 0 and 1 for the majority of the observations, indicating that the data conformed to normality and that the dataset included only a few outliers (Lin and Wu 2014). The final database, after deleting missing variables and outliers, comprised 271 usable responses. Hair et al. (2010, p. 175) suggested that to ensure reliability, validity, and generalizability of results, the sample size should be in the ratio of 50:1 (50 observations per variable). In our study, the sample size is above this threshold level and therefore signifies a high level of data representativeness and reliability to the research questions. The final tests focused on assessing reliability and validity. Each scale (Appendix A) demonstrated acceptable levels of convergent validity and reliability. The demographic profile of the organizations in the final database is shown in Table 1.

Table 1. Demographic Profile of Companies.

Measure	Category	Frequency	Percentage (%)
Industry	Chemical Manufacturing	6	2
	Pharmaceuticals	11	4
	Healthcare Manufacturing	11	4
	Automotive Manufacturing	11	4
	Technology Manufacturing	19	7
	Food Manufacturing	28	10
	Service	39	14
	Logistics	48	18
	General Manufacturing	98	37
Organization Size (Number of Employees)	>1000	105	38
	500–1000	83	30
	100–500	61	24
	1–100	22	8
Years Company in Existence	>10 years	271	100
Geographic Location	North America	127	47
	Europe	61	23
	Asia	58	21
	South America	25	9

To ensure the robustness of the model, we also include firm size as a control variable in our model. We measure firm size by considering two parameters: (1) the number of employees within an organization and (2) the annual turnover of the firm (Saeed et al. 2019). The consideration of these control variables is justified as the circumstances under which supply chain disruption events negatively impact a firm's financial performance are contingent on the size of the firm (Pleshko et al. 2014). The inclusion of these control variables in the

model helps extract the associated variance. As the survey respondents had self-identified the organization that they were working for, secondary data related to the total number of employees and annual revenue of the firm were collected through COMPUSTAT, and in some cases directly from the company's website. As the data range was extremely broad, we used log values (base 10) for standardizing the values of both variables. In addition to the survey data, such use of secondary data further adds to the robustness of the model and the validity of the empirical investigation.

5.3. Data Analysis and Results

We used AMOS covariance-based structural equation modeling to test our research hypotheses (AMOS 25.0). Scholars have argued that a CB-SEM approach is a superior approach and is better suited when dealing with complex models (Rönkkö et al. 2016). The complete sample of 271 respondents was used for the estimation. For testing potential response bias, we followed the suggestions of Armstrong and Overton (1977). We compared the findings of early respondents and late respondents. Using the late respondents as a proxy for non-responders, we randomly selected a sub-sample of 50 respondents from the initial contact list and statistically tested for response bias (Choudhary and Sangwan 2019). The result of the Student's t-test showed no significant difference between early and late respondents, implying that response bias was not a source of concern in our findings.

5.4. Assessing Potential Common Method Bias

To ensure the robustness of the study, detailed tests were conducted to examine potential common method bias (CMB) within the dataset (Podsakoff et al. 2003). We followed the most widely accepted methodological approaches to deal with common method bias, both ex-ante and ex-post (Chang et al. 2010; Tourangeau et al. 2000; Hu et al. 2019). First, during the item construction phase, we involved two academics and two practitioners well versed in supply chain risk management and strategy development and used their feedback to refine the survey instrument. Second, during the data collection process, respondents were assured of anonymity and confidentiality of their responses. Third, several scholars (Pavlou et al. 2007; Hu et al. 2019) have suggested that common method bias would exist if the correlations between the constructs were higher than *0.90*. In our study (Table 2), the highest correlation coefficient was *0.73*. Harman's single factor test (Shen et al. 2019; Podsakoff et al. 2003) also indicates that no single component accounts for most of the variance.

Table 2. Reliabilities and Inter-item Correlations.

Constructs	CR	AVE	Supply Chain Risk Drivers	Strategic Innovative Practices	Risk Management Practices	CSR Organizational Practices	Financial Outcomes
Supply Chain Risk Drivers	0.820	0.605	1.00	-	-	-	-
Strategic Innovative Practices	0.850	0.587	−0.167	1.00	-	-	-
Risk Management Practices	0.802	0.578	−0.067	0.534	1.00	-	-
CSR Organizational Practices	0.738	0.414	−0.310	0.739	0.602	1.00	-
Financial Outcomes	0.857	0.545	−0.290	0.492	0.553	0.604	1.00

Note: CR = Composite Reliability; AVE = Average Variance Extracted; n = 271.

5.5. Measurement Model

The measurement model was evaluated prior to the structural model to ascertain whether we have construct reliability, discriminant validity, convergent validity, and unidimensionality. As factor loadings for almost all items in the scale were found to be above *0.4*, all scale items were used for confirmatory factor analysis (CFA). Unidimensionality was reflected through high internal loadings and high Cronbach's α (CA), which exceeded 0.8 for all constructs (Nunnally 1978), and high (*>0.7*) composite reliability for each construct (Segars 1997; Hair et al. 2010). We also tested the model for multicollinearity using variance inflation factors (VIF). The constructs' VIFs ranged from *1.14 to 2.81*, which is lower than the threshold of *3.33* (Hu et al. 2019). These estimates indicate that no multicollinearity exists within the model.

We evaluated the measurement model using CFA (Anderson and Gerbing 1988). CFA was operationalized in two stages—first through a measurement model and second through a structural model (James et al. 1982). Values were calculated for composite reliability (CR), average variance extracted (AVE), Cronbach's alpha (α), and item loadings to assess the internal reliability and convergent validity. The values for CR and AVE, along with the standardized CFA loadings in Appendix A, provide evidence of convergent validity. Almost all the factor loadings in the measurement model are greater than *0.6*, showing convergent validity (Bagozzi et al. 1991). For an additional test of the model fit, we used the chi-square goodness-of-fit test. The chi-square test value in our analysis was *1.286*, further showing excellent fit (Hair et al. 2010). Another important index used for assessing model fit is the root mean square error of approximation (RMSEA), which provides a mechanism for adjusting for sample size, where chi-square statistics are used (Byrne 2016). The RMSEA of our measurement model came to *0.033*, providing further evidence of an excellent model fit (Browne and Cudeck 1992; Kline 2011; Byrne 2016). In our measurement model, the comparative fit index (CFI) was observed to be *0.979* and PClose was observed to be *0.987*, providing further evidence for an excellent model fit (Hair et al. 2010). Therefore, an analysis of the measurement statistics suggests that the model displays excellent fit along with high reliability and validity. Since all the measurement criteria were satisfied, we further tested the structural model.

6. Structural Model Results and Discussion

6.1. Structural Model Test Results

The structural model was examined using AMOS covariance-based SEM to test our hypotheses. The results of the analysis are outlined in Figure 3 and Table 3. Hypothesis 1a (H1a) states that supply chain risk drivers (SCRD) negatively impact a firm's financial outcomes (FO). The effect is observed to be negative and significant ($\beta = -0.139$, $p < 0.001$). This result was expected and is in keeping with the current literature that had identified the negative impact that supply chain risk has on a firm's financial performance (Zsidisin et al. 2016; Dubey et al. 2019). This result provides support for the previous study that supply chain risk drivers (SCRD) directly and negatively impact a firm's financial performance. The result of H1b ($\beta = -0.201$, $p < 0.001$) supports that SCRD negatively impacts strategic innovative practices (SIP). This confirms that supply chain disruptions motivate firms to devise new and different responses in their strategic level planning practices (Singh and Hong 2020; Kaplan 2008; Nader et al. 2022).

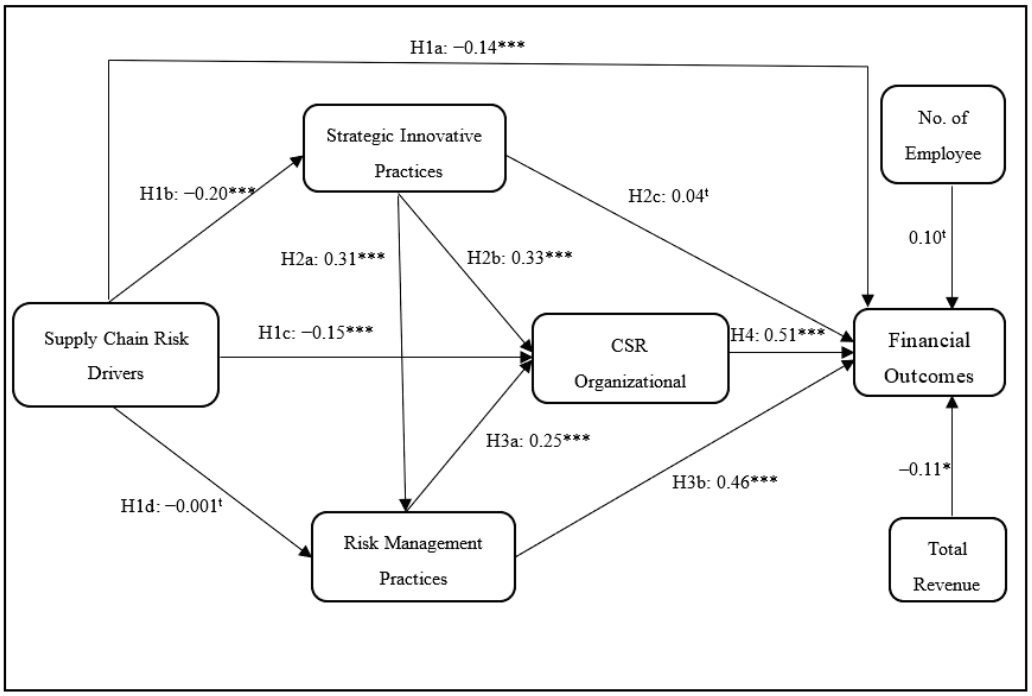

Figure 3. Analysis of Empirical Results. Notes: * 90% significance level; *** 99% significance level; t: statistically insignificant.

Table 3. Structural Model Results.

Hypothesis	Path	Path Coefficient	*p*-Value	Result
H1a	Supply Chain Risk Drivers (−ve) ⟶ Financial Outcomes	−0.139	$p < 0.001$	Supported
H1b	Supply Chain Risk Drivers (−ve) ⟶ Strategic Innov. Practices	−0.201	$p < 0.001$	Supported
H1c	Supply Chain Risk Drivers (−ve) ⟶ CSR Org. Practices	−0.150	$p < 0.001$	Supported
H1d	Supply Chain Risk Drivers (+ve) ⟶ Risk Mgmt. Practices	−0.001	$p > 0.05$	Not Supported
H2a	Strategic Innovative Practices (+ve) ⟶ Risk Mgmt. Practices	0.312	$p < 0.001$	Supported
H2b	Strategic Innovative Practices (+ve) ⟶ CSR Org. Practices	0.334	$p < 0.001$	Supported
H2c	Strategic Innovative Practices (+ve) ⟶ Financial Outcomes	0.037	$p > 0.05$	Not Supported
H3a	Risk Management Practices (+ve) ⟶ CSR Org. Practices	0.250	$p < 0.001$	Supported
H3b	Risk Management Practices (+ve) ⟶ Financial Outcomes	0.457	$p < 0.001$	Supported
H4	CSR Org. Practices (+ve) ⟶ Financial Outcomes	0.507	$p < 0.001$	Supported

The result of H1c ($\beta = -0.150$, $p < 0.001$) also supports that SCRD negatively impacts CSR organizational practices (CSR). This suggests that various supply chain risk drivers become the source of added pressures and stresses and they are quite disruptive for normal CSR routines (Singh 2021; Lim 2020; Zhou and Ki 2018). The result of H1d ($\beta = -0.001$, $p > 0.05$) indicates that SCRD negatively impacts risk management practices (RMP) but it is not statistically significant. This means that risk management practices by nature anticipate disruptive events and thus they are better prepared to deal with these external disruptions without a huge impact on risk management practices across organizational boundaries. The results of H2a ($\beta = 0.312$, $p < 0.001$), H2b ($\beta = 0.334$, $p < 0.001$), and H2c ($\beta = 0.037$, $p > 0.05$) show that strategic innovative practices (SIP) positively impact RMP and CSR but not financial outcomes (FO). This explains that firms that formulate strategic innovative practices through proactive and systematic processes involving organizational members are more likely to implement effective RMP and CSR (Agarwal and Ansell 2016; Dupire and M'Zali 2018; Nyuur et al. 2019). The result of H2c indicates that strategic planning practices alone do not directly impact financial performance. The financial performance outcomes require the implementation of mediating organizational practices that support strategic planning goals (Certo et al. 2006; Seifzadeh and Rowe 2019; Lestari et al. 2020; Hong et al. 2019).

The results of H3a ($\beta = 0.250$, $p < 0.001$) and H3b ($\beta = 0.457$, $p < 0.001$) suggest that RMP positively impacts both CSR and FO. This indicates the powerful synergy when organizations implement both RMP and CSR in their normal organizational processes (Craighead et al. 2007; Scheibe and Blackhurst 2018; Kim et al. 2019; Singh and Hong 2020). Organizations can achieve positive financial performance if they use RMP and CSR to support strategic goal practices (Davis et al. 2009; Ho et al. 2015; Hong et al. 2019). The results of H4 ($\beta = 0.507$, $p < 0.001$) report that CSR positively impacts FO. This suggests that as CSR is positioned in the back-end (as an operational implementation mechanism), and not in the front-end (as a strategic planning tool), it has a much more direct impact on financial performance (Cruz 2013; Roberts and Dowling 2002; Saeidi et al. 2015; Zhao et al. 2019).

6.2. Theoretical Rationale and Empirical Tests

Hypotheses state the relationships between key variables with theoretical support and logical rationale. In this study, the original survey items of each variable clearly reflect what each theoretical rationale suggests, and the adequate sample size allowed us to empirically test the validity of the relationships between these key variables.

Items of strategic risk drivers and strategic innovation practices represent external environmental challenges and pressures, whereas strategic innovation practices reflect the organizational intent and strategic aims and goals of firms according to the emphasis of strategic orientation theory (Chaganti and Sambharya 1987; Day and Wensley 1983; Saebi et al. 2017; Tourky et al. 2020). Items of strategic risk management practices consider both practical and timely organizational risk management approaches according to what risk management theory suggests. Items of CSR organizational practices measure key CSR practices that benefit both internal (e.g., employees) and external stakeholders (e.g., direct customers and societal members).

7. Limitations and Implications

As with all empirical research, our study also has certain limitations. First, most respondents were primarily senior managers working in either the manufacturing sector or the logistics sector. However, this research does not include a representation of firms from the service and hospitality sectors, where the experience of organizations in managing and reacting to supply chain disruptions might be different. Second, this study was primarily empirical in nature and therefore aimed at quantitatively identifying strategic practices that are relevant to both the manufacturing and logistics sectors. Therefore, the study does not identify specific strategic innovative, risk management, and CSR practices that firms can adopt to manage incidences of supply chain disruption. Third, the study takes a macro

perspective of the role played by CSR practices in managing corporate reputation when firms are faced with a supply chain crisis situation. The study, however, does not identify how much CSR practices differ across sub-sectors. Despite these limitations, the findings of this study provide meaningful insights on theoretical and practical aspects.

7.1. Theoretical Implications

First, this study clarifies theoretical ambiguity about the role of CSR in relation to organizational processes and performance outcomes. The debate on CSR was not about the value of CSR purpose and intent but on the process and outcomes (Ginder et al. 2021; Liu et al. 2021). To test the role of CSR, the research model defines key variables that highlight three theoretical perspectives. All the key variables in this research are further measured by the original benchmark instrument, which is the result of rigorous instrument development procedures (Churchill 1979; Hair et al. 2010). The empirical tests results suggest that firms that position CSR as a vital organizational process beyond a strategic intent indicator are more likely to achieve better performance results. In this sense, this study clarifies the theoretical rationale on how firms can formulate and implement CSR for achieving desirable performance results.

Second, this study suggests that confirmation of theoretical relationships requires using both perceptive and actual performance measures. This study uses both perceptive organizational variables and actual financial statements from annual reports. Distinctively different from prior CSR empirical research articles, this research does not use self-reported perceptive financial measures. The credibility of empirical investigation is often debated because of the heavy usage of self-reported perceptual measures without the actual financial performance outcomes (Broadbent et al. 2015; Maestrini et al. 2017; Moore and Benbasat 1991). In contrast, this research validates the trustworthiness of self-assessed practices through actual financial performance outcomes. In this sense, an important theoretical implication is that a useful benchmark survey instrument should use hybrid measures in terms of self-reported perceptive measures and objectively reported actual outcomes measures (Byrne 2016; Gligor et al. 2015; Hu et al. 2019).

Third, the effective role of CSR requires the corresponding right configuration of relevant variables. This study suggests that CSR alone does not generate desirable outcomes. Rather, CSR, with the combination of other congruent variables, provides synergistic effects on performance outcomes (Lee and Kwon 2019; Ben Brik et al. 2011). In this study, CSR organizational practices are positioned as a crucial mediating linkage mechanism that directly impacts financial performance outcomes. In prior CSR research, CSR practices were positioned as the front-end practices. CSR is envisioned at the corporate level and CSR practices are implemented as mandates of overall corporate mandates (Ham and Kim 2019; Snider et al. 2003). Therefore, CSR is too often not so visible and relevant in mid-level business practices. On the other hand, in our research model, CSR, as a center of organizational practices, is positioned between upfront strategic flow and back-end performance flow (Wang et al. 2016; Singh 2021; Zhao et al. 2019). This research suggests that CSR success is only possible when CSR is implemented broadly throughout organizational processes along with other relevant variables. The theoretical implication of this study is that CSR can become a critical linkage between corporate missional intent and competitive performance results through risk management practices.

7.2. Managerial Implications

First, outstanding firms adopt CSR beyond promotional and demonstration effects. Although all firms operate in their unique contexts, business practices with staying power adopt practices that are sensible (i.e., theoretically explainable) (Albuquerque et al. 2019; Day and Wensley 1983) and credible (i.e., broadly tested in diverse contexts) (Nader et al. 2022; Saeed et al. 2019; Singh and Hong 2020). This study's findings suggest that effective CSR implementation requires strategic motivation through supply chain risk drivers and process routinization through broad acceptance by large organizational members. A unique

aspect of this study is that CSR management practices are not outlier practices, but they interact with strategic innovative practices and risk management practices as a part of important organizational routines (Mehralian et al. 2016; Wu et al. 2015). This suggests that firms that treat CSR as an indispensable element of organizational practices are more likely to succeed in achieving superior and sustainable performance outcomes in their organizational contexts. It is imperative for senior leadership to communicate the positive role of CSR practices and use them as a critical linkage between front-end strategic flow and back-end performance flow. CSR success is not merely CSR program achievements but an organization's enduring success. In this sense, CSR is no longer a marketing tool but an organizational culture that defines organizational character (Pan et al. 2022; Schaefer et al. 2019; Wang et al. 2016). Just as the soul is the actual content of the body, CSR defines the soul of the company.

Second, business leadership achieves competitive financial performance outcomes as the result of pursuing a something bigger purpose. Organizational viability is sustained through steady and consistent financial outcomes. Without financial success, no business can survive regardless of its noble intent. CSR is important to the extent that it is supported by other relevant business practices and demonstrates their sound impact on financial performance (Lestari et al. 2020; Seifzadeh and Rowe 2019; Zsidisin et al. 2016). Any corporate initiatives and even government mandates cannot ignore the importance of financial performance. However, outstanding leaders motivate their organizational members to achieve not merely tangible financial goals but to help strive for something with a deeper meaning. In this sense, CSR is a part of defining what such bigger and larger goals of business firms are. The more CSR efforts are conceived as a concrete element of a purpose-driven organization, the more its broad impacts are reaped in the form of diverse and sustainable business outcomes including financial performance (Hong et al. 2021; Levillain and Segrestin 2019; Malnight et al. 2019; Muñoz et al. 2018).

8. Summary and Conclusions

This article examines the role of CSR in the context of supply chain risk drivers. CSR practices are also related to risk management practices and performance outcomes. This research provides a conceptual framework that highlights the role of three theoretical rationales as a general model. The research model highlights the relevance of strategic orientation theory and risk management theory in that risk drivers require top management to formulate vigilant oversight for front-line practices in the form of strategic innovation practices, risk management practices, and CSR practices to achieve performance outcomes. This study focused on the critical linkage role of CSR in relation to strategic innovation practices and risk management practices.

Future studies may further examine how firms implement CSR in response to other risk drivers such as geo-political and trade tensions, national interest-driven industrial policy implementations, and increasing disruptive technology effects (e.g., AI, robotics, IoT, and the Fifth Industrial Revolution) and broad expectations of environment–sustainability–governance (ESG) (Avramov et al. 2022; Du and Xie 2021; García-Sánchez et al. 2021; Hong and Park 2020; Li et al. 2021; Shakil 2021). In addition to survey-based benchmark instruments, future studies may conduct in-depth case studies of firms from a wide range of business sectors. Future studies may conduct an extensive literature review on diverse patterns of CSR and use multiple databases (e.g., primary, secondary, online research, panel, and platform data) to examine the changing roles of CSR as a part of complex strategic, cultural, psychological, operational business dynamics that are being adapted in the turbulent, uncertain, and competitive market environments (Antwi and Hamza 2015; Fielding et al. 2016; Khan et al. 2021; Pratt et al. 2020; Smith 2015; Snyder 2019).

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Conflicts of Interest: The authors declare no conflict of interest.

Appendix A. Survey Instrument: Items, Mean, Standard Deviation, and Factor Loadings

Variables	Item Descriptions (Scale)	Mean	S.D.	Loadings
Supply Chain Risk Drivers (α = 0.789)				
SCRD1	Our suppliers' weak quality practices damage productivity goals.	2.88	0.888	0.790
SCRD2	Our suppliers' delivery performance often generates complaints from our customers.	2.67	0.890	0.669
SCRD3	Our suppliers' capabilities are inadequate to meet fluctuating customer orders.	2.68	0.837	0.863
CSR Organizational Practices (α = 0.720)				
CSR1	Our firm has a long history of implementing diversity.	3.83	0.983	0.597
CSR2	Our firm uses a fair rewards system.	3.75	0.815	0.616
CSR3	Our firm values innovative problem solving.	4.17	0.754	0.657
CSR4	Our firm encourages socially responsible work practices.	4.21	0.769	0.700
Strategic Innovative Practices (α = 0.841)				
SIP1	Our senior managers accept ideas or perspectives that diverge radically from past ideas/perspectives.	3.51	0.918	0.734
SIP2	Our senior managers regularly ask questions that challenge the status quo.	3.72	0.924	0.822
SIP3	Our senior managers willingly adopt ideas from other industries.	3.55	0.933	0.752
SIP4	Our senior managers frequently experiment with new ways of doing things.	3.37	0.956	0.754
Risk Management Practices (α = 0.672)				
RMP1	Our firm assesses fierce competitive threats.	3.80	0.877	0.762
RMP2	Our firm considers the impact of losing important customer segments.	3.91	0.856	0.635
RMP3	Our firm implements rapid response initiatives (e.g., continuous replenishment or vendor-managed inventory).	3.52	0.992	0.867
Financial Outcomes (α = 0.849)				
FO1	Within the last three years, our firm achieved profitability growth targets.	3.75	0.986	0.767
FO2	Within the last three years, our firm increased its competitive market share.	3.32	1.038	0.702
FO3	Within the last three years, our firm secured desirable return on asset (ROA) performance.	3.49	0.886	0.750
FO4	Within the last three years, our firm ensured steady cash flows.	3.91	0.935	0.754
FO5	Within the last three years, our firm attained an excellent market reputation.	3.98	0.830	0.717

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Article

Capital Budgeting Practices: A Survey of Two Industries

Jorge Mota [1,2,3,*] and António Carrizo Moreira [1,2,4,5]

[1] DEGEIT—Department of Economics, Management and Industrial Engineering and Tourism, Campus Universitário de Santiago, University of Aveiro, 3810-193 Aveiro, Portugal; amoreira@ua.pt
[2] GOVCOPP—Research Unit on Governance, Competitiveness and Public Policies, University of Aveiro, 3810-193 Aveiro, Portugal
[3] CICEE—Research Center in Business and Economics, UAL, 1150-293 Lisboa, Portugal
[4] INESCTEC—Institute for Systems and Computer Engineering, Technology and Science, Campus da Faculdade de Engenharia da Universidade do Porto, Rua Dr. Roberto Frias, 4200-465 Porto, Portugal
[5] NECE-UBI—Research Center for Business Sciences, Universidade da Beira Interior, 6200-209 Covilhã, Portugal
* Correspondence: jorgemota@ua.pt

Abstract: This research examines the capital budgeting practices used by small and medium-sized firms (SMEs) in two Portuguese industries, footwear and metalworking, aiming at answering the following research questions: How much knowledge do managers have about capital budgeting practices? What are the most used practices? How much importance do they attribute to applying them? The research was conducted through an online survey with a response rate of 14.9%. The results document that most companies in both industries are familiar with capital budgeting practices, despite differences between the two. The footwear industry recognizes the importance of these indicators but makes little use of them, and many companies prefer using payback period (PBP). The metalworking industry, on the other hand, makes greater use of capital budgeting practices, with net present value being the favored indicator and PBP being used as supplementary. This study contributes to the capital budgeting literature in two ways: first, by focusing on SMEs instead of only large firms, and second, by exploring data from two industries rather than multiple, heterogeneous industries.

Keywords: capital budgeting; capital budgeting practices; footwear industry; metalworking industry; manufacturing; SMEs

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1. Introduction

Capital budgeting (CB) practices have been widely studied, with the literature concentrating on identifying companies' most commonly applied capital budgeting indicators and reasons for using some rather than others. Most studies are based on large listed companies in big countries with developed economies, such as the USA (e.g., Graham and Harvey 2001), the UK, Germany, the Netherlands, France, Sweden, Italy, Spain (e.g., Brounen et al. 2004; Daunfeldt and Hartwig 2014; Rossi 2014), Brazil (e.g., de Souza and Lunkes 2016), Canada (e.g., Bennouna et al. 2010), Australia (e.g., Truong et al. 2008), and Korea (e.g., Kim et al. 2021). There are also studies in other countries such as Croatia (e.g., Dedi and Orsag 2008), Sri Lanka (e.g., Nurullah and Kengatharan 2015), Kuwait (e.g., AlKulaib et al. 2016), Barbados (e.g., Alleyne et al. 2018), and Portugal (e.g., João et al. 2007). As a country whose business is based on small and medium-sized firms (SMEs), Portugal depends heavily on their development and growth to become more competitive in the face of major European and global economies. According to Sureka et al. (2022), there is a lack of studies investigating the capital budgeting (CB) process and the factors affecting the CB efficiency of SMEs.

Wealth maximization is the primary objective of large publicly listed firms, whereas SME owners want utility from the business, such as "contentment" or "happiness", along

with financial gains (Vos et al. 2007), which results in SME owners being very emotionally involved in the business. SMEs tend to over- or underinvest and suffer from agency costs (e.g., Vos et al. 2007). Compared with large firms, SMEs have fewer managerial levels and a simpler organizational structure (Ling et al. 2008), as their owners are reluctant to share control of the firm (Matias and Serrasqueiro 2017). This establishes strong ground for an expected difference between CB practices in large and small firms. It is therefore important to study SMEs' CB to understand their practices, processes, and issues.

Capital investment, corporate goals, and profitability objectives, among others, are characteristics that differ between industries (e.g., Arena et al. 2015; Gurnani 1984). When exploring CB practices, most studies have used samples from various industries and tend to generalize their outcomes. This approach might not produce robust results. It is thus desirable to study CB in specific industries to investigate the possibility of adopting CB models specific to each industry (e.g., Sureka et al. 2022).

Given these gaps, and to improve knowledge in this field, this study aims to answer the following research questions for SMEs in the Portuguese industries of footwear and metalworking: How much knowledge do managers have about capital budgeting practices? What are the most used practices? How much importance do they attribute to applying them? These two industries play a central role in Portugal's competitiveness and in its standing abroad, in the European and world context. The footwear industry exports 66.29% of its production, and the return on assets is 6.6%, while the metalworking industry exports 55.74%, and the return on assets is 10.6%. For the whole Portuguese economy, exports on sales represent 22.17%, all at 2021 values, which gives a picture of the importance of the two industries for the economy (data drawn from the Sector Tables published by the Portuguese Central Bank, https://www.bportugal.pt/QS/qsweb/Dashboards (accessed on 22 February 2023)).

To answer the research questions, online questionnaires were used, divided into three groups of questions: first, about the company; second, about the manager/owner/CEO of the company; and finally, about investments.

The main findings show that most companies know about capital budgeting practices, despite differences regarding their importance in the two industries analyzed. In the footwear industry, their nonuse stands out, which is the result of a lack of specialized human resources, while in the metalworking industry, the net present value (NPV) is preferred, contrary to what is practiced in Europe.

This paper makes a twofold contribution to the literature on capital budgeting practices. Firstly, our empirical focus is on SMEs, while most of the literature has focused predominantly on large firms. Secondly, we test data from two industries, whereas most of the literature uses data drawn from heterogeneous industries (e.g., Graham and Harvey 2001; Brounen et al. 2004; Truong et al. 2008).

The study yields significant managerial insights, indicating a low adoption rate of capital budgeting practices among companies in Portugal, particularly in the two analyzed industries consisting mainly of SMEs that hold strategic significance for the country's growth. This underscores the importance of raising awareness among decision makers and users that increased use of CB techniques may be tied to education on their importance in management and business schools, as greater use appears to be correlated with knowledge gained through education.

The paper is structured as follows: After this introduction, Section 2 presents the literature review. Section 3 presents the research design. Section 4 presents the empirical findings. Finally, Section 5 presents the conclusions and limitations of the study.

2. Literature Review

Capital budgeting (CB), a planning tool, aims to aid the proper distribution of financial resources among investment projects to make sound investment decisions and assess project viability. Capital budgeting broadly covers the entire process from identification to selection and realization of investment projects, aiming to maximize company and

shareholder value (Megginson et al. 2008; Keršytė 2011; Andor et al. 2015). This theme incorporates subtopics, e.g., capital budgeting practices, cost of capital estimation, and capital structure (e.g., Graham and Harvey 2001; Brounen et al. 2004; Dedi and Orsag 2008). This study focuses on the subtopic of capital budgeting practices.

Capital budgeting has aroused academics' interest, particularly the practices and actual rates of use in companies. At a later stage, some academics also wanted to identify the factors leading to choosing some indicators over others (e.g., Graham and Harvey 2001; Brounen et al. 2004; Daunfeldt and Hartwig 2014; Bennouna et al. 2010).

These studies began in the USA, first based on the analysis of large companies (LCs) and later expanding to studies in Europe and the whole world. As for the literature investigating LCs, trends diverge. Firms in the USA report a preference for the payback period (PBP) in the 1970s (e.g., Mao 1970), but other studies indicate greater use of the internal rate of return (IRR) and net present value (NPV) (e.g., Farragher et al. 1999; Graham and Harvey 2001; Ryan and Ryan 2002; Schall et al. 1978). In Europe, the indicator of choice is the PBP, with the exception of Croatia (e.g., Andrés et al. 2015; Daunfeldt and Hartwig 2014; Brounen et al. 2004; Dedi and Orsag 2008; Sandahl and Sjögren 2003).

In more detail, Schall et al. (1978) investigated three subthemes of capital budgeting: capital budgeting practices, calculation of the cost of capital, and the risk associated with projects. They applied a questionnaire to 424 USA LCs (achieving a 46.8 percent response rate). They conclude that most companies only apply capital budgeting practices for some investments, and the most used one is the PBP, together with other indicators. However, in their study of 379 CFOs of American LCs, Farragher et al. (1999) reveal IRR as their favorite indicator.

Graham and Harvey (2001) and Ryan and Ryan (2002) found that NPV is the most used indicator by American LCs, followed by IRR and then PBP. Graham and Harvey (2001) also identified some factors that would justify the choice of some indicators instead of others and presented the following ones: factors related to managers' characteristics (age, experience, and level of education) and company-related characteristics (size and number of acquisitions made). Ryan and Ryan (2002) distinguish their study by revealing that the amount of capital available for investments is an important factor in the choice of indicator.

Unlike in the USA, the trend in Europe—Europe (Rossi 2014; Brounen et al. 2004), Sweden (Daunfeldt and Hartwig 2014; Sandahl and Sjögren 2003), Spain (Andrés et al. 2015), and Croatia (Dedi and Orsag 2008)—has remained homogeneous, and companies choose PBP, except for Croatia, which chooses IRR as the preferred indicator.

Brounen et al. (2004) analyzed and compared four major European countries—the UK, Germany, the Netherlands, and France—on the topic of capital budgeting. To do so, they applied a questionnaire to LCs, obtaining 313 responses. Their results differ from those of Graham and Harvey (2001), since European countries choose PBP to evaluate their investment projects, while the USA chooses NPV. Brounen et al. (2004) justify this difference due to the size of firms, i.e., large European companies are relatively smaller than those in the USA. Both studies conclude that NPV is used more by managers who hold an MBA, with the exception of the UK.

Andrés et al. (2015) identified PBP as the most consensual indicator in Spanish LCs, followed by IRR, NPV, and real options (see also Rossi 2014). They also analyzed different industries, finding that PBP is more usual in the manufacturing industry and IRR is more frequently adopted in the consumer industry. As in previous studies, they claim that NPV is more commonly used among public firms than private firms (e.g., Graham and Harvey 2001). These authors reveal that the frequency of using capital budgeting practices does not depend on the CFO's characteristics, except for real options.

Analyzing large Croatian companies, Dedi and Orsag (2008) identified different trends from those in other European countries and concluded that the most commonly used capital budgeting practice is IRR, followed by the nonupdated PBP and NPV. They differentiate their study by asking about the existence of a department to frame and analyze projects

and conclude that 50 percent of the companies did have that department, whereas the other 50 percent did not.

A study conducted in Canada discloses NPV as the preferred indicator among large companies, followed by IRR, and 8 percent of companies claim to use real options (Bennouna et al. 2010).

The above literature on LCs shows that capital budgeting practices differ between countries but present a more homogeneous trend in Europe. These differences may also exist for SMEs, and even between LCs and SMEs.

Therefore, regarding SMEs, and according to, e.g., Block (1997) and Danielson and Scott (2006), PBP is the main indicator used. Block (1997) justifies the choice of PBP by its simplicity of implementation and analysis and also investigates the average PBP of the 233 USA SMEs analyzed: 2.81 years. When analyzing SMEs' capital allocation categories, 57.6 percent of the companies admit that they use the indicators mainly for maintenance and replacement investments, and only 8.1 percent claim that it is for expansion into new areas (Block 1997).

Danielson and Scott (2006), surveying 250 American SMEs, tried to understand the type of investment made, presenting similar conclusions to Block (1997): 50 percent of companies choose the replacement investment class, and investment in new production lines is also considered by 25 percent. They also conclude that 26 percent of companies use the "gut feel" factor as a capital budgeting practice. The causes for not using capital budgeting practices may differ between the need to replace equipment, the fact that they are SMEs and have limited sources of finance, and also the owner's financial situation. However, as Graham and Harvey (2001) claim, the cause for using some indicators over others is the result of the manager's age and level of education, as well as the number of employees.

Lazaridis (2004) investigates the trend in the use of capital budgeting practices in Cyprus, and his findings are similar to the previous authors. The author finds that much of the investment by SMEs in Cyprus, as noted by Block (1997) and Danielson and Scott (2006), is for expanding production, replacing old equipment, and/or creating new product lines. However, Lazaridis (2004) also discloses that 17.19 percent of the companies surveyed invest in new markets, and there is a small percentage that invests in energy-saving projects. He also identifies that 18.99 percent of companies do not use capital budgeting practices to evaluate their projects. The main reasons are not knowing them, not believing that they bring benefits to the company, and not having specialized human resources, experience, and/or time to apply and analyze them. Of those that admit to using them, they prefer PBP.

Some authors have conducted studies comparing the use of capital budgeting practices between LCs and SMEs (e.g., Andor et al. 2015; Graham and Harvey 2001; Truong et al. 2008; Vecino et al. 2015). Graham and Harvey (2001) identified factors such as manager characteristics (age, experience, and education) and firm-level characteristics (size, number of acquisitions made, export, industry, and dividend distribution policy) that are associated with the use of some indicators. NPV and IRR are more used by managers with MBAs, by dividend-paying LCs, and by public companies. PBP is more usual among SMEs and applied by managers without MBA degrees (e.g., Block 1997; Ryan and Ryan 2002).

Based on the analysis of 87 responses from 356 companies in 9 industries, Truong et al. (2008) claim that Australian LCs prefer indicators such as NPV, IRR, and lastly, PBP. For medium-sized companies, the preferred indicator is IRR, followed by NPV and PBP. Small firms choose PBP (Graham and Harvey 2001). When questioned about how many indicators the companies applied, 26 percent of the surveyed companies revealed the use of four indicators.

Vecino et al. (2015) analyzed the knowledge and correct application of capital budgeting practices in Colombia. Their sample included 54 percent LCs and 46 percent SMEs, with most managers holding university degrees. Their findings show that 68 percent of the companies employ capital budgeting practices. The most used indicators are NPV, cost/benefit ratio, and IRR. They justify the use of these choices because they are easy to

apply and take into consideration the principle of value for money. Regarding the correct use of indicators, although LCs apply them correctly, SMEs present a higher rate of error in their application. Vecino et al. (2015) identify company size and level of education as conditioning factors for the choice of capital budgeting practices, as previously mentioned by Graham and Harvey (2001).

Andor et al. (2015) analyze Central and Eastern Europe countries. This study differs from others by utilizing countries' level of development. Like Graham and Harvey (2001) and Vecino et al. (2015), their findings reveal that LCs employ NPV and IRR, unlike SMEs, which indicates that their choice is influenced by firm size. They also identify other factors, such as the presence of ethical codes, the country and company culture, the company objectives, and the number of projects analyzed. They also conclude that LCs, compared with SMEs, have better specialized human resources with knowledge and experience, as well as greater financial availability, which influences the use of more sophisticated capital budgeting practices.

Hermes et al. (2007) compared capital budgeting between companies in China and the Netherlands, having as their main argument the differences in the countries' level of development and to what extent this factor affects the choice of capital budgeting practices. Their most important conclusions are that Dutch companies prefer to opt for NPV, particularly LCs. PBP is the preferred choice among SMEs. As far as Chinese firms are concerned, they opt to use PBP. Regarding the use of IRR, both countries use it in a similar way.

According to the literature, there are differences between LCs and SMEs, and these differences may extend more specifically to different industries. Some studies focus on single industries. For example, Ross (1986), Hasan (2013), and Nurullah and Kengatharan (2015) analyzed the manufacturing industry. Ross (1986) analyzed the differences between theory and practice in implementing capital budgeting practices that take into account the cost of capital. To do so, he held interviews in which he proposed project cases and checked how managers solved them. His findings revealed that indicators are selected according to the size of the project firms are involved with. However, for smaller projects, PBP is the preferred indicator (Ross 1986).

Hasan (2013) investigates how Australian manufacturing SMEs use capital budgeting practices and risk analysis. Like Block (1997), Lazaridis (2004), and Danielson and Scott (2006), Hasan (2013) examined the areas of investment, and the answers are similar to those already mentioned: replacement of machinery, the extension of new production lines, and investment in new business areas and/or new markets. However, 7 percent of the companies invest in research and development. PBP continues to be the most used indicator, utilized by about 48.8 percent of the companies analyzed, and these results are explained by its simplicity of use and not requiring much financial expertise. Hasan (2013) also asked what the average number of years for which the project would be accepted was, and most companies presented a PBP between 3 and 5 years.

When studying the most used capital budgeting practices in companies in manufacturing and trading industries in Sri Lanka, Nurullah and Kengatharan (2015) show different results from previous authors, identifying NPV as the most used indicator, followed by PBP, and finally, IRR. When relating the selection of capital budgeting practices to the variables of (1) budget size, (2) managers' education, and (3) managers' experience, Nurullah and Kengatharan (2015) claim that (1) only NPV, PBP, and IRR are important indicators regarding budget size, rejecting the others; (2) managers' education is rejected by the lack of sufficient evidence to support it; and (3) managers' experience shows some evidence, but only for IRR, being rejected for the other indicators.

Finally, the conclusions of a small study of the Algarve, Portugal differ from the European trend, as IRR is the most used capital budgeting practice in that region, followed by NPV and PBP. However, the choice of these indicators depends on the size and purpose of the project, and industry type may have some influence (João et al. 2007).

3. Research Design

Data were collected by applying an online questionnaire due to the simplicity of collection and analysis of the information obtained. After placing the questionnaire on the platform developed and managed by the University of Aveiro, emails were sent, and subsequent telephone contacts were made with the sample of both industries.

The sample for the footwear industry was based on a universe of 370 companies whose contacts were provided by the Portuguese Association of Footwear, Components, Leather Goods, and Leather Goods Manufacturers, obtaining 45 valid responses. Regarding the metalwork industry, the sample was drawn from a universe of 131 companies, of which 30 responded. The general response rate was 14.9 percent, with 12 percent for the footwear industry and 22 percent for the metalworking industry. When compared with previous studies, these rates are average, since Block (1997) had a response rate of 27.29 percent, Hasan (2013) had a 17 percent response rate, and Graham and Harvey (2001) had a 9 percent response rate.

The two industries were defined by company size (SMEs), with most being family businesses and geographically close, which ensures homogeneity in terms of characteristics in the decision process and that differences in capital budgeting practices are mainly due to differences between the two industries.

The construction and structuring of the instrument took into account previous studies (Hristov et al. 2022a, 2022b; Evans III et al. 2015; Block 1997; Danielson and Scott 2006; Graham and Harvey 2001; Lazaridis 2004), duly adapted to the Portuguese context. Although many authors analyze SMEs, the Portuguese situation was taken into account as it presents different characteristics from other studies, being based on small family companies, which may interfere with knowledge and application of capital budgeting practices.

The questionnaire uses multiple choice questions (in order to be quick to answer and to increase the response rate) and is divided into three groups:

(1) Questions about the company: These aim to characterize the companies and identify the number of employees and sales volume, the type of family ties, and knowledge of capital budgeting practices.
(2) Questions about the manager/owner/CEO: This group of questions intends to collect information about the investment decision maker and how age, experience, and education affect such deliberations.
(3) Investment-related questions: These aim to understand what kind of investments are made, knowledge of capital budgeting practices, and the most used ones (checking if there is any industry-based trend).

The first and second groups of questions support the third one, i.e., knowledge of capital budgeting practices and their use are combined with the variants of the first two groups of questions to identify causes.

4. Results

Analysis of the results begins by presenting the descriptive characteristics of the companies in our sample, in Table 1. Most companies in the sample are family-owned, with more than 50 percent of them having this characteristic in both industries.

The age of the companies in the sample shows that 40 percent in the footwear industry are between 11 and 20 years old. In contrast, metalworking has a greater spread of ages, with similar values among all categories.

With regard to the number of employees, the footwear industry is primarily made up of companies with 10 to 50 employees, while the metalworking industry has 2 predominant categories: from 10 to 50 and from 50 to 250 employees.

In terms of sales in Portugal, 51 percent of the companies surveyed in the footwear industry had sales ranging from EUR 2 M to EUR 10 M. In contrast, most of the sales in the metalworking industry are below EUR 2 M.

Table 1. Descriptive characteristics of the companies.

Group of Variables	Variable	Categories	Footwear	Metalworking
Company Characteristics	Family-Owned	Yes	67%	77%
		No	33%	23%
	Age	<10	16%	20%
		Between 11 and 20	40%	20%
		Between 21 and 30	20%	13%
		Between 31 and 40	7%	20%
		Between 41 and 50	9%	7%
		>50	4%	13%
		N/A	4%	7%
	Number Employees	Up to 10	9%	28%
		10 to 50	51%	33%
		50 to 250	40%	33%
		Above 250	0%	3%
		N/A	0%	3%
	Sales for Portugal	up to 2 M €	38%	53%
		Between EUR 2 M and EUR 10 M	51%	30%
		Between EUR 10 M and EUR 50 M	4%	13%
		Above EUR 50 M	0%	0%
		N/A	7%	3%
	Foreign Sales	<50%	20%	57%
		50% to 70%	0%	13%
		70% to 100%	71%	23%
		N/A	9%	7%

The size of the companies in the sample can be determined by combining the number of employees with sales in Portugal. They are categorized as micro or small businesses as they do not exceed EUR 10 M in annual sales and typically have fewer than 50 employees.

Regarding sales abroad, the footwear industry has a higher rate, with over 70 percent of companies having this characteristic. In comparison, the metalworking industry has an inferior amount; the footwear industry has higher export rates than the metalworking industry.

In the first group of characteristics defining the companies, there are differences between the industries, particularly in terms of internal and external sales. The remaining variables are similar in both industries.

The following data were collected about the manager/owner/director, shown in Table 2. Concerning respondents' age, most respondents in the footwear industry are older, most being in the 40–50 age group. In contrast, 47 percent of respondents in metalworking are 40 years old or younger. It is worth mentioning that respondents older than 66 years only account for 2 percent in the footwear industry and 0 percent in metalworking.

Table 2. Descriptive characteristics of the owners/managers/directors.

Group of Variables	Variable	Categories	Footwear	Metalworking
Characterization of the manager/owner/director	Age	<40	31%	53%
		Between 40 and 50	40%	23%
		Between 50 and 66	22%	23%
		>66	2%	0%
		N/A	4%	0%
	Education Level	Up to 9th Grade	14%	10%
		12th Grade	20%	23%
		Bachelor	9%	10%
		Graduation	42%	40%
		Master	11%	17%
		Others	2%	0%
		N/A	2%	0%
	Position in the Company	Administrator	56%	34%
		Manager	20%	23%
		Financial Director (CFO)	20%	23%
		Executive Director (CEO)	2%	13%
		N/A	2%	7%
	Owner	Yes	64%	43%
		No	32%	57%
		N/A	4%	0%

In terms of education, most respondents have a bachelor's degree, with 10 respondents indicating a master's degree. Nonetheless, 20 percent and 23 percent of respondents in the footwear and metalworking industries, respectively, reported having completed up to the 12th year of secondary education.

As for job positions, there are differences between the industries. The footwear industry has 25 administrators, compared with 10 in metalworking. On the other hand, metalworking has 13 percent of respondents identified as CEO, while the footwear industry only has 2 percent of respondents in this position. The footwear industry has 64 percent of respondents who own the company, which is not the case in the metalworking industry, where most respondents do not own the company.

In this group of questions, there are differences in the variables—in terms of respondents' age, the metalworking industry has younger managers/owners/directors than the footwear industry. With regard to company ownership, there is a greater tendency for respondents in the footwear industry to own the company than in metalworking.

In the group of investment-related issues, shown in Table 3, it was found that the majority of companies made an investment in the past year: 73 percent in the footwear industry and 67 percent in the metalworking industry. Additionally, the metalworking industry made more frequent investments, with a periodicity greater than 5 years when compared with the footwear industry.

Table 3. Descriptive characteristics of the investment-related issues.

Group of Variables	Variable	Categories	Footwear	Metalworking
Investment	Last Investment	In the Last Year	73%	67%
		Between 2 and 5 Years	21%	23%
		More than 5 Years	4%	10%
		N/A	2%	0%
	Type of Investment	Equipment Replacement	62%	50%
		Production Lines Creation	4%	7%
		Expansion of Production Lines	16%	23%
		Others	18%	20%
	Evaluation of the Possible Return on Investment	Not Evaluated	11%	10%
		Intuition	4%	0%
		Equipment Replacement Need	40%	37%
		Sales Prevision	36%	33%
		Capital Budgeting Practices	2%	7%
		Other	4%	13%
		N/A	2%	0%
	Knowledge of Capital Budgeting Practices	Yes	60%	80%
		No	38%	20%
		N/A	2%	0%
	Preference Capital Budgeting Practices	IRR	15%	21%
		NPV	19%	42%
		PBP	22%	17%
		Nonuse	44%	21%
	Preference Complementary Indicator	IRR	23%	25%
		NPV	15%	13%
		PBP	31%	31%
		Nonuse	31%	18%
		Others	0%	13%

The types of investment made by both industries include the replacement of equipment, participation in fairs, expansion of facilities, acquisition of new equipment and/or tools, modernization of equipment, land purchases, and investment in e-commerce.

Evaluation of the potential return on investment was based on the need to replace equipment, which was reported by 40 percent of companies in the footwear industry and 37 percent of companies in the metalworking industry. It was also observed that 4 percent of footwear companies mentioned intuition as a factor, while none of the metalworking companies referred to this. The use of capital budgeting practices was mentioned by 7 percent of metalworking companies and 2 percent of footwear companies.

With regard to understanding capital budgeting practices in the footwear and metalworking industries, there are rates above 50 percent of knowledge in both industries:

60 percent in footwear and 80 percent in metalworking. There is no distinct preference for a specific capital budgeting practice among the companies surveyed.

As for the use of capital budgeting practices, 44 percent in the footwear industry reported nonuse, compared with 42 percent in the metalworking industry that selected NPV. Most footwear companies favored PBP, while NPV and IRR were more commonly used in the metalworking industry.

Five companies were excluded from the study as they reported using the same complementary indicator. For the remaining companies, the trend of using a complementary indicator was similar in both industries, with PBP being the most common choice. EBITA and financial autonomy were also reported as complementary indicators.

The nonuse of capital budgeting practices, in the companies that were aware of them, was primarily attributed to a lack of specialized HR in both industries. Only one company reported not using the indicators due to difficulties in calculating cash flows.

The study sample was comprised mostly of family-owned micro or small enterprises that have been in the market for up to 40 years. These companies were managed by administrators who were mostly aged 50 years or younger and held an academic degree. Most companies in both industries had knowledge of capital budgeting practices, with higher application rates in the metalworking industry. The last investment made by companies in both industries was due to the need to replace equipment.

The aim of this study was to determine the knowledge and importance of capital budgeting practices among Portuguese companies in the footwear and metalworking industries. The study was limited to companies that reported having knowledge of the indicators. The results indicate that above 70 percent of family-owned companies had knowledge of capital budgeting practices, with higher rates in footwear (81 percent) than metalworking (71 percent).

As for companies' characteristics, the results indicate the following: In the footwear industry, the majority of companies that report being knowledgeable about capital budgeting practices have been in the market for 11 to 20 years, accounting for 26 percent of all companies that are aware of capital budgeting practices. Eighty-nine percent of the companies report domestic sales of up to 10 million euros.

In the metalworking industry, 25 percent of the companies that are aware of capital budgeting practices have been in the market for less than 10 years, while another 25 percent have been in the market for 31 to 40 years. Most companies report internal sales of up to 2 million euros.

Regarding external sales, the results reveal that in the footwear industry, 74 percent of the companies surveyed that are aware of capital budgeting practices export more than 70 percent of their footwear, while only 15 percent export up to 50 percent. In the metalworking industry, 54 percent of the companies that are aware of capital budgeting practices report exporting up to 50 percent, while only 8 percent export more than 70 percent.

The results regarding the manager/owner/director indicate that those who are knowledgeable about capital budgeting practices are relatively young, with a younger demographic in metalworking than in footwear. The 40 to 50 age group is most knowledgeable about capital budgeting practices in the footwear industry, while in the metalworking industry, this group is the under-40s. No respondents were over the age of 66.

Level of education is consistent in both industries. Among those knowledgeable about capital budgeting practices, graduates have higher rates in both industries: 59 percent in footwear and 46 percent in metalworking.

The study found a lack of uniformity in the use of capital budgeting practices in different industries. In the footwear industry, the tendency is to be both owner and administrator, while in the metalworking industry, respondents reported not being the owners and serving as the CFO.

Although the majority of respondents reported having knowledge of capital budgeting practices, they had not evaluated the possible return on investment and had made the investment due to the need to replace equipment.

A complementary analysis was conducted to understand which capital budgeting practices are preferred by companies that are familiar with and apply them. Family-owned companies in the footwear industry tend not to use capital budgeting practices, and if they do, they prefer NPV or PBP. In the metalworking industry, 33 percent of family-owned companies elected NPV as their preferred indicator.

For non-family-owned companies in the footwear industry, the trend remains not to use capital budgeting practices, and those that do use either IRR or PBP. In the metalworking industry, there is no clear trend, with options including NPV, IRR, and nonuse, with only one company referring to PBP.

Regardless of the category, the footwear industry tends not to use capital budgeting practices. If they do use them, they prefer NPV or PBP. In the metalworking industry, the preference is for NPV.

NPV is used in similar proportions by both industries for companies that have been in the market for up to 10 years. For other categories, the rate is higher in the metalworking industry. IRR is more commonly used in metalworking, especially by companies that have been in the market for up to 10 years. The use of PBP is similar in both industries, except in the category of 21 to 30 years, where the footwear industry has twice as many companies using PBP as the metalworking industry.

The study found variation in the preferred capital budgeting practices in footwear companies based on the size of the company and their sales to the domestic market. Companies with higher invoicing (between EUR 2 M and EUR 10 M) tend not to use capital budgeting practices, while those billing up to EUR 2 M prefer NPV or PBP. In the metalworking industry, the preferred indicator is NPV for most companies. However, those with sales between EUR 10 M and EUR 50 M prefer IRR.

Among footwear companies that export more than 70 percent of their products abroad, 37 percent do not use capital budgeting practices, and those that do use either IRR or PBP. In the metalworking industry, the preferred indicator is NPV, although companies that export more than 70 percent prefer IRR.

Discussion of Results

Most companies in both industries claim to have knowledge about capital budgeting practices, with licensed administrators in their management. As mentioned by Vecino et al. (2015) in their study in Colombia, most companies say they have knowledge of the indicators, but in this country there is a higher rate of application than in Portugal, particularly in the footwear industry (where knowledge is claimed, but use is reduced, opting for PBP).

The metalworking industry has a higher rate of use of capital budgeting practices than footwear, with a preference for NPV, as mentioned by Vecino et al. (2015) and Nurullah and Kengatharan (2015) in their study of manufacturing and trading in Sri Lanka. However, the present study contradicts Hasan (2013) and Andrés et al. (2015) regarding Spanish companies, which refer to the use of PBP in the manufacturing industry.

NPV was also described as the preferred indicator of GEs in the USA in the study by Graham and Harvey (2001), in the Netherlands when compared with China in the study by Hermes et al. (2007), and also in the study by Andor et al. (2015) of the GEs of Central and Eastern Europe.

PBP is mentioned by scholars as a preferred indicator of SMEs in the USA, Australia, and Europe by companies in general (Block 1997; Sandahl and Sjögren 2003; Brounen et al. 2004; Danielson and Scott 2006; Dedi and Orsag 2008; Andrés et al. 2015).

When we compare the study conducted in the Algarve region with these two industries, both of which analyze Portuguese companies, there are discrepancies. The Algarve region has IRR as a preferred indicator, related to the size and purpose of projects, suggesting there may be some tendency for industries.

In this study, the reasons for the choice of capital budgeting practices are consistent across authors and can be attributed to the characteristics of both the company and the manager/administrator (Graham and Harvey 2001; Danielson and Scott 2006). Investi-

gating the impact of family ownership on knowledge of capital budgeting practices is novel and not previously explored in the literature. Results indicate that this variable does not significantly impact their knowledge, which is in contrast with the Portuguese cultural context.

Regarding the selection of indicators, the results reveal that the metalworking industry predominantly chooses NPV, while the footwear industry prefers PBP. This finding contradicts the results of Sandahl and Sjögren (2003), who observed that PBP was the most commonly used indicator in Swedish companies, regardless of their size.

In terms of external sales, the results show a stark difference between the two industries. The footwear industry has a high proportion of companies with exports exceeding 70 percent, of which 20 percent have knowledge of capital budgeting practices. However, only half of these companies reveal their usage, opting for PBP and IRR as complementary indicators. The nonuse of these indicators is attributed to the lack of specialized HR.

In the metalworking industry, 17 out of 30 companies export up to 50 percent of their products, with fewer companies in the remaining categories. Out of these 17 companies, 13 reported knowledge of capital budgeting practices and favored the use of NPV, with PBP as a complementary measure. The nonuse of capital budgeting practices by companies in this industry was attributed to a lack of specialized HR.

In the current study, respondents' age was found to have an impact on knowledge of capital budgeting practices, with younger respondents having more knowledge than their older counterparts, despite the limited sample size. This trend may reflect the recent shift towards higher levels of education among younger administrators in Portugal.

However, age was not found to be a determining factor in the selection of capital budgeting practices. The metalworking industry favored NPV, while the footwear industry did not use capital budgeting practices, and those who did choose PBP, as previously discussed. This result differs from the conclusions of Graham and Harvey (2001) and Danielson and Scott (2006), who suggested that age was a critical factor in the selection of capital budgeting practices.

Regarding level of education, the results show that higher educational attainment was positively associated with greater knowledge of capital budgeting practices, which is in line with the findings of Vecino et al. (2015) in Colombia. However, the results do not support the conclusion of Graham and Harvey (2001) and Brounen et al. (2004) that higher levels of education lead to a preference for more sophisticated indicators, as no such relationship was observed here. An academic degree was found to be fundamental for knowledge of capital budgeting practices, but the differentiation between industries remained, with the footwear industry opting for nonuse and the metalworking industry favoring NPV.

In previous studies, the CEO or CFO was usually the position questioned. However, in the context of Portugal and the prevalence of SMEs in the country, this study examined the management position held by the respondents and its impact on their knowledge and practice of capital budgeting practices (Graham and Harvey 2001; Brounen et al. 2004; Hermes et al. 2007; Truong et al. 2008; Nurullah and Kengatharan 2015).

The results of the present study indicate that the respondent's position is not a significant factor in determining their knowledge or usage of capital budgeting practices. Instead, the majority of respondents reported having knowledge of these indicators, regardless of their position. This was particularly evident in the footwear industry, where most respondents reported not using any indicators, regardless of their position. On the other hand, in the metalworking industry, administrators and CFOs were found to be the primary users of the NPV and IRR indicators.

An innovative aspect of this study was examination of the respondent's ownership status and its relationship with their knowledge and usage of capital budgeting practices. The results show that knowledge of these indicators was relatively consistent regardless of ownership, although application of these indicators was more evident among nonowners in the metalworking industry.

Both industries were found to invest primarily in equipment replacement and production line expansion, as previously noted by Block (1997), Lazaridis (2004), and Danielson and Scott (2006). The lack of specialized HR and perceived low benefits were identified as key factors contributing to the limited knowledge and usage of capital budgeting practices (Lazaridis 2004). Additionally, the limited financial availability often associated with SMEs (Andor et al. 2015) was considered a potential contributing factor.

In terms of complementary indicators, their use in the footwear industry was even more limited, with most respondents using PBP. Similarly, in the metalworking industry, PBP was the most commonly used complementary indicator.

5. Implications, Limitations, Conclusions, and Future Research Perspectives

5.1. Academic Implications

The results of the study suggest that most companies in both industries are aware of capital budgeting practices. However, the level of importance attached to these indicators varies between industries. The footwear industry acknowledges the importance of these indicators, but their usage is low, and many companies prefer to use PBP, in line with the trend observed in European countries. The high rate of nonusage of capital budgeting practices among footwear companies can be attributed to their owners' focus on their businesses' annual financial results, rather than on capital budgeting practices.

In contrast, companies in the metalworking industry use capital budgeting practices more, with NPV being the preferred indicator and PBP being used as a complementary indicator. This result contrasts with the results of previous studies conducted in the USA, Australia, and the Algarve region, where IRR was favored over other indicators.

Most of the administrators surveyed in this study stated that they are knowledgeable about capital budgeting practices, but the biggest challenge to their usage was a lack of specialized human resources. Only 3 out of the 75 respondents reported using capital budgeting practices in their latest investment, which contradicts the claims of 29 respondents that they use these practices. Additionally, this research shows a connection between formal educational achievement and the use of capital budgeting tools, since over time more company managers have attended business schools where capital budgeting techniques are presented and taught.

5.2. Practical Implications

This study provides valuable insights into the capital budgeting practices of SMEs in Portugal, a country comprised mostly of SMEs that are of strategic importance for the country's growth and position in the global economy. The study's uniqueness lies in comparing two central industries in the Portuguese context. The number of companies applying capital budgeting practices is still very low in Portugal, specifically in these two industries, and the increased use of CB may be related to teaching the importance of these techniques in management and business schools, since knowledge through education seems to be related to greater use.

5.3. Policy Recommendations

As a policy recommendation, this research suggests that teaching programs should focus more on the importance of using capital budgeting tools for better decision making on investments by companies to maximize their wealth.

5.4. Limitations of the Study

It should be noted that the conclusions of this study are limited by, on one hand, the comparative and qualitative nature of the research design of the study and, on the other hand, by the limited size of the sample collected, which jeopardizes the generalization of the conclusions to the population. One of the biggest limitations was the lack of collaboration from the companies approached, which confirms the stereotype of SMEs' reluctance to participate in academic research.

5.5. Conclusion and Future Research Perspectives

This study concludes that managers possess knowledge of CB practices but do not apply them, mainly due to a lack of resources. Additionally, the use of CB tools differs between SMEs in different industries, even within manufacturing. Industries with lower plasticity of assets, such as metalworking compared with footwear, use CB practices more. This research also concludes on the importance of the knowledge of CB practices obtained through higher education for their use.

Future studies should address the shortage of specialized human resources as a cause of the nonusage of capital budgeting practices. Additionally, it would be interesting to examine the proper usage and updating of cash flows, the impact of financial constraints on the usage of capital budgeting practices, and the relationship between loan requirements and the use of capital budgeting practices. Furthermore, an enlarged sample size supported by econometric-based studies covering LC and SMEs of several industries would give future research more reliability and generalizability.

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Equity Investment Decisions of Operating Firms: Evidence from Property and Liability Insurers

Sunghan Bae, Andre P. Liebenberg and Ivonne A. Liebenberg *

School of Business Administration, Finance Department, University of Mississippi, University, MS 38677, USA
* Correspondence: iliebenberg@bus.olemiss.edu

Abstract: During the 2007–2009 financial crisis, almost 10% of Property and Liability (P&L) insurers completely liquidated their equity portfolios, and more than half of them never resumed equity market investments. In contrast, those P&L insurers that continued investing in equities after the crisis, increased their portfolio allocation substantially. To understand these findings, we develop and estimate models that explain P&L insurers' dynamic equity investment decisions, in terms of firm, group, and market characteristics over the period 2002–2018. We study three different approaches to equity investments, a pure investment strategy, internal capital market contributions, and an outsourcing option and find that the factors driving the decision to invest in equities differ from those that explain the extent of their equity investments. Moreover, we find that while equity portfolio losses drive the decision to temporarily cease investments in equities, the decision to permanently exit equity markets is driven by both equity market losses and underwriting losses. These findings shed some light on the factors driving the demand for equity investments by operating firms.

Keywords: equity investments; property and liability insurers; financial crisis

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1. Introduction

Property and Liability (P&L) insurers tend to hold a significant amount of equities in their investment portfolios. In 2019, they held over USD 500 billion in equities, which accounted for 27% of their total investments.[1] However, during the 2007–2009 financial crisis, almost 10% of P&L insurers completely liquidated their equity portfolios and more than half of them never resumed equity market investment.[2] In contrast, those insurers that continued investing in equities after the crisis increased their portfolio allocation substantially. The existing literature does not provide explanations for the insurers' dynamic choice to participate in equity markets or the amount of their investment. The institutional equity investment literature focuses on mutual funds and hedge funds; however, Ge and Weisbach (2020) argue that insurers are mainly operating companies who depend on the returns from their investments on financial assets to fund their operations.

There is very little research about the determinants of financial investments by operating firms, despite their importance in financial markets.[3] In this study, we shed some light on the investment decisions of operating firms by studying the determinants of P&L insurers' equity investments. In particular, we model P&L equity investments as a function of firm, group, and market characteristics and examine how their investment decisions may differ in terms of participation and volume. We study three different approaches to equity investments, a pure investment strategy, internal capital market contributions, and an outsourcing option. Moreover, we provide a dynamic analysis of P&L insurers' investment behavior and focus on examining the impact of negative operational and investment shocks (caused by the financial crisis) on equity market investments.

We study US P&L insurers since (1) they have a substantial amount of funds to invest due to the time discrepancy between premiums earned and claims paid out;[4] (2) there is a significant number of equity investing P&L insurers and, more importantly, approximately

an equal number of non-equity investing peers;[5] and (3) detailed portfolio data are available for the insurance industry. All licensed insurers (whether public or private) are required to report highly detailed and complete accounts of their investment activities. In particular, equity investments are separately reported for affiliated firms, unaffiliated firms, and mutual fund holdings, which enables us to investigate the effects of pure investment strategies, Internal Capital Markets (ICMs), and of having an option to outsource the insurers' equity investment decisions.[6]

The existing literature on P&L insurers' investment in risky assets, such as equity, primarily depends on three theories. The risk management theory of Smith and Stulz (1985) and Froot et al. (1993) predicts that firms with weak financial conditions should decrease their investments in risky assets, while the risk shifting theory of Jensen and Meckling (1976) argues that financially constrained firms should increase their exposure to risky assets. The coordinated risk management theory of Schrand and Unal (1998) suggests risk reallocation between operation and investments.

In the context of hedging activities, Cummins et al. (2001) propose that insurers' hedging decisions should differ in terms of participation and volume. More specifically, only firms that have considerable risk exposures will decide to engage in hedging due to the fixed costs of initiating hedging activities, while, given the decision to participate, firms with high risk appetites will hedge less due to the marginal costs of hedging.

Market characteristics, such as market interest rates, are important determinants of P&L insurers' decisions on equity investment holdings since government bonds (including municipal bonds) take up most of their investment portfolios. Di Maggio and Kacperczyk (2017) document that institutional investors move their portfolios toward risky assets when faced with low market interest rates.

Insurance groups reallocate limited resources within affiliated firms through ICMs. As documented by Kim (2016), P&L insurers that are larger in size are more likely to provide capital to affiliated firms. Higher capital requirement regulation on risky assets in the P&L insurance industry, however, can limit available funds as well as the risk capacity of those larger P&L insurers who participate in ICMs.

Firm size effects on equity investments may not be clear since smaller firms can as easily have access to the equity markets by outsourcing, as acknowledged by Che and Liebenberg (2017). To study this in particular, we look into P&L insurers that have exposure to equity investments but only through mutual funds.

Therefore, we pose five research questions. (1) Are the firm-specific factors that affect equity investment participation decisions different from those that affect volume decisions? (2) Do market interest rates affect participation and volume decisions differently? (3) Do ICM considerations affect participation and volume decisions? (4) Does firm size affect participation and volume decisions in equity investments via mutual funds? (5) Are P&L insurers' decisions to quit their equity investments affected by the performance of their equity investments or underwriting portfolio?

We apply the Cummins et al. (2001) approach to the equity investment context and model P&L insurers' participation and volume decisions in equity investments as a function of market, group, and firm characteristics. We adopt Cragg's (1971) two-part model to allow the parameters for the participation and volume decisions to differ, as suggested by Cummins et al. (2001). Utilizing a rich data set, we differentiate insurers' equity investments in unaffiliated firms, affiliated firms, and mutual funds to further investigate the effects of pure investment strategies, ICMs, and having an outsourcing option. Given the non-trivial amount of equity investments on affiliated firms[7], analyzing equity investments in affiliated and unaffiliated firms separately is important since it enables this study to distinguish P&L insurers' pure motivations on equity investments from the work of ICMs.

A growing literature in economics (such as Malmendier and Nagel 2011), illustrates that personal experiences can affect individual investors' decision making process substantially. For instance, Andersen et al. (2019) document that great losses from investment activities can lead individual investors not only to refrain, but also to shy away from

risky investments. Institutional investors, such as P&L insurers are more likely to behave more rationally, but insurers with weak financial status and lean risk capacity from their operations may be more susceptible to those adverse experiences. We conduct Logit regression analyses for insurers' quit decisions that separately estimate the permanent and temporary quitters.

First, we document that P&L insurers are not as flexible in their participation decisions as they are in their volume decisions. Insurers appear to be volatile in deciding the amount invested in equity assets and these decisions are inversely related to market interest rates, while insurers' decision to participate in the equity market appear to be more stable and insurers seem not to take notice of market interest rates in making these decisions. Our multivariate analysis supports these observations. Our Cragg two-part model on pure equity investments[8] documents that, in their participation decisions, insurers take into consideration firm environment variables, firm financial status factors, and operation risk capacity measures, but do not consider profitability variables and market interest rates. Therefore, their decision to participate is rather rigid and inflexible. In their volume decisions, however, insurers are more affected by risk appetite and profitability measures. Insurers significantly regard their profitability concerns and pay attention to the changes in external market conditions, increasing equity investments when the interest rates decrease. Firm environment variables are still significant determinants of their decision. In contrast, some of the firm risk-related variables, in particular operation risk capacity measures, lose their significance in their volume decisions.

With respect to the effects of ICMs, the results on total equity investments (i.e., affiliated and unaffiliated) show a positive relationship between interest rates and participation decisions, but a negative relationship in the volume decision. Further analysis on equity investments only in affiliated firms reveals that insurers' capital contributions to the affiliates in the forms of equity investments are positively related with market interest rates as higher interest rates imply higher costs of external capital. In the volume decisions, however, appetite for higher profit outweighs the effect of ICMs. P&L insurers are required to hold more capital for risky assets, such as equity, and thus capital transfers through ICMs hamper larger insurers to employ their optimal equity investments in unaffiliated firms.

As for the use of an outsourcing option, we document that firm size has no significant impact on insurers' participation decisions when insurers have an option to outsource equity investments via mutual funds. However, insurers respond to changes in market interest rates in their participation decisions. The results imply that insurers, regardless of their size, have incentives to respond to the changes in the external market conditions even in their participation decision, and they are willing to act and accomplish this desire if no major fixed costs are involved.

In the analysis of the quit decision, we document that P&L insurers with lower gains (higher losses) from both equity investments and underwriting are more likely to quit equity investments. Moreover, we find that market interest rates do not significantly influence insurers' quit decisions and that the effects of ICMs are limited on insurers' quit decisions. Furthermore, temporary quitters are less influenced by the losses in equity investments and not affected at all by fluctuations in underwriting performance.

Our study fills several gaps in the existing literature. First, prior studies do not distinguish between the participation and volume decisions for equity investments and evidence (from hedging behavior) suggests that these decisions may be driven by different factors (Cummins et al. 2001). Second, prior studies have not explicitly examined the various equity investment strategies available to P&L insurers, and it is possible that the factors affecting equity investment differ by investment strategy. Third, although some studies have explored factors affecting investment in risk assets (e.g., Che and Liebenberg 2017; Yu et al. 2008), there is an absence of research focusing on the decision to end, or quit, equity investments.

Our contribution to the existing literature is three-fold. First, we develop a model to study the equity investment behavior of institutional investors, in particular of opera-

tional institutional investors. We show that they pay close attention to profit measures as well as market interest rates when choosing the extent of their equity investments given their participation decision. This approach is novel as it allows for the determinants of the participation and volume decisions to differ and the previous literature has mainly focused on studying how firms' risk characteristics affect their risky investments. Second, unlike previous literature, we are able to identify different approaches for insurers' equity investments and study them separately. We document differences in the factors driving the participation and volume decisions of pure equity investment strategies, ICM capital contributions, and the option to outsource through mutual fund investments. Third, we develop a model to better understand the decision to quit equity markets and find evidence supporting experimental studies that suggest that institutional investors shy away from risky assets when they are exposed to unfavorable experiences (Malmendier and Nagel 2011; Chiang et al. 2011; Chernenko et al. 2016; Knüpfer et al. 2017; Andersen et al. 2019).

Our results are significant since they shed new light on the determinants of equity investments by an important class of institutional investor—P&L insurers. Moreover, our analysis of the three major equity investment strategies for P&L insurers illustrates the differences in factors that affect each strategy. Finally, our study documents the significant impact of the financial crisis on insurer equity investment and examines the factors associated with the decision to quit equity investments.

The rest of this paper is organized as follows. Section 2 presents a literature review and hypotheses development. Section 3 describes our methodology. Section 4 describes our data and summary statistics. Sections 5 and 6 report the multivariate analysis and results. Section 7 presents the summary and conclusions.

2. Previous Literature and Research Questions

The existing literature on risk management for operating firms (including institutions, such as P&L insurers that hold substantial risky financial assets) relies heavily on three theories. (1) The risk management theory of Smith and Stulz (1985) and Froot et al. (1993) which suggests that firms manage risk in order to reduce their total risk and avoid costly financial distress or undesirable underinvestment. This theory implies that financially constrained firms should reduce their investments in risky assets. (2) The risk shifting theory of Jensen and Meckling (1976) which suggests that financially weak firms should increase their exposure to risky assets since raising the volatility of the firms' investments can increase shareholder value when there is a substantial probability of a default.[9] (3) Schrand and Unal (1998) suggest a coordinated risk management theory that focuses more on risk reallocation. They argue that firms balance the levels of risk from their core business with the levels of risk from their investments, so that a decrease in the core business risk should enable them to increase their investments in risky assets.[10]

In the insurance industry, Cummins et al. (2001) study the risk management behavior of Life and Health (L&H) and P&L insurers, in terms of their hedging strategies, and propose that the decision to participate in the derivatives market is distinct from the choice regarding the extent, or volume, of derivatives holdings. The authors argue that, given the fixed costs for hedging, only firms with substantial risk exposures would find it worthwhile to enter the derivatives market. However, once they have chosen to participate in the derivatives market, firms with high risk appetites will hedge less due to the marginal costs of hedging in the form of risk premiums. Therefore, while the main determinants of risk management are primarily associated with firms' risk measures (e.g., financial constraints and core business risk) in the participation decisions, the volume decisions are determined by the firms' risk appetites. For P&L insurers, one of the primary risks that they face is from equity investments. *Our first research question*, motivated by Cummins et al. (2001) and the three risk management theories discussed earlier, is whether the firm-specific factors that affect equity investment participation decisions differ from those that affect volume decisions.

Theory suggests that external factors, such as interest rates, will also affect equity investment decisions. P&L insurers invest, on average, most of their available funds in government bonds and municipal bonds, which are highly affected by interest rates.[11] Low interest rates make those safe assets less attractive for P&L insurers and give an incentive to reach for higher yield generating assets, such as equity. For instance, a number of studies provide evidence that institutional investors, such as banks, mutual funds, and pension funds invest in riskier assets when interest rates are low, a phenomenon often referred to as "reaching for yield" (Maddaloni and Peydró 2011; Jiménez et al. 2014; Chodorow-Reich 2014; Hanson and Stein 2015; Choi and Kronlund 2018; Di Maggio and Kacperczyk 2017; Andonov et al. 2017).[12] *Our second research question*, based on the aforementioned studies, is whether market interest rates affect equity investment participation and volume decisions (See Jiménez et al. 2014; Di Maggio and Kacperczyk 2017; Lian et al. 2019).

P&L insurers' equity investment decisions may be driven by commitments to provide capital to affiliates. Therefore, we also investigate the role of internal capital markets on these decisions by conditioning on insurer investments in affiliates. Powell et al. (2008) show that the ICMs are active in the P&L insurance industry and that capital contributions are the most significant channel. We argue that P&L insurers' equity investments in affiliated firms are likely motivated by ICM-related factors as opposed to pure investment considerations. As noted in the prior studies (e.g., Kim 2016), larger insurers are expected to engage in ICMs and transfer capital to affiliated firms. Therefore, *our third research question* is whether ICM considerations affect equity investment participation and volume decisions.[13]

Another important consideration is the ability to outsource equity investment decisions. Pottier (2007) suggests that large insurance firms have in-house investment analysts and credit specialists, which would provide an advantage in investing risky equity assets. However, Che and Liebenberg (2017) point out that the trend of investment outsourcing provides small firms easy access to the equity market. Given that investments in mutual funds are a way to outsource equity investment, our *fourth research question* is whether firm size affects the participation and volume decisions in equity investments via mutual funds.

Traditional views on individual investors assume that they have stable risk preferences and are rational using all available information when forming beliefs about risky outcomes. However, psychology literature proposes that personal experiences, in particular recent and small sampled ones, can affect investors' decisions to a great extent (See Nisbett and Ross 1980; Weber et al. 1993; Hertwig et al. 2004). Malmendier and Nagel (2011) and Malmendier et al. (2020) show that individual experiences of macroeconomic shocks affect financial risk taking and Chiang et al. (2011) report that high returns in previous IPO auctions increase the likelihood of individual investors participating in future auctions. Furthermore, two recent studies document that individual investors actively shy away from, rather than simply refraining from, risky investments: For Knüpfer et al. (2017), the experiences are about adverse labor market conditions, while for Andersen et al. (2019), the shocks come from investment activities. While operating institutional investors, such as P&L insurers are expected to behave in accordance with rational expectation views and less likely to be influenced by transitory experiences, P&L insurers that are financially constrained and have less risk capacity from their operations will be more likely to be affected by adverse experiences.[14] Furthermore, a number of studies show that the effects of experiences are not only subject to individual investors, but also to institutional investors (See Chiang et al. 2011; Malmendier and Nagel 2011; Chernenko et al. 2016). Our *fifth research question* is whether P&L insurers' decisions to quit their equity investments are affected by equity investment or underwriting performance.

3. Methodology

Following the approach taken by Cummins et al. (2001) for insurer hedging, we adopt Cragg's (1971) two-part model to allow for a potential difference in the determinants of the participation and volume decisions in P&L insurers' equity investments. To investigate the potential effects of ICMs and having an outsourcing option, we define four different equity

investment dependent variables. To investigate why P&L insurers decide to quit equity investments, we conduct a Logit regression.

3.1. The Effects of ICMs and the Outsourcing Option

First, we investigate the determinants of equity investments of P&L insurers, where the fraction of equity investments to total invested assets is regressed against firm specific variables along with macro-economic variables. The dependent variable is equal to zero if an insurer does not participate in equity investments, but equal to the volume (ratio) of equity investments if an insurer engages in equity investments. The dependent variable is truncated at zero and is continuous otherwise.

Although the Tobit model is a standard and very widely used procedure when the dependent variable is truncated or censored, the implications of the Tobit model are particularly restricted for this type of study. One of the major limitations of the Tobit model is that the participation decision and the volume decision are determined by the same vector of parameters. Specifically, the signs of the explanatory variables are forced to be the same on both, the decision to participate and the volume decision. Therefore, when the effects of firm specifics are expected to be different depending on the two decisions, the Tobit model is more likely to be misspecified.

Cragg (1971) proposed a two-part model, which combines a Probit model for the discrete decision and a truncated regression model for the continuous decision. This model includes two separate vector parameters of γ (for the Probit) and β (for the truncated regression) and jointly estimates the participation decision and volume decision allowing for the coefficients to differ.[15]

Cragg's two-part model is applied to the following pooled regression equation that is clustered at firm level to address potential autocorrelation issues in the given panel data set. The analysis contains unobservable year and state effects, and the analysis is conducted at the insurers' level.

$$\begin{aligned} \text{E\_Investments}_{i,t} = {} & \alpha_t + \beta_1 \text{Firm\_size}_{i,t} + \beta_2 \text{Ownership}_{i,t} + \beta_3 \text{Group}_{i,t} + \beta_4 \text{Long\_ratio}_{i,t} \\ & + \beta_5 \text{Riskybond\_ratio}_{i,t} + \beta_6 \text{ROA}_{i,t} + \beta_7 \text{Lines\_hfd}_{i,t} + \beta_8 \text{Geo\_hfd}_{i,t} \\ & + \beta_9 \text{Leverage}_{i,t} + \beta_{10} \text{Reinsurance}_{i,t} + \beta_{11} \text{Combined\_ratio}_{i,t} \\ & + \beta_{12} \text{RBC\_adjusted}_{i,t} + \beta_{13} \text{Financial\_slack}_{i,t} + \beta_{14} \text{Treasury\_3m}_{i,t} \\ & + \beta_{15\text{-}31} \text{Year}_t + \beta_{32\text{-}87} \text{State}_{i,t} \end{aligned} \quad (1)$$

where $\text{E\_Investments}_{i,t} = [\text{E\_Total}_{i,t}, \text{E\_Unaffiliated}_{i,t}, \text{E\_Affiliated}_{i,t}, \text{E\_Mutual\_Only}_{i,t}]$.

To investigate the effects of ICMs and having an option to outsourcing, four different ratios of equity investments are defined as dependent variables. P&L insurers are required to report their holdings on equity investments in a very detailed manner.[16] For the purpose of this paper, however, we categorize their equity holdings broadly into two categories: Equity investments on affiliated firms and unaffiliated firms. The dependent variable "E_Unaffiliated" represents equity investments only on unaffiliated firms (including mutual fund holdings), which indicates insurers' pure investment motivation on equity. The dependent variable "E_Total" includes all equity investments, including investments both on affiliated and unaffiliated firms, which adds the effects of ICMs to their equity investment motivation. Prior studies have not distinguished between these two equity investment motivations and given the non-trivial amount of equity funds invested in affiliated firms, their findings often mislead the underlying incentives of operating firms' investments on equity. To further illustrate the effects of ICMs, we use the dependent variable "E_Affiliated", which includes equity investment only on affiliated firms. Finally, the dependent variable "E_Mutual_Only" denotes the cases where insurers use only the mutual fund channel if they have any exposure to the equity market. Our analysis of the "E_Mutual_Only" dependent variable would reveal the ramifications of having an "option to outsourcing" equity investments, rather than incurring substantial fixed costs.

3.2. Quit Decisions

To empirically investigate insurers' decisions to cease equity investments, we estimate the following Logit model with random effects and firm level clustering.[17]

$$\begin{aligned}\text{Quit\_Decisions}_{i,t} = \alpha_t + \beta_1 \text{Net\_Gains\_Equity}_{i,t} + \beta_2 \text{Net\_Gains\_Underwriting}_{i,t} \\ + \text{Controls}_{i,t}\ (\text{Firm, External Market}) + \text{Fixed\_Year}_t + \text{Fixed\_State}_{i,t}\end{aligned} \quad (2)$$

where $\text{Quit\_Decisions}_{i,t} = [\text{Quit\_All}_{i,t}, \text{Quit\_Permanent}_{i,t}, \text{Quit\_Temporary}_{i,t}]$.

In determining the Quit_All dependent variable, which includes insurers that cease to invest in equity in a given year, we distinguish equity-investment-quitting insurers from those insurers that go out of business. We differentiate between insurers that quit equity investment and never return during the sample period, Quit_Permanent, from insurers that once quit but then revert in later years, Quit_Temporary. Net gains from equity investments are separated into net gains from unaffiliated firms and total firms to examine the potential effects of ICMs on insurers' quit decisions. The analysis also differentiates between net gains from equity investments that are adjusted for capital gains and those that are not adjusted for capital gains. Our control variables are the same firm specifics used in the previous section. All the independent variables in Equations (1) and (2) are defined in Table 1.

Table 1. Variables and descriptions.

Variables	Description
E_Total	The fraction of insurers' equity investment on affiliated and unaffiliated firms over total investments.
E_Unaffiliated	The fraction of insurers' equity investment on unaffiliated firms over total investments.
E_Affiliated	The fraction of insurers' equity investment on affiliated firms over total investments.
E_Mutual	The fraction of insurers' equity investment on mutual funds over total investments.
Firm_size	Insurers' total net admitted assets in the scale of natural logarithm.
Ownership	Dummy variable equal to 1 for mutual insurers and 0 for stock insurers.
Group	Dummy variable equal to 1 for affiliated insurers and 0 for unaffiliated.
Long_tail_ratio	The fraction of net premiums written on long-tail business lines.
Riskybond_ratio	The fraction of risky bond (NAIC class 3 and above) over total investments.
ROA	Return on assets: The ratio of net income to total net admitted assets.
Lines_Div	The complement of the Herfindahl Index of net premiums written across business lines.
Geo_Div	The complement of the Herfindahl Index of net premiums written across states.
Leverage	The ratio of policyholder surplus to total net admitted assets.
Reinsurance	The ratio of premiums ceded to the sum of direct premiums written and reinsurance assumed.
Combined_ratio	The sum of incurred losses and underwriting expenses that are proportional to premiums earned; the sum of loss ratio and expense ratio.
RBC_adjusted	Insurers' surplus that is adjusted to the risk based capital measurement.
Financial_slack	The ratio of cash and short-term investments to total net admitted assets.
Treasury_3m	The average of the 3-month Treasury bill yields for the given year.
Quit_All	Dummy variable equal to 1 for all insurers who quit equity investments in a given year.
Quit_Permanent	Dummy variable equal to 1 for insurers who quit equity investments permanently (do not re-enter).
Quit_Temporary	Dummy variable equal to 1 for insurers who quit equity investments temporarily (re-enter).
Net_G_Naff_IC	Equity investment income on the unaffiliated, adjusted for realized capital gains.
Net_G_Total_IC	Equity investment income on the unaffiliated and the affiliated, adjusted for realized capital gains.
Net_G_Naff_ICu	Equity investment income on the unaffiliated, adjusted for realized and unrealized capital gains.
Net_G_Total_ICu	Equity investment income on the unaffiliated and the affiliated, adjusted for realized and unrealized capital gains.
Net_G_Udw	Net gains from underwriting: Premiums earned minus loss incurred and expenses.

4. Data

This paper collects P&L insurers' data from the regulatory annual statements with the National Association of Insurance Commissioners (NAIC) for the years of 2002 through 2018. We obtain 3-month Treasury yields data and equity market return data (Standard & Poor's 500 Index) from the FRED database and CRSP, respectively.

To construct our sample of insurers in a given year, we use the following criteria: (1) Insurers with negative total net admitted assets and negative net premiums written are excluded; (2) insurers without sufficient firm specific information necessary to calculate key variables are excluded. Therefore, insurers without adequate group affiliation and business type identifiers are excluded; (3) insurers that are neither mutual ownership nor stock ownership are excluded. After the above exclusion process, the final sample consists of an average of 1831 different firms per year (in total 2691 different firms) and 31,130 total firm-year observations over a 17-year sample period.[18]

Some of our key variables are substantially negatively skewed. Therefore, we use the logarithmic transformations of firm specific variables, such as total assets and adjusted risk based capital, a procedure that also helps address the scale difference among the variables. All the variables are also winsorized at the 0.99 and 0.01 percentiles. To measure P&L insurers' line of business diversification, we follow Berry-Stölzle et al. (2012). We first group similar business lines to arrive at 24 distinct lines, and then the measure is calculated as the complement of the Herfindahl Index of net premiums written across the business lines.[19] We follow Che and Liebenberg (2017) to measure geographical diversification.[20] To measure the weight of long-tail business, we use the proportion of net premiums written in long-tail business lines.[21]

Table 2 summarizes key descriptive statistics of the sample. Our four dependent variables are positively skewed representing the censored nature of equity investments. The substantial difference between mean and median values indicates that when P&L insurers decide to participate in equity markets, they invest substantial portions of their available funds. Moreover, it is important to note the non-trivial amount of equity investments on affiliated firms; especially the fact that it takes up approximately 27.69% of total equity investments[22]. Therefore, analyses that fail to separately examine pure investment and total investments that include the effects of ICMs may be misleading in the insurers' motivations for equity investments. Our indicator variables are the ideal setting for our sample of P&L insurers as the industry has a good number of equity investing insurers as well as non-equity investing insurers; it also has a similar number of insurers who are affiliates and those who are not. A combined ratio that is over 100% shows that, on average, insurers are losing money from their operations, which highlights the importance of investment activities for them. Although the mean value of Long_tail_ratio is rather low due to observations in the lower tail of its distribution, the highly negative skewness indicates there are large numbers of insurers that employ long-tail lines of business. After the logarithmic transformation, the Firm_size variable appears to be free of any skewness issue, but the RBC_adjusted variable still remains highly negatively skewed. Net gains from equity investment that is adjusted to both realized and unrealized capital gains appear to be larger in size and have more variation, but less skewed than the Net gains adjusted to realized capital gains. Net gains from underwriting business are on average negative over the entire sample period and vary more severely than the gains from equity investments. This again highlights the importance of equity investment activities for these firms. Overall, the descriptive statistics in Table 2 are in line with those reported in prior studies.

Table 2. Summary Statistics. This table reports the pooled descriptive statistics of the variables used in Cragg's two-part model analysis. The sample is collected from the NAIC database (2002–2018) and consists of an average of 1831 different firms in a given year and 31,130 firm-year observations. The statistics are at the insurer level.

Variables	Obs	Mean	Median	Min	Max	Std. Dev.	Skewness
E_Total	31,130	11.868	5.765	0.000	49.332	14.672	1.235
E_Unaffiliated	31,130	7.705	1.992	0.000	36.876	10.756	1.478
E_Affiliated	31,130	3.286	0.000	0.000	25.137	7.019	2.188
E_Mutual	31,130	1.255	0.000	0.000	11.392	3.030	2.507
Firm_size	31,130	18.330	18.290	15.130	21.759	1.849	0.089
Ownership	31,130	0.214	0.000	0.000	1.000	0.410	1.393
Group	31,130	0.685	1.000	0.000	1.000	0.464	−0.799
Long_tail_ratio	31,130	0.787	0.948	0.000	1.000	0.332	−1.650
Riskybond_ratio	31,130	0.008	0.000	0.000	0.072	0.019	2.634
ROA	31,130	0.021	0.024	−0.074	0.096	0.041	−0.447
Lines_Div	31,130	0.367	0.394	0.000	0.839	0.324	0.067
Geo_Div	31,130	0.389	0.310	0.000	0.944	0.386	0.244
Leverage	31,130	0.463	0.421	0.197	0.888	0.193	0.705
Reinsurance	31,130	0.365	0.303	0.000	0.907	0.301	0.415
Combined_ratio	31,130	1.049	0.992	0.530	2.155	0.338	1.798
RBC_adjusted	31,130	16.440	17.289	0.000	20.697	4.497	−2.837
Finnancial_slack	31,130	0.133	0.070	0.003	0.589	0.158	1.723
Treasury_3m	31,130	1.284	0.931	0.033	4.727	1.484	1.206
Net_G_Naff_IC	31,130	0.361	0.013	−2.325	4.931	0.935	2.126
Net_G_Total_IC	31,130	0.461	0.031	−2.581	6.389	1.150	2.451
Net_G_Naff_ICu	31,130	0.423	0.000	−6.704	7.890	1.752	0.642
Net_G_Total_ICu	31,130	0.579	0.009	−7.808	9.658	2.152	0.675
Net_G_Udw	31,130	−0.304	0.180	−28.270	18.226	6.653	−1.008

5. Empirical Analysis: Participation and Volume Decisions

In this section, we examine the determinants of P&L insurers' decisions with respect to their investments in equity assets. In the framework of Cragg's two-part model, we jointly estimate insurers' participation and volume decisions on equity investments. Furthermore, Cragg's alternative model is applied to our different dependent variables that are designed to represent insurers' pure incentives to invest in equity, motivations that incorporate the effects of ICMs, and ramifications of using mutual fund vehicles for equity investments.

5.1. Univariate Analysis

In this section, we provide initial evidence regarding our first research question and conduct a univariate analysis to investigate whether the firm specific variables are statistically different between insurers who invest in equities and insurers who do not. The mean difference is first tested by a parametric *t*-test, and then the results are further ascertained with a non-parametric Mann-Whitney-Wilcoxon test.

Table 3 reports the mean difference test results for our four dependent variables, where most of the firm specific variables are found to be significantly different between equity investing insurers and non-equity investing insurers. The results indicate that P&L insurers depend on all the tested firm specific variables in their decision making process with respect to equity investments. Overall, firms with larger size, mutual ownership, affiliation to a group, higher long tail ratio, higher fraction of risky bonds, higher profitability, more business and geographic diversification, lower leverage, lower reinsurance ratio, lower combined ratio, higher risk adjusted capital, and higher financial slack, invest more in equity assets. Therefore, the results are basically consistent with what previous studies have documented.

Table 3. Mean Difference Tests: Participation Decision. This table reports the mean difference test results for all the firm specific dependent variables. The "Yes" column reports the mean for insurers that participate in equity investments, and the "No" column reports the mean for insurers that do not participate in equity investments. The mean difference is first tested by a *t*-test, and then the results are further ascertained with a Mann-Whitney-Wilcoxon test: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Variables	E_Total			E_Unaffiliated			E_Affiliated			E_Mutual_Only		
	Yes	No	Diff.	Yes	No	Diff.	Yes	No	Diff.	Yes	No	Diff.
Firm_size	18.673	17.605	1.068 (***)	18.636	17.829	0.807 (***)	19.546	17.788	1.758 (***)	17.442	18.364	−0.922 (***)
Ownership	0.281	0.073	0.209 (***)	0.301	0.072	0.229 (***)	0.320	0.167	0.153 (***)	0.171	0.216	−0.045 (***)
Group	0.677	0.703	−0.026 (***)	0.659	0.728	−0.069 (***)	0.856	0.610	0.246 (***)	0.543	0.691	−0.148 (***)
Long_tail_ratio	0.798	0.766	0.032 (***)	0.805	0.759	0.045 (***)	0.808	0.778	0.030 (***)	0.793	0.787	0.006 ( )
Riskybond_ratio	0.010	0.003	0.008 (***)	0.011	0.003	0.007 (***)	0.013	0.006	0.007 (***)	0.003	0.008	−0.005 (***)
ROA	0.023	0.017	0.006 (***)	0.023	0.017	0.006 (***)	0.023	0.020	0.002 (***)	0.019	0.021	−0.003 (**)
Lines_Div	0.407	0.281	0.126 (***)	0.412	0.292	0.120 (***)	0.463	0.324	0.139 (***)	0.235	0.372	−0.136 (***)
Geo_Div	0.421	0.320	0.101 (***)	0.412	0.350	0.062 (***)	0.512	0.334	0.178 (***)	0.302	0.392	−0.090 (***)
Leverage	0.452	0.487	−0.035 (***)	0.452	0.481	−0.029 (***)	0.431	0.478	−0.047 (***)	0.478	0.463	0.015 (**)
Reinsurance	0.333	0.433	−0.101 (***)	0.325	0.431	−0.106 (***)	0.341	0.376	−0.035 (***)	0.310	0.367	−0.058 (***)
Combined_ratio	1.026	1.098	−0.072 (***)	1.020	1.096	−0.076 (***)	1.032	1.056	−0.025 ( )	1.030	1.050	−0.020 ( )
RBC_adjusted	16.924	15.420	1.504 (***)	16.972	15.570	1.402 (***)	17.883	15.797	2.086 (***)	15.256	16.486	−1.230 (***)
Financial_slack	0.108	0.186	−0.078 (***)	0.108	0.175	−0.067 (***)	0.082	0.156	−0.074 (***)	0.152	0.133	0.019 (***)

Interestingly, when we separate the sample in the different types of equity investments, we see that these results are driven by insurers with unaffiliated and affiliated equity investments. However, the results for insurers with investments in mutual funds only are significant but with the opposite sign. This suggests that insurers that choose to invest only in mutual funds have different characteristics and a different motive for equity investments. For example, smaller firms invest more in mutual funds as they need the option to outsource their equity investments.

In our multivariate analysis, we will control for the effect of all these variables on our dependent variables and we will differentiate between the decision to participate in equity markets and the volume decision.

5.2. Time-Series Analysis

In this section, we present the time-series changes in P&L insurers' equity investments.

Table 4 shows relative stability in insurers' participation decisions. Given the gradual decrease in the total numbers of insurers in the industry over time, we report the participation numbers as a percentage of total insurers. We observe a very stable proportion of insurers that invest in equity. However, during the financial crisis, there is approximately a 5% reduction in the number of insurers investing in unaffiliated firms. We further investigate the decision to quit equity investments in this group of insurers in Section 6. The proportion of insurers investing in affiliated firms remains very stable (around 30%) throughout the sample period, which indicates that insurers keep their ICM strategies pretty stable even in the midst of a financial crisis. Moreover, we observe a 2% decline in

the number of insurers investing only on mutual funds during the financial crisis. The reduction in the percentage of mutual funds and unaffiliated firms during the financial crisis is consistent with the notion that pure equity investments are more likely to cease in periods of higher uncertainty and financial distress.

Table 4. Insurers' Participation in Equity Investments Over Time. This table reports time-series changes in the numbers of insurers who hold equity investments from 2002 to 2018. Column 2 presents the total numbers of insurers; column 3 presents the numbers of insurers who hold equity investments on both affiliated and unaffiliated firms; column 4 presents the numbers of insurers who hold equity investments on unaffiliated firms; column 5 presents the numbers of insurers who hold equity investments on affiliated firms; column 6 presents the numbers of insurers who hold equity investments only in mutual funds for a given year. Proportions to the total numbers of insurers are reported in parentheses.

Year	Total	E_Total	E_Unaffiliated	E_Affiliated	E_Mutual_Only
2002	1973	1365 (69.18%)	1238 (62.74%)	677 (34.31%)	43 (2.17%)
2003	1923	1315 (68.38%)	1194 (62.09%)	633 (32.92%)	42 (2.18%)
2004	1892	1299 (68.65%)	1189 (62.84%)	598 (31.61%)	64 (3.38%)
2005	1866	1291 (69.18%)	1182 (63.34%)	590 (31.62%)	77 (4.12%)
2006	1919	1316 (68.57%)	1218 (63.47%)	596 (31.06%)	103 (5.36%)
2007	1926	1318 (68.43%)	1224 (63.55%)	578 (30.01%)	104 (5.39%)
2008	1939	1309 (67.5%)	1209 (62.35%)	586 (30.22%)	74 (3.81%)
2009	1902	1239 (65.14%)	1117 (58.72%)	582 (30.60%)	62 (3.25%)
2010	1877	1212 (64.57%)	1093 (58.23%)	565 (30.10%)	61 (3.24%)
2011	1842	1202 (65.25%)	1090 (59.17%)	557 (30.24%)	59 (3.20%)
2012	1820	1202 (66.04%)	1088 (59.78%)	555 (30.49%)	60 (3.29%)
2013	1771	1199 (67.70%)	1094 (61.77%)	539 (30.43%)	69 (3.89%)
2014	1741	1195 (68.63%)	1090 (62.60%)	520 (29.87%)	74 (4.25%)
2015	1738	1199 (68.98%)	1108 (63.75%)	525 (30.21%)	69 (3.97%)
2016	1697	1176 (69.29%)	1079 (63.58%)	514 (30.29%)	76 (4.47%)
2017	1672	1153 (68.95%)	1069 (63.93%)	493 (29.49%)	67 (4.00%)
2018	1632	1117 (68.44%)	1028 (62.99%)	482 (29.53%)	61 (3.73%)

5.3. Multivariate Analysis

In this section, we conduct a multivariate analysis in the framework of Cragg's two-part model.

5.3.1. Pure Equity Investment Incentives: Equity Investments on Unaffiliated Firms

Columns 2 and 3 of Table 5 report the estimation results for P&L insurers' equity investment decisions in unaffiliated firms, which includes mutual funds holdings, but excludes holdings in affiliated firms.

Table 5. Participation and Volume Decisions: E_Unaffiliated, E_Mutual_Only. This table reports the estimates of Cragg's two-part model. Columns 2 and 3, "E_Unaffiliated," report the estimates for insurers' equity investment decisions on unaffiliated firms, which includes holdings on mutual funds. Columns 4 and 5, "E_Mutual_Only," report the estimates for insurers' decisions on equity investments only on mutual funds. Robust standard errors are in parentheses: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

	E_Unaffiliated		E_Mutual_Only	
	Participation	**Volume**	**Participation**	**Volume**
Firm_size	0.1258 ***	−1.8415 ***	0.0231	−1.3784 ***
	(0.0156)	(0.5092)	(0.0155)	(0.2062)
Ownership	1.1312 ***	8.7137 ***	0.7508 ***	1.0517 **
	(0.0606)	(1.5295)	(0.0500)	(0.5086)
Group	−0.4038 ***	−9.2380 ***	−0.2781 ***	−1.5601 ***
	(0.0481)	(1.5289)	(0.0484)	(0.5467)
Long_tail_ratio	0.1104 *	6.7956 ***	0.0735	1.2558
	(0.0623)	(2.2799)	(0.0660)	(0.7761)
Riskybond_ratio	13.2930 ***	114.509 ***	2.6248 ***	−19.3528 *
	(0.9283)	(22.7756)	(0.7791)	(10.3826)
ROA	−0.1487	−28.4323 **	−0.6554	−2.3390
	(0.4105)	(13.8505)	(0.4103)	(4.9586)
Lines_Div	0.4511 ***	1.5944	0.1498 **	0.6775
	(0.0652)	(2.2259)	(0.0667)	(0.8342)
Geo_Div	0.2304 ***	3.8428 *	−0.0317	3.6037 **
	(0.0602)	(2.0583)	(0.1111)	(1.4030)
Leverage	0.0011	42.7821 ***	0.0399	−0.6821
	(0.1072)	(4.1096)	(0.0622)	(0.8560)
Reinsurance	−0.7866 ***	−15.1529 ***	−0.5608 ***	−0.3189
	(0.0617)	(2.6614)	(0.0655)	(0.9136)
Combined_ratio	−0.2200 ***	−1.9175	−0.2485 ***	0.4817
	(0.0508)	(2.2487)	(0.0565)	(0.6828)
RBC_adjusted	0.0310 ***	−0.1119	0.0120 **	−0.0647
	(0.0049)	(0.1561)	(0.0052)	(0.0554)
Financial_slack	−1.0040 ***	−10.4305 **	−1.0695 ***	−1.6694
	(0.1115)	(5.2115)	(0.1315)	(1.6015)
Treasury_3m	0.0165	−1.0907 ***	−0.0195 *	−0.2972 **
	(0.0102)	(0.2908)	(0.0103)	(0.1194)
Constant	−1.9563 ***	10.5739	−0.9491 *	17.1548 ***
	(0.4361)	(12.0516)	(0.4988)	(4.8230)
Sigma	17.9033 ***		17.1548 ***	
	(0.5694)		(4.8230)	
Fixed_State	Yes		Yes	
Fixed_Year	Yes		Yes	
Observations	31,129		31,129	

First, the participation decision estimates indicate that the decision to invest in the equity market depends on firm financial status factors, operation risk capacity measures, and firm environment variables, although the decision does not seem to be a function of profitability or leverage. Evidence regarding our second research question is provided by the coefficient estimates for the variable "Treasury_3m". Our analysis suggests that the market interest rate (3-month Treasury bill yield) had no significant impact on the insurer's decisions to initiate unaffiliated equity investments.

In the volume decision regressions, the firm financial constraints and operational risk variables (e.g., Combined_ratio and RBC_adjusted capital) are not significant—unlike what is seen in the participation decision regressions. Another important difference with respect to the participation decision is that the insurers' volume decision is inversely and significantly (at the 1% level) related to market interest rates. This implies that when interest rates are low (high), insurers reduce (increase) their investments in bonds and increase (decrease) their equity investments.

Several results on the firm specific variables shed light on our first research question. First, firm size is a significant determinant of both the participation and volume decisions. Firms entering the equity market require expertise that will incur substantial fixed costs. Pottier (2007) suggests that large insurance firms have in-house investment analysts and credit specialists, which would provide an advantage in investing in risky equity assets. Consistently, the results show that the firm size coefficient is positive in the participation decision. However, the negative firm size coefficient in the volume decision is not only puzzling, but also counter-intuitive: Larger insurers that should have more available funds and risk capacity invest less in equity assets. This negative coefficient is driven by insurers that invest in mutual funds, which are included in this group of insurers investing in unaffiliated firms. We will study insurers investing only in mutual funds in Section 5.3.3.

Second, prior studies, such as Yu et al. (2008) and Che and Liebenberg (2017) suggest that given that long-tail insurers have higher operational risk, they should take less asset risk to achieve a balanced portfolio. However, an alternative explanation is that long-tail insurers are more willing to invest in equity since the greater length of time before claims are paid provides more flexibility with respect to their investment activities. The positive and significant sign on the Long_tail variable supports this explanation and suggests that there exists a profitability incentive that is derived from this kind of business along with its risk-related consequences.

Third, prior studies report mixed evidence on the effects of insurers' ownership structure (whether mutual or stock) on their investments in risky assets, such as equity. Yu et al. (2008) find that stock insurers are more averse to risky investments since they are subject to shareholders' monitoring, while Che and Liebenberg (2017) document the exact opposite, stock insurers are more capable of assuming risk due to easier access to capital markets. Our results provide support for the former argument.

Finally, the negative coefficient on the Financial_Slack variable implies that insurers with lower liquidity (less cash and short-term investments) hold more equity investments, which is consistent with the findings of Colquitt et al. (1999). They argue that cash holdings and common stock holdings are substitutes, and consequently find that insurers with high stock holdings hold less cash and short investments.

5.3.2. The Effects of ICMs: Equity Investments in both Affiliated and Unaffiliated Firms

Columns 2 and 3 of Table 6 document Cragg's two-tier model outcomes for insurers' equity investment decisions in both affiliated and unaffiliated firms (E_Total), while columns 4 and 5 present the results for investments in affiliated firms only (E_Affiliated). Given the non-trivial amounts of equity investment in affiliated firms, this section addresses our third research question by investigating the effects of ICMs on insurers' equity investment decisions.

Table 6. Participation and Volume Decisions: E_Total, E_Affiliated. This table reports the estimates of Cragg's two-part model. Columns 2 and 3, "E_Total," report the estimates for insurers' equity investment decisions in all firms: Both unaffiliated firms and unaffiliated. Columns 4 and 5, "E_Affiliated," report the estimates for insurers' equity investment decisions in affiliated firms only. Robust standard errors are in parentheses: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

	E_Total		E_Affiliated	
	Participation	**Volume**	**Participation**	**Volume**
Firm_size	0.2073 ***	2.0777 ***	0.3289 ***	0.1780
	(0.0167)	(0.5222)	(0.0179)	(0.4775)
Ownership	1.1643 ***	12.4260 ***	1.0703 ***	−3.8262 **
	(0.0650)	(1.5949)	(0.0626)	(1.4864)
Group	−0.3353 ***	0.6390	0.6011 ***	30.2774 ***
	(0.0502)	(1.7012)	(0.0605)	(3.8819)
Long_tail_ratio	0.0552	5.1640 **	−0.0491	2.3725
	(0.0643)	(2.5521)	(0.0739)	(2.3191)
Riskybond_ratio	13.3146 ***	131.191 ***	4.5369 ***	19.1463
	(1.0145)	(22.5869)	(0.8233)	(18.6491)
ROA	−0.8737 **	−93.2503 ***	−1.8493 ***	−76.5657 ***
	(0.4208)	(15.3412)	(0.4496)	(12.7091)
Lines_Div	0.3893 ***	6.7485 ***	0.2206 ***	2.0751
	(0.0683)	(2.3686)	(0.0748)	(2.0731)
Geo_Div	0.2980 ***	5.0711 **	0.2602 ***	4.1751 **
	(0.0631)	(2.1803)	(0.0677)	(1.7885)
Leverage	0.2201 **	70.7753***	0.4903 ***	37.6857 ***
	(0.1123)	(4.3558)	(0.1260)	(3.5628)
Reinsurance	−0.7907 ***	−6.1609 **	−0.4486 ***	5.4578 ***
	(0.0645)	(2.4684)	(0.0699)	(1.8884)
Combined_ratio	−0.2084 ***	0.3643	−0.0038	2.0372
	(0.0523)	(2.2803)	(0.0574)	(1.6171)
RBC_adjusted	0.0265 ***	−0.1975	0.0105 *	−0.0240
	(0.0050)	(0.1857)	(0.0056)	(0.1866)
Financial_slack	−1.0508 ***	−20.6284 ***	−0.3180 **	−9.2134 **
	(0.1094)	(5.3602)	(0.1318)	(4.6405)
Treasury_3m	0.0191 *	−0.7035 **	0.0454 ***	−0.3022
	(0.0106)	(0.3176)	(0.0108)	(0.2813)
Constant	−3.3204 ***	−91.7357 ***	−8.0826 ***	−71.8032 ***
	(0.4514)	(13.3605)	(0.5232)	(23.1229)
Sigma	21.8932 ***		12.7207 ***	
	(0.5825)		(4.8230)	
Fixed_State	Yes		Yes	
Fixed_Year	Yes		Yes	
Observations	31,129		31,129	

In the analysis of total equity investments, not only is the 3-month Treasury bill rate statistically significant, but also the sign of the coefficient is positive in the participation decision. The results indicate that insurers are more likely to initiate equity investments when market interest rates are high, which is counter-intuitive according to the discussion in the previous section. Insurers should have less incentive to decrease their investments on government bonds when interest rates are high. The existence of the internal capital market, however, can provide a plausible explanation for this puzzling result. In columns 4 and 5, we directly investigate the effects of ICMs by studying insurers that invest only in affiliated firms. Insurers increase capital contribution to the affiliates in need when interest rates are high because the cost of external financing increases with interest rates. Furthermore, as noted by Stein (2003), capital contributions via ICMs can be less costly than external capital. Given the significant amounts of equity investments through ICMs, they drive the positive coefficient in the participation decision for insurers' total equity investments. In contrast,

in the volume decision, the coefficient remains negative, indicating that motivations for higher profit (risk appetite hypothesis) outweigh the effects of ICMs.

As expected, the firm size coefficient is positive and significant. As reported in column 4 of Table 6, larger insurers are more likely to engage in ICMs providing capital to the affiliated firms in need. The result on the ROA variable is also worth noting. Column 4 of Table 6 reports that the ROA variable is statistically significant and negative in the participation decision, while it lacked statistical significance in the previous section (in the analysis without ICMs.) This result shows that insurers with better performance contribute less capital to affiliates.

5.3.3. The Effects of the Outsourcing Option: Equity Investments Only on Mutual Funds

Columns 4 and 5 of Table 5 list the estimation results for insurers' decisions in equity investments only on mutual funds. Therefore, this section sheds light on our fourth research question. We find that firm size has no significant impact on the insurers' decision to participate in mutual funds. When insurers have an option to outsource equity investments that require substantial upfront costs to initiate, small insurers can have access to the equity market as easily as large insurers. In their volume decision, however, the firm size coefficient is negative and significant, indicating that given their decision to invest in mutual funds, smaller insurers invest more in mutual funds than larger insurers, as this option to outsource is more valuable for small insurers. It is harder for small insurers to have the expertise to actively invest in equity securities. Therefore, it makes sense for them to invest more in mutual funds. This negative and significant coefficient in firm size is what drives the puzzling result in Section 5.3.1, the negative firm size coefficient in the volume decision for investment in unaffiliated firms.

Moreover, it is important to note the negative and significant sign in the 3-month Treasury yield variable. This result indicates that insurers respond to the changes in the external market when deciding whether to invest in mutual funds. The results for the volume decision are consistent with the findings in the previous two sections. When interest rates are low (high), insurers reduce (increase) their investments in bonds and increase (decrease) their investments in risky assets, such as mutual funds.

6. Empirical Analysis: Quit Decisions

In this section, we explore our fifth research question by examining the determinants of P&L insurers' quit decisions in their equity investments. After looking into all the insurers that cease to invest in equity in a given year, we separately investigate insurers that quit equity investments permanently from insurers that quit once but return in later years.

6.1. Time-Series and Univariate Analyses

In this section, we first look into the profiles of insurers that cease to invest in equity, and then conduct a univariate analysis to investigate whether the firm specific characteristic of insurers that quit equity investments in a given year are statistically different from the characteristics of insurers that remain in the equity market. We use parametric and non-parametric tests for the difference in means.

Table 7 and Figure 1 report time-series changes in the numbers of insurers who quit equity investments from 2003 to 2017. Noticeably, more insurers decided to terminate their positions in the equity market from 2007 to 2009, when the market was experiencing a severe financial crisis (Figure 1, Panel A). In 2009, the proportion of insurers that quit equity investments relative to all insurers who held equity investments in unaffiliated firms increased to 11% (from 5% prior to the crisis). Before the financial crisis, the majority of insurers that left the equity market did so on a temporary basis. However, during and after the crisis, we observe a drastic reversal in that trend, as the majority of these firms that quit equity investments did so on a permanent basis (Figure 1, Panel B). These observations suggest that insurers stop investing in equity when they experience large losses from equity

investments. Moreover, it is worth noting that in years with low market interest rates, relatively small numbers of insurers leave the equity market.

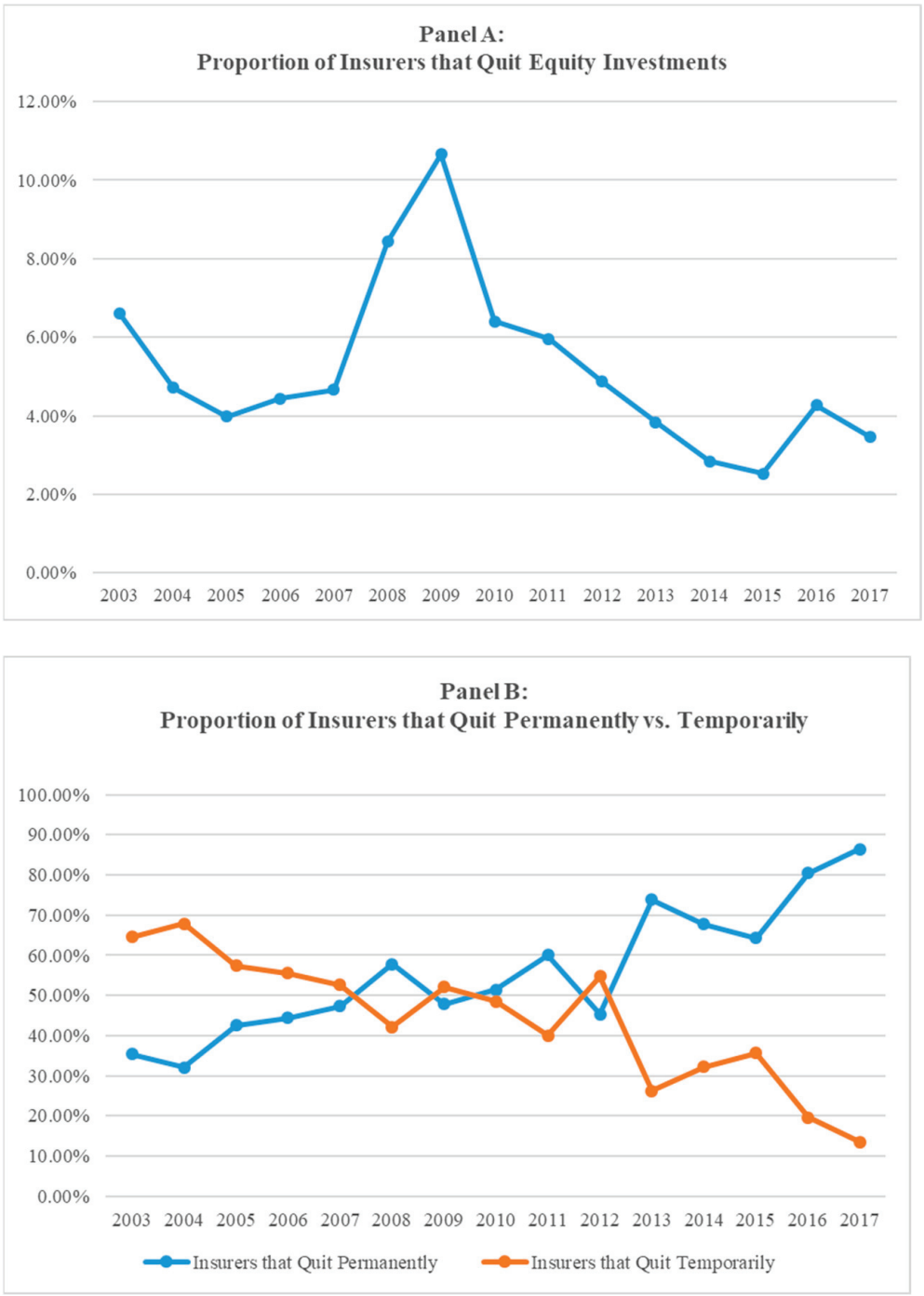

Figure 1. Time-series Changes in the Proportion of Insurers that Quit Equity Investments. The figures report the proportion of insurers that quit equity investments from 2003 to 2017. Panel (**A**) reports the insurers that quit equity investments as a proportion of all insurers that invest in the equity of unaffiliated firms. Panel (**B**) reports the insurers that quit permanently vs. those that quit temporarily as a proportion of all the insurers that quit in a given year. All numbers are in percentage terms.

Table 7. Profile of Insurers' Quit Decision. This table reports time-series changes in the numbers of insurers who quit equity investments from 2003 to 2017. Column 2 presents the total numbers of insurers; column 3 presents the numbers of insurers that hold equity investments on unaffiliated firms; column 4 presents the number (and proportion) of all insurers that quit equity investments in a given year (relative to those who hold equity investments in unaffiliated firms); column 5 presents the number (and proportion) of insurers that quit equity investments permanently (relative to all the insurers that quit in the same year); column 6 presents the number (and proportion) of insurers that quit equity investments temporarily (relative to all the insurers that quit in the same year).

Year	Total	E_Unaffiliated	Quit_All		Quit_Permanent		Quit_Temporary	
2003	1923	1194	79	6.62%	28	35.44%	51	64.56%
2004	1892	1189	56	4.71%	18	32.14%	38	67.86%
2005	1866	1182	47	3.98%	20	42.55%	27	57.45%
2006	1919	1218	54	4.43%	24	44.44%	30	55.56%
2007	**1926**	**1224**	**57**	**4.66%**	**27**	**47.37%**	**30**	**52.63%**
2008	**1939**	**1209**	**102**	**8.44%**	**59**	**57.84%**	**43**	**42.16%**
2009	**1902**	**1117**	**119**	**10.65%**	**57**	**47.90%**	**62**	**52.10%**
2010	1877	1093	70	6.40%	36	51.43%	34	48.57%
2011	1842	1090	65	5.96%	39	60.00%	26	40.00%
2012	1820	1088	53	4.87%	24	45.28%	29	54.72%
2013	1771	1094	42	3.84%	31	73.81%	11	26.19%
2014	1741	1090	31	2.84%	21	67.74%	10	32.26%
2015	1738	1108	28	2.53%	18	64.29%	10	35.71%
2016	1697	1079	46	4.26%	37	80.43%	9	19.57%
2017	1672	1069	37	3.46%	32	86.49%	5	13.51%

Table 8 reports mean difference test results for our three quit dependent variables. The net gains from equity investments as well as from underwriting for insurers that continue to invest in equity are, on average, statistically greater than the net gains for those who quit. Therefore, lower equity investment gains and net underwriting gains lead them to quit the equity market. Interestingly, the results indicate that the combined ratio and the net underwriting gains for insurers that only temporarily leave the equity market are not significantly different from those that continue investing in equity markets.

Table 8. Mean Difference Tests: Quit Decision. This table reports the mean difference test results for all the firm-specific variables depending on the classification of the Quit Decision variables. The difference in means is tested with a *t*-test. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

	Quit_Not	Quit_All		Quit_Permanent		Quit_Temporary	
	Mean	Mean	Diff.	Mean	Diff.	Mean	Diff.
Firm_size	18.642	18.223	0.42 (***)	18.254	0.39 (***)	18.139	0.50 (***)
Ownership	0.311	0.099	0.21(***)	0.062	0.25 (***)	0.201	0.11 (***)
Group	0.657	0.699	−0.04 (***)	0.751	−0.09 (***)	0.553	0.10 (***)
Long_tail_ratio	0.807	0.761	0.05 ( )	0.757	0.05 ( )	0.774	0.03 ( )
Risykbond_ratio	0.011	0.006	0.00 (***)	0.006	0.00 (***)	0.006	0.01 (***)
ROA	0.024	0.016	0.01 (***)	0.016	0.01 (***)	0.018	0.01 (**)
Lines_Div	0.417	0.355	0.06 (***)	0.357	0.06 (***)	0.352	0.06 (***)
Geo_Div	0.411	0.425	−0.01 ( )	0.439	−0.03 (*)	0.385	0.03 ( )
Leverage	0.452	0.442	0.01 ( )	0.440	0.01 ( )	0.448	0.00 ( )
Reinsurance	0.322	0.387	−0.07 (***)	0.398	−0.08 (***)	0.356	−0.03 ( )
Combined_ratio	1.019	1.067	−0.05 (***)	1.076	−0.06 (***)	1.040	−0.02 ( )
RBC_adjusted	16.993	16.023	0.97 (***)	15.994	1.00 (***)	16.106	0.89 (***)
Financial_slack	0.107	0.137	−0.03 (***)	0.128	−0.02 (***)	0.160	−0.05 (***)
Net_G_Naff_IC	0.560	0.164	0.40 (***)	0.145	0.41 (***)	0.214	0.35 (***)
Net_G_Total_IC	0.692	0.238	0.45 (***)	0.226	0.47 (***)	0.272	0.42 (***)
Net_G_Naff_ICu	0.784	0.137	0.65 (***)	0.130	0.65 (***)	0.158	0.63 (***)
Net_G_Total_ICu	1.016	0.221	0.79 (***)	0.207	0.81 (***)	0.262	0.75 (***)
Net_G_Udw	−0.008	−1.079	1.07 (***)	−1.287	1.28 (***)	−0.505	0.50 ( )

6.2. Multivariate Analysis

In this section, we conduct a Logit regression analysis in order to examine our fifth research question in a multivariate context.

Columns 2 and 3 of Table 9 report the Logit estimation results for P&L insurers' quit decisions that are based on net gains from equity investments. The results show an inverse and statistically significant relationship between insurers' quit decision and net gains both from equity investments and underwriting. Moreover, firm environment variables and risk measures affect the decision to quit. It is also worth noting that the Treasury bill rate variable is statistically insignificant in both the analyses of E_Unaffiliated and E_Total. The insignificant result on E_Unaffiliated indicates that market interest rates do not affect insurers' decisions to quit their investments in unaffiliated firms, while the insignificant result on E_Total indicates that the effects of ICMs on insurers' quit decisions is limited in that insurers do not retract their capital contributions to the affiliated firms only due to the fact that interest rates are low (i.e., the cost of external capital has become inexpensive). The fact that the absolute size of the coefficient on net gains from equity investment is larger for E_Unaffiliated (4.1010) than E_total (1.5510) shows that ICMs still matter for quit decisions, in which some insurers are more likely to terminate their position on unaffiliated equity assets due to the capital contributions to the affiliated firms. The analysis on equity investment net gains that are adjusted for capital gains (columns 4 and 5), reports similar results except for less pronounced effects of equity investment gains in terms of magnitude.

Table 9. Quit Decisions: Quit_All. This table reports the estimates of the Quit Decision for all insurers that cease to invest in equity in a given year using Logit regressions with random effects, clustered at the firm level. "Equity Investment" refers to net investment gains from equity investments, "Underwriting" refers to net underwriting income, all other variables are defined in Table 1. Columns 2 and 3, "Net Gains," report the estimates where the variable "Equity Investment" is unadjusted for capital gains. Columns 4 and 5, "Net Gains (Capital gain adjusted)," report the estimates where the variable "Equity Investment" is adjusted for realized and unrealized capital gains. "E_Unaffiliated" represents equity investment in unaffiliated stocks and "E_Total" denotes equity investment in unaffiliated and affiliated stocks. Robust standard errors are in parentheses: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

	Net Gains		**Net Gains (Capital Gain Adjusted)**	
	E_Unaffiliated	**E_Total**	**E_Unaffiliated**	**E_Total**
Equity Investment	−4.1010 ***	−1.5510 ***	−0.1401 ***	−0.1227 ***
	(−0.2799)	(−0.1523)	(0.0244)	(0.0199)
Underwriting	−0.0429 ***	−0.0480 ***	−0.0370 ***	−0.0384 ***
	(−0.0119)	(−0.0118)	(0.0116)	(0.0116)
Firm_size	−0.2615 ***	−0.2069 ***	−0.2222 ***	−0.2125 ***
	(−0.0382)	(−0.0379)	(0.0391)	(0.0391)
Ownership	−1.3619 ***	−1.4450 ***	−1.5982 ***	−1.5904 ***
	(−0.1499)	(−0.1499)	(0.1552)	(0.1552)
Group	0.3045 ***	0.3600 ***	0.4602 ***	0.4584 ***
	(−0.1167)	(−0.1158)	(0.1194)	(0.1192)
Long_tail_ratio	−0.2093	−0.2682 *	−0.3227 **	−0.3194 **
	(−0.1549)	(−0.1528)	(0.1570)	(0.1569)
Riskybond_ratio	−11.4558 ***	−13.1091 ***	−16.4539 ***	−16.2892 ***
	(−2.6822)	(−2.6574)	(2.6699)	(2.6683)
ROA	8.4256 ***	9.6594 ***	8.1631 ***	8.4688 ***
	(−1.8199)	(−1.816)	(1.7517)	(1.7633)
Lines_Div	−0.3288 **	−0.3654 **	−0.4374 ***	−0.4339 ***
	(−0.1617)	(−0.1605)	(0.1655)	(0.1654)
Geo_Div	0.223	0.2931 **	0.2425	0.2499
	(−0.1474)	(−0.1476)	(0.1537)	(0.1536)
Leverage	0.0813	−0.0246	−0.4727	−0.4251
	(−0.2852)	(−0.2861)	(0.2901)	(0.2904)

Table 9. *Cont.*

	Net Gains		Net Gains (Capital Gain Adjusted)	
	E_Unaffiliated	E_Total	E_Unaffiliated	E_Total
Reinsurance	0.6346 ***	0.8189 ***	0.9958 ***	1.0002 ***
	(−0.1608)	(−0.1607)	(0.1639)	(0.1640)
Combined_ratio	0.4838 ***	0.4881 ***	0.5019 ***	0.4811 **
	(−0.1865)	(−0.1858)	(0.1886)	(0.1886)
RBC_adjusted	−0.0296 **	−0.0334 ***	−0.0358 ***	−0.0352 ***
	(−0.0127)	(−0.0125)	(0.0127)	(0.0127)
Financial_slack	1.1124 ***	1.1806 ***	1.3012 ***	1.3035 ***
	(−0.3147)	(−0.3101)	(0.3160)	(0.3161)
Treasury_3m	−0.0281	−0.0162	−0.3571	−0.3208
	(−0.2567)	(−0.2542)	(0.2603)	(0.2584)
Constant	3.0751 ***	1.5252	2.2437 **	1.9593 *
	(−1.0555)	(−1.0511)	(1.0798)	(1.0788)
Fixed_State	Yes	Yes	Yes	Yes
Fixed_Year	Yes	Yes	Yes	Yes
Observations	17,590	18,210	18,210	18,210

Columns 2 and 3 in Table 10 document the estimation results for P&L insurers that cease to invest in equity for a given year and never return during the entire sample period (Quit_Permanent), while columns 4 and 5 report the estimation results for P&L insurers that once quit equity investments but return in later years (Quit_Temporary). The analyses are based on net gains from equity investments on unaffiliated firms.

Table 10. Quit Decisions: Quit_Permanent & Quit_Temporary. This table reports the estimates of the Quit Decision for all insurers that cease to invest in equity permanently and temporarily using Logit regressions with random effects, clustered at the firm level. Columns 2 and 3, "Quit_Permanent," report the estimates for the permanent Quit Decision. Columns 4 and 5, "Quit_Temporary," report the estimates for the temporary Quit Decision. "Equity Investment" refers to net investment gains from equity investments, "Underwriting" refers to net underwriting income, all other variables are defined in Table 1. Columns 2 and 4, "Net Gains," report the estimates where the variable "Equity Investment" is unadjusted for capital gains. Columns 3 and 5, "Net Gains (Capital gain adjusted)," report the estimates where the variable "Equity Investment" is adjusted for realized and unrealized capital gains. Robust standard errors are in parentheses: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Variables	Quit_Permanent		Quit_Temporary	
	Net Gains	Net Gains (Capital Gain Adjusted)	Net Gains	Net Gains (Capital Gain Adjusted)
Equity Investment	−5.4505 ***	−0.2398 ***	−2.5840 ***	−0.1036 ***
	(0.4818)	(0.0402)	(0.3206)	(0.0336)
Underwriting	−0.0560 ***	−0.0543 ***	−0.0242	−0.0240
	(0.0163)	(0.0176)	(0.0167)	(0.0164)
Firm_size	−0.3604 ***	−0.3894 ***	−0.1369 ***	−0.0996 *
	(0.0587)	(0.0739)	(0.0516)	(0.0515)
Ownership	−2.3206 ***	−3.0719 ***	−0.7675 ***	−0.8618 ***
	(0.2960)	(0.3769)	(0.1792)	(0.1793)
Group	0.8735 ***	1.2703 ***	−0.2938 *	−0.2100
	(0.1811)	(0.2299)	(0.1555)	(0.1548)
Long_tail_ratio	−0.1574	−0.3051	−0.2029	−0.2727
	(0.2215)	(0.2662)	(0.2121)	(0.2100)
Riskybond_ratio	−11.0092 ***	−17.3900 ***	−9.4501 **	−13.5781 ***
	(3.8304)	(4.1700)	(3.7341)	(3.6853)
ROA	10.7285 ***	11.7285 ***	4.3377 *	4.7592 *
	(2.5452)	(2.6940)	(2.5217)	(2.4432)

Table 10. *Cont.*

Variables	Quit_Permanent		Quit_Temporary	
	Net Gains	Net Gains (Capital Gain Adjusted)	Net Gains	Net Gains (Capital Gain Adjusted)
Lines_Div	−0.5033 **	−0.6597 **	−0.0652	−0.1964
	(0.2343)	(0.2852)	(0.2193)	(0.2177)
Geo_Div	0.1278	0.2049	0.3147	0.3417 *
	(0.2067)	(0.2587)	(0.2035)	(0.2061)
Leverage	0.2064	−0.3112	0.0040	−0.3943
	(0.3967)	(0.4726)	(0.4009)	(0.3999)
Reinsurance	0.6287 ***	1.1732 ***	0.6332 ***	0.9165 ***
	(0.2270)	(0.2749)	(0.2254)	(0.2247)
Combined_ratio	0.6489 ***	0.7871 ***	0.1276	0.1266
	(0.2466)	(0.2838)	(0.2817)	(0.2840)
RBC_adjusted	−0.0443 **	−0.0661 ***	−0.0018	−0.0029
	(0.0177)	(0.0212)	(0.0179)	(0.0176)
Financial_slack	1.0813 **	1.3283 **	1.2590 ***	1.4348 ***
	(0.4481)	(0.5186)	(0.4164)	(0.4124)
Treasury_3m	−0.1416	0.0382	−0.8896	−0.8832
	(0.4441)	(0.4651)	(0.9251)	(0.9233)
Constant	−12.7337	−16.9625	−0.1970	−1.2196
	(2799.2725)	(9430.8936)	(1.3216)	(1.3171)
Fixed_State	Yes	Yes	Yes	Yes
Fixed_Year	Yes	Yes	Yes	Yes
Observations	16,154	16,154	15,437	15,437

The results for insurers that quit permanently are essentially the same as those reported in Table 9, in terms of the signs and significance of the explanatory variables, including those for Treasury bills interest rates. The results on the main variables suggest that insurers that suffer great losses both in equity investments and underwriting are more likely to leave the equity market permanently. However, we see a clear difference between permanent and temporary quitters. Not only are temporary quitters less severely influenced by the losses in equity investments (i.e., the coefficient is smaller in magnitude than for permanent quitters) and not affected at all by fluctuations in the underwriting business, but their quit decisions also appear to be less impacted by firm risk measures. Specifically, variables, such as Lines_Div, Combined_ratio, and RBC_adjusted do not seem to affect the decision to temporarily quit equity investments. An interesting result is that the Financial_slack variable is positive and significant in the temporary quit decision (as well as in the permanent decision) suggesting that insurers with high cash holdings and short-term assets are more likely to quit (i.e., invest less in equity).

7. Discussion and Conclusions

In this study, we investigate US P&L insurance companies to determine the incentives of operating firms to participate in their equity investments. In particular, we examine how their decisions to participate may differ from their and volume decisions using Cragg's two-part model that allows parameter vectors to differ between participation and volume decisions. Using a rich data set of the P&L insurance industry, we further investigate the effects of pure investment strategies, ICM, as well as outsourcing options on the equity investment decisions, taking into account the potential impact of external market environments. Finally, we look into the determinants of their quit decision. We find that market interest rates can be a significant determinant of how ICMs work; that ICMs play a significant role in firms' equity investment decision making process impeding their optimal strategies; that when outsourcing equity investments is available, firm size is not relevant for their decisions; and that operational institutional investors decide to leave equity markets when they experience great losses from equity investments and their operation

side, and are more likely to exit if they are financially constrained and have weak risk capacity from their core business.

Our study moves the body of knowledge forward in several ways. While prior literature does not distinguish between participation and volume determinants for equity investments, we explicitly model these decisions as separate and show that the factors affecting the decision to invest in equities differ from the factors that determine how much to invest. We also provide evidence regarding the manner in which P&L insurers invest in equities and show that firm and market characteristics have different impacts for each investment strategy. Finally, our study provides novel evidence regarding the decision by P&L insurers to quit equity investments following the financial crisis.

Our study has several limitations. First, we focus on investors in one industry only and our results may not be generalizable to other institutional investors. Second, some of the motivations for equity investments may be affected by regulation which may not be relevant for other institutional investors. Third, due to the fact that our data are annual and cover a period that includes only one financial crisis, our results on interest rates and investment shocks may not be entirely representative. Despite these limitations, we believe that our research provides additional insight into the investment behavior of P&L insurers.

Future research directions include an analysis of equity investments by other institutional investors, ideally in settings where regulation is less prominent. This analysis would likely require proprietary data since we are only able to perform our analysis due to the regulatory requirement that insurance companies report detailed data on underwriting and investments.

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Notes

1 https://www.iii.org/publications/a-firm-foundation-how-insurance-supports-the-economy/investing-in-capital-markets/property-casualty-industry-investments; (accessed on 5 March 2023).

2 For reference, hedge funds liquidated about 29% of their aggregate portfolio in 2008: Q3–Q4 (Ben-David et al. 2012).

3 Ge and Weisbach (2020) report that property and liability (also termed property and casualty) insurers held invested assets worth USD 6.5 trillion at the end of 2017, 30% of the total US assets held by endowments, foundations, pension funds, and insurance companies in the same year.

4 In insurance jargon, this is called the "float".

5 The fraction of equity investing P&L insurers in this study's sample fluctuates from 52.10% to 62.74%. The sample reports lower ratios in more recent years.

6 More than two thirds of the P&L insurers are affiliated, thus providing an ideal setting to study the potential impact of ICMs on equity investment decisions.

7 P&L insurers of this study's sample invest on average about 3.29% of their total investments in affiliated firms in the form of equity investments, where the total equity investments take up about 11.87% of the total investments. Therefore, approximately 27.69% of P&L insurers' equity investments are actually executed via ICMs in the form of capital contributions. Among the equity investments in affiliates, the vast majority of funds are invested in privately traded affiliates and proportions of publicly traded stocks are trivial.

8 The term "pure" is used in order to differentiate P&L insurers' motivations to invest in equity investments from the work of ICMs, capital contributions, which are also recorded as equity investments. Pure equity investments denote equity investments in unaffiliated firms.

[9] Rauh (2009) studies the asset allocation of defined benefit pension and finds that risk management theory plays a considerably larger role than risk shifting theory in explaining variation in pension fund investment policy. Almeida et al. (2011) also show that firms may reduce rather than increase risk when leverage increases exogenously, thus supporting risk management theory but not risk shifting theory.

[10] Che and Liebenberg (2017) find that multi-line (more diversified) insurers invest more in risky assets than do single-line (less diversified) insurers, providing supporting evidence for the coordinated risk management theory, but not for risk management theory. Moreover, McShane et al. (2012) test and document evidence for the coordinated risk management theory, reporting that insurers hedge investment risk using derivatives, while simultaneously increasing underwriting risk.

[11] This study's sample reports that P&L insurers invest on average 39.40% of their funds on government bonds that include municipal bonds, while they invest 17.56% and 10.86% on corporate bonds and equity, respectively. The fraction decreased to 35.17% in 2018, arguably due to the low market interest rates.

[12] Lian et al. (2019) demonstrate that individual investors have a greater appetite for risk-taking when interest rates are low.

[13] Prior studies document a wide range of determinants of ICMs, such as group financial constraints and status, product market competition, risk sharing, and growth prospects. See for example, Almeida et al. (2015), Kuppuswamy and Villalonga (2016), Gopalan and Xie (2011), Matvos and Seru (2014), Campello (2002), Maksimovic and Phillips (2008), Belenzon and Berkovitz (2010). In the insurance literature, Powell et al. (2008) provide supporting evidence that P&L insurance firms used internal capital markets to transfer capital to the affiliated firms with the best investment opportunities. However, Niehaus (2018) finds that insurance groups provide a risk-sharing mechanism for life insurers. Moreover, Chiang (2020) finds that life insurers with bank affiliates use internal capital market to reallocate resources to weaker divisions. Most recently, Fier and Liebenberg (2023) show that P&L insurers use internal capital markets to manage the risk of regulatory scrutiny.

[14] Guiso et al. (2018) state that the distribution of wealth and background risks of investors can initiate different changes in their risk aversion.

[15] For further details, refer to Wooldridge (2010, pp. 692–94).

[16] Under the "summary investment schedule" in the statutory annual statements, equity investments are reported as following, 3.1 Investments in mutual funds, 3.2 Preferred stocks (3.21 Affiliated, 3.22 Unaffiliated), 3.3 Publicly traded equity securities (excluding preferred stocks) (3.31 Affiliated, 3.32 Unaffiliated), 3.4 Other equity securities (3.41 Affiliated, 3.42 Unaffiliated), 3.5 Other equity interests, including tangible personal property under lease (3.51 Affiliated, 3.52 Unaffiliated).

[17] Due to lack of within variation, firm fixed effects to be conditioned out of likelihood do not exist. The reported random effects model results are robust to the pooled regression model that is clustered at firm level. The analysis controls for unobservable year and state effects and it is conducted at the insurers' level.

[18] The initial sample comprises 2717 different firms, on average, per year and 46,182 total firm-year observations over the entire sample period.

[19] The line diversification calculation is,

$$\text{Lines\_Div} = 1 - \sum_{j=1}^{24} \left(NPW_{i,j,t} / NPW_{i,t} \right)^2$$

where, $NPW_{i,j,t}$ indicates the net premiums written by an insurer i in line $j = 1, \ldots, 24$ in year t; $NPW_{i,t}$ denotes the insurer's total net premiums written in a given year t. Insurers with larger value are relatively more diversified. See Berry-Stölzle et al. (2012) for details on grouping similar business lines.

[20] As in the line of business diversification, the geographical diversification measure is calculated as:

$$\text{Geo\_Div} = 1 - \sum_{k=1}^{58} \left(DPW_{i,k,t} / DPW_{i,t} \right)^2$$

where $DPW_{i,k,t}$ indicates the direct premiums written by an insurer i in state $k = 1, \ldots, 58$ in year t; and $DPW_{i,t}$ denotes the insurer's total direct premiums written in a given year t. Insurers with larger value are relatively more diversified.

[21] Following Phillips et al. (1998), long-tail lines consist of Farm Owners Multiple Peril, Homeowners Multiple Peril, Commercial Multiple Peril, Ocean Marine, Medical Professional Liability, Workers' Compensation, Other Liability, Product Liability, Automobile Liability, Aircraft, Boiler and Machinery, International, and Reinsurance.

[22] The E_Affiliated mean of 3.286 divided by the E_Total mean of 11.868.

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