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The Relationship between Capital Structure and Firm Performance: The Moderating Role of Agency Cost

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Abstract: Since it first appeared, agency theory has argued that debt can decrease agency issues between agent and principal and enhance the value of firms. This paper explores the moderating effect of agency cost on the association between capital structure and firm performance. A panel econometric method, namely a fixed-effect regression model, was used to evaluate the above description. This investigation uses secondary data collected from published annual reports of manufacturing firms listed on Tehran Stock Exchange (TSE) during 2011–2019. Empirical results show that capital structure is negatively related to firm performance. Agency cost also has a negative impact on corporate performance; however, in the case of ROA and EPS, the relationship is positive. Interestingly, the findings illustrate that increasing the level of debt can reduce agency costs and enhance firm performance. Moreover, robust correlations are revealing that agency cost significantly affects the relationship between capital structure and corporate performance. These findings provide proof to support the assumptions of agency theory, which explains the association between capital structure and performance of firms. This study provides new perspectives on the relationship between capital structure and firm performance by using data from listed manufacturing firms in Iran; hence, these new insights from a developing market improve the understanding of capital structure in Asian and Middle Eastern markets.

Keywords: agency theory; capital structure; financial performance; Iran; manufacturing firms

JEL Classification: C23; G30; G32; D82

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Citation: Ahmed, Amanj Mohamed, Deni Pandu Nugraha, and István Hágen. 2023. The Relationship between Capital Structure and Firm Performance: The Moderating Role of Agency Cost. *Risks* 11: 102. https://doi.org/10.3390/risks11060102

Academic Editor: Mogens Steffensen

Received: 5 May 2023
Revised: 17 May 2023
Accepted: 22 May 2023
Published: 1 June 2023

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1. Introduction

The concept of an agency relationship highlights that a manager (agent) and shareholder (principal) behave in their own interest and this creates conflict of interest, which results in increasing enterprise costs, commonly known as "agency costs" (Hoang et al. 2019). According to Demsetz and Lehn (1985), huge publicly listed companies, including manufacturing firms, are often reported to have extremely diffuse ownership composition that efficiently segregates ownership of residual rights from corporate control. This division of control and ownership is a significant topic of debate in both organizational economic theory and the continuing discussion of the social impact of contemporary businesses. Many companies need significant amounts of money in order to obtain scale economies. Thus, efficient managers may be more suitable for managing a company due to their technical proficiency, knowledge, and personal characteristics (Sdiq and Abdullah 2022). For the benefit of large shareholders, however, agents are pressured by the owners to eliminate diversification and achieve a certain level of adequate performance (Thomsen and Pedersen 2000). These elements result in agency issues between agents and principals. Agency cost

is involved in monitoring agents, supervising agents, and also trying to prevent their abuse (Hoang et al. 2019; Sdiq and Abdullah 2022).

In addition, owners suffer from agency conflict, as their executive managers may not perform effectively on their behalf and may receive excessive bonuses and luxury salaries (Abdullah and Tursoy 2023; Baykara and Baykara 2021; Kalash 2019). Hence, agency cost of equity may increase when the interest of the managers is different from the interests of shareholders, and this can only be eliminated by effective planning (Sdiq and Abdullah 2022). Jensen and Meckling (1976) have also argued that agency problems can be reduced by utilizing debt financing because managers may be disciplined by having consistent debt payment. Debt also restricts the agent's capacity to diminish value via lack of effort or perquisite spending. However, costs may be involved in a prominent level of leverage, and this may increase the agency costs regarding debt (Jensen 1986). Thus, the company's capital structure has a crucial role in creating a balance between the agency costs regarding equity, debt, and other benefits of debt.

A firm's capital structure, on the other hand, can be seen through a statement of financial position (balance sheet), and it is a mixture of debt (short and long-term) and the owners' equity (preferred and common stock) (Ali and Ahmed 2021; Ngatno et al. 2021; Sdiq and Abdullah 2022). The balance sheet also contains total assets, which are acquired through equity or debt (Abdullah 2021). When examining a firm's capital structure, one important aspect to consider is the ratio of debt to equity. This means that when decisions are made by the managers on financial strategy, agency costs appear (Dawar 2014). The findings from prior literature provide different arguments and suggest that more studies are still needed to explain the relationship between capital structure and firm performance in less-developed countries (Ayalew and McMillan 2021; Sdiq and Abdullah 2022).

Further, one of the crucial financial metrics for investors is financial leverage, which is generated from the amount of debt, because it may reveal a company's capital structure (Bae et al. 2017). Diantimala et al. (2021), Ngatno et al. (2021), and Myers (1984) argue that projected capital structure as a combination of debt capital, preferred stock capital, and equity capital uses by the company as a long- and short-term funding strategy. This means that debt and equity have been combined to represent the structure of capital historically. The first proposal was MM theory by (Modigliani and Miller 1958), which argued that capital structure has no bearing on a firm's value. This theory, however, is predicated on restrictive expectations of a perfect capital market, which does not exist in reality (Le and Phan 2017). If these assumptions are disproved, the debt-to-equity ratio decision becomes essential for determining value. For example, based on the assumption of no taxes, Modigliani and Miller (1963) argued that companies ought to employ the maximum possible debt in the structure of their capital due to interest payments that are tax-deductible. Therefore, the firm's performance can be improved by using maximum debt, and shareholders have access to a greater amount of earnings. The findings from prior investigations are different and resulted from testing both developed and developing countries. El-Sayed Ebaid (2009) and Sheikh and Wang (2012) found a negative relationship between capital structure and firm performance, while Ayalew and McMillan (2021), Al-Kayed et al. (2014), and Jouida (2018) illustrated that capital structure is positively linked with financial performance.

The aims of this paper are two. First, it aims to explore the association between capital and financial performance of manufacturing companies from an emerging economy. Secondly, it investigates the effect of agency cost on firm performance and answers the question of whether agency cost as a moderator has any influence on the connection between the structure of capital and corporate financial performance in Iranian manufacturing firms. The industrial sectors in Iran are large and contribute to the country's economic development. Hence, evaluating some issues from a developing economy may provide important insight and enrich the present literature. Eldomiaty (2008) claimed that the capital market in developing economies is insufficient and imperfect and experiences greater information asymmetry than capital markets in developed economies.

From the prior investigations, the association between capital structure and firm financial performance has received some proof, and the crucial role of capital structure in enhancing the firm value is evidenced. However, there is still an absence of empirical study on the financing practices of Iranian companies with regards to the aforementioned internal aspects. What makes Iran distinct from other countries is the state's involvement in the ownership structure of companies and additional external factors, including trade and financial restrictions on Iran. Hence, this country is a good research sample. Nevertheless, studies that investigate the moderating impact of specific variables that are sensitive to the relationship between capital structure and firm performance are still quite rare. Therefore, by filling the above gaps, this study reinforces the current literature and provides empirical evidence about the above associations.

The next section is dedicated to reviewing a number of related studies and hypotheses development. In the third section, materials and methods are discussed, while the results and discussion are presented in the fourth section. Lastly, conclusions and recommendations are described in the fifth section.

2. Literature Review

2.1. Theoretical Approach

The first theory that attempted to clarify the issue of capital structure was the irrelevance hypothesis by Modigliani and Miller (1958). MM theory claims that a corporate capital structure has no effect on firm value and that the value of the firm will be decided by their assets rather than the proportion of equity or debt granted. In other words, the value of the firm is unaffected by any combination of debt and equity. However, the proposal of MM depends on a number of assumptions regarding a perfect efficient market, which include no bankruptcy risk; no taxes; no information asymmetry; no transaction costs; and maximization being a goal embraced by all managers.

Further, to consider a capital market imperfectly, other theories have been proposed as a replacement to MM theory, namely, agency theory; tradeoff theory; and pecking-order theory. Agency theory, developed by (Berle and Means 1932; Jensen 1986; Jensen and Meckling 1976), asserts that there are conflicts of interest among management, stockholders, and bondholders. The proper capital structure for maximizing corporate value is one that substantially reduces agency costs. Jensen and Meckling (1976) also argue that agency costs have two main types: "agency cost of equity", which is driven by the conflict between agents and principals, and "agency cost of debt", which is brought about by the conflict between bondholders and equity holders. The conflict between agents (managers) and principals (shareholders) suggests that agents prioritize achieving their own goals over maximizing the value of the company and returns for stockholders. For instance, when there is extra free cash flow, managers might engage in unprofitable projects to promote their own interests (Le and Phan 2017). However, Jensen (1986) claimed that when there is a significant amount of debt, managers are under stress to participate in productive projects to generate free cash flow. Therefore, it is obvious that to minimize the agency costs, debt may have an influence on firm performance.

Elaborated by (Kraus and Litzenberger 1973; Modigliani and Miller 1963), tradeoff theory argues that firm leverage is measured by comparing the benefits of tax reduction in debt against the bankruptcy costs. The company will trade off the expenses and advantages of debt related to tax savings and establish the ideal capital structure for maximizing firm value in confronting economic crisis. Debt gains are mostly achieved due to tax shelters (Modigliani and Miller 1963). This is because the firm can minimize tax obligation by reducing income through interest payment (Adair et al. 2015; Le and Phan 2017; Sdiq and Abdullah 2022). Previous studies showed mixed results regarding the connection between capital structure and corporate performance (Abdullah and Tursoy 2021; Ayalew and McMillan 2021; Mansyur et al. 2020), and according to them, some circumstances, such as the size of the firm, industry dynamics, and market conditions, have an influence on building this relationship.

Elucidated by (Myers 1977; Myers and Majluf 1984), pecking-order theory claims that firms prioritize their funding in order to satisfy their capital needs. The internal finances are represented by operational earnings and should be used first. Then, debt is generated, and once there is no more debt that can be acquired, finally, equity can be offered instead. In fact, when the internal financing improves, firms rely less on financing from the external market. Hence, firms' financial performance is inversely affected by leverage (Myers and Majluf 1984).

2.2. Hypothesis Development

As we indicated before, most of these theories claimed debt may impact firm performance or value of the firm in an imperfect market. Nonetheless, the correlation between capital structure and corporate performance has still been controversial, and the empirical data support different interpretations of this relationship.

2.2.1. The Relationship between Capital Structure and Financial Performance

A study by Miller (1977) examined the relationship between capital structure and corporate performance by employing different theories, such as agency theory, tradeoff theory, pecking-order theory, and MM theory. The study indicated that capital structure and firm value had a favorable relationship and revealed evidence to support agency theory. Berger and Bonaccorsi di Patti (2006) utilized data from the US banking sector and clearly highlighted that a greater debt ratio is associated with better corporate performance, as measured by profitability. Particularly, a raise of 1% in the debt-to-equity ratio leads to an improvement of 6% in firm profitability. Within a different context, other investigations also found financial performance is positively affected by capital structure (Abdullah 2020; Abdullah and Tursoy 2021; Jouida 2018; Ngatno et al. 2021). However, by concentrating on developing countries, some investigations, specifically those performed in transitioning or emerging economies have proven that the capital structure and firm value or firm performance are negatively correlated (Abor 2007; Sheikh and Wang 2013; Al-Imam and Hassan 2019; Alexander 2016; Dawar 2014; Ibhagui and Olokoyo 2018; Li et al. 2019; Sadeghian et al. 2012; Siddik et al. 2017; Zeitun and Tian 2007).

Some other studies found a nonlinear connection between capital structure and corporate performance, which means capital structure has an impact on firm financial performance in ways both positive and negative (Hasan et al. 2014; Ngatno et al. 2021; Sdiq and Abdullah 2022; Tretiakova et al. 2021). Regarding non-existing relationship, few studies reported that capital structure has no or weak influence on corporate performance (Al-Taani 2013; El-Sayed Ebaid 2009). In the outline of capital structure theory, the most critical factor is obtaining capital, one measure of which is debt. The higher the ratio of debt to assets, the greater the expectation of maximizing productive debt in developing a business that can generate company profit as an essential factor in company performance (Al-Gamrh et al. 2020). In MM theory, the right debt can improve company performance, and any debt that is not utilized optimally will only add to the debt interest burden (Al-Gamrh et al. 2020). Thus, the first hypothesis is developed as follows:

Hypothesis 1. *Capital structure significantly affects financial performance.*

2.2.2. The Relationship between Agency Cost and Firm Performance

The agency cost theory was first elucidated by (Berle and Means 1932) and later by (Jensen 1986; Jensen and Meckling 1976). It claims that when management and ownership of a corporation are separated, the manager (agent) who leads the firm will be inspired and given the chance to carry out operations that promote their own benefits rather than increasing the wealth of the owners. Agency costs arise as a result of insufficient legal agreement between the agents, who are the managers, and the principals, who are the owners. They include the expenses spent by the owners to supervise and control manager activities, bonding costs to establish a system to guarantee that the owners will receive

enough return, and finally, residual loss, which comprises the relevant costs involved because of the conflict of interest between managers and owners (Jensen and Meckling 1976).

Conflicts of interest can be seen as a main ingredient of agency theory (Shrestha 2020), and the theory engages with finding solutions for issues that appear due to conflict of interest between agents and principals (Nidumolu 2018). Ang et al. (2000) computed the agency costs by operating expenses ratio and asset utilization ratio, and the first ratio displays how corporate managers control operating expenses. They found that when the ratio of operating expenses is high, the agency costs will be high, too. The asset utilization ratio estimates how the firm assets are used effectively by the managers. When the asset utilization ratio is high, this means that the assets are utilized efficiently, and this is oppositely linked with the agency costs. Numerous scholars have investigated how agency expenses affect corporate performance, but the results are mixed. Chi (2005) studied the relationship between firm value and shareholder rights, and the results indicated that giving shareholders more rights might be a useful technique to minimize agency costs and improve firm performance. Mehmood (2021) has also found a positive association between agency costs and organizational performance. However, some other studies found firm performance has been impacted by agency costs negatively (Jabbary et al. 2013; Wang 2010; Xiao and Zhao 2014), and Kontuš (2021) found a weak correlation between firm performance and agency costs in some European countries. Many companies try to maximize asset utilization in order to obtain benefits from utilizing more resources. As a result, maximum sales can be achieved, and this leads to an increase in corporate profit, which is considered one of the main factors in measuring a firm's performance (ROA, TQ, and EPS) (Pham and Tran 2020; Seth et al. 2020). Therefore, the second hypothesis is developed as follows:

Hypothesis 2. *Increasing agency cost can significantly affect firm performance.*

2.2.3. The Relationship between Agency Cost, Capital Structure, and Firm Performance

In assessing the relationship between capital structure and firm performance through the moderating effect of agency cost, Sdiq and Abdullah (2022) found that agency cost as a moderator has an influence on the association between capital structure and firm performance in ways both positive and negative. Other studies argued that when the leverage is low, firms can increase their capital through debt financing. Then, the agency conflicts and their costs can be reduced, and hence, firm performance will be improved (Abdullah et al. 2021; Abdullah and Tursoy 2021; Grossman and Hart 1982; Hoang et al. 2019; Jensen 1986; Li and Cui 2003; Jensen and Meckling 1976; Williams 1987). This means that managers have lower ability to focus on their personal interest, which reduces conflict of interest.

On the other hand, Dawar (2014) and Pandey and Sahu (2019) investigated the connection between agency costs, debt financing, and Indian firm performance. The results implied that debt has a significant and negative impact on corporate performance, while the size of debt has a favorable impact on reducing agency costs. Similarly, Booth et al. (2001) conducted a study of ten emerging economies, namely Pakistan, Turkey, Mexico, Malaysia, India, Korea, Brazil, Jordan, Thailand, and Zimbabwe. The results demonstrated that agency costs of debt are much higher in developing economies than in developed markets. Tran Thi Phuong and Nguyen (2019) have also tested the Vietnamese firms for the same purpose and found that firm performance is negatively correlated with capital structure. Hence, the third hypothesis is developed as follows:

Hypothesis 3. *Agency cost moderates the influence of capital structure on firm performance.*

3. Materials and Methods

3.1. Theoretical Approach

The data in this study are based on secondary data and were obtained from the annual reports of manufacturing firms listed on Tehran Stock Exchange (TSE) over the period 2011–2019. Considering balanced panel data, the final sample contained 1404 years' observation from 156 firms. Despite the fact that our initial sample was substantially bigger than what we have examined, because of matching inconsistent variable definitions and availability of all variables across all manufacturing firms, some firms were dropped, and we limited the data to 156 firms. In addition, we concentrate on this sample period because the COVID-19 outbreak caused some listed companies to close and be delisted. As a result, there were no financial data for the companies from the years 2020 and 2021. Therefore, to guarantee that a cross-sectional sample of companies was selected from all years, we utilized data covering 2011–2019. Companies involved in the sample are divided into thirteen different industrial categories, namely, food and beverage; automobiles and their parts; plastics and rubber; electrical machinery; petroleum products; metallic minerals; machinery and equipment; other non-metallic mineral products; ceramic tile; basic metals; medicinal products; chemicals; and cement lime gypsum. Table 1 displays the sample companies' classification in terms of their participation in various industrial groups.

Table 1. The sample distribution based on the industrial sector.

No.	Sector or Industry	Number of Firms	Percentage %
1	Food and beverage	13	8.33
2	Automobiles and their parts	24	15.38
3	Plastics and rubber	6	3.85
4	Electrical machinery	5	3.21
5	Petroleum products	7	4.49
6	Metallic minerals	8	5.13
7	Machinery and equipment	9	5.77
8	Other non-metallic mineral products	8	5.13
9	Ceramic tile	6	3.85
10	Basic metals	17	10.90
11	Medicinal products	23	14.74
12	Chemicals	13	8.33
13	Cement lime gypsum	17	10.90
	Total	156	100

3.2. Variables Selection

3.2.1. Independent and Moderator Variables

Capital structure theory and its relationship with corporate performance has been a critical theme in the literature of corporate finance. As the purpose of this study is to examine the relationship between capital structure and financial performance, we assigned capital structure as an independent variable. The capital structure can be defined as a mixture of debt and equity in the corporate form of financing (Kontuš 2021). In the literature, different financial leverage ratios are used to measure the capital structure, such as equity multiplier, debt-to-assets ratio, debt-to-equity ratio, debt-to-market-capitalization ratio, and short- and long-term debt ratio (Sheikh and Wang 2013; Alexander 2016; Dawar 2014; Li et al. 2019; Nguyen and Hoang 2022; Sdiq and Abdullah 2022; Siddik et al. 2017; Tran Thi Phuong and Nguyen 2019). In our study, capital structure is measured by both debt-to-assets and debt-to-market-capitalization ratios.

Further, agency theory argues that the conflict of interest between agents and principals brings an agency cost. Thus, agency cost is considered an independent variable and has a significant role in and moderating effect on the relationship between capital structure and financial performance. Agency cost is estimated through the literature by operating

expense ratio and asset utilization ratio (Hoang et al. 2019; Jabbary et al. 2013; Kontuš 2021; Mehmood 2021; Wang 2010). The first ratio indicates how corporate managers regulate and control operational expenses, including agency costs. The second ratio assesses how managers utilize corporate assets accurately (Ang et al. 2000). In our study, asset utilization ratio is applied to measure the agency cost. Table 2 summarizes the variables used in the empirical analysis.

Table 2. Description of variables.

Variables		Notation	Proxies	Definition
Dependent Variable	Financial Performance	ROA	Return on Assets	Net Income/Total Assets
		TQ	Tobin's Q	(Market Value of Equity + Book Value of Debt)/Book Value of Assets
		EPS	Earnings Per Share	Net Income/Number of Shares Outstanding
Explanatory Variable	Capital Structure	DTA	Debt to Assets	Total Debt/Total Assets
		DTMC	Debt to Market Capitalization	Total Debt/(Total Debt + Market Capitalization)
Independent and Moderating Variable	Agency Cost	AUR	Asset Utilization Ratio	Annual Sales/Total Assets
Control Variable		SG	Sales Growth	Proportion of sales growth compared with the previous year
		AGE	Firm Age	Natural logarithm of number of years in service since established

3.2.2. Dependent Variables

The dependent variable is financial performance, and the previous literature applied a variety of indicators for financial performance to examine how capital structure affects financial performance. These measurements include financial ratios (accounting-based ratios), such as return on equity (ROE), return on assets (ROA), Tobin's Q (TQ), and earnings per share (EPS) (Abdullah 2020; Abdullah and Tursoy 2023; Hoang et al. 2019; Ibhagui and Olokoyo 2018; Sadeghian et al. 2012; Siddik et al. 2017). Our study employs the ratios of return on assets, Tobin's Q, and earnings per share.

3.2.3. Control Variables

In order to identify the associations between agency cost, capital structure, and corporate performance, two control variables are utilized in this study. We incorporate a matrix of control variables into the study models to reduce the selection bias and also to control the corporate or sector characteristics. Following the directions of (Al-Gamrh et al. 2020; Almustafa et al. 2023; Dang and Nguyen 2021; Dawar 2014; Ibhagui and Olokoyo 2018; Li et al. 2019; Nguyen and Hoang 2022; Pandey and Sahu 2019), we employed both firm age and sales growth in our empirical models to control the firm's "scope of operation", which may affect firm management activities and firm performance. Sales growth has a positive and significant impact on firm performance (Abor 2007; Chi 2005; Mardones and Cuneo 2020) and it is predicted to have a similar result in our study. In the case of firm age, Ayalew and McMillan (2021), Chi (2005), and Ibhagui and Olokoyo (2018) argued that firm performance is positively linked to firm age, while other studies observed an adverse relation (Dawar 2014; Li et al. 2019).

3.3. Method and Empirical Model

This study utilizes a quantitative method for secondary data released by listed companies on Tehran Stock Exchange (TSE). Multivariate panel regression is used to analyze the relationship between capital structure and firm performance. The moderating impact is

also examined by using multivariate panel regression. Therefore, multiple panel regression data analysis is performed to determine the connection between capital structure, financial performance, and agency cost as a moderator. This approach allows the researchers to explore the correlation between one dependent and multiple explanatory variables (Ngatno et al. 2021), and it is used by several researchers (Ayalew and McMillan 2021; Dawar 2014; Liu et al. 2019; Mehmood 2021; Siddik et al. 2017). The general econometric model as an equation for this study is given below:

$$Y_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 M_{it} + \beta_3 (X_{it} \times M_{it}) + \beta_4 C_{it} + E_{it}$$

where Y_{it} represents the dependent variable, β_0 is the constant term, β_1 to β_5 are vectors of explanatory variables, X_{it} indicates the independent variable, M_{it} is an independent and moderating variable, $X_{it} \times M_{it}$ is a result of independent and moderating variables, C_{it} is a control variable, and E_{it} is a statistical random error. Based on the variable definitions provided in Table 1, in order to test the study hypothesis, the following three econometric models were designed to estimate the complete cross-section samples.

Model 1: Return on Assets (ROA).

a. Model 1 without moderation.

$$ROA_{it} = \beta_0 + \beta_1 DTA_{it} + \beta_2 DTMC_{it} + \beta_3 AUR_{it} + \beta_4 C_{it} + E_{it}$$

b. Model 1 with moderation.

$$ROA_{it} = \beta_0 + \beta_1 DTA_{it} + \beta_2 DTMC_{it} + \beta_3 AUR_{it} + \beta_4 (DTA_{it} \times AUR_{it}) + \beta_5 (DTMC_{it} \times AUR_{it}) + \beta_6 C_{it} + E_{it}$$

Model 2: Tobin's Q (TQ)

a. Model 2 without moderation.

$$TQ_{it} = \beta_0 + \beta_1 DTA_{it} + \beta_2 DTMC_{it} + \beta_3 AUR_{it} + \beta_4 C_{it} + E_{it}$$

b. Model 2 with moderation.

$$TQ_{it} = \beta_0 + \beta_1 DTA_{it} + \beta_2 DTMC_{it} + \beta_3 AUR_{it} + \beta_4 (DTA_{it} \times AUR_{it}) + \beta_5 (DTMC_{it} \times AUR_{it}) + \beta_6 C_{it} + E_{it}$$

Model 3: Earnings Per Share (EPS).

a. Model 3 without moderation.

$$EPS_{it} = \beta_0 + \beta_1 DTA_{it} + \beta_2 DTMC_{it} + \beta_3 AUR_{it} + \beta_4 C_{it} + E_{it}$$

b. Model 3 with moderation.

$$EPS_{it} = \beta_0 + \beta_1 DTA_{it} + \beta_2 DTMC_{it} + \beta_3 AUR_{it} + \beta_4 (DTA_{it} \times AUR_{it}) + \beta_5 (DTMC_{it} \times AUR_{it}) + \beta_6 C_{it} + E_{it}$$

In addition, the Gauss–Markov theorem holds when we adhere to the four assumptions of OLS: linearity, no multicollinearity, strict exogeneity, and spherical errors. If we make these four assumptions, then $\hat{\beta}$ is a good unbiased linear predictor (BLUE) (Wooldridge 2002; Koop 2008). Implementation of the Gauss-Markov theorem depends on model data panel-selection pooled least-square "common effect model", "fixed effect model", and "random effect model", all explained in Table 3.

Based on these assumptions, the authors also added an explanation of heteroscedasticity test in the Results and Discussion section to show the heteroscedasticity test with model 1, model 2, and model 3.

Table 3. Panel data assumption test.

	OLS (FEM and CEM)	GLS (REM)
Normality	No	Yes
Heteroscedasticity	Yes	No
Multicollinearity	Yes (independent variable more than 1)	Yes (independent variable more than 1)
Autocorrelation	No	No

4. Results and Discussion

4.1. Descriptive Results

Table 4 presents the summary statistics of the variables employed in the regression analysis throughout the sample period. Among the financial performance indicators, ROA has the lowest mean value, 0.12, with a standard deviation of 0.14. The minimum and maximum values of ROA are −0.54 and 0.65, respectively. TQ has a greater mean value, 2.06, with a higher deviation, 1.66. The minimum and highest values are 0.58 and 20.58, respectively. EPS has a middle range among the proxies of financial performance (M = 0.95, SD = 1.57, Min = −6.27, and Max = 16.89). The indicators of capital structure are DTA and DTMC and have arithmetic means of (M = 0.58, SD = 0.21, Min = 0.03, and Max = 2.07) and (M = 0.38, SD = 0.21, Min = 0.01, and Max = 0.92), respectively. AUR as an agency cost measurement has (M = 1.02, SD = 0.79, Min = 0.08 and Max = 6.83). The arithmetic mean for the estimates of control variables are SG (M = 0.27, SD = 0.49, Min = −0.82, and Max = 6.59) and AGE (M = 3.54, SD = 0.41, Min = 1.94, and Max = 4.26).

Table 4. Descriptive statistics.

	ROA	TQ	EPS	DTA	DTMC	AUR	SG	AGE
Mean	0.125	2.061	0.955	0.586	0.387	1.024	0.277	3.545
Std. Dev.	0.147	1.669	1.574	0.210	0.217	0.779	0.499	0.418
Minimum	−0.540	0.583	−6.278	0.036	0.01	0.058	−0.825	1.945
Maximum	0.652	20.581	16.897	2.077	0.921	6.839	6.594	4.262
Skewness	0.440	4.415	3.481	0.616	0.303	3.347	4.233	−0.734
Kurtosis	4.187	32.113	24.957	6.127	2.158	18.667	42.066	2.900
Observations	1404	1404	1404	1404	1404	1404	1404	1404

According to Brooks (2014), data can be considered normal if standard skewness is ±1.9 and standard kurtosis is ±3. In Table 4, the findings demonstrate that the sample data sets are not normally distributed due to not achieving the normal range. Due to considering a large sample size, non-normal distribution of data is not predicted to pose an issue (Ahmad et al. 2022). Variables including ROA, TQ, EPS, DTA, DTMC, AUR, and SG are positively skewed, while AGE is inversely skewed. In addition, a study by Liang et al. (2008) indicated that if the kurtosis < 3, it is a "platykurtic" distribution; if the kurtosis = 3, it is a "mesokurtic" distribution; and if the kurtosis > 3, it is a "leptokurtic" distribution. Hence, the kurtosis results in Table 4 display that all variables have "leptokurtic" distribution, except DTMC and AGE, which have "platykurtic" distribution. Based on the above explanation and by using the normality test "Jarque-Bera", we can reject the null hypothesis and accept the alternative.

4.2. Multicollinearity Test

Table 5 shows the correlation coefficients between all dependent, independent, and control variables. ROA, TQ, and EPS as financial performance indicators have significant and negative relations with DTA and DTMC, while AUR is positively associated with the performance indicators, and the result is statistically significant in the cases of ROA and TQ only. Regarding control variables, ROA, TQ, and EPS are related to SG positively; however, AGE is negatively linked with ROA and EPS but positively with TQ.

Table 5. Correlation Analysis.

	ROA	TQ	EPS	DTA	DTMC	AUR	SG	AGE
ROA	1							
TQ	0.273 ***	1						
EPS	0.734 ***	0.158 ***	1					
DTA	−0.648 ***	−0.181 ***	−0.318 ***	1				
DTMC	−0.631 ***	−0.586 ***	−0.377 ***	0.516 **	1			
AUR	0.064 **	0.076 ***	0.027	0.066 **	−0.021	1		
SG	0.270 ***	0.302 ***	0.169 ***	−0.107 ***	−0.231 ***	0.137 ***	1	
AGE	−0.136 ***	0.044 *	−0.144 ***	0.097 ***	0.048	−0.005	0.022	1

Notes: *** Significant at 1% level; ** Significant at 5% level; and * Significant at 10% level (two-tailed).

Moreover, this study uses cross-sectional panel data for 156 manufacturing firms during 2011–2019. Therefore, the issues of multicollinearity must be considered. To determine whether different variables are collinear, first, correlation coefficients have been examined between the independent variables, which are represented by a correlation analysis. According to Wooldridge (2015), Yoshikawa and Phan (2003), and Porter and Gujarati (2009), if the coefficient of correlation between independent variables is higher than 70%, multicollinearity issues may exist. Findings in Table 6 demonstrate that there is no significant connection between the independent variables (all lower than 70%); hence, multicollinearity is not an issue in this study.

Table 6. Variance Inflation Factors (VIF).

Variables	VIF	Tolerance
DTA	2.112	0.474
DTMC	2.176	0.460
AUR	1.032	0.969
SG	1.083	0.923
AGE	1.012	0.989
Mean	1.483	

Secondly, we also examined the existence of multicollinearity issues through two other common metrics, Variance Inflation Factor (VIF) and Tolerance. The acceptable rate for the value of VIF is <10, with a tolerance value of not less than 0.1 (Nachane 2006; Hair et al. 2010; Newbold et al. 2013). Table 6 illustrates that the highest value of VIF is 2.17 and the minimum tolerance value is 0.460. Therefore, it is clear that the data in this study are free from multicollinearity problems and the models do not contain any multicollinearity.

4.3. Heteroscedasticity Test

Table 7 shows the heteroscedasticity test with model 1, model 2, and model 3. The heteroscedasticity test is problematic because the probability value of chi-square is smaller than $\alpha = 0.05$.

Table 7. Heteroscedasticity Test.

Breusch–Pagan–Godfrey	Model 1 (ROA)	Model 2 (TQ)	Model 3 (EPS)
Prob. Chi-Square (2)	0.000	0.000	0.000

Based on the test in Table 7 and due to experiencing heteroscedasticity problems, the fixed-effect model uses a cross-section weight. The cross-section weight corresponds to the characteristics of this test data, which include more cross-section data than time-series data (Wooldridge 1997).

4.4. Panel Unit-Root Tests

Table 8 presents the panel unit test results for all variables. To improve the reliability of the results, the study conducted three different unit-root tests, namely Levin–Lin–Chu (LLC), Fisher Augmented Dickey–Fuller (ADF-Fisher), and Harris–Tzavalis (HT) (Dickey and Fuller 1979; Harris and Tzavalis 1999; Levin et al. 2002). From the results of Table 8, it is found that each variable in the study is stationary at level I(0). Hence, all variables reject the unit-roots hypothesis at 1%, 5%, and 10% significance levels. ROA and AUR were significant at 5% and 10%, respectively, in terms of ADF-Fisher test only, while the rest of the variables were significant at 1%, including ROA and AUR for LLC and HT tests.

Table 8. Results of unit-root tests.

Variables	Unit Root in	LLC	ADF-Fisher	HT
ROA	Level	−24.44 ***	358.43 **	29.17 ***
DTA	Level	−27.01 ***	366.36 ***	30.75 ***
DTMC	Level	−103.40 ***	590.71 ***	46.81 ***
AUR	Level	−29.91 ***	347.57 *	34.79 ***
SG	Level	−26.76 ***	636.24 ***	8.47 ***
AGE	Level	−55.33 ***	1642.05 ***	22.02 ***

Note: ***, **, and * indicate the levels of significance at 1%, 5%, and 10%, respectively.

4.5. Model Specification

This investigation employs regression models to assess the relationship between dependent and independent variables. Fixed-effects methodology (FEM) and random-effects methodology (REM) through using ordinary least square (OLS) were tested. Table 9 displays the results of Lagrange Multiplier, Chow, and Hausman tests, which are useful for determining the accurate model and running the regression appropriately. According to Albart et al. (2020) if the probability of Lagrange Multiplier, Chow, and Hausman tests are below the significant level (5%), FEM must be selected as a suitable model. Based on the robustness result of Table 9, FEM with cross-section weight is an appropriate method and can be used to estimate the models in this study, as we can safely reject the null hypothesis.

Table 9. Model estimation.

Test Summary	Synopsis	Model 1 ROA	Model 2 TQ	Model 3 EPS	Result
Lagrange Multiplier Test Breusch–Pagan	REM	1557.26 ***	4523.42 ***	1240.68 ***	H0 accepted
Chow Test Cross-section, Chi-square	FEM	1138.24 ***	192.45 **	1075.93 ***	H0 rejected
Hausman Test Cross-section random, Chi-square	FEM	49.88 ***	44.19 ***	24.03 ***	H0 accepted

Note: *** and ** denotate 1% and 5% significance levels, respectively.

4.6. Regression Results

4.6.1. Effect of Capital Structure on Firm Performance

Table 10 shows the regression outcomes through the fixed-effect model (FEM) to examine the moderating effect of agency cost on the relationship between capital structure and firm performance, which is measured by (ROA, TQ, and EPS). The findings illustrate that without a moderator, ROA and EPS are affected negatively by DTA with coefficients of (β = 0.310; sig. < 1%) and (β = 1.858; sig. < 1%), respectively, while DTA with no moderating effect has a positive and significant impact on TQ, as displayed in model 2a, with a coefficient of (β = 3.304; sig. < 1%). This means that a 1% increase in total DTA decreases ROA and EPS by 0.310 and 1.858 percent, respectively, and inversely increases TQ by 3.304 percent. In addition, as shown in Table 10, ROA, TQ, and EPS with no moderation

are impacted largely by DTMC in a negative way for all models, with coefficients of (β = 0.144; sig. < 1%), (β = 6.964; sig. < 1%), and (β = 0.839; sig. < 1%), respectively. This shows that a 1% raise in DTMC would cause ROA, TQ, and EPS to be decreased by 0.144, 6.964, and 0.839 percent respectively. Thus, the first hypothesis, that capital structure significantly affects financial performance, is accepted and practically supported, as the leverage determined by DTA and DTMC has a negative impact on firm performance.

Table 10. Panel fixed-effect regression results.

Variables	ROA				TQ				EPS			
	Model 1a (Without Moderation)		Model 1b (With Moderation)		Model 2a (Without Moderation)		Model 2b (With Moderation)		Model 3a (Without Moderation)		Model 3b (With Moderation)	
	Coef.	t-Stat.	Coef.	t-Stat.	Coef.	t-Stat.	Coef.	t-Stat.	Coef.	t-Stat.	Coef.	t-Stat.
C	0.834 ***	9.43	0.814 ***	9.22	−2.754 *	−1.90	−2.204 *	−1.54	3.345 ***	2.66	3.318 ***	2.62
DTA	−0.310 ***	−17.17	−0.249 ***	−9.66	3.304 ***	11.15	1.550 ***	3.70	−1.858 ***	−7.21	−1.748 ***	−4.73
DTMC	−0.144 ***	−8.42	−0.195 ***	−7.69	−6.964 ***	−24.85	−5.212 ***	−12.72	−0.839 ***	−3.44	−1.021 ***	−2.82
AUR	0.029 ***	5.09	0.053 ***	4.82	−0.115 **	1.18	−0.509 ***	−2.84	0.153 *	1.88	0.171	1.08
AUR*DTA			−0.064 ***	−3.26			1.845 ***	5.80			−0.113	−0.40
AUR*DTMC			0.051 ***	2.74			−1.758 ***	−5.82			0.181	0.67
SG	0.053 ***	12.18	0.052 ***	11.95	0.443 ***	6.22	0.478 ***	6.79	0.408 ***	6.60	0.404 ***	6.50
AGE	−0.145 ***	−6.02	−0.145 ***	−6.06	1.505 ***	3.81	1.502 ***	3.87	−0.351	−1.02	−0.347	−1.01
R-Square	0.783		0.785		0.546		0.561		0.615		0.615	
Adjusted R-Square	0.755		0.757		0.488		0.504		0.565		0.565	
F-statistic	28.09		28.03		9.378		9.82		12.41		12.25	
Prob.	0		0		0		0		0		0	

Note: ***, **, and * indicate the level of significancy at 1%, 5%, and 10% respectively.

These findings are not consistent with the hypotheses of agency theory that are generally accepted and recognized in some emerging countries. This is due to the fact that agency costs are high in developing countries compared with developed countries (Booth et al. 2001). However, the findings are consistent with pecking-order theory, which claims that firms should use internal finance first and then focus on debt financing in cases where the operating income is not sufficient. Even though debt can be a sign for the market or investors to examine the corporate capital structure, if the debt is not fully utilized, it may become a burden for the company to pay interest rates. This finding shows that in Iran, the firm capital structure of debt is not cheap. Thus, the higher the debt structure, the lower the return. However, the firm's value may increase. These results are supported by the previous literature, indicating that firm performance is negatively affected by the firm's leverage (Abor 2007; Sheikh and Wang 2013; Alexander 2016; Dawar 2014; Ibhagui and Olokoyo 2018; Li et al. 2019; Sadeghian et al. 2012; Siddik et al. 2017; Zeitun and Tian 2007).

4.6.2. Effect of Agency Cost on Firm Performance

Based on the panel regression results shown in Table 10 (models 1a, 2a and 3a), AUR as a measurement of agency cost has weak and positive impact on ROA and EPS, with coefficients of (β = 0.029; sig. < 1%) and (β = 0.153; sig. < 10%), respectively. This means

that if other variables remain constant, a 1% increase in AUR brings about increases in ROA and EPS by 0.029 and 0.153 percent, respectively. This is similar to the findings of (Kontuš 2021; Mehmood 2021). However, TQ is negatively impacted by AUR, with a coefficient of (β = 0.115; sig. < 5%), indicating that every 1% increase in AUR causes a decrease in TQ by 0.115 percent. This finding is supported by agency theory and consistent with the arguments of (Jabbary et al. 2013; Wang 2010; Xiao and Zhao 2014), showing that when the assets management ratio is high, the assets are used efficiently and, as a result, agency cost is reduced. The reduced agency cost can increase the company's profit as an important factor in measuring the corporate financial performance. However, asset utilization that is already maximized may make the market uninterested in investing, because it will be difficult to improve performance. Again, this is one of the findings where asset utilization has a positive effect on return on equity but has a negative effect on firm value. As a result, the second hypothesis, that increasing agency cost can significantly affect firm performance, is accepted.

4.6.3. Moderating Effect of Agency Cost

The results of fixed-effect model (FEM) estimation illustrate that AUR*DTA as a moderating effect has negative impacts on ROA and EPS of 0.064 and 0.113 percent, respectively, but the result is statistically insignificant in the case of EPS, while as shown in model 2b, TQ is positively impacted by the moderating effect of AUR*DTA, increasing by 1.845 percent. In addition, ROA and EPS are positively affected by AUR*DTMC, increasing by 0.051 and 0.181 percent, respectively, but the result in model 3b regarding EPS is statistically not significant. Results of model 2b also display that AUR*DTMC has a significant and negative impact on TQ of 1.758 percent. The robust results also display that the Adjusted R-Square increased after the moderating effect of agency cost, which means that the relationship between capital structure and firm performance is influenced by the moderator. Finally, SG as a control variable with or without moderator positively affected performance in all models. However, ROA and EPS are negatively affected by AGE, but the result was statistically not significant in the case of EPS. AGE also has a positive and significant effect on TQ. Similar results for control variables are found by (Abor 2007; Ayalew and McMillan 2021; Chi 2005; Dawar 2014; Li et al. 2019; Mardones and Cuneo 2020). Based on the above explanation, it is obvious that there is a significant relationship between capital structure and performance of firms, with the moderating effect of agency cost. Therefore, the third hypothesis, that agency cost moderates the influence of capital structure on firm performance, is accepted. These findings are supported by agency theory (Berle and Means 1932; Jensen 1986; Jensen and Meckling 1976), which argues that one way to reduce agency issues and their costs is using debt financing, because having more debt leads to managers being under pressure and restricted to participating in profitable projects in order to create more free cash flow. Additionally, they are forced to give greater attention to corporate performance and to fulfill their commitments without failing. Hence, the firm's performance can be improved. These results are also in line with the work of (Abdullah et al. 2021; Abdullah and Tursoy 2021; Grossman and Hart 1982; Hoang et al. 2019; Li and Cui 2003; Williams 1987).

5. Conclusions

The purpose of this study is to empirically examine the moderating effect of agency cost on the association between capital structure and firm performance among Iranian manufacturing firms listed on Tehran Stock Exchange (TSX) over the period 2011–2019. To achieve the study objective, three econometric models were employed to assess the above relationship. For the purpose of data analysis, fixed-effects methodology (FEM) is used. Firm performance is a dependent variable and measured by three proxies, namely return on assets (ROA), Tobin's Q (TQ), and earnings per share (EPS). The independent variable is capital structure and is indicated by debt-to-assets ratio (DTA) and debt-to-market-capitalization ratio (DTMC). Agency cost has a role as an independent variable and

moderator and is measured by asset utilization ratio (AUR). Two control variables were selected and proxied by sales growth (SG) and firm age (AGE).

Empirical findings display that DTA has a significant and negative effect on ROA and EPS but a positive effect on TQ. DTMC has a negative and significant impact on all performance indicators, as illustrated in Table 8. Moreover, ROA and EPS are impacted positively by AUR, and the results are statistically significant at 1% and 10%, respectively. TQ, however, is negatively affected by AUR. The results of the fixed-effects regression model also show that the moderating effect of AUR*DTA has a negative influence on ROA but a positive one on TQ. Regarding EPS, the result appears to be statistically insignificant. AUR*DTMC affects ROA positively but negatively affects TQ. These effects are statistically insignificant on EPS. With respect to the control variables, all performance measurements are positively influenced by SG. However, AGE as a second control variable negatively affects ROA, and positively affects TQ. The above findings confirm all of the study hypotheses and are supported by agency theory. Agency theory claims that firms can reduce agency cost through having more debt, because managers are under the control of shareholders, and they cannot follow their own interest, as they are required to monitor the firm performance more cautiously.

The main contributions of these outcomes demonstrate how agency cost in Iran may control and monitor decisions regarding capital structures and maximizing firm performance. The findings suggest that by increasing the influence of capital structures on maximizing firm performance, companies can reduce agency costs through increasing asset utilization. Once the asset utilization is raised, firms can maximize the possibility of using debt or funding that could be more optimal; in other words, the firm's capital structure strategy is the best strategy to improve the firm performance and reduce agency cost. Furthermore, investors can use this finding in investment decisions by considering how significant the impact of asset utilization is on corporate performance. Furthermore, this study can help to enrich the literature that examines capital structure and corporate performance through the moderating effect of agency cost in emerging markets. Further, these empirical findings may give useful information to managers and shareholders, namely that debt financing can reduce agency costs and finally increase firm value. In Iran, managers frequently make decisions based on their own interests, such as extending their empires, which might cause debt to minimize free cash flow, with respect to them.

This study is not free from limitations. First, it is highly recommended for future research to focus on other industry types, such as banking, telecommunication, and insurance. Secondly, using other indicators for capital structure, such as short-term debt ratio, log-term debt ratio, debt-to-equity ratio, and equity multiplier ratio, and for agency cost, such as operating expenses ratio and free cash flow ratio, must be taken into consideration. Thirdly, using a significant number of developing countries might be necessary to analyze whether the effect can be generalized in every country or has been characteristic of countries with different economic environment. Finally, with the development of behavioral finance, research on agency cost is needed to ensure that firms can maximize financial performance with an appropriate level of debt in the capital structure.

Author Contributions: Conceptualization, A.M.A. and D.P.N.; methodology, A.M.A., D.P.N. and I.H.; software, A.M.A. and D.P.N.; validation, A.M.A., D.P.N. and I.H.; formal analysis, A.M.A., D.P.N. and I.H.; investigation, A.M.A. and I.H.; resources, A.M.A.; data curation, A.M.A. and D.P.N.; writing—original draft preparation, A.M.A. and D.P.N.; writing—review and editing, A.M.A., D.P.N. and I.H.; visualization, A.M.A., D.P.N. and I.H.; supervision, I.H.; project administration, A.M.A., D.P.N. and I.H.; funding acquisition, A.M.A., D.P.N. and I.H. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Data Availability Statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

Acknowledgments: The authors want to thank the editor and confidential reviewers for their insightful criticism. Their comments and recommendations drastically improved the paper.

Conflicts of Interest: The authors declare no conflict of interest.

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