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The Impact of Audit Quality and Corporate Governance on Financial Segment Disclosure in Egypt

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Abstract: This paper examines the impact of audit quality and internal corporate governance mechanisms on segment disclosure. It uses manual content analysis to measure the levels of disclosure for a sample of Egyptian-listed companies from 2015 to 2023. It provides evidence that audit quality, joint audit, gender diversity, and board independence have a positive impact on the segment disclosure level. In contrast, audit opinion, foreign directors, and military background directors have a negative impact on the segment disclosure level in Egypt.

Keywords: audit quality; corporate governance; content analysis; narrative disclosure; segment disclosure

1. Introduction

The disclosure of segments has attracted the attention of standard-setting institutions worldwide (e.g., the Financial Accounting Standards Board (FASB)) for years. This has culminated in a convergence project between the International Accounting Standards Board (IASB) and FASB consensus on the managerial approach and the introduction of the International Financial Reporting Standard Number 8 (IFRS 8).

Segment disclosure remains one of the most important pieces of information that investors and financial analysts seek (Cereola & Dynowska, 2022; Saleh et al., 2023; Gisbert et al., 2024; Lenormand & Touchais, 2021; Al-Aamri et al., 2022; Botosan et al., 2021). Research highlights the importance of segment disclosure. For example, Song (2021) argues that financial information is more informative when disaggregated. Atanasov (2024) finds that multisegmented firms have more incentives for transparency if they have more diverse informational segments. Karuna (2023) finds that the level of managerial segment information expresses the level of the company's share of the market and that more competition strengthens this relationship. In addition, Cao et al. (2022) provide evidence of a labor market benefit of high-quality segment financial disclosure in the CEO recruiting process. In another context, Deng et al. (2021) show that less segmental disclosure is linked with higher tax avoidance.

This paper addresses the drivers of segmental reporting in Egypt before and after the adoption of IFRS 8. Prior research has explored the relationship between corporate governance and segment disclosure (e.g., Saidi, 2017; Gisbert et al., 2014; Tran et al., 2021). However, the research is limited in countries like Egypt, where effective regulation on segmental reporting is lacking.

Recent studies have examined segment disclosure practices in annual reports but focused on examining segment disclosure after the introduction of IFRS 8. For example,

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research explores how companies react to the new standard and the number of items disclosed, disaggregation of geographical information, and analyst forecasts (Cereola et al., 2017; Aboud, 2023; Aboud & Helfaya, 2021). The existing literature documents a large number of measures that were created to evaluate segment disclosure, most of which were applied in developed countries. For example, Aboud et al. (2019) presented several measures that contained 15 proxies, divided into four groups, which were used to measure the levels of segment disclosure of the largest companies in the European Union. They found that the levels of segment disclosure change according to the type of measurement used. Mardini et al. (2023) and Ammar and Mardini (2021) provide a measure based on IFRS 8 comprises 24 items, and they have investigated IFRS 8 implementation in Qatar. Guo (2023) introduces a recent disclosure index for Australian companies. He classifies information as non-discretionary and discretionary, hard and soft, and provides evidence that audit effort is associated with higher segment disclosure levels.

This paper examines the audit quality and corporate governance impact on segment disclosure of the listed Egyptian companies on the stock market during the period 2015–2023, before the adoption of IFRS8 in Egypt and after its adoption. It finds that (auditor type, joint audit, auditor opinion) and governance mechanisms (gender diversity, board independence, foreign directors, family directors, audit committee existence) are the main drivers of segment disclosure.

The study adds to the disclosure literature in three main ways. First, it measures segment disclosure in Egypt, where the adoption of IFRS 8 is undeveloped. We extend the literature on segment disclosure by creating a new measure of segment disclosure that can be used to examine both narrative and financial disclosure disaggregation. Our measure is different from Aboud et al. (2019), Mardini et al. (2023), Ammar and Mardini (2021), and Guo (2023). Our measure follows the implementation guidance of the IFRS 8 standard (2022). Second, we provide new empirical evidence on the main drivers of segment disclosure and the nature of companies' behavior toward segment disclosure standards. This could inform stakeholders and regulators about segment disclosure practices and their main drivers. A comprehensive set of governance variables will be used to explore the determinants of segment disclosure. Third, the study can be considered a practical response to the IFRS8 Post-Implementation Review (PIR) that is required by the IASB. So, it gives a chance to take a closer view of the managerial approach's weaknesses, strengths, and development methods.

The rest of this paper is organized as follows. Section 2 reviews the institutional background of segmental disclosure and the Egyptian context. It also reviews the relevant literature and develops research hypotheses. Section 3 presents the research method. Section 4 presents the empirical results and an additional analysis. Section 5 concludes the paper.

2. Literature Review and Hypotheses Development

2.1. Institutional Background of Segment Disclosure

Different bodies have tried to provide segment disclosure standards that are compatible with user needs. The path of standards development included two attempts that are considered the most important in developing segment standards; the first is the American, where the American Standards Board, FASB, released their segment standard (Statements of Financial Accounting Standards 14 (SFAS 14) in 1976, and this was the first to improve the industry approach by both Lines of business (LOB) and geographic (GEO) area. However, there were many criticisms of this standard, and one of these criticisms is not linked to the company's internal decision-making process. Accordingly, FASB released SFAS 131- after ASC 280-, and the standard gained greater acceptance in the USA than its predecessor, requiring companies to disclose segments by management reports (Management approach) and reviewed regularly by the chief operating decision maker (CODM) (Cereola & Dynowska, 2022; Durney et al., 2024; Lenormand & Touchais, 2021).

The second attempt was the International Accounting Standards Committee (IASC), starting with IAS14 in 1981, which used a risk and return approach, but which was suffering the same criticisms as the American standard SFAS14. Then, its amended version, IASR14, in 1998, required a two-tier structure for disclosing segments of LOB and GEO. In 2002, the standard bodies began the convergence project to elect one of the two approaches. The management approach that was adopted by SFAS131 or the return and risk approach that was adopted by IASR14 have many challenges in assessing the different impacts between IASR14 and SFAS131 on different users. Later, IASB replaced IASR14 with IFRS 8, which became effective in January 2009, and it adopted the ASC 280 requirement that disclosure be consistent with the management approach (Mardini, 2013; Gisbert, 2019; Moldovan, 2014).

Prior studies also addressed the development of segment standards, providing mixed results regarding the impact of IFRS 8. Research shows the advantages of reporting segment information. These include reducing information asymmetry between managers and stakeholders (Cereola & Dynowska, 2022; Saleh et al., 2023; Gisbert et al., 2024; Lenormand & Touchais, 2021; Al-Aamri et al., 2022). On the other hand, there are many criticisms, such as the managerial approach allowing the operational decision maker to identify, aggregate, and report segment information, which provides more room for personal judgment, the lack of obligation to disclose geographical segments, and the lack of clear guidelines on the relative importance related to geographical disclosure, which helps managers exploit vague guidelines on geographical disclosure. There is also the possibility of hiding tax avoidance practices, disclosure rates being persistently low after IFRS8, adapting the managerial approach in international accounting standards ending in a very complex box of practices and resulting in the failure of comparisons, the possibility of conflict with international accounting measures, and the loss of information utility (Schipper, 2022; Veron, 2007; Aboud, 2023). All these reasons prompted three members of the IASB to vote against the convergence project regarding IFRS 8. The dissatisfaction of the European Parliament with the exact copy of US-GAAP suggests that its application was more of a political process than an accounting improvement process, and that only American accounting standards were followed without considering the repercussions of applying the standards. This necessitated what is known as an IFRS8 post-implementation review (PIR) of the standard (Crawford et al., 2014; Crawford, 2019; Hossfeld et al., 2020).

2.2. Institutional Setting in Egypt

In Egypt, the accounting system has gone through several stages. Egypt progressed from being the first country in the Middle East to issue a constitution for the accounting and auditing profession in 1958 (Abdelfattah & Hussainey, 2019; Abdelfattah, 2018). In the sixties, the organization of the accounting and auditing profession and setting standards became a government function. Moreover, there was the issuance of the unified accounting system in 1966, then the open-door policy to attract investments in the mid-seventies, and the issuance of Companies Law 159 in 1981. In the nineties, Egypt moved to the privatization program, which required compliance with international accounting standards (IAS) and procedures, and it established the capital market authority (CMA) in 1992 to control the accounting practices of listing companies. To improve governance procedures, following the World Bank's first assessment of corporate governance practice in Egypt in 2002, more than 60% of governance principles were applied. Egypt issued a Corporate Governance Law in 2016, which obligated companies to either comply with corporate governance principles or explain the reasons for non-compliance, and it also indicated that the application of international standards is the best accounting application for companies. The Egyptian Accounting Standards kept pace with segment disclosure development as well, by issuing Egyptian Accounting Standard 33 in 2006, which is merely a translation of the International Accounting Standard IAS14R, in addition to issuing Egyptian Accounting Standard 41, entitled Operating Segments in 2015, which is a translation of IFRS8 (Abdelhak et al., 2023; Samaha & Dahawy, 2010; Ebaid, 2016; Abdelfattah & Hussainey, 2019; Abdelfattah, 2018; Ghattas et al., 2021; Makhaiel & Sherer, 2018; Ebaid, 2016).

Limited research, however, explores the impact of corporate governance on segment disclosure in Egypt. This may be due to the weakness of segmental reporting in this country in the first place, the lack of international multi-segment companies, or insufficient infrastructure to harmonize with IFRS (Ashfaq et al., 2024; Trabelsi, 2016). Companies in developing countries tend to be smaller in size compared with those in developed countries. It is worth noting the observation made by the Quoted Companies Alliance (QCA, 2006) regarding the fear of disclosing sensitive segment information due to the fragility of the competitive situation of small companies compared to large ones.

2.3. Theoretical Framework

Following the prior literature, we focus on the main theories widely examined in the segment reporting literature: agency theory and proprietary cost theory (Sang et al., 2022; Saleh et al., 2023).

Agency theory tries to explain the principal–agent relationship. Principals (owners of the company) delegate agents (managers) to perform tasks and make decisions on their behalf; however, this relationship has many conflicts, including that the agent may seek personal interests and not care about the interests of the principal in all cases. On the other hand, the principal cannot verify the validity of the agent due to the separation between them, and there is information that the agent has that the principal does not have, which is known as information asymmetry, which requires the presence of regulatory parties and good corporate governance that monitors this relationship effectively (Jensen & Meckling, 1976).

The proprietary-cost theory tries to explain the disclosure-related cost from another point of view. According to this theory, managers' interests are not only the driver of disclosure decisions, but some kinds of information also disclosed are proprietary information that may be unfavorable for the company to disclose (Verrecchia, 1983). Many types of research that examine segment disclosure explain the low quality of segment disclosure as a self-defense strategy for the company to decrease the costs of disclosure that could expose the company to risk from competitors, suppliers, and other factors (Guo, 2023).

Managers, according to both theories, might decrease the quality of segment disclosure as a result of agency cost or proprietary cost. We will use both theories to make complementary arguments when there is agreement between the theories, and competing arguments when there is disagreement between the theories, according to the literature.

2.4. Hypotheses Development

2.4.1. External Audit Characteristics

Audit firm size: From the perspective of proprietary-cost theory, stronger external monitoring can reduce the negative relationship between disclosure transparency and proprietary costs. So, we can understand that the company will have a higher level of disclosure if there is a Big4 firm (Yang, 2021; Beisland et al., 2015). In the same direction, agency theory supposes that external auditors play an important role in the monitoring process and reduce agency conflicts (Kobbi-Fakhfakh et al., 2018). Big 4 firms are more motivated to provide higher quality audits to protect their position and reputation and to avoid litigation risk. Therefore, the presence of a Big4 firm can signal that the company has a higher-quality audit process and high-quality disclosure (Albitar et al., 2021; El-Halaby & Hussainey, 2016). The literature on the Big 4 effect on disclosure shows mixed results. On the one hand, some studies show a positive effect of the Big4 (Masud et al., 2024; Hrazdil et al., 2024; Feng et al., 2023; Wuttichindanon & Issarawornrawanich, 2020; Shehadeh et al., 2024), while others show a negative relationship (Le et al., 2023; Rahaman & Karim, 2023). On the other hand, some studies found no relationship (Mawardani & Harymawan, 2021). Based on complementary theories, we set a directional hypothesis as follows:

H1. *The segment disclosure level is likely to be positively influenced by audit firm size.*

Audit opinion: According to the agency theory, the audit is generally a control mechanism that helps reduce information risk and gives different parties more assurance and that reduces the agency cost (Shuraki et al., 2021). The auditor's opinion is the final product of the audit process, so the auditor considers agency conflicts when proposing an audit opinion (Fan & Wong, 2005; Vichitsarawong & Pornupatham, 2015). So, like other audit quality proxies, audit opinion can be a motivation for managers to increase disclosure quality. The auditor's opinion reflects disclosure level as corporate management is biased towards greater disclosure than any party, so high-quality disclosure can be explained through the audit opinion as a powerful signal about the company to the market (Chen et al., 2020; Elmarzouky et al., 2022). On the other hand, Guo (2023, pp. 104–105) pointed out that the theory of proprietary costs can explain the auditor's opinion on segment disclosure when it tends to be negative, as managers can reduce the level of quality of segment disclosure without incurring the costs of non-compliance to avoid a negative audit opinion. The IFRS8 management approach may result in not being consistent with International Accounting Standards, so different standards have different levels of precision and complexity which impact auditors' effort and opinion, which suggests that auditors are more likely to support companies which have low levels of disclosure in their financial statements, especially when the companies do not violate accounting standards. According to Zhou and Xu (2021) and Cipriano et al. (2017), the auditor's opinion can negatively affect disclosure quality. The consequences of the fear of the auditor's opinion may cause companies to decrease disclosure levels, or the auditor's interests may prevent him from issuing a qualified opinion. The literature on audit opinion shows different results as well; some studies show a positive relationship (Imen & Anis, 2021; Yao et al., 2019; Street & Bryant, 2000; Hossain et al., 2020), while others show negative relationships (Shuraki et al., 2021), and a third group of studies show insignificant relationships (Özcan, 2021; Abid et al., 2018). Based on competing theories that we illustrated above, and the contrasted literature, we set a non-directional hypothesis as follows:

H2. *The segment disclosure level is likely to be influenced by an audit opinion.*

Joint-audit: According to AbuRaya (2023), theoretical aspects of the joint audit are still undeveloped as a result of the absence of convincing theories. However, agency theory may explain how joint audits enhance accountability, reduce agency costs, and improve disclosure credibility. Also, a joint audit protects auditors from potential conflicts of interest and reduces opportunistic behavior as two audit firms are stronger than one. Empirical studies show a positive relationship between joint audit and disclosure. For example, Mandour et al. (2018) show a negative relationship between co-audit and earnings management. In the same direction, Bozzolan and Miihkinen (2021) show that risk disclosure quality is positively related to the attributes of the audit partner, like experience. Based on agency theory, we set a directional hypothesis as follows:

H3. *The segment disclosure level is likely to be positively influenced by a joint audit.*

2.4.2. Board of Directors Characteristics

Gender diversity: Agency theory suggests that greater representation of females on boards reduces agency costs, enhances board effectiveness, and reduces conflicts. Females are important resources for companies as they bring diverse experiences, help meet stakeholders' information needs, and are more sensitive to ethical issues, striving to avoid harm to society (Assenga et al., 2018; Sarhan & Ntim, 2019; Carvajal et al., 2022). Radu and Smaili (2021) showed that the presence of women on the board of directors has a positive effect on disclosure only once they reach a critical number on the board of directors. Empirical results in segment disclosure show a positive relationship between segment disclosure and gender diversity (e.g., Akpan & Nkanga, 2023; Njokuji & Chukwu, 2023). Also, several studies on different types of disclosure show the same results (e.g., Elmarzouky et al., 2021a, 2021b; Peng et al., 2021; Hasan et al., 2022; Al-Shaer et al., 2021; Ben Fatma & Chouaibi, 2021; Radu & Smaili, 2021; Seebeck & Vetter, 2021). On the other hand, some studies find a negative relationship (e.g., Ashfaq & Rui, 2019). Based on agency theory, we set a directional hypothesis as follows:

H4. *The segment disclosure level is likely to be positively influenced by gender diversity.*

Board independence: Agency theory can also explain the positive impact of board independence on disclosure. Independent directors can reduce agency costs as they are considered independent parties who can reduce conflicts between different parties due to their qualifications and skills, and they can add more expertise to improve many kinds of disclosure. It can be concluded from the agency theory perspective that the higher the percentage of independent directors, the higher the motivation to disclose information (Baalouch et al., 2019; Salem et al., 2019). Empirically, research offers are mixed. Some studies find that the number of independents on the board of directors affects disclosure positively (e.g., Grassa et al., 2021; Elmarzouky et al., 2021a, 2021b), while other studies find negative associations between the two variables (Elgammal et al., 2018). Some studies do not find any relationship between the two variables (e.g., Ananzeh et al., 2022; Elgattani & Hussainey, 2020). Based on agency theory, we set a directional hypothesis as follows:

H5. *The segment disclosure level is likely to be positively influenced by board independence.*

Foreigners in the board of directors: Agency theory argues that foreign board members are strong corporate governance mechanisms that ensure alignment between stockholders' objectives and managers' interests. Board diversity with foreign directors gives companies more credibility in disclosure. They know foreign countries and have connections with international companies. They are considered effective tools to prevent conflicts of interest and add more expertise and skills to the board of directors. It can be concluded from the agency theory perspective that the higher the percentage of foreign directors, the higher the motivation to disclose information (Mardini & Elleuch Lahyani, 2022). Empirically, the results are mixed. Some studies find a positive relationship (e.g., Jahid et al., 2020; Grassa et al., 2021; Garanina & Aray, 2021). Others find a negative relationship (e.g., Agyemang et al., 2020). The third group, like Alodat et al. (2023), finds an insignificant relationship between foreign ownership and disclosure or mixed results based on the nationality of directors. For example, Toumi et al. (2022) find that some nationalities affect some kinds of disclosure positively and others negatively. Based on agency theory, we set a directional hypothesis as follows:

H6. *The segment disclosure level is likely to be positively influenced by foreign directors.*

Family members on the board of directors. According to agency theory, family directors face fewer agency problems (Type 1) between management and ownership. However, they can face severe agency problems (Type 2) between non-controlling and controlling shareholders (Ali et al., 2007; Alfraih & Almutawa, 2017; Darmadi & Sodikin, 2013). In general, family directors may be executive and non-executive directors, they may have the power to determine key management, and they can influence the level of disclosure. Applying the agency theory, when firm ownership is not concentrated, this will lead to many conflicts that can be reduced by releasing more information (Fama & Jensen, 1983). Concentrated ownership firms are expected to have fewer conflicts and less need for information, so they disclose less information (Jensen & Meckling, 1976). Ahmed and Uddin (2024) suggested that companies dominated by family directors are not motivated to satisfy minority needs for information; they tend to keep information to serve their own interests, not all stakeholders'. It can be concluded from the agency theory perspective that the higher the percentage of family directors, the lower the motivation to disclose information. Empirical findings are mixed. Some studies find a positive relationship between family directors and disclosure (e.g., Issa et al., 2022; Aribi et al., 2018). According to Lv et al. (2020); Abdelhak et al. (2023); De Silva Lokuwaduge et al. (2020); Bataineh et al. (2022); Mazumder (2024); and Boshnak (2023), family directors tend to preserve the family image and tend to obtain social acceptance through disclosing information. On the other hand, many studies find a negative relationship between family members and disclosure or family ownership and disclosure (e.g., Arayssi & Jizi, 2024; Rahaman & Karim, 2023; Biswas et al., 2019; Biswas et al., 2020; Qa'dan & Suwaidan, 2019; Md Zaini et al., 2020). Other studies find insignificant relationships (Al Amosh & Khatib, 2021). Based on agency theory, we set a directional hypothesis as follows:

H7. *The segment disclosure level is likely to be negatively influenced by family directors.*

Directors with a military background. Despite the lack of a developed theoretical framework for military background directors, agency theory may explain the effect of military directors on disclosure. According to Nawaz and Nawaz (2024) and Lin et al. (2011), military background affects firm values. Military directors have the power to prevent conflicts among different parties and decrease agency costs as the presence of directors with military backgrounds attenuates the negative effect of poor corporate governance and lower agency costs. In general, the personalities of the board of directors influence various aspects, e.g., internal control and incurred fees (Quan et al., 2023; Chen et al., 2021; Nawaz & Nawaz, 2024). Empirically, some studies find a positive relationship between disclosure and military background (e.g., Jha et al., 2024; Nawaz & Nawaz, 2024; Li et al., 2024; Nasih et al., 2019). Most justifications are that companies managed by military directors or managers have stronger, stricter, and more disciplined internal systems. They also have high-quality disclosure as military directors have a great sense of responsibility toward their societies. in other studies, a negative relationship is also detected between directors or managers who have a military background, readability, and ESG disclosure (e.g., Abdul Wahab et al., 2024; Chen et al., 2021). Based on agency theory, we set a directional hypothesis as follows:

H8. *The segment disclosure level is likely to be positively influenced by directors with a military background.*

Internal audit committee existence. Agency theory explains the positive impact of the internal audit committee and how it can play an effective role in increasing the quality of different kinds of disclosure, reduce agency costs by working as a mechanism of internal control and coordination among parties, and work as a delegate committee to serve stakeholders' interests by providing all parties with the needed information (Omair Alotaibi & Hussainey, 2016; Pucheta-Martínez et al., 2021). Empirically, most studies find a positive relationship between many characteristics of AC and disclosure, e.g., independence, frequency of meetings, and financial expertise of a committee member. (See, for example, Abad & Bravo, 2018; Agyei-Mensah, 2019; Raimo et al., 2021; Pucheta-Martínez et al., 2021) Also, some studies find a negative impact of certain characteristics of audit committees on disclosure, like legal expertise (Bepari, 2023; Abu & Jaffar, 2020). Some studies, like Hamdan (2020), find that audit committees' effectiveness is associated with earnings conservatism. Other studies, like Alshabibi et al. (2021), find an insignificant relationship between some of the AC characteristics and disclosures. Based on agency theory, we set a directional hypothesis as follows:

H9. *The segment disclosure level is likely to be positively influenced by the audit committee's existence.*

3. Research Methodology

3.1. Sample and Data Collection

Our analysis is based on 39 listed companies in the Egyptian stock exchange that have segment disclosure SD on their annual reports from 2015 to 2023. The total number of annual reports is 351. We collected annual reports from https://www.mubasher.Info/countries/eg (accessed on 1 June 2024), as well as companies' sites and Egyptian stock exchange sites. Governance data were collected from the BOD and the CG and annual reports. We identified segment-related information in annual reports after investigating IFRS8, as well as IASR14, by using manual content analysis to search for sentences and statements that are related to company segments to measure the extent of SD. We used the following regression model 1 to test our research hypotheses and model 2 for additional analysis.

$$\begin{gathered}\text{SEGMENT\_DISC} = \beta 0 + \beta 1\text{AUDITFIRM} + \beta 2\text{OPINION} + \beta 3\text{CO\_AUDIT} + \\ \beta 4\text{FEMALE} + \beta 5\text{UNEXCUT} + \beta 6\text{FOR} + \beta 7\text{FAMILY} + \beta 8\text{MILTARY} + \\ \beta 9\text{CEXIS} + \beta 10\text{AGE} + \beta 11\text{LIQ} + \beta 12\text{LEV} + \beta 13\text{ROA} + \beta 14\text{TAXAV} + \\ \beta 15\text{INDUSTRY DUMMIES} + \beta 16\text{ YEAR DUMMIES} + \text{ei}\end{gathered} \tag{1}$$

$$\begin{gathered}\text{SEGMENT\_DISC} = \beta 0 + \beta 1\text{AUDITFIRM} + \beta 2\text{OPINION} + \beta 3\text{CO\_AUDIT} + \\ \beta 4\text{FEMALE} + \beta 5\text{UNEXCUT} + \beta 6\text{FOR} + \beta 7\text{FAMILY} + \beta 8\text{MILTARY} + \beta 9\text{AGE} \\ + \beta 10\text{LIQ} + \beta 11\text{LEV} + \beta 12\text{ROA} + \beta 13\text{TAXAV} + \beta 14\text{INDUSTRY DUMMIES} + \\ \beta 15\text{ YEAR DUMMIES} + \text{ei}\end{gathered} \tag{2}$$

where SEGMENT_DISC is the segment disclosure level, AUDITFIRM is the Big 4 audit firm. Dummy variables equal 2 if the company was audited by two Big4 firms, 1 if audited by one Big4 firm and 0 otherwise. OPINION is the auditor's opinion and is a dummy variable 1 for clear acceptance and 0 otherwise. CO_AUDIT is a dummy variable 1 for the company that was audited by two audit firms and 0 otherwise. FEMALE is the percentage of females on the board. UNEXCUT is the percentage of independents on the board of directors. FOR is the percentage of foreigners on the board of directors. FAMILY is the percentage of family members on the board. MILTARY is the percentage of military background directors on the board. CEXIS is the existence of an audit committee with variable 1 if it exists and 0 otherwise. AGE is the age of the company, LIQ is the liquidity of the company, LEV is the leverage of the company, ROA is the return on assets, TAXAV is tax evasion, INDUSTRY

DUMMIES is the company type of industry (if financial, 1, and 0 otherwise), and YEAR DUMMIES is the year of the annual report.

3.2. Measures of Variables

3.2.1. Dependent Variable

Our measurement of segment disclosure is as follows. Many researchers depend on quantity and disaggregation measures as a proxy for disclosure quality. For example, by using a list of items related to segment disclosure, Aboud and Roberts (2018) introduced their segment disclosure index which consists of 53 items that comprise two subindices. Mardini et al. (2023) also introduced a disclosure index from 24 items. Many researchers have introduced different measures of segment disaggregation, cross variability, and consistency (i.e., Aboud et al., 2019; Crawford et al., 2012; Nichols et al., 2000).

We used the guidelines of segment standards in the implementation guidance of the standard of IFRS 8 (IFRS, 2022) to create the measure, which contains two kinds of information: descriptive and financial. The descriptive information is divided into three different types of paragraphs: the first about products and services for every segment, the second about the measurement of operating segment profit and loss and assets and liabilities, and, finally, factors that management uses to determine the company's reportable segments. Also, the guidelines divide financial information into four statements: first, information about reportable segment profit or loss, assets and liabilities; second, reconciliation of reportable segment revenues, profit or loss, assets, and liabilities; third, geographical information; and, finally, information about major customers.

Knowing that guidelines provided with the standard are guidelines for the practical application, we used them to divide the information into narrative and financial, then divided the disclosure level according to six degrees. A company that has six degrees has four statements or more, both narrative and financial segmental statements, and comparisons among years. A company with five degrees has three statements, both narrative and financial segmental statements and comparisons among years. A company with four degrees has two statements and narrative disclosure. A company with three degrees has one statement and narrative disclosure. A company with two degrees has financial disclosure and no more than one statement, and a company with one degree has narrative segmental disclosure only.

We first thought of using a disclosure index of items, but we found it would be inaccurate, as the presentation structure would be ignored, and the way of examination is impractical in Egypt, as we do not use automatic but manual content analysis. We depend on the number of segmental statements the company discloses and the level of segmental narrative disclosure. Our focus on the dependent variable, other than the disclosure index, is based on many reasons listed below:

- Segment information is characterized by the presence of separate financial statements that express many financial items, as well as the presence of descriptive and narrative information, which is a feature that other types of disclosure do not have. We find that through this, the level of segment disclosure can be understood more practically and easily, especially as each statement contains several items in the disclosure index, so existence of the financial statement that represents information about reportable segment profit or loss, assets, and liabilities will have different items like the profit of the segment, assets, liabilities, depreciation, and other items that are contained in the disclosure index. Also, to measure segment disclosure more accurately by using the disclosure index from the authors' view, it is necessary to increase the index items significantly. This can be a solution in developed countries where the examination is conducted automatically, but it will be impractical in developing countries, such as Egypt, where financial statements depend on manual examination.

- Companies can disclose all items in the disclosure index in one statement or narratively only. Also, items can be disclosed in more than one financial statement, and thus the disclosure levels' measure or text mining technique that focuses on words or sentences can be inaccurate in this case. We will ignore the nature of the presentation of information that cannot be entered into the index, like comparisons among years that represent important figures. Knowing the balance between narrative and financial information has an impact on its usefulness if it is only narrative or limited financially in the view of the authors, and, therefore, its quality level was determined from this perspective.
- Many researchers have presented multiple measures for segment disclosure that can be used more efficiently in developed contexts, which depend not only on the disclosure index but also on the number of segments, consistency, etc., so there has been no single agreed-upon measure for segment disclosure until now. Adding a new measure in developing countries would be useful.

We did not try to propose the measure at first by using the underlying items or differentiating the degree of application. At first, we examined the financial statements of a part of our sample to explore the nature of segment disclosure in Egypt and the best ways to measure it. We found that many companies are small, not like in the USA or the European Union, many companies are applying standards in many different ways, and many of them still apply the old standard IASR14. Many companies disclose narratives only about their segments or unclear financial statements. Most companies do not have geographical segments, so we focus on how Egyptian companies practically disclose their segment information in terms of quality. The number of geographical segments and business segments was also generated in our study and included in our sheet for future research. We think that our measure is more appropriate for Egypt—a developing country—in which there is still a duality of standard applications based on both IFRS-8 and IASR14, so the segment disclosure environment is still less improved, and the nature of disclosed companies cannot be compared to companies in the United States or even the European Union. Therefore, it is a realistic and practical measure in the Egyptian environment and in developing countries. We did not try to test the IFRS-8 standard in Egypt as new and old segmental standards overlap in the application, and many companies still have narrative and unclear segmental disclosures. Therefore, we argue that testing the standard will not be scientifically useful due to the lack of full application.

3.2.2. Independent Variables

Following prior research, we measured audit quality by using three measures. The first measure is AUDITFIRM. Many researchers use a dummy variable 1 or 0 (Jain & Agarwalla, 2023; Viana et al., 2022; Masud et al., 2024). We developed the measure and used the number of Big 4 firms that participate in auditing. It was noted that a few Egyptian companies that disclose segment disclosure are audited by more than one Big 4 firm. The authors suggest the importance of examining the impact of auditing by more than one Big4 firm on the company, as a company audited by one Big4 firm may not have the same disclosure impact as another company audited by more than one Big4 firm. On this basis, a new measure was created considering the existence of more than one Big4 firm. In the case of more than one Big4 firm, it is 2. In the case of the presence of one Big4 firm, it is 1; otherwise, it is 0. The second measure is OPINION. By following Abdelhak et al. (2023); Arens et al. (2017), and Shuraki et al. (2021), we made a dummy variable equal to 1 for standard clean opinion and 0 otherwise. The third measure was CO-AUDIT, and following

Ajili and Khlif (2020) and Salem et al. (2021), we used a dummy variable equal to 1 if two firms made the audit, and 0 otherwise. On the other hand, we made six measures of corporate governance. The first was gender diversity, FEMALE. Following Areneke et al. (2023); Nuhu and Alam (2024); and Mazumder and Hossain (2023), we used the percentage of the number of women on the board of directors. The second measure was board independence UNEXCUT, following Campanella et al. (2021) and Rouf and Hossan (2021), and we used the percentage of the number of independent members on the board of directors. The third measure was foreigners' existence on the board of directors (FOR), following Garanina and Aray (2021) and Mardini and Elleuch Lahyani (2022). We used the percentage of the number of foreigners on the board of directors. The fourth measure was FAMILY, following Wan-Hussin (2009) and Boujelben and Boujelben (2020). We used the percentage of the number of family members on the board of directors. The fifth measure was MILITARY, and, following Nawaz and Nawaz (2024), we used the percentage number of members with a military background. The sixth measure was audit committee existence (CEXIS). Following Abdelhak et al. (2023) and Pucheta-Martínez et al. (2021), we used a dummy variable equal to 1 when the audit committee existed and 0 otherwise.

3.2.3. Control Variables

We followed the prior disclosure research literature (Boshnak, 2021; Abhayawansa & Guthrie, 2016; Wang et al., 2022; Jana & McMeeking, 2021; Hamrouni et al., 2019). We used five measures of firm-specific characteristics like {firm age, firm liquidity, firm leverage, return on assets, and tax evasion}. We used the year 2024 minus the year of establishment. The second measure is LIQ and it represents firm liquidity. We used the current assets to current liabilities ratio. The third measure is LEV, which represents firm leverage, which is measured as long-term liabilities divided by capital equity. The fourth measure is ROA, which reorients return on assets, and it is measured as net income by average total assets. The fifth measure is TAXAV, and it represents the Tax Evasion Index. By following Baker et al. (2024); Abid and Dammak (2022); and Xu et al. (2022), we measured tax evasion as paid taxes by income before tax.

4. Empirical Results and Discussion

4.1. Descriptive Statistics

Table 1 presents the descriptive statistics. It shows that the mean of segment disclosure at level SEGMENTDISC is relatively moderate in level 3, which reflects the undeveloped level of segment disclosure in Egypt, with a minimum of 0, which reflects that some companies did not regularly disclose information about their segments, and a maximum of level 6. The mean of having a Big4 AUDITFIRM involved in the auditing process was 0.68, which means that many companies that disclose segment information (more than half) use Big4 firms to provide auditing, with a minimum of 0 and a maximum of 2. The mean of OPINION was 0.88, which reflects the high level of auditing's clear acceptance in companies that disclose segmental information in Egypt. The mean of JOINT auditing is 0.408, which reflects the low level of being audited by joint auditing firms.

The descriptive analysis also shows that despite the important role of females in many economic aspects (Shahrour et al., 2024), there is a very low presence of women on the board of directors. The mean gender diversity percentage of the board FEMALE is 0.126 and it is very low with a minimum of 0 that reflects the need to improve the role of women on the board of directors in Egypt. There is a maximum of 0.5 percentage of females on the board of directors. The mean 0.759 of the UNEXCU percentage shows that many Egyptian companies that disclose segmental information have a percentage of 0.759 independent members or more, with a minimum of 0 and a maximum of 100 per cent.

The mean of foreigners (FOR), family members (FAMILY), and army members (MILTARY) in percentages on the board of directors are 0.097, 0.093, and 0.021, respectively, which reflects the low representation of these categories on the board of directors in our sample. With a maximum of 0.778, 0.833, and 0.75, respectively, the existence of the internal auditing committee was high with a mean of 0.97.

Table 1. Descriptive statistics.

Panel A: Dummy variables					
Variable	Obs	Mean	Std.Dev.	Min	Max
OFFICE	351	0.684	0.560	0	2
OPINION	351	0.880	0.325	0	1
JOINT	351	0.407	0.492	0	1
CEXIS	351	0.972	0.167	0	1
Panel B: Continuous variables					
Variable	Obs	Mean	Std.Dev.	Min	Max
SEGMENTDISC	351	3.248	2.104	0	6
FEMALE	351	0.126	0.105	0	0.5
UNEXC	351	0.759	0.146	0.167	1
FOR2	351	0.097	0.187	0	0.778
FAMILY	351	0.093	0.180	0	0.833
MILTARY	351	0.021	0.105	0	0.75
AGE	351	41.254	12.284	18	69
LIQ	351	1.659	2.342	0.133	20.885
LEV	351	1.279	8.511	−3.637	153.338
ROA	351	5.829	11.373	−38.482	54.962
TAXAV	351	−0.053	2.880	−1.892	53.375

4.2. Correlation Analysis

Table 2 shows the correlation matrix. It shows that Segment Disclosure SD is correlated with some characteristics that reflect audit quality, such as the audit firm size; being audited from more than one firm or joint auditing, being correlated with CG mechanisms, such as board gender diversity; independent directors; foreigner directors; family members directors; and directors with an army experience. It is also correlated with firm-specific characteristics like the age of the company, liquidity, and tax evasion. There is no high correlation between our independent/control variables, suggesting that there is not a multicollinearity problem. We confirmed this finding using VIF or the variance inflation factor.

Table 2. Correlation matrix.

Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**	**(13)**	**(14)**	**(15)**	**(16)**	**(17)**
(1) SEGMENTDIS	1.000																
(2) FINANCIAL	0.501	1.000															
	(0.000)																
(3) YEAR	0.108	0.000	1.000														
	(0.044)	(1.000)															
(4) AUDITFIRM	0.251	0.248	−0.201	1.000													
	(0.000)	(0.000)	(0.000)														
(5) OPINION	0.027	0.261	−0.007	0.247	1.000												
	(0.617)	(0.000)	(0.899)	(0.000)													
(6) JOINT	0.520	0.619	−0.031	0.272	0.181	1.000											
	(0.000)	(0.000)	(0.557)	(0.000)	(0.001)												
(7) FEMALE	0.204	−0.019	0.272	−0.108	0.062	−0.070	1.000										
	(0.000)	(0.724)	(0.000)	(0.042)	(0.243)	(0.190)											
(8) UNEXC	0.193	0.241	0.103	−0.031	−0.054	0.115	0.022	1.000									
	(0.000)	(0.000)	(0.054)	(0.559)	(0.309)	(0.031)	(0.679)										
(9) FOR	0.321	0.533	−0.028	0.408	0.192	0.458	0.045	0.087	1.000								
	(0.000)	(0.000)	(0.603)	(0.000)	(0.000)	(0.000)	(0.400)	(0.104)									
(10) FAMILY	−0.120	−0.265	0.032	0.023	0.174	−0.065	0.147	−0.545	−0.188	1.000							
	(0.024)	(0.000)	(0.555)	(0.662)	(0.001)	(0.223)	(0.006)	(0.000)	(0.000)								
(11) MILTARY	−0.135	−0.080	0.014	0.091	−0.015	−0.024	−0.132	0.012	−0.105	−0.104	1.000						
	(0.011)	(0.136)	(0.799)	(0.088)	(0.785)	(0.652)	(0.013)	(0.824)	(0.050)	(0.052)							

Table 2. *Cont.*

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
(12) CEXIS	−0.069	0.085	0.027	−0.005	−0.063	0.107	0.105	0.376	0.089	−0.269	0.034	1.000					
	(0.194)	(0.113)	(0.620)	(0.926)	(0.238)	(0.045)	(0.049)	(0.000)	(0.096)	(0.000)	(0.520)						
(13) AGE	0.295	0.108	−0.002	−0.052	−0.225	0.189	−0.069	0.083	0.142	−0.313	0.055	0.009	1.000				
	(0.000)	(0.043)	(0.971)	(0.333)	(0.000)	(0.000)	(0.197)	(0.120)	(0.008)	(0.000)	(0.308)	(0.865)					
(14) LIQ	−0.226	−0.220	−0.063	−0.224	−0.080	−0.245	0.019	0.079	−0.157	−0.044	−0.073	0.013	0.007	1.000			
	(0.000)	(0.000)	(0.236)	(0.000)	(0.132)	(0.000)	(0.725)	(0.140)	(0.003)	(0.416)	(0.175)	(0.802)	(0.894)				
(15) LEV	−0.003	−0.063	0.013	0.044	−0.049	−0.076	−0.056	−0.027	−0.049	−0.060	−0.021	0.017	−0.065	−0.048	1.000		
	(0.962)	(0.239)	(0.804)	(0.407)	(0.363)	(0.155)	(0.298)	(0.618)	(0.360)	(0.264)	(0.697)	(0.756)	(0.221)	(0.375)			
(16) ROA	0.037	−0.160	0.003	−0.080	−0.067	0.039	0.150	−0.116	−0.093	0.405	0.033	0.061	−0.131	0.070	−0.130	1.000	
	(0.495)	(0.003)	(0.962)	(0.136)	(0.211)	(0.468)	(0.005)	(0.030)	(0.084)	(0.000)	(0.535)	(0.252)	(0.014)	(0.191)	(0.015)		
(17) TAXAV	−0.106	−0.056	−0.081	0.022	0.007	−0.075	−0.001	−0.037	−0.043	−0.019	−0.012	0.004	0.006	−0.013	0.000	−0.035	1.000
	(0.047)	(0.294)	(0.131)	(0.680)	(0.892)	(0.163)	(0.978)	(0.486)	(0.421)	(0.728)	(0.824)	(0.942)	(0.905)	(0.801)	(0.997)	(0.518)	

p-value is reported in parentheses.

Table 3 shows that VIF values range from 1.4 to 2.2, suggesting no multicollinearity problem. Table 4 shows the normality test of the model as well. We used the test of Doornik and Hansen; the probability was in the range of 0.5108, suggesting no normality problem as well.

Table 3. Variance inflation factor.

	VIF	1/VIF
FAMILY	2.238	0.447
FINANCIAL	2.189	0.457
JOINT	1.938	0.516
FOR2	1.743	0.574
UNEXC	1.689	0.592
AUDITFIRM	1.433	0.698
ROA	1.371	0.729
OPINION	1.279	0.782
AGE	1.268	0.789
CEXIS	1.246	0.803
FEMALE	1.198	0.835
YEAR	1.172	0.853
LIQ	1.157	0.864
MILTARY	1.11	0.901
LEV	1.054	0.949
TAXAV	1.021	0.979
Mean VIF	1.444	0.693

Table 4. Test for multivariate normality.

Doornik–Hansen	chi2(2) =	1.344	Prob>chi2 = 0.5108

4.3. Regression Analyses

Table 5 shows the regression analysis for the model. The results for the full set of explanatory variables {audit quality variables, board characteristics} shows that being audited by one of the Big4 firms has a significant positive impact on segment disclosure in Egypt. We expected that the Big4 has a positive impact on segment disclosure according to agency theory, as these firms are considered strong monitoring mechanisms to reduce agency costs, tend to protect their reputation, and provide a high-quality auditing process. We put as our first hypothesis that the segment disclosure level is likely to be positively influenced by auditing firm size. This result is consistent with prior research (Masud et al., 2024; Hrazdil et al., 2024; Feng et al., 2023; Wuttichindanon & Issarawornrawanich, 2020; Shehadeh et al., 2024). So, H1 is accepted. On the other hand, we put our second hypothesis that the segment disclosure level is likely to be influenced by an audit opinion. We tend to adopt agency theory as we suggest that audit opinion impact will be positive as we first thought that auditing quality indexes would show the same results and that auditor opinion would have the same effect as the Big4, but against our expectation, we found that having a clear opinion has a significant negative impact on segment disclosure level in Egypt. This result is consistent with proprietary theory and with the study of Shuraki et al. (2021) and that which Guo (2023, pp. 104–105) pointed out that auditors may support companies that have low levels of disclosure in their financial statements as they did not violate accounting standards. We think that this has an impact on the managerial approach which allows companies to disclose segmental information even if it violates other accounting standards, so H2 is accepted. Our third hypothesis was that the segment disclosure level is likely to be positively influenced by the co-audit process. We expected that agency theory being audited by two audit firms would have a significant positive impact on segment disclosure as it reflects auditing quality that protects auditors from potential conflicts. Our expectation was evidenced in our paper and the result of Mandour et al. (2018); Bozzolan and Miihkinen (2021). Hence, H3 is accepted.

Table 5. Regression results.

Segmentdisc	Coef.	St.Err.	t-Value	*p*-Value	[95% Conf	Interval]	Sig
Constant	−113.518	65.539	−1.73	0.084	−242.439	15.403	*
AUDITFIRM	0.832	0.166	5.02	0	0.506	1.158	***
OPINION	−0.603	0.27	−2.23	0.026	−1.134	−0.071	**
JOINT	1.272	0.22	5.79	0	0.84	1.704	***
FEMALE	5.166	0.812	6.36	0	3.568	6.763	***
UNEXC	2.215	0.691	3.20	0.001	0.855	3.575	***
FOR2	−1.077	0.549	−1.96	0.051	−2.157	0.003	*
FAMILY	−0.523	0.644	−0.81	0.417	−1.791	0.744	
MILTARY	−2.542	0.779	−3.26	0.001	−4.075	−1.009	***
CEXIS	−2.839	0.52	−5.46	0	−3.862	−1.817	***
AGE	0.04	0.007	5.68	0	0.026	0.054	***
LIQ	−0.085	0.036	−2.39	0.017	−0.155	−0.015	**
LEV	0.015	0.009	1.64	0.102	−0.003	0.034	
ROA	0.024	0.008	3.01	0.003	0.008	0.04	***
TAXAV	−0.047	0.027	−1.74	0.082	−0.101	0.006	*
FINANCIAL	1.231	0.243	5.06	0	0.752	1.709	***
YEAR	0.057	0.032	1.75	0.081	−0.007	0.121	*
Mean dependent var		3.248		SD dependent var		2.104	
R-squared		0.546		Number of obs		351	
F-test		25.070		Prob > F		0.000	
Akaike crit. (AIC)		1274.378		Bayesian crit. (BIC)		1340.011	

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. evasion.

The regression analysis results also show the analysis for board characteristics. We put our fourth hypothesis, according to most studies on disclosure, that the segment disclosure level is likely to be positively influenced by gender diversity. Adopting agency theory, our expectations were evidenced by the empirical results that show that gender diversity has a positive and significant impact on SD in Egypt. This result is consistent with several studies, e.g., Akpan and Nkanga (2023); Njokuji and Chukwu, (2023); Elmarzouky et al. (2021a, 2021b); Peng et al. (2021); Hasan et al. (2022); Al-Shaer et al. (2021); Ben Fatma and Chouaibi (2021); Radu and Smaili (2021); and Seebeck and Vetter (2021), so H4 is accepted. Our fifth hypothesis accords with agency theory that independent directors can reduce agency conflicts and use their expertise to enhance disclosure quality; they are free of financial and social commitments toward any part of the stakeholders, so we hypothesized that the Segment disclosure level is likely to be positively influenced by board independence. According to empirical results, our expectations were evidenced, and we found that board independence has a positive and significant impact on the SD level in Egypt. This result is consistent with Grassa et al. (2021) and Elmarzouky et al. (2021a, 2021b) and is contrary to Elgammal et al. (2018), so H5 is accepted. On the other hand, contrary to our sixth hypothesis that relies on agency theory that the segment disclosure level is likely to be positively influenced by foreigners on the board of directors, we found that the SD level is negatively impacted by several foreigners on the board in Egypt. This could be explained by the presence of foreign directors of nationalities from countries that adopt low levels of disclosure that exist in Egyptian companies. This result is contrary to prior research, e.g., Mardini and Elleuch Lahyani (2022) and Garanina and Aray (2021), and is consistent with Agyemang et al. (2020), so H6 is rejected. We put our seventh hypothesis based on agency theory, that the segment disclosure level is likely to be influenced by family members on the board of directors. Our expectation was unclear, so we did not expect an impact on segment disclosure. Many famous Egyptian companies have family directors, and many Egyptian companies have low-quality segment disclosure. Our analysis shows evidence that the number of family members on the board of directors negatively but insignificantly affects the SD level in Egypt. This result is consistent with the previous disclosure literature that finds a negative relationship between family ownership, the number of family directors, and different types of disclosure, e.g., Arayssi and Jizi (2024); Rahaman and Karim (2023); Biswas et al. (2019); Biswas et al. (2020); Qa'dan and Suwaidan (2019); and Md Zaini et al. (2020), so H7 is rejected. Our eighth hypothesis was based on the agency theory that directors with military backgrounds have the power to prevent conflicts and agency costs; they tend to have a disciplined working environment and high-quality disclosure, so we hypothesized that the segment disclosure level is likely to be positively influenced by directors with a military background. Against our expectations, the empirical results show that the number of directors with military backgrounds has a negative significant impact on the SD level in Egypt. This result is consistent with Abdul Wahab et al., 2024 and Chen et al., 2021. The results can be interpreted as military background directors tending to conservatism and secrecy, and their disciplined character might prevent disclosure that contradicts generally accepted accounting procedures that the managerial approach allows according to IFRS8, so H8 is rejected. Our ninth hypothesis was based on agency theory that the existence of an internal audit committee, AC, can play an effective role in increasing the quality of disclosure, so we hypothesized that the segment disclosure level is likely to be positively influenced by the AC's existence. Contrary to our expectation, the existence of AC has a negative significant impact on the SD level. In Egypt, the results can be interpreted as the AC being more conservative in its disclosure when it finds that it is permissible to use measures other than those of generally accepted accounting standards, according to the managerial approach. This result is consistent with Bepari (2023); Abu and Jaffar (2020); and Hamdan (2020) in that the existence of AC is associated with more disclosure conservatism, and there are negative relationships between some AC characteristics and disclosure, so H9 is rejected.

For the control variables, studies differed regarding their impact on segment disclosure. For example, firm age can be viewed as a proxy for reputation, so it positively affects disclosure. In other opinions, young firms are interested in more disclosure to maintain their presence and stability in the markets. So, they disclose information to protect themselves from uncertainty, but studies also have mixed results. For example, Akuchi et al. (2022)

found that firm age positively affects segment disclosure, but Ibrahim (2014); Blanco et al. (2015) found a negative relation. Alanezi et al. (2016) did not find a significant relationship, so we did not have a clear expectation. Still, we found that firm age positively impacts segment disclosure in Egypt, which supports the idea that age is a reputation proxy in Egyptian companies.

Regarding firm profitability (ROA), the effect of firm profitability based on proprietary cost would be negative as firms will be reluctant to provide information that affects their competitive position, especially the profitability of some segments, so segment disclosure quality will be lower. Alanezi et al. (2016), Guo (2023), and Berger and Hann (2007) evidenced this. On the other hand, Rufino (2022) and Akuchi et al. (2022) found a positive relation between reportable segments and ROA, and Kobbi-Fakhfakh et al. (2018) found no significant relationship between them, so we had no clear expectations. Our results support the positive impact of profitability on the segment disclosure level of Egyptian companies.

Following Chuwonganant et al. (2023) we put forward our expectation that liquidity would be positively related to the diversification nature of the firm and its high-quality segment disclosures. This assumption was based on the ability of multi-segment companies to generate profits and retain more liquidity than others in a basket of different currencies. However, the results were contrary to our expectations as the segment disclosure level in Egypt was negatively related to liquidity. This can be explained by the behavior of segmented companies in Egypt that are surrounded by many investment opportunities as an emerging economy, so companies tend to invest more than retain liquid money.

Some studies did not support the positive relationship between leverage and segment disclosure (Gisbert et al., 2014). The positive relation argues that companies commit creditors to provide high-quality disclosure, and some studies did not find a significant relationship, for example, Alanezi et al. (2016) in Kuwait. We expected, according to previous studies, that leverage would not have a positive impact on SD level. The empirical results support the insignificant relationship between both. Finally, according to Deng et al. (2021) and Kobbi-Fakhfakh (2023), we expected a negative relationship between tax evasion and SD level; the results support our expectation.

We summarize that firm age and profitability positively impact the segment disclosure level in Egypt, while firm liquidity (LIQ) and tax evasion negatively impact segment disclosure. To conclude, the main drivers for segment disclosure in the Egyptian annual reports are the auditor firm, co-audit, auditor opinion, gender diversity, board independence, foreign directors, military background directors, AC existence, firm age, profitability, liquidity, and tax.

Our hypotheses were based on two theories—agency and proprietary—so the cost of agency or proprietary can be reduced or increased by any of the variables presented. We found that agency costs decrease with the presence of Big4 firms, joint audits, gender diversity, and independence, while proprietary costs increase with the auditor's opinion, as auditors can support low-quality segment disclosure when it does not violate accepted accounting standards. This makes the proprietary cost theory explain audit opinion as the auditor prefers the full application of generally accepted accounting standards, which is the opposite case in segment disclosure according to the management approach. In our paper, agency theory does not explain the effect of foreigners on the board of directors and military background directors in segment disclosure. We think that proprietary cost increases due to the presence of foreigners on the board of directors, especially in countries that tend to conservatism and secrecy and also with restricted-military-background directors. The two types prefer not to violate accepted accounting standards which may happen due to the management approach and have a great fear of proprietary information that is related to segment disclosure.

Additional Analysis:

For the dummy variable of audit committee existence, it is noted that most companies have an audit committee (e.g., Table 1 shows a mean audit committee existence of 0.972, which means that almost all companies have an audit committee). Hence, there will be no variance in your data regarding this variable. We were unable to collect audit committee characteristics due to data availability. Table 6 shows the findings after removing this variable.

Table 6. Additional analysis.

Segmentdisc	**Coef.**	**St.Err.**	**t-Value**	***p*-Value**	**[95% Conf**	**Interval]**	**Sig**
Constant	−125.625	68.262	−1.84	0.067	−259.901	8.65	*
AUDITFIRM	0.837	0.173	4.84	0	0.497	1.177	***
OPINION	−0.556	0.281	−1.98	0.049	−1.109	−0.002	**
JOINT	1.152	0.228	5.06	0	0.704	1.6	***
FEMALE	4.614	0.84	5.50	0	2.963	6.266	***
UNEXC	1.267	0.697	1.82	0.07	−0.105	2.638	*
FOR	−1.205	0.572	−2.11	0.036	−2.33	−0.081	**
FAMILY	0.014	0.664	0.02	0.983	−1.291	1.32	
MILTARY	−2.661	0.812	−3.28	0.001	−4.258	−1.064	***
AGE	0.043	0.007	5.88	0	0.029	0.058	***
LIQ	−0.082	0.037	−2.22	0.027	−0.155	−0.009	**
LEV	0.013	0.01	1.37	0.172	−0.006	0.033	
ROA	0.018	0.008	2.23	0.026	0.002	0.035	**
TAXAV	−0.051	0.028	−1.79	0.074	−0.107	0.005	*
FINANCIAL	1.33	0.253	5.26	0	0.833	1.827	***
year	0.062	0.034	1.83	0.069	−0.005	0.128	*

Mean dependent var	3.248	SD dependent var	2.104
R-squared	0.505	Number of obs	351
F-test	22.792	Prob > F	0.000
Akaike crit. (AIC)	1302.401	Bayesian crit. (BIC)	1364.173

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

5. Conclusions

Despite the scientific attempts to deal with segment disclosure, the current research on it is less developed, especially in developing countries, and the drivers that can encourage some companies to disclose more segmental information are less understood in many contexts. In our study, we address this research gap by exploring the influence of three audit quality attributes, six corporate governance mechanisms, plus five firm characteristics. Our analysis shows that the auditor firm, co-audit, gender diversity, and board independence have a significant and positive impact on the level of segment disclosure in Egypt. In contrast, auditor opinion, foreigners—military background directors, and AC existence have a significant negative impact on the level of segment disclosure in Egypt. This paper contributes to the literature by adding a new segment disclosure measure that can be used in an IFRS8-undeveloped-adaptation context. It also provides empirical evidence on segment disclosure drivers in one developing country.

The research findings offer practical implications for many stakeholders who are interested in such kind of disclosure, and it will benefit regulators and the IASB that require post-implementation review after the IFRS8, especially in developing countries.

We limit our analysis to the auditor firm, the auditor opinion, and the co-audit. There are other audit effects, like audit fees and report lags. We limited our study to the Egyptian context and we also limited our segment disclosure measure to the level and disaggregation of disclosure and did not take the number of segments in our measurement. We were also unable to solve the problem of having multiple measures of segment disclosure or to create a unified measure in which all important elements are collected. We limited our study to some of the governance characteristics, but we need to perform further research that could consider more governance characteristics, like financial background, AC characteristics, and other important committees. Future research should consider the relation among audit quality proxies, as their impact was different at the SD level in Egypt. Also, we collected the number of segments in our working sheet for future research. Further research could consider exploring the link between SD level measures and between the SD level and other kinds of disclosures. Further research might consider tax evasion analysis and the impact of governance mechanisms on it. Further research should also investigate the economic consequences of the SD level.

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