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The impact of corporate governance on financial leverage: evidence from Egypt

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Abstract: This study examines the effect of corporate governance on financial leverage of emerging market firms. This study shows the effects of corporate governance by estimating empirical model in which firms' financial leverage is dependent variable, while board size, blockholder ownership, independent directorship, and duality are independent variables. The study employs the panel dataset of 50 listed non-financial firms in Egypt in the period 2008–2019 and the econometric method for panel data, which is multiple regression model. The study suggests a significant and negative effect of board size and duality on the financial leverage relation. The impact of board independence on the financial leverage inclines to be positive significant, and the effect of blockholder ownership tends to be positive, although it is statistically insignificant. The results are inline with diverse of estimation methods. Overall, the findings are consistent with the view that in a context with weak institutional environment, internal corporate governance mechanisms play a particularly important role in the risk-taking activities of emerging market firms.

Keywords: corporate governance; financial risk; managerial entrenchment; ownership structure; Egypt.

JEL codes: G32, G34.

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1 Introduction

Egypt is one of the emerging markets with low governance ranking, and its governance estimate is -0.62 in the most recent 2018 worldwide governance indicators in which countries are rated between -2.5 (weak) to 2.5 (strong) based on their governance performance (World Bank, 2018). According to the Legatum Prosperity Index published by Legatum Institute (2018), the governance quality in Egypt is one of the lowest and ranked 117 out of 149 countries. As corporate governance plays a salient role in influencing shareholders wealth in the light of agency theory (Atrill, 2017), and financial leverage has an economic effect on firms (see for instance, Titman et al., 2013; Gitman and Zutter, 2015), prevailing literature suggests a central role of corporate governance in determining a firm's financial leverage (see for example, Berger et al., 1997; Arping and Sautner, 2010; Watson, 2013) as advancing an understanding of the impact of corporate governance on firm financial risk is integral for policy makers (Mueller, 2006).

While some of the existing literature suggests a positive relationship between corporate governance and financial risk, other studies argue a negative association between these variables. For example, Liao et al. (2015) argue that better quality of corporate governance is positively correlated with financial leverage. Younas and Kassim (2020) suggested that good corporate governance would lead to the optimal financial leverage which should prevent the bankruptcy of firms. Also, Pham and Nguyen (2019) concluded that there is a positive relationship between most of the corporate governance characteristics and financial leverage.

On the other hand, results from research by Arping and Sautner (2010) show that an improvement in corporate governance tends to decrease the firm's financial leverage as a managerial disciplining device. Along the same line, Watson (2013) indicates that

managers are being excessively rewarded for taking financial risk, suggesting a negative association between corporate governance and financial risk. Tawfeeq et al. (2018) argues that increasing the board size would lead to higher financial leverage. Another study by Nadarajah et al. (2016) also find a significantly negative effect of corporate governance on financial leverage and provides support for the argument that better quality of corporate governance tends to significantly lower the firm's financial risk.

Nevertheless, the results from a study by Kesner et al. (1986) and Simpson and Gleason (1999) suggest that there is no significant effect of corporate governance on the firm's financial leverage. Similarly, Abobakr and Elgiziry (2016) suggested insignificant relationship between duality and independence of directors with financial leverage. However, a study by John et al. (2008) adopts a different position and suggests that there are both positive and negative correlations between corporate governance and risk.

The aforementioned literature indicates that the prevailing empirical evidence on the impact of corporate governance on financial risk is inconclusive. Although there are a number of previous studies that attempt to research on the effect of corporate governance on firm's risk, none of the studies examined the effect of different disaggregated components of corporate governance specifically on financial leverage of firms in emerging markets, except a study done by Abobakr and Elgiziry (2016) examined the relationship between corporate governance and financial leverage on non-financial Egyptian firms over the period 2007–2011, the results of the study is biased to older period where the Egyptian market already faced major changes in its policies after this period. Other than this, Arping and Sautner (2010) investigated the relationship between corporate governance on aggregate basis and leverage for Dutch firms over the period 2000–2007, while Agha (2013) studied the relationship for US-listed firms for the period 1999–2005. Similarly, a study by Tao and Hutchinson (2013) examined the relationship between corporate governance and firm risk for financial sector firms in Australia for a three-year period 2006–2008.

Therefore, since the research has been conducted to examine the relationship between corporate governance and financial leverage, and there is a vast amount of literature on this type of research was done in developed contexts, this type of research still has not pay too much attention in developing and emerging markets. And the reason to conduct the research on the context of emerging market like Egypt is that, corporate governance practices of Egyptian Stock Exchange (EGX) listed companies still lag behind the laws and regulations, and the non-financial disclosures of these companies still underdeveloped concerning ownership and governance structures, and financial risk factors. Also, this research will add a profound understanding about how the ownership structure and the board characteristics could have and impact on the pattern of the management decisions especially on how using debts as a source of finance. Thus, this research will provide much clear understanding on how board size, blockholder ownership, independent directorship, and duality have an impact on financial leverage for more than a decade from 2008 till 2019. Taking in consideration that the financial leverage has been measured by more than on proxy, besides considering many control variables to avoid any bias or external impact on the results to prevent any endogenous problems could happen, which something considered first to be done in this type of research. Moreover, it is clear from prior research that there are no consistent or generalised empirical findings on the relationship between corporate governance and financial leverage. The reason behind such inconsistent findings is the diverse situational

factors of every context under research. Thus, this study tries to add to the literature's body of corporate governance by introducing new evidence on the relationship between corporate governance and financial leverage. In addition, the study provided a comprehensive measure of corporate governance and financial leverage. Moreover, it contributes to the research of corporate governance by introducing market and book value measures of financial leverage.

The remainder of this article is organised as follows. The next section provides a background for institutional context in Egypt. The subsequent section develops hypotheses based on the literature. The section afterwards describes the data and variables including sample characteristics. The penultimate section presents and discusses the empirical results obtained from various regression estimations and robustness tests. Finally, the last section concludes the article.

2 Institutional context

The corporate governance act in Egypt was introduced in the late 1990s. There are two main groups of laws that govern the legal framework that influences the mechanisms of corporate governance in Egypt: laws that govern the incorporation of Egyptian companies; and laws that govern the listed companies in the Cairo Alexandria Stock Exchange (CASE).

The actions taken by the Egyptian Government to improve the legal, regulatory, and institutional framework have achieved much with regard to corporate governance. The Ministry of Investment (MoI) initiated the Egyptian Institute of Directors (EIoD), and the constituency's first codes of corporate governance were launched for private and state-owned companies (Shehata and Dahawy, 2014). A number of modifications to the legal and regulatory framework have been done to help tighten insider trading related provisions, strengthen disclosure rules, require companies to institute board-level audit committees, and improve the accounting and auditing framework in-line with international standards. The Capital Market Authority (CMA) formed a special Corporate Governance Department, and the EGX began to enforce its listing rules, leading to a remarkable wave of de-listings from a high of 1,148 in early 2002 to 333 by mid-2009 (World Bank, 2009).

On the other hand, concrete corporate governance practices of EGX listed companies continue to lag behind the 'law on the books', especially for companies that are not listed in the EGX-30. Firstly, a number of boards do not guide or supervise management by helping them develop and holding them accountable to a set of vital performance indicators. Main policies concentrate on risk management, internal control and audit procedures (Shehata and Dahawy, 2014). Board nomination processes largely remain solid and are frequently dominated by majority owners, at times prominent to key skills-gaps and insider boards. Secondly, financial reporting has enhanced distinctly in terms of the timeliness and excellence of disclosure; however, non-financial disclosure still remains underdeveloped. Only a few companies publicly disclose their ownership and governance structures, remuneration policies, or conceivable risk factors in their published annual reports. Thirdly, the laws and regulations that constitute shareholder rights have developed noticeably, though a few remaining weaknesses persist. Unusual transactions do not require shareholder approval for good practice, except in cases where the transaction creates a merger or an acquisition, or the transaction of a fixed asset, in

which case EGM authorisation is required (Dahawy, 2009). In the apparent lack of an active court system, shareholders are practically unable to hold executives accountable for a breach of their responsibilities.

The EIoD employs constant efforts towards achieving good corporate governance practices and strengthening the act of the boards of directors, for example, by hosting international and national conferences, presenting competitions to create consciousness, and developing manuals and procedures to help implement corporate governance. In 2005, the CMA further contributed to the corporate governance reforms by restructuring its organisation and initiating a separate sector focused on corporate finance and corporate governance (World Bank, 2009). The new CMA organisation structure includes three major sectors:

- 1 the corporate finance and corporate governance sector
- 2 the market regulation sector
- 3 market surveillance and enforcement sector, in addition to other central departments and units (Shehata and Dahawy, 2014).

In June 2009, the World Bank issued the Report on the Observations of Standards and Codes (ROSC) for the Arab Republic of Egypt. The ROSC report was conducted by the World Bank three times in ten years (2001, 2004 and 2009) for Egypt. This corporate governance ROSC suggests several reforms to the laws, regulations, and institutions that are considered to be essential in building a modern corporate governance framework (Dahawy, 2009). The key to enhancing corporate governance will be to build a cadre of competent, experienced, and professional directors and owners that understand the business case for good corporate governance.

In May 2013, the Egyptian Society of Accountants and Auditors developed its first draft regarding Corporate Governance Regulations to be considered for the acceptance exam for the society. Moreover, board members of the Egyptian Society of Accountants conducted sessions helping to clarify and explain the novel part of the exam. In June 2013, corporate governance was formally part of the acceptance exam to the society (Shehata and Dahawy, 2014).

3 Literature review and hypotheses development

Previous studies are mainly focusing on the relationship between corporate governance and firms' performance (Bhagat and Bolton, 2019; Chen and Matousek, 2020), besides some other studies showing the association between corporate governance and firms' behaviours (Harris et al., 2015). Similarly, there is growing research focusing on the association between corporate governance and financial leverage (Ellul and Pagano, 2019; Alter and Elekdags, 2020). However, the previous related research is mostly focusing on the developed countries. Egypt as an emerging country with many corporations has not paid much attention to this type of research.

Most of the corporate governance research is derived from the agency theory. Corporate governance studies emphasise the problems arising from the separation of ownership in accordance with the principal-agent problems. The mechanisms of

corporate governance concentrate on the way that the board of directors monitor the management to minimise such problems (Mallin, 2016).

Moreover, the role of the directors is related to governance functions of the board of directors through their input to management decisions and monitoring of the actions of the managers via implementations of these decisions (Fama and Jensen, 1983; Baysinger and Butler, 1985; Daily and Dalton, 1994). According to the agency theory, the primary focus of the board of directors is to maximise the shareholder wealth in the corporations; and the theory has created a case of uncertainty due to asymmetric information (Deegan, 2004).

Stewardship theory states that a firm's management is trustworthy as stewards for the firm and concentrates on the overall and collective benefits for the firm rather than the personal interests of managers (Donaldson and Davis, 1991; Davis et al., 1997). There is therefore no room for moral hazards as it is argued that managers work on behalf of the principal, thereby eliminating potential risk arising from the separation of owners and managers in the principal-agent model in the presence of steward managers. This theory therefore suggests that managers are likely to engage in activities that are expected to benefit the firm's shareholders although such activities will not benefit or satisfy the steward managers' interests. This assertion is based on the assumption of commonality between the principal (owners) and the agent (steward managers) which is in contrast to the assumption of individualistic and self-serving managers as highlighted by the management model in the market (Donaldson, 1990).

Another theory known as resource dependency theory argues that the firm is considered to consist of groups of coalition that are always in a state of change (Pfeffer and Salancik, 1978). According to this theory, these groups of coalition are classified into internal groups (shareholder, managers or employees), and external groups (customers, government or suppliers). Each group of coalition possesses a significant power on the firm for specific reasons. For instance, shareholders may tend to perform some actions to influence a firm's behaviour. Similarly, a firm's managers may exert some power to control the use of the firm's resources. Also, labour unions may apply some control on the access of the skilled labour as a type of control over human resources.

Another theory known as institutional theory provides a theoretical framework for investigating social (particularly organisational) phenomena, which regard the social world as comprised of institutions, stable rules, practices, and structures that place conditions on action. Institutions are elementary in illuminating the social world because they are built into the social order and express the flow of social life. They are the constants that establish the rules of variation. Institutions form action because departures away from them are counteracted by social controls that make divergence from the social order costly. Based on this theory, the effectiveness of governance is determined by both micro level and macro level of controls exercised by various agents in a pursuit to maximise firm value.

While various researchers tended to adopt different definitions of corporate governance, the primary definition employed is "the set of mechanisms – both institutional and market based – that induce the self-interested controllers of a company to make decisions that maximize the value of the company to its owners" [Denis and McConnell, (2003), p.2]. According to this definition, since managers are regarded as controllers of an organisation and their interest may not be in line with what is best for the owners, corporate governance plays a salient role in ensuring that the managers make decisions to maximise the value of the firm and shareholder wealth. This points to

another definition of corporate governance which is summed up as “the mechanism through which shareholders are assured that managers will act in their interests” [Arun and Turner, (2002), p.4].

It has been recognised that managers do not always act in the best interests of shareholders (Henderson, 1986). This problem tends to be particularly exacerbated in the Anglo-Saxon economies, where the evolution of the modern firm is characterised by a large number of shareholders and there is a separation of ownership and control. The separation of ownership and control has given rise to an agency problem whereby management operates the firm in their own interests, not those of shareholders (Jensen and Meckling, 1976; Fama and Jensen, 1983).

However, a broader view of corporate governance regards corporate governance as the “methods by which suppliers of finance control managers in order to ensure that their capital cannot be expropriated and they earn a return on their investment” [Shleifer and Vishny, (1997), p.737]. This is considered to be a widely recognised definition as the authors looked at corporate governance techniques as a means by which the owners hold the power and the upper hand to control their interests and their investments.

Corporate governance mechanisms have evolved to help reduce though not completely eliminates the costs associated with the separation of ownership and control (Denis, 2001). Jensen and Meckling (1976) defined the agency relationship as a contractual relationship in which one or more parties (principal) delegates the authority of running and managing the business to another party (agent). Therefore, a conflict of interests might arise between the two parties of the contract, leading to the existence of agency conflicts and costs. Agency costs include monitoring expenditure such as auditing, budgeting, control and compensation systems, and bonding expenditures (Abor and Biekpe, 2007).

The concept of corporate governance stated by Jensen and Meckling (1976) suggests that if the agent decides to maximise his own interest, the agent is unlikely to engage in activities and make decisions in favour of the principal. Hence, the principal can limit this conflict by one of the two ways: either provide more incentives for the agent or set out more monitoring costs to limit the activities of the agent. In an article by Denis (2001), it is stated that the board of directors is an integral part of the mechanism for corporate governance, as they are in charge of hiring, firing, controlling and monitoring. This therefore suggests that a corporate governance mechanism can be used as a method to correct any potential problems that may occur.

Denis (2001) asserts that management have the control over the firm's assets, which give them the power to have more knowledge and ability to achieve their own interests. Agency costs are always associated with the success of the corporate governance mechanism as it represents a control on the controllers of the company which is the target of existence of corporate governance. In addition to agency costs, there are various other means by which a firm would be able to maximise the shareholder wealth. There are number of factors such as board size, board composition, duality, blockholder ownership, that affect the extent to which a firm would be able to influence its financial risk and ultimately shareholder wealth. Therefore, we discuss these variables related to board characteristics, ownership structure and their relationships with firm's financial risk in the following sections.

3.1 Board size

The board size reflects the total number of directors on the board for each sample. The size includes the executive and the non-executive directors. This classification is same as that used by Hermalin and Weisbach (1988) and Bhagat and Black (2002). According to Jensen and Meckling (1976), board size refers to the number of directors inside the board of a firm. The board size is measured as the sum of the number of directors of the board including the chairperson.

Board size is a major board characteristic and is expected to play a significant role in the effectiveness of the board members in monitoring the management, and thus indirectly affecting the quality of corporate governance mechanism (Lipton and Lorsch, 1992; Jensen, 1993). Small boards are more effective because they improve the communication channels and coordination procedures between the board members (Yermack, 1996). Younas and Kassim (2020) stated that the large board size has an optimal impact on financial leverage. In addition, Pham and Nguyen (2019) argued on their research on the listed firms in Vietnam from 2011 to 2015, that there is significant positive association between board size and financial leverage. Furthermore, Lipton and Lorsch (1992) argue that the problem of dysfunctional role of board members' increases in large board sizes. It has also been suggested that firms cut the number of board members to ten directors, with a favourable board size of eight or nine members (Yermack, 1996). Similarly, a study by Jensen (1993) asserts that more effective control mechanism is achievable with a small number of boards. Specifically, Jensen (1993) argued that the board of directors would perform more effectively, and their role is harder to be affected by the management when the number of directors is less than seven. Chaganti et al. (1985) also provide support for the view that small boards play an important role in control functions, while large boards have a coordination problem which led to the free riding of managers to achieve their own goals.

From the agency theory perspective, it is recommended that large boards lead to better performance (see for example, Hermalin and Weisbach, 2003). This argument is based on the premise that large boards would have diversities that secure the critical resources and would lessen the environmental uncertainties, is corroborated by a study by Guttentag and Herring (1986) which assumed that large board sizes tend to reduce insolvency risk. Abobakr and Elgiziry (2016) studied the effect of board characteristics and ownership structure on corporate financial leverage of 50 listed Egyptian firms covering the period 2007–2011, the results showed a significant negative relationship between board size and financial leverage. Further, Simpson and Gleason (1999) argue that there is no clear relationship between board size and firm's financial risk, whereas a research by Adams and Mehran (2004) suggests that there is a direct relationship between the two variables. Moreover, Simpson and Gleason (1999) indicate that there is no significant relationship between board size and firm's financial risk, but a study by Titman and Wessels (1988) posits that the relationship between board size and corporate financial risk could be either positive or negative. In addition, Tawfeeq et al. (2018) argued that there is significant relationship between board size and leverage in the context of 100 Jordanian non-financial firms. In contrary, Bin Purag and Abdullah (2016) argued in their research on 195 Malaysian family-owned companies, that there is insignificant relationship between board size and financial leverage. However, research done by Wangechi and Nasieku (2015) on the listed companies in East Africa argued,

that there is a positive relationship between board size and capital leverage. In the light of the existing literature, we develop the following hypothesis:

Hypothesis 1 There is a significant positive relationship between board size and financial risk.

3.2 Blockholder ownership

It is broadly argued that the concentration in the ownership structure effectively contributes to the reduction of agency conflicts between the management and the shareholders, which could be achieved through provision of proper monitoring. Taking into consideration the competence and the motivation of large investors, dominant shareholders might play a significant role in monitoring management action and decisions and in controlling the activities of their firms (Hartzell and Starks, 2003). Due to the high monitoring costs that shareholders incur in order to alleviate agency problems, only concentrated ownership structure can perform this process since they have the capability and the motive to monitor management actions and thereby improve the value of the firm (Grossman and Hart, 1980; Shleifer and Vishny, 1986; Huddart, 1993).

It has been argued that the main shareholders tend to have stronger incentives to monitor the executive's behaviour in firms characterised by high ownership concentration, while the individual shareholders tend to lack motivation to do so in firms characterised by low ownership concentration (Munisi and Mersland, 2016). As a result, firms' structure with concentration of institutional ownership tends to be desirable for small investors 'the free-riders'. Therefore, the presence of concentrated ownership as a corporate governance mechanism is vital, not only to monitor management actions, but also to support the interests of the shareholders through formulation of suitable incentive patterns that encourages the management to improve the firms' value (Hartzell and Starks, 2003).

Blockholder ownership reflects the ratio of the shares in the corporation that are not publicly traded but are concentrated and blocked by specific holders. As regards the relationship between blockholder ownership and firm's risk, Demsetz and Lehn (1985) argued that there is a positive relationship between managerial ownership and riskiness of the firm. It is argued that when managers have equity in the firm they are seeking to maximise their wealth by taking higher risk, which is reflected in the results showing that large executive ownership will lead to high firm risk.

Yassen and Al-Alamarneh (2015) argued that there is a positive significant relationship between the holdings of large owners with the leverage. The reason is that managers could have a better access to the market to finance the companies with extra debts.

Hypothesis 2 There is a significant positive relationship between blockholder ownership and financial risk.

3.3 Board composition

Boards of directors consist of executive, non-executive and independent directors. Non-executive and independent directors are external directors who not only act as judges in the case of any conflicts and disagreements between internal directors but also

contribute to resolving issues concerning agency problems between the principal and the agent, for example on matters such as hiring and firing of managers and determining management's compensations (Fama and Jensen, 1983). Agency theory suggests that independent directors perform a significant role in aligning the interests of management with those of shareholders by providing the firms with proper monitoring process because independents are assumed to have no motivation to join forces with the management. Based on this theory, the percentage of non-executive directors of the total board size has been used to determine the degree of board independence in previous studies (Mehran, 1995; Franks et al., 2001; Ozkan, 2011; Khalil and Ozkan, 2016).

The study done by Abobakr and Elgiziry (2016) on the Egyptian listed non-financial firms from 2007 to 2011 argued a negative insignificant relationship between board non-executive directors and financial leverage. As it is clear, a very few recent studies are done on the Egyptian market to examine this type of relationship. Moreover, research by Pham and Nguyen (2019) argued board independence has a significant positive impact on financial leverage of the listed firms in Vietnam. From another perspective, Younas and Kassim (2020) argued that the balance of independent directors would have an optimal impact on firms' leverage. Furthermore, research by Alam and Shah (2013) demonstrated a link between the components of corporate governance and firm risk by employing a sample size of 106 firms for a period of six years. However, Hutchinson and Gul (2004) find that while the structure of board of directors plays an important role in reducing agency costs, there is no significant relationship between board independence and firm risk. Similarly, Kesner et al. (1986) accounted for the perspective of outside dominance by adopting financial leverage as a proxy for measuring the financial risk of firms, and their results revealed there is no significant effect of independent directors on firm's financial risk. This finding was also supported by Simpson and Gleason (1999) which examined the relationship between board structure and financial risk. Jensen (1993) argued that outsiders should not serve on the board due to the possibility of high retribution. This argument is based upon the premise that outside directors may not understand the complexities of the company and so they are not equipped to monitor effectively. Also, when outsiders represent a large number of the board this would create diverse interests and restrict the flexibility of the operation (Weisbach, 1988; Brickley et al., 1994). Similarly, Bin Purag and Abdullah (2016) argued in their research on Malaysian family-owned companies that there is inverse relationship between board composition and debt leverage. In contrary, the larger number of independent directors, the higher leverage of the firms.

Hypothesis 3 There is no significant relationship between independent board members and financial risk.

3.4 Duality

Duality occurs when the same person fills both positions by serving as a chief executive officer (CEO) and also as a chairperson of the same organisation. From the managerial standpoint concerning the duality role, the CEO-chairperson duality reduces the board's independence and maximises managerial power in the hands of a single individual over the control of action and decisions taken, which includes determining the pattern and structure of managerial compensation. Moreover, agency theory assumes that CEO-chairperson duality maximises the agency problems by giving the CEO an

opportunity to take decisions in their favour through maximising his/her own benefits rather than maximising the shareholders' interests and wealth (Jensen, 1993; Boyd, 1995; Core et al., 1999). Pham and Nguyen (2019) argued that there is insignificant impact on financial leverage although they have reached a negative relation. Furthermore, Abobakr and Elgiziry (2016) argued a positive insignificant relationship between the duality characteristic of the listed Egyptian firms and financial leverage. This study is essential to confirm the validity of the relationship reached by Abobakr and Elgiziry (2016), as Egyptian governance is not in the top worldwide ranks, hence we should not confirm the elimination of the impact of the duality characteristic on leveraging the Egyptian firms. Jensen (1993) argued that board members might perform more effectively by the separation of the CEO and chairperson positions. In addition, Boyd (1995) argued that the presence of duality roles in a firm's structure results in reduced firm's performance and increased risks and uncertainties. This view is in line with the contention that the board performs well when the chair position is being filled by an external chairperson and designing proper incentive patterns for the CEO (Williamson, 1985), and hence lack of duality would help secure the interests of the agent as well as those of the principal (Donaldson and Davis, 1991).

Alam and Shah (2013) examined the impact of duality on firm risk in the light of two contrasting theories for analysis. One theory is the agency theory which does not recommend the adoption of CEO duality as it hampers the firm performance due to the compromise involved with regard to the control and monitoring activities of the CEO, which is an argument also put forward by Westphal and Zajac (1995). The other theory is stewardship theory which supports the idea of CEO duality, as it could help reduce the confusion between stakeholders and managers and this would lead to effective decision making (Finkelstein and D'Aveni, 1994). The opposing view was corroborated by research conducted by Simpson and Gleason (1999), which provided evidence that there is a positive significant relationship between duality and financial risk.

Hypothesis 4 There is a significant positive relationship between CEO duality and financial risk.

4 Data and variables

4.1 Data

The sample for our research is based on the data of the Egyptian companies, from the most active 50 companies listed in the Egyptian stock market. We were eventually able to collect data for 40 firms from the top 50 over the period 2008–2019 so that the most comprehensive relevant data could be achieved. This could be the cause for the potential omission for the missing data for each year. In our study, we rely on the secondary data from the firms' annual reports. These data were collected manually from the annual reports for the sample. Banks and financial sectors are excluded from our sample as they have their own regulations and characteristics that are different from the other industrial sectors. Also, firms that lack necessary data for independent variables are excluded and those lacking data for calculating the proxies for firm performance are also excluded. Hence, the final panel dataset consists of 503 observations based on data availability.

4.2 Variables and measures

4.2.1 Financial risk

Based on previous studies, this research employs the most commonly used proxy, debt to equity, to measure a firm's financial risk as dependent variables (see, for example, Jensen, 1993; Agha, 2013). Since the greater the debt in a firm's capital structure, the greater the financial obligations and hence the greater the financial leverage, we use the debt as a percentage of equity to gauge the financial risk variable. In addition to the conventional book leverage, we also use another dependent variable, measured as the sum of short-term debt and long-term debt divided by the sum of short-term debt, long-term debt and market value of equity, to reflect market leverage (Baker and Wurgler, 2002).

4.2.2 Corporate governance and control variables

Blockholder ownership is measured as the percentage of blockholders of the total ownership. The sum of executive and non-executive directors in the board of directors is used to gauge board size. The proxy for board independence is calculated as the percentage of independent directors over the board size (Mike, 2004; Rashid et al., 2010; Rashid, 2018). The duality variable is captured by whether the same person holds both CEO role and chairperson role in the same firm. Duality takes the value of one if the same person holds two positions as CEO and chairperson; otherwise, it takes the value zero.

In addition to the aforementioned explanatory variables, we incorporate various control variables such as firm size, capital intensity, profitability, liquidity, firm age, non-debt tax shields, and growth opportunities based on prior research (see, for example, Watson, 2013; Chang et al., 2015; Menichini, 2015; Nadarajah et al., 2016). The natural log of total assets is included to account for the effect of firm size. Capital intensity is calculated as fixed assets divided by total assets. Earnings before interest and taxes to total assets is included to control for profitability performance, and the ratio of current assets to current liabilities is used to account for liquidity. Firm age is gauged as the natural log of number of years since the firm's listing. Non-debt tax shield is measured by depreciation as a percentage of total assets, while market value to book value of equity is employed to control for growth opportunities. The following used regression model is appropriate for the purpose of the study. It is useful to reach clear conclusion from its estimated results. Abobakr and Elgiziry (2016), Pham and Nguyen (2019) and Younas and Kassim (2020), most of the previous studies relied on the panel regression model to examine the impact of corporate governance on financial leverage. In addition, a test of standard error robustness is used as the data is not normally distributed.

The panel data regression for this paper is based on the following model:

$$FR_{it} = \alpha + \beta_1 BS_{it} + \beta_2 IND_{it} + \beta_3 DUA_{it} + \beta_4 FSZ_{it} + \beta_5 FATTA_{it} + \beta_6 EBITTA_{it} \\ + \beta_7 CATCL_{it} + \beta_8 FGE_{it} + \beta_9 DEPTA_{it} + \beta_{10} MVTBV_{it} + \varepsilon_{it}$$

where FR_{it} denotes financial risk, BS_{it} for board size, BH_{it} refers to blockholder ownership, IND_{it} for independent directors, DUA_{it} for CEO duality, FSZ_{it} for firm size, $FATTA_{it}$ for capital intensity, $EBITTA_{it}$ for profitability, $CATCL_{it}$ for liquidity, FGE_{it} for firm age, $DEPTA_{it}$ for non-debt tax shields, $MVTBV_{it}$ for growth opportunities, ε_{it} for

error term, for firm i at time t , β_1 to β_{11} for corresponding parameters to be estimated. The financial risk variable is proxied by book leverage DTE measured as debt to equity, as well as by market leverage MKL measured as total debt divided by the sum of total debt and market value of equity.

4.2.3 Sample characteristics and preliminary findings

There are a number of features associated with the panel data used for this research which are discussed below. First, the variables that are needed to measure the data are in the percentage and proportions form, and small variables are dummy, so the ultimate method to use is the parametric method to analyse and test the data, which provides the actual standard errors and significance. Additionally, missing values, imputation and deletion are not used in this study as these arise due to the data availability constraint, and imputation and deletion change the nature of information and distort the data which could lead to misleading interpretation of population. Another advantage achieved from maintaining the missing values is to add more firms to the sample size and thereby helping achieve a more representative sample for the population. Moreover, another feature relates to outliers which are represented by the highest and lowest infrequent and extreme values. The call for elimination of outlier is not a preference in the study as new outlier may appear after removal of the initial ones. Also, we do believe that the outlying values may contain vital information and its removal may lead to emerging promising new information. Finally, this study employs various tools to check for distribution of observations and descriptive statistics, such as the mean, median, standard deviation, minimum and maximum values of various relevant variables including financial risk and independent variables. Table 1 presents the mean, median and standard deviation of the variables from year 2008 to 2019. Also, it provides the minimum and maximum for each variable for the sample period.

Table 1 includes summary statistics. These include board characteristics variables, ownership structure variable and the variables used to measure financial leverage. The findings revealed that the average measure of DTE and MKL are 35% and 22%, respectively. The findings also show that average size of the board is of 10.5, we could conclude that most the firms have board size of ten members. Additionally, duality occurs when the chairman and CEO positions are held by the same person. The descriptive statistics table shows that average measure of DUA is 1 which indicates that most of the tested companies have the dual structure. Few studies have been examined the relationship between duality and financial leverage. Alam and Shah (2013) argued that there is a negative relationship between duality and firms' financial risk. This is also consistent with the agency theory; the agency problems might arise between interested parties if the companies are characterised by dual structure. Moreover, Table 1 shows that the average percentage of independent directors is almost 81%. This besides, the average percentage of the blockholders of total shares is around 64%. Egyptian firms have concentrated ownership structure. Finally, it has been observed that some of the data is normally distributed. Skewness standard for the data should be within the range of ± 1.96 (Haniffa and Hudaib, 2006). Table 1 shows that BH , BS , DUA and MKL are normally distributed. However, other variables are not normally distributed like $INDD$, DTE , $LTDC$ and $LTDA$. Similarly, kurtosis test for normality where the data should be within the range ± 3 (Haniffa and Hudaib, 2006). It is obvious from Table 1 that kurtosis shows the same outcomes of skewness test.

Table 1 Descriptive statistics of panel data: 2008–2019

<i>Variable</i>	<i>Description</i>	<i>Obs.</i>	<i>Mean</i>	<i>Median</i>	<i>SD</i>	<i>Min.</i>	<i>Max.</i>	<i>Kurtosis</i>	<i>Skewness</i>
<i>BH</i>	Block holder ownership	503	63.639	67.318	21.203	6.3	98.851	2.899	−0.899
<i>BS</i>	Board size	503	10.545	10	3.951	4	24	3.063	0.669
<i>INDD</i>	Independent directors	503	0.817	0.875	0.129	0.4	1	7.405	−2.220
<i>DUA</i>	Duality	503	0.652	1	0.476	0	1	1.738	−0.859
<i>FS</i>	Firm size	503	6.138	6.049	0.609	4.731	7.977	2.907	0.781
<i>FATTA</i>	Fixed assets to total assets	503	0.373	0.377	0.244	−0.439	0.987	3.196	−0.142
<i>EBITTA</i>	Earnings before interest and taxes to total assets	503	0.115	0.089	0.149	−0.377	1.484	2.972	−0.023
<i>CATCL</i>	Current assets to current liabilities	503	1.867	1.348	1.661	0.030	18.155	40.972	5.552
<i>DepTTA</i>	Depreciation to total assets	503	0.008	0	0.028	0	0.236	16.860	3.801
<i>MTBV</i>	Market value to book value of equity	503	1.603	1.144	1.682	0.058	16.247	12.140	2.799
<i>DTE</i>	Debt to equity	503	0.353	0.061	0.811	−3.164	7.102	37.14	−4.447
<i>MKLIV</i>	Market leverage	503	0.226	0.150	0.234	0	1	3.335	1.014
<i>LTDTA</i>	Long-term debt to total assets	503	0.097	0.034	0.134	0	0.939	9.037	2.220
<i>LTDCL</i>	Long-term debt to capital	503	0.130	0.046	0.376	−6.623	2.826	63.440	−7.557
<i>FA</i>	Firm age	503	1.095	1.113	0.164	0.477	1.477	2.493	0.407

Table 2 Investigating the stationary of the panel data

Method	BH		BS		INDD		DUA		DTE		MKLV		LTDC		LTDA	
	<i>I(0)</i>	Statist. Prob.	<i>I(0)</i>	Statist. Prob.	<i>I(0)</i>	Statist. Prob.	<i>I(0)</i>	Statist. Prob.	<i>I(0)</i>	Statist. Prob.	<i>I(0)</i>	Statist. Prob.	<i>I(0)</i>	Statist. Prob.	<i>I(0)</i>	Statist. Prob.
Levin Lin Chu	1.8	1.000	3.056	0.000	-77.886	0.000	-1.9	0.000	-1.4	0.000	-8.611	0.000	-10.539	0.000	-19.53	0.000
Hadri	0.37	0.355	10.747	0.000	13.103	0.000	8.779	0.000	8.473	0.000	9.362	0.000	4.654	0.000	17.839	0.000
Method	<i>I(1)</i>	Statist. Prob.	<i>I(1)</i>	Statist. Prob.	<i>I(1)</i>	Statist. Prob.	<i>I(1)</i>	Statist. Prob.	<i>I(1)</i>	Statist. Prob.	<i>I(1)</i>	Statist. Prob.	<i>I(1)</i>	Statist. Prob.	<i>I(1)</i>	Statist. Prob.
	<i>I(1)</i>	Statist. Prob.	<i>I(1)</i>	Statist. Prob.	<i>I(1)</i>	Statist. Prob.	<i>I(1)</i>	Statist. Prob.	<i>I(1)</i>	Statist. Prob.	<i>I(1)</i>	Statist. Prob.	<i>I(1)</i>	Statist. Prob.	<i>I(1)</i>	Statist. Prob.
Levin Lin Chu	-16.47	0.000	1.683	0.953	-28.940	0.000	-7.9	0.000	-3.4	0.000	-33.17	0.000	-1.0	0.000	-27.455	0.0000
Hadri	-3.307	0.999	-1.048	0.852	-2.832	0.997	1.815	0.034	0.157	0.437	-2.236	0.987	2.839	0.002	-4.015	1.00

Table 3 Spearman correlation coefficients

	<i>BH</i>	<i>BS</i>	<i>INDD</i>	<i>DUA</i>	<i>FS</i>	<i>FATTA</i>	<i>EBITTA</i>	<i>CATCL</i>	<i>DepTTA</i>	<i>DTE</i>	<i>MKLV</i>	<i>LTDIA</i>	<i>LTDC</i>	<i>MVTBV</i>	<i>FA</i>
<i>BH</i>	1														
<i>BS</i>	0.168***	1													
<i>INDD</i>	-0.168***	0.296***	1												
<i>DUA</i>	0.041	0.165***	0.009	1											
<i>FS</i>	0.361***	0.182***	0.004	0.184***	1										
<i>FATTA</i>	-0.036	0.191***	0.126***	0.038	0.163***	1									
<i>EBITTA</i>	0.027	0.046	0.055	0.102**	0.042	0.079**	1								
<i>CATCL</i>	0.215***	0.060	0.122***	0.162***	0.182***	0.506***	0.102*	1							
<i>DepTTA</i>	0.039	0.174	0.037	0.018	0.107	0.057	0.071	0.116***	1						
<i>DTE</i>	0.122***	0.093**	0.025	0.051	0.063	0.459***	0.154***	0.466***	0.016	1					
<i>MKLV</i>	0.041***	0.122***	0.087	0.090	0.098	0.446***	0.280***	0.455***	0.010	0.647***	1				
<i>LTDIA</i>	0.144	0.113	0.003	0.048	0.062	0.487***	0.154*	0.468***	0.034	0.949***	0.654***	1			
<i>LTDC</i>	0.129	0.099	0.022	0.044	0.055***	0.443***	0.164	0.462	0.032	0.965***	0.627	0.972	1		
<i>MKTBV</i>	-0.111*	0.044	0.054	0.136**	0.169***	0.079	0.132	0.179	0.001	0.025	0.344***	0.042**	0.05	1	
<i>FA</i>	-0.239***	-0.055	-0.077*	-0.043	0.104	-0.174***	-0.034	0.225***	-0.001	-0.264***	-0.141***	-0.2786***	-0.2567***	-0.2394	1

Table 2 is testing for non-stationary to detect the unit root in pane data. In this paper, we have employed both panel data stationary tests which are Levin, Lin and Chu (2002) and Hadri test. It has been clear from Table 2 the financial leverage proxies are (*DTE*, *MKLV*, *LTDC* and *LTDA*) are stationary at level and first difference as the p-value is less than 5% employing Levin Lin Chu test. Moreover, the results show that the proxies of ownership structure and board characteristics (*BH*, *BS*, *INDD* and *DUA*) are also stationary at level and first difference ($p < 0.05$). Hence, the results are consistent with vector auto regression model which suggests that all the employed variables should stationary. Similarly, Hadri test on the variables; the results show that the proxies of the tested variables are stationary ($p < 0.05$).

After processing the descriptive statistics test to identify the pattern of the data, correlation analysis is presented to check the degree of correlation between dependent and independent variables, and the correlation among the independent variables to check for the occurrence of multi-co-linearity. Spearman's correlation shows the degree of correlation between variables. The degree of correlation between the independent variables should not exceed 80%, otherwise a multi-co-linearity between the independent variables occurred. From Table 3, it was obvious that there is no multi-co-linearity between the variables, it is observed that the maximum correlation appeared is between debt-to-equity long-term debt to assets (*LTDTA*) and long-term debt to capital (*LTDC*) with the amount of 97.2%. Furthermore, the second highest correlation is between debt to equity (*DTE*) and long-term debt to capital (*LTDC*) with amount of 96.5%. Finally, the last highest correlation recorded in this table is between debt to equity (*MKLV*) and long-term debt to assets (*LTDTA*) with the amount of 94.9%. It is obvious that all the correlations that break 80% are between dependent variables, which show that there is no intercorrelations between the independent variables and the control variables for a single regression model.

Table 4 Multicollinearity test with VIF coefficients

Model	Dependent variable		Dependent variable	
	DTE		MKLV	
	VIF	Tolerance	VIF	Tolerance
<i>BH</i>	1.53	0.655	1.58	0.632
<i>BS</i>	1.21	0.825	1.21	0.827
<i>INDD</i>	1.10	0.911	1.10	0.906
<i>DUA</i>	1.23	0.814	1.17	0.857
<i>FS</i>	1.24	0.807	1.26	0.792
<i>FATTA</i>	1.29	0.775	1.23	0.814
<i>EBITTTA</i>	1.23	0.814	1.21	0.827
<i>CATCL</i>	1.45	0.689	1.40	0.715
<i>DepTTA</i>	1.15	0.872	1.45	0.692
<i>MVTBV</i>	1.34	0.746	1.53	0.654
<i>FA</i>	1.26	0.792	1.45	0.692
Mean VIF	1.27		1.33	

Tables 4 and 5 show the variance inflation factor (VIF) and tolerance of the tested variables ($1 / \text{VIF}$). The initiatives of the tests to observe if there is multicollinearity between the variables of the model. It is obvious from Tables 4 and 5 that the findings lie within the common rule of the mean VIF finding; it should be less than 10 and the tolerance ($1 / \text{VIF}$) should be more than 0.01. Accordingly, we should conclude that there is no multicollinearity between the tested variables.

Table 5 Multicollinearity test with VIF coefficients

<i>Model</i>	<i>Dependent variable</i>		<i>Dependent variable</i>	
	<i>LTDC</i>		<i>LTDA</i>	
	<i>VIF</i>	<i>Tolerance</i>	<i>VIF</i>	<i>Tolerance</i>
<i>BH</i>	1.58	0.632	1.58	0.632
<i>BS</i>	1.21	0.827	1.21	0.827
<i>INDD</i>	1.10	0.906	1.10	0.906
<i>DUA</i>	1.17	0.857	1.17	0.857
<i>FS</i>	1.26	0.792	1.26	0.792
<i>FATTA</i>	1.23	0.814	1.23	0.814
<i>EBITTTA</i>	1.21	0.827	1.21	0.827
<i>CATCL</i>	1.40	0.715	1.40	0.715
<i>9DepTTA</i>	1.45	0.689	1.45	0.689
<i>MVTBV</i>	1.53	0.654	1.53	0.654
<i>FA</i>	1.45	0.689	1.45	0.692
Mean VIF	1.33		1.33	

5 Empirical results

5.1 Hausman test (fixed or random effects)

As commonly used to choose between random and fixed effects model, Hausman specified test is employed to observe the violation of the random effect model. Hausman is distributing the chi-square with a freedom degree equal to the number of regresses in the model. When the result show ($p < 0.05$), the two models are different enough to reject the random effect model and employing the fixed effect model. In contrary if the findings do not show a significant difference ($p > 0.05$), random effect model is utilised.

Hausman is distributing chi-square with a freedom degree equal to the number of regresses in the model. When the results show ($p < 0.05$), the two models are different enough to reject the random effect model and accepting the fixed effect model. However, if the findings of the test do not indicate a significant difference ($p > 0.05$), random effect model is preferred over the fixed effect model.

The finding of Table 6a shows that the probability of chi2 for the determinant of financial leverage debt to income (*MKLIV*) is below 5%, which means that a fixed effect of the model is more appropriate. Besides, the finding in Table 6b shows the probability of chi2 for the probability for the determinant of financial leverage debt to equity (*DTE*)

is less than 5%. Hence, hypotheses testing will be based on a fixed regression effect for *MKL**V* determinant and *DTE* determinant.

The findings of Tables 6c and 6d show the probabilities for the determinants financial leverage *LTDC* and *LTDA* are above 5%, accordingly the random effect model is detected. Hence the following hypotheses testing will be based on fixed effect tests for *DTE* and *MKL**V*, and random effect tests for *LTDC* and *LTDA* variables.

Table 6a Hausman test: fixed or random effect of *MKL**V*

	<i>Fixed</i>	<i>Random</i>	<i>Difference</i>	<i>SE</i>
<i>BH</i>	−0.000	0.000	−0.001	0.000
<i>BS</i>	−0.009	−0.005	−0.004	0.001
<i>INDD</i>	0.018	0.023	−0.005	0.041
<i>DUA</i>	−0.030	−0.013	−0.017	0.006
<i>FS</i>	−0.000	−0.000	0.000	0.011
<i>FATTA</i>	0.136	0.178	−0.041	0.021
<i>EBITTTA</i>	−0.150	−0.118	−0.032	0.021
<i>CATCL</i>	−0.015	−0.013	−0.001	0.000
<i>DepTTA</i>	−0.119	0.165	−0.285	0.162
<i>MVTBV</i>	−0.033	−0.033	−0.000	0.001
<i>FA</i>	−0.071	−0.075	0.004	0.006
Chi2(10)			47.29	
Prob. > chi2			0.000	

Note: Number of observations = 500, period: 2008–2019.

Table 6b Hausman test: fixed or random effect of *DTE*

	<i>Fixed</i>	<i>Random</i>	<i>Difference</i>	<i>SE</i>
<i>BH</i>	0.002	0.002	0.000	0.003
<i>BS</i>	−0.001	−0.005	0.003	0.009
<i>INDD</i>	1.770	1.109	0.660	0.293
<i>DUA</i>	−0.186	−0.143	−0.042	0.047
<i>FS</i>	−0.021	−0.056	0.034	0.077
<i>FATTA</i>	1.117	0.881	0.235	0.155
<i>EBITTTA</i>	−0.424	−0.313	−0.111	0.172
<i>CATCL</i>	0.000	−0.006	0.007	0.008
<i>DepTTA</i>	−0.136	3.314	−3.450	1.208
<i>MVTBV</i>	−0.052	−0.025	−0.026	0.013
<i>FA</i>	−0.751	−0.650	−0.101	0.081
Chi2(10)			24.73	
Prob. > chi2			0.0107	

Note: Number of observations = 503, period: 2008–2019.

Table 6c Hausman test: fixed or random effect of *LTDC*

	<i>Fixed</i>	<i>Random</i>	<i>Difference</i>	<i>SE</i>
<i>BH</i>	−65.24	−57.28	−7.961	4.511
<i>BS</i>	113.35	159.1	−45.80	23.53
<i>INDD</i>	628.26	482.7	145.49	117.5
<i>DUA</i>	−170.33	−152.7	−17.61	23.81
<i>FS</i>	10.93	8.699	2.237	1.052
<i>FATTA</i>	29.88	52.12	−22.23	34.26
<i>EBITTA</i>	−107.5	−85.25	−22.29	17.00
<i>CATCL</i>	−472.1	−412.2	−59.81	30.67
<i>DepTTA</i>	−0.128	0.158	−0.274	0.164
<i>MVTBV</i>	−0.021	−0.027	−0.000	0.000
<i>FA</i>	−0.069	−0.081	0.005	0.007
Chi2(8)			5.14	
Prob. > chi2			0.742	

Note: Number of observations = 503, period: 2008–2019.

Table 6d Hausman test: fixed or random effect of *LTDA*

	<i>Fixed</i>	<i>Random</i>	<i>Difference</i>	<i>SE</i>
<i>BH</i>	−85.54	−74.07	−11.466	5.488
<i>BS</i>	146.6	204.08	−57.40	28.69
<i>INDD</i>	902.9	646.60	256.30	143.05
<i>DUA</i>	−218.9	−196.9	−22.01	28.95
<i>FS</i>	14.51	11.57	2.943	1.279
<i>FATTA</i>	53.93	58.83	−4.898	41.91
<i>EBITTA</i>	−141.3	117.2	−24.056	20.66
<i>CATCL</i>	−615.3	−535.6	−78.726	37.31
<i>DepTTA</i>	−0.134	2.941	−2.147	1.103
<i>MVTBV</i>	−0.031	−0.019	−0.031	0.012
<i>FA</i>	−0.685	−0.031	−0.038	0.092
Chi2(8)	5.66			
Prob. > chi2	0.685			

Note: Number of observations = 503, period: 2008–2019.

5.2 Hypotheses testing

The developed models to examine the impact of corporate governance on financial leverage would be examined using fixed regression effects. The hypotheses of the model are examined in Table 7.

The results of the data are shown in Table 7 using multiple regressions with cross-sectional panel regression technique to examine the hypotheses of the econometric

models. The analysis of the data needs to be applied using a non-parametric test that matches the non-normal distributed of the non-parametric data.

Table 7 Fixed-effects regression

<i>Dep.</i>	<i>DTE</i>		<i>MKL</i>	
<i>Var.</i>	<i>Coef.</i>	<i>T-value</i>	<i>Coef.</i>	<i>T-value</i>
<i>BH</i>	0.003	0.79	−0.000	−0.36
<i>BS</i>	−0.004	−0.27	−0.008***	−2.90
<i>INDD</i>	1.752***	3.64	0.120*	1.51
<i>DUA</i>	−0.183**	−1.86	−0.034**	−1.87
<i>FS</i>	−0.018	−0.16	−0.000	−0.02
<i>FATTA</i>	1.133***	4.41	0.138***	2.86
<i>EBITTTA</i>	−0.451	−1.26	−0.157**	−2.28
<i>CATCL</i>	0.000	0.02	−0.157***	−3.15
<i>DepTTA</i>	−0.143	−0.07	−0.118	−0.31
<i>MVTBV</i>	−0.050*	−1.65	−0.033***	−5.78
<i>FA</i>	−0.025***	−2.72	−0.023	−0.196
_cons	−0.949	−1.06	0.399**	2.37
R square	0.20		0.18	

Notes: *** $p \leq 0.01$, ** $p \leq 0.05$ and * $p \leq 0.10$.

Number of observations = 503, number of groups (panels) = 7 obs. per group,
min. = 40, average = 41, max. = 42.

The results show that there an insignificant positive relationship between *DTE* and blockholders. However, *MKL* is negatively significant to blockholder ownership. The result of the dependent variable *DTE* is consistent with Demsetz and Lehn (1985) examinations who argued that there is a direct relationship between block holders' ownership and firms' financial leverage. However, the results are not in line with Yassen and Al-Alamaneh (2015) which argued a positive significant relationship between large owners' holdings and leverage. The Egyptian firms listed in the stock market which have concentrated ownership have no significance on the risky decisions for the accounting data to maximise their wealth. In the contrary, blockholder ownership has indirect relationship on the marketing measures taking in consideration the changes that should occur for the market value of stocks.

The coefficients of the test show a negative relationship between board size and the two proxies of firms' leverage. *MKL* is negatively strong significant with board size and debt to equity has negative insignificant relationship with board size, the significance relationship between board size and leverage is not in line with the results reached by Alam and Shah (2013) and Simpson and Gleason (1999). However, the results are consistent with the study done by Abobakr and Elgiziry (2016) on the Egyptian listed non-financial firms, their study argues significant negative association between board size and financial leverage. Other studies do not show any significant relationship between board size and financial leverage (Tawfeeq et al., 2018). The results of our study show that the changes of the number of board members have influence on firms' financial leverage.

With regards to the role of duality, the findings show that there is a significant negative relationship between duality and *DTE*. Besides, *MKLIV* shows a negative significant relation with duality. The findings are not consistent with the examinations made by Simpson and Gleason (1999) and Alam and Shah (2013). In addition, the results are not consistent with Pham and Nguyen (2019) which argues insignificant relation although their study reached a negative relationship too. Moreover, the results are not consistent with the results reached by Abobakr and Elgiziry (2016) which argues positive insignificant relation with duality. Jensen (1993) shows the positive effect of the role of duality on firm's leverage. Where, when the two positions CEO and chairman are held by the same person, this would give him the power to avoid risky actions.

Firms' leverage indicators like debt to equity have positive significant relationship with independency of board. furthermore, *MKLIV* has a positive significant relationship with the presence of independent directors, which means that the changes that occur in firms' leverage could be explained due to the presence of independency of directors. The findings are in line with the results reached by Pham and Nguyen (2019) which argues that board independence has a significant direct impact on financial leverage. Same results have been reached by Younas and Kassim (2020). However, the findings are not in line with the results reached by Alam and Shah (2013), and Simpson and Gleason (1999) that no significant relation found between independency of board members and firm leverage. Also, the results are not consistent with the outcome reached by Abobakr and Elgiziry (2016), which shows a negative insignificant relationship between board non-executive and financial leverage that was done on the Egyptian firms over the period 2007–2011.

Table 8 Random-effects regression

<i>Dep.</i>	<i>LTDC</i>		<i>LTDA</i>	
<i>Var.</i>	<i>Coef.</i>	<i>T-value</i>	<i>Coef.</i>	<i>T-value</i>
<i>BH</i>	−0.001	−0.32	0.000*	1.49
<i>BS</i>	0.024	0.94	−0.005***	−2.68
<i>INDD</i>	2.035***	2.98	0.191***	3.03
<i>DUA</i>	−0.275**	−1.73	−0.014	−1.14
<i>FS</i>	0.094	0.76	0.037**	2.46
<i>FATTA</i>	1.645***	3.94	0.137***	4.06
<i>EBITTA</i>	−0.663	−1.15	−0.098**	−2.09
<i>CATCL</i>	−0.002*	−0.06	−0.005*	−1.73
<i>DepTTA</i>	−1.485	0.45	−0.178	−0.07
<i>MVTBV</i>	−0.111**	−2.28	−0.005	−1.37
<i>FA</i>	−1.734***	−4.62	−0.005***	−4.13
_cons	−1.471	−0.96	−0.044	−0.43
R square	0.24		0.23	

Notes: *** $p \leq 0.01$, ** $p \leq 0.05$ and * $p \leq 0.10$.

Number of observations = 503, number of groups (panels) = 7 obs. per group,
min. = 40, average = 41, max. = 42.

Table 8 examines the impact of corporate governance determinants on firms' financial leverage, but this time the study examines another two proxies of financial leverage

which long-term debt to capital employed (*LTDC*) and long-term debt to total assets (*LTDA*). The usefulness of this is to widen the study and test the relationships from different angles.

The results show that there is a significant positive relationship between financial leverage and blockholders. The indicators of firm's financial are positively related with blockholder ownership. Blockholder determinant is positively insignificant with *LDTC* and is weakly positively significant with *LTDA*. These results are consistent with Demsetz and Lehn (1985) examinations who argued that there is a direct relationship between block holders' ownership and firms' financial leverage. The Egyptian firms listed in the stock market which have concentrated ownership have a significance on the risky decisions to maximise their wealth.

The coefficients of the test show a negative significant relationship between board size with one of the proxies of firms' leverage. *LDTC* is positively insignificant with board size and *LTDA* has a moderate negative significant relationship with board size, the significance relationship between board size and leverage is not in line with the results reached by Alam and Shah (2013) and Simpson and Gleason (1999). The results show that as the changes of the number of board members has no influence on firms' financial leverage.

With regards to the role of duality, the findings show that there is insignificant negative relationship between duality and one of firms' financial leverage indicators, and positive significant relationship with the indicator. *LTDA* shows a negative insignificant relation with duality. Moreover, *LTDC* is positively significant with duality. The findings are not consistent with the examinations made by Simpson and Gleason (1999) and Alam and Shah (2013). Jensen (1993) shows the positive effect of the role of duality on firm's leverage. Where, when the two positions CEO and chairman are held by the same person, this would give him the power to avoid risky actions.

Firms' leverage indicator like *LTDA* has strong positive significant relationship with independency of board. While, *LTDC* has positive insignificant relationship with the presence of independent directors, which means that the changes that occur in firms' leverage could be explained due to the presence of independency of directors. The findings are not in line with the results reached by Alam and Shah (2013) and Simpson and Gleason (1999) that no significant relation found between independency of board members and firms' leverage.

To check the results' robustness and sensitivity to alternative specifications, the fixed OLS regression is utilised in Table 9.

The main objective of the sensitivity analysis is to show to what extent the results and findings are sensitive towards the changes in statistical tests. The findings show that the OLS regression has almost the same strength of the main panel data regression. The sensitivity tests show the same significant and insignificant relationships between the determinants of firms' financial leverage with corporate governance determinants.

The findings of the OLS regression showed that the results of the panel data analysis are not sensitive to changing the tests type. As a result, the elected panel data analysis is fitting fit with the examined data. In addition, the findings and results of the sensitivity analysis verify the reliability of the results which sustain the generalisation of those results.

Table 9 OLS regression

Dep. Var.	DTE		MKLV		LTDA		LTDC	
	Coeff.	T-val.	Coeff.	T-val.	Coeff.	T-val.	Coeff.	T-val.
<i>BH</i>	0.002	1.15	0.000	1.4	0.000***	3.29	0.000	0.23
<i>BS</i>	0.000	0.10	0.003	1.41	0.000	0.12	-0.010	-0.73
<i>INDD</i>	0.569**	2.31	0.102*	1.61	0.079*	1.89	0.068	0.16
<i>DUA</i>	-0.107*	-1.48	0.094***	4.92	-0.018*	1.63	-0.069	-0.59
<i>FS</i>	-0.024	-0.49	-0.007	0.48	-0.001	0.2	-0.108	-1.09
<i>FATTA</i>	0.739***	4.90	0.214***	5.13	0.168***	6.9	0.903***	3.59
<i>EBITTA</i>	-0.441	-1.59	-1.65	1.02	-0.100***	2.45	-0.132	-0.31
<i>CATCL</i>	-0.274	-1.15	-0.033***	5.28	-0.008*	2.19	-0.065	-1.69
<i>DepITTA</i>	6.677***	5.48	0.159	0.5	0.937***	4.98	5.929***	3.01
<i>MVIBV</i>	0.028	1.22	-0.041***	6.53	0.005	1.55	0.017	0.45
<i>FA</i>	-0.290**	-1.94	-0.135**	2.23	-0.112***	3.15	-0.031	-2.37
_cons	0.671	1.32	0.301	2.27	0.062	0.8	1.504**	2.06
R-square	0.169		0.318		0.265		0.124	

Notes: *** $p \leq 0.01$, ** $p \leq 0.05$ and * $p \leq 0.10$.
Number of observations = 503. For the period 2008–2019.

The results in Table 8 shows that there is a positive significant relationship between financial leverage determinant (*LTDA*) and blockholder ownership, and insignificant positive relationship with *DTE*, *MKL**V* and *LTDC*. Besides, a positive significant relationship between financial leverage determinants (*LTDA*) and independent directors, and positive insignificant relationship with *DTE*, *MKL**V* and *LTDC*.

Furthermore, board size showed a positive insignificant relationship with the financial leverage proxies. And finally, duality showed a positive strong significant relation with *MKL**V* and weak negative significant relation with *LTDA*.

6 Conclusions

In this study, as the literature suggests a pivotal role of corporate governance attributes on financial risk, we investigate the effect of corporate governance on financial risk for companies listed in the Egyptian stock market over more than a decade spanning from 2008 through to 2019. We examine disaggregated attributes of corporate governance such as board size, concentrated ownership, independent directorship and duality role and their relationship with firm's financial leverage. Using a panel data regression analysis, our results suggest that while board size is negatively associated with financial risk, blockholder ownership is positively correlated with financial leverage, albeit the magnitude of the relationships is relatively marginal in both cases. Interestingly, our findings also indicate that board independence not only has a positive and statistically significant effect on financial leverage but also has the greatest influence on financial leverage. The estimated parameters for the duality variable, however, show that duality role has a relatively moderate effect on the firm's financial risk.

Overall, the findings from this study indicate that in a context where there is a weak institutional environment such as in Egypt, internal corporate governance mechanisms within organisations could play a particularly essential role in the risk-taking activities of the firms. Moreover, in the light of the prevalence of family-owned businesses in the Egyptian market, the results also appear to suggest that firms could further benefit from stronger corporate governance code.

While this research sheds more light on the effect of corporate governance attributes on the financial risk of firms in an emerging market context, there are a number of caveats to be borne in mind. First, there are data availability constraints associated with limited data on active firms in the Egyptian stock market available for a sufficiently long period of time to be included in the sample. Also, future studies could incorporate the role of compensation schemes on the dynamics between corporate governance and risk-taking activities of firms as such schemes could have influenced the relationship between the explanatory variables and the firm's financial risk (see, for example, Florackis and Ozkan, 2009; Agha, 2013; Tao and Hutchinson, 2013).

Egyptian firms should consider the different effects of corporate governance characteristics on its capital structure which in turn will have an impact on the firms' value to endure and grow globally. Accordingly, our study provides some recommendation for the Egyptian policy makers; as the role of the independent directors is significant in the deciding how the Egyptian firms could gear their finance, so it is crucial for the Egyptian policy maker to create a system based on a strict selection of the independent directors to enhance their role. Moreover, consider the importance of the

structure of duality of the Egyptian firms as they have a significant impact on avoiding relying on financial leverage or taking risky actions which could not be always for the best interest of the shareholders. In addition, the Egyptian policy maker should establish a supervision and monitoring system of firms with large ownerships to guarantee that interest of minor shareholders which in turn would motivate investors to trade on these types of companies of such capital structure.

Although this paper contributes to the literature and helps us gain more insight into the various factors influencing the firms' financial leverage in emerging market, it would be interesting to further examine the role of incentive schemes in the context of emerging markets when such data become more widely available in the future.

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