CORPORATE GOVERNANCE MECHANISMS AND CAPITAL STRUCTURE IN A TWO-TIER BOARD SYSTEM: THE ROLE OF BOARD GENDER DIVERSITY

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Abstract

This study sought to investigate the relationship between capital structure and corporate governance variables, with an emphasis on the moderating effect of gender diversity on the board on the relationship between capital structure and corporate governance mechanisms in a two-tier board structure (Indonesia). Utilizing a sample of 384 non-financial firms listed on the Indonesia Stock Exchange (IDX) from 2012 to 2021, this study generated 3,836 observations to evaluate hypotheses regarding the impact of the board of directors (BOD), board of commissioners (BOC), and the proportion of independent commissioners (PIC) on capital structure, as proxied by the debt-to-asset ratio (DAR) and long-term debt-to-asset ratio (LTD). Furthermore, it examined the moderating role of gender diversity in the relationship between corporate governance mechanisms and capital structure metrics. Panel data regression analysis, which comprised a fixed-effects (FE) model with clustered standard errors, was used to analyse the data. The study found no significant relationship between the corporate governance mechanisms and DAR. However, the BOD and the BOC significantly affect LTD. Incorporating gender diversity as a moderator revealed a significant enhancement in the linkage between corporate governance practices and financial leverage measures. Negative and notable associations were observed when moderated by gender diversity, indicating an amplified influence in the presence of female board members.

Keywords: Corporate Governance, Gender Diversity, Capital Structure, Indonesia

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1. INTRODUCTION

Recent attention from academics and practitioners has increasingly focused on corporate governance issues, particularly regarding their impact on key organizational decisions, notably in financing. Corporate governance, rooted in agency theory (Jensen, 1986), aims to align shareholder interests by ensuring managers (agents) effectively fulfill their duties. Its primary function is to reduce agency conflicts that result from an organization's division of ownership and control (Harjayanti, Suherman, et al., 2024). Jiraporn et al. (2012) contended that organizations with robust governance structures are likely to experience fewer agency conflicts. Moreover, effective corporate governance can enhance market value and reduce information asymmetry through improved disclosure practices, potentially improving management quality and overall firm performance (Miloud, 2022; Alotaibi & Al-Dubai, 2024). Notably, strong governance may facilitate access to external debt financing (Liao et al., 2015).

According to agency theory, an escalation in debt reduces the proportion of equity financing, thereby diminishing agency conflicts between managers and shareholders (Jensen & Meckling, 1976). However, higher debt levels also elevate financial distress risk and bankruptcy, which, in turn, increase agency costs as measures are implemented to minimize conflicts between shareholders and managers (Amin et al., 2022). Therefore, determining an optimal capital structure is crucial for minimizing agency costs and enhancing company value (Yeboah et al., 2024).

The nature of the nexus between corporate governance and capital structure decisions has been the subject of numerous studies over the past few decades. Nevertheless, the results are still unclear. According to studies on the subject, board size has an unfavorable influence on capital structure. Examples of these studies include those by Abobakr and Elgiziry (2016), Meah (2019), Berger et al. (1997), and Hasan and Butt (2009). According to these studies, managers' decision-making authority is diminished by a larger board, which also prefers equity to debt in the company's capital structure, lowering leverage and future default risk. In contrast, studies by Zaid et al. (2020), Amin et al. (2022), Gill et al. (2012), and Saad (2010) have demonstrated unequivocal results that board size significantly and positively impacts the firm's financing decisions. Usman et al. (2019) highlighted that an extensive board size correlates with elevated debt costs, suggesting that the disadvantages of larger boards, such as the cost of inefficient communication, may outweigh their advantages.

Regarding the nexus between independent directors and capital structure, several studies, including those by Amin et al. (2022), Zaid et al. (2020), Bokpin and Arko (2009), and Laksana et al. (2024), revealed a positive relationship. These studies suggest that outside independent directors tend to favor issuing debt to prevent managers from misusing free cash flows, as they align more closely with shareholder interests (Berger et al., 1997). Additionally, a company's access to outside funding may be facilitated by the networks of independent directors, who are likely to have more expertise and information (Nguyen et al., 2021). On the other hand, Wen et al. (2002) and Dimitropoulos (2014) found a negative correlation between leverage and the number of independent directors, arguing that managers choose to employ less leverage in reaction to stricter governance requirements.

Furthermore, the moderating effect of other dimensions, particularly board gender diversity in two-tier board structures, has not been factored into the majority of recent research that has examined the relationship between corporate governance and capital structure. Therefore, it is imperative that scholars investigate previously unexplored areas to obtain new insights into capital structure that go beyond conventional perspectives, particularly in nations with a two-tier board structure (e.g., Indonesia). Due to more oversight, strong independence, and diligence, having women on boards improves communication and idea exchange among board members (Schippers et al., 2003; Li & Li, 2020), reduces systemic biases, and diversifies networks (Bass, 2019). As a result, the presence of women on boards will influence how the members of the board influence the capital structure of the company. The influence of board size and independent directors on a company's capital structure in Pakistan (a country with a one-tier board system) is considerably mitigated by board gender diversity, according to Amin et al. (2022). Therefore, in order to shed light on the relationship between corporate governance and capital structure in the Indonesian setting (two-tier board system), our study uses the participation of women on the board as a moderating variable.

To the best of the authors' knowledge, this study is among the first to examine how gender diversity on boards influences the relationship between capital structure and corporate governance practices in emerging economies, specifically in Indonesia. Indonesia's unique legislative framework, fluctuating corporate governance environment, and quickly shifting economic conditions make it an interesting case study for this investigation. Being Southeast Asia's largest economy, the nation has undergone significant financial reforms with the goal of improving corporate governance. However, governance challenges persist, with varying levels of compliance among firms. Additionally, Indonesia's business culture, characterized by concentrated ownership (Utama et al., 2017) and family-controlled firms (Brahmana et al., 2019), offers an interesting context for examining the role of board gender diversity in financial decision-making. Given these factors, Indonesia provides a valuable setting to explore how governance mechanisms influence capital structure and how gender diversity on boards moderates this relationship, contributing to the broader understanding of governance practices in emerging markets. Two important concerns are especially addressed in this study:

RQ1: Do corporate governance mechanisms influence capital structure?

RQ2: Does the link between corporate governance mechanisms and capital structure get moderated by gender diversity on the board?

In order to answer these issues, we examined data from 384 publicly listed companies (PLCs) that were listed between 2010 and 2021 on the Indonesia Stock Exchange (IDX). The findings indicate that corporate governance mechanisms, measured by the board of directors (BOD) and board of commissioners (BOC), significantly and positively affect the capital structure leverage, specifically measured by long-term debt-to-assets (LTD). Furthermore, gender diversity on the board

significantly moderates the relationship between corporate governance mechanisms (BOD, BOC, and the proportion of independent commissioners [PIC]) and capital structure leverage, as gauged by debt-to-asset ratio (DAR) and LTD. A robustness check was performed in order to confirm and validate the results of the initial analysis. It is noteworthy that the outcomes of these extra checks maintained the validity of the conclusions reached by being in agreement with the results of the primary study.

This study adds in a number of ways to the body of knowledge already available on capital structure and corporate governance. Initially, it presents gender diversity as a moderating factor in the relationship between capital structure and corporate governance in emerging countries, particularly Indonesia (which has a two-tier board arrangement). As far as the authors are aware, gender diversity in this moderating role has not been examined in earlier research done in emerging economies, particularly Indonesia. Second, this study uses two different ratios — DAR and LTD — to obtain a thorough, comprehensive knowledge and deep insights into the capital structures of the organizations under investigation. This approach integrates the methodologies of previous studies, such as those by Amin et al. (2022) and Zaid et al. (2020), which only utilized the DAR ratio. Third, in contrast to earlier studies on the relationship between corporate governance and capital structure in Indonesia, this study is predicated on a larger sample size and a longer observation period (3,836 observations from 2012 to 2021). Fourthly, it adds empirical support to the literature on corporate governance by concentrating on Indonesia, a developing and civil law nation that offers a different economic, cultural, legal, and social landscape than the developed and common law nations where most prior research has been done.

The remainder of this study is structured as follows. Section 2 examines the literature and develops the hypotheses to be tested. Section 3 explains the analytical model and the variables that are part of it. Section 4 presents the data, the primary descriptive statistics, empirical analysis, robustness tests, and a discussion of the findings. The final Section 5 concludes the study and the implications.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

2.1. Agency theory

Agency theory was developed by Jensen and Meckling (1976) and states that an agency relationship is a contract between a principal (owner) and an agent (manager) to carry out a service for the benefit of the owner, involving the delegation of decision-making authority to an agent. The separation between management and ownership has the potential to cause conflicts when there are differences in interests between owners and managers (Altaf et al., 2021). Agency conflicts will arise when the manager only focuses on pursuing their personal interests at the expense of the interests of the shareholders (Amin et al., 2022). This gives rise to agency costs, to supervise agents to act in accordance with the interests of the owner. Such agency costs can be reduced in several ways, according to agency theory; one of these is by deciding on the company's capital structure. According to agency theory, debt financing in capital structure can reduce agency costs derived from managers and shareholders (Jensen, 1986). The use of debt will force the company to pay future cash flows to creditors, thus avoiding the potential for excessive investment and consumption due to abundant free cash flow (Vo & Nguyen, 2014). In addition, funding with debt will also prevent existing shareholders from the risk of dilution of control by the company, as well as the transfer of wealth to new shareholders (Zaid et al., 2020).

According to agency theory, firms will have more options to secure external funding if they have robust corporate governance and improved rights for creditors and shareholders (Nguyen et al., 2021; La Porta et al., 1997). The existence of mechanisms that can monitor the performance of managers in order to act ethically, protect the interests of investors and create information transparency (in the form of good corporate governance) can help to reduce agency conflicts (Ibrahim & Demi Pangestuti, 2022). By implementing good corporate governance, managers will adopt capital structure decisions that can maximize shareholder interests (Nguyen et al., 2021).

2.2. Indonesian corporate governance system

The corporate governance system of Indonesia is distinguished by a two-tier board structure, which contrasts with most Southeast Asian countries (e.g., Thailand, Singapore, Malaysia, Laos, Brunei, Cambodia, and Myanmar) that use a one-tier board structure (Soomro & Hanafiah, 2022). One significant difference from the other economies using a dual-tier board framework (e.g., Germany, France and the Netherlands) is that Indonesia requires the two-tier board regardless of a company's listing, type, or size (Government of Indonesia, 2007). By contrast, only Dutch public companies and German stock corporations are mandated to have a two-tier board structure (Kamal, 2008). Table 1 shows differences between the Indonesian corporate governance system and the common one-tier and two-tier system based on matrices developed by Federo et al. (2020).

Table 1. Corporate governance system comparison

Board duty	*Indonesian two-tier system*	*One-tier system (e.g., US, UK)*	*German two-tier system*
Oversight	BOC (separate board)	Non-executive directors	Supervisory board
Resource allocation	BOD (executive board)	Executive directors	Management board
Strategic participation	BOC (advisory) and BOD (implementation)	All directors	Supervisory board (approval) and management board (implementation)

Indonesia's corporate governance framework, which was influenced by Dutch civil law, has a dual board structure. The BOD and the BOC are the two groups of board members that fall under this structure. The BOCs are comparable to the non-executive or supervisory boards in common law countries. Monitoring and advising the BOD is its primary duty. The executive boards, often known as

the BODs, are in charge of overseeing the regular activities of a corporation, in their best interests, and advocating on its behalf in court (Arifai et al., 2018). The chief executive officer (CEO) serves as the President Director (Chairman) on the BODs, which are made up of all the executive directors. Concerns of duality between the chair and the CEO do not exist, in contrast to the unitary board structure. Referring to the concept of an independent director that applies in common law countries, if this is translated into Indonesian company law, the concept of an independent director who is a non-executive director is actually the same as an independent commissioner in countries with a Continental European legal system that adopts two-tier systems (Supriatna & Ermond, 2019). Consequently, the term "corporate governance variables" in this study refers to BODs, BOCs, and independent commissioners.

2.3. Hypotheses development

One important internal governance tool that may influence agency costs and financial choices, like capital structure, is an efficient BOD. According to Lipton and Lorsch (1992), board size has been strongly stressed as a crucial factor in corporate governance effectiveness. Federo et al. (2020) separated the responsibilities of the board into three main groups: 1) strategic involvement, 2) resource allocation, and 3) supervision. According to La Porta et al. (2000), a greater number of board members may enhance firm value, alleviate principal-agent problems through improved oversight, and reduce agency-related conflicts. In contrast, Lipton and Lorsch (1992) contended that, as boards become larger, they lose some of their effectiveness and become more sensitive to CEO influence. As a result, with larger boards, the decision-making issues are more severe.

The nexus between capital structure and corporate governance has been examined in the burgeoning research. According to research by Jiraporn et al. (2012) and Berger et al. (1997), businesses with sound corporate governance minimize debt usage and outperform those with poor corporate governance. By contrast, Abobakr and Elgiziry (2016) argued that the larger the BODs, the more effective the exclusive monitoring and pressure on management for the company's funding decisions. Larger BOD sizes will facilitate the company's use of more debt for funding and help it make the best decision for shareholders because of close monitoring and the loss of asymmetric information. This will influence managers' decisions and force them to pay for future cash flows by restricting the amount of money they can spend in line with their policies, which will ultimately increase the company's worth (Feng et al., 2020). A larger board should be associated with more leverage, according to Jensen (1986), because debt is a helpful instrument for controlling the agency costs of free cash flow.

There are conflicting results from the literature regarding the connection between capital structure and board size. According to a number of studies (Meah, 2019; Abobakr & Elgiziry, 2016; Berger et al., 1997), a larger board limits managers' ability to make decisions and favours adding more equity to the company's capital over debt, which lowers leverage and lowers the risk of future default. On the contrary, a prior study by Zaid et al. (2020) looked at the relationship between board characteristics and a company's financing choices for non-financial listed companies in Palestine and showed without a doubt that board size has a positive and significant influence on a company's financing choices. Similarly, Usman et al. (2019) found that an extensive board size correlates with elevated debt costs, suggesting that the burden of flawed communication is greater than the benefits of larger boards. Prior research by Saad (2010), Amin et al. (2022), and Gill et al. (2012) provided additional support for these conclusions. According to the empirical study and theoretical explanations presented, the first and second hypotheses might be stated as follows:

H1: A board of directors' size is positively related to a firm's capital structure leverage.

H2: A board of commissioners' size is positively related to a firm's capital structure leverage.

According to agency theory perspectives, having a high percentage of independent directors on the board strengthens the firm's ability to defend itself against risks, particularly insolvency. According to Fan et al. (2019), independent directors are regarded as an effective corporate governance mechanism. They are able to make effective governance decisions by closely monitoring the activities of top management due to their independence from management, expertise, and diverse perspectives (Weisbach, 1988). According to some studies, there is a positive relationship between independent directors and leverage (Zaid et al., 2020; Amin et al., 2022; Bokpin & Arko, 2009). Since independent directors are in line with the interests of shareholders, they try to dissuade managers from using free cash flows by issuing debt (Berger et al., 1997). Additionally, since independent directors are likely to possess greater knowledge and information, their network may make it simple for a company to get external capital (Nguyen et al., 2021). On the other hand, Dimitropoulos (2014) and Wen et al. (2002) reported a negative relation between independent directors and leverage and asserted that managers choose to use less leverage in response to higher governance measures. Taking the preceding discussion into account, the authors formulated the next hypothesis to suit the Indonesian context:

H3: The proportion of independent commissioners is positively related to the firm's capital structure leverage.

Agency theory suggests that a more diverse board is more likely to be independent and more capable of regulating managers' choices (Liandy et al., 2024; Carter et al., 2010). The more power and independence the board has, the more heterogeneity it will have because of the participation of diverse genders on the board (Adams & Ferreira, 2009). As a result, the proportion of women on the BOD might influence how its attributes influence the company's capital structure. Additionally, choosing board members based on their gender diversity may have an impact on funding decisions. Therefore, the impact of board characteristics like size and independence on the company's capital structure is likely to be stronger when the board comprises an equal representation of men and women (Zaid et al., 2020). Because females tend to be more cautious when taking risks, they perform supervision duties with greater strictness (Ahmad

et al., 2024; Muttaqin, 2023; Sabila et al., 2023). As a result, females are more likely to develop positive relationships with other stakeholders, which can promote the efficacy of the board and the application of good corporate governance (Mathew et al., 2020). Therefore, the possibility of agency conflict can be reduced.

Based on the aforementioned considerations, the authors theorize that having female members on a board satisfies the required degree of governance and enhances the board's qualities because of their strong independence and improved oversight of management's actions. Consequently, a company's debt decisions will be made. In particular, firms may be able to better manage their financial strategies when women and men are equally represented on the board. Thus, the subsequent hypotheses can be stated:

H4a: The influence of the board of directors' size on a firm's capital structure leverage is more pronounced in companies that have female representation on the board.

H4b: The influence of the board of commissioners' size on a firm's capital structure leverage is more pronounced in companies that have female representation on the board.

H4c: The influence of the independent commissioners on a firm's capital structure leverage is more pronounced in companies that have female representation on the board.

3. RESEARCH METHODOLOGY

3.1. Sample

The study's subject population included all PLCs that were listed between 2012 and 2021 on the IDX. Secondary data, which came from the annual reports and financial statements of each business that made up the research sample, was used in this study. These statistics were gathered from the annual reports of each of the sample companies as well as those accessible on the IDX's official website. The data employed in this analysis were of a panel nature, amalgamating both time-series and cross-sectional datasets. However, this panel data is characterized as being unbalanced, owing to variances in the time-series length across different cross-sectional units.

The selection of the research sample was conducted using purposive sampling, subject to several criteria. Firstly, the companies must be publicly listed on the IDX. Secondly, these companies must have been continuously listed on the IDX from 2012 to 2021. Thirdly, the companies selected should not operate within the financial sector or related industries. Lastly, the companies must possess complete financial data for the duration under review. A more detailed account of the sample selection process is provided in Table 2.

Table 2. Sample selection procedure

No.	*Sample generation procedures*	*No*	*Percentage*
1	PLCs in IDX by December 2021	766	100.00%
2	Removal of financial and banking industry companies	(105)	(13.71%)
3	Exclusion of firms that lacked the complete data necessary for this research	(277)	(36.16%)
4	Firms that fulfill the criteria and consistently appear throughout the observation period	384	50.13%

3.2. Research variables

3.2.1. Dependent variables

The dependent variable under investigation in this study was capital structure leverage, which included two different metrics: *LTD* and *DAR*. Kumala et al. (2024), Altaf et al. (2021), Laili and Dalimunthe (2022), and Zaid et al. (2020) conducted earlier studies that served as the foundation for the use of these measurements. The ratio of long-term debt-to-assets is shown by *LTD*, whereas *DAR* is the percentage of debt-to-assets. The use of these disparate measures resulted from the understanding that *DAR* does not distinguish between short-term and long-term debt, but *LTD* does, and that this difference significantly influences investment choices (Aivazian et al., 2005).

3.2.2. Independent variables

This study considered three key variables related to corporate governance within its framework. First, according to Roffia et al. (2022), the size of the *BOD* indicated the total number of directors on the board. According to Law No. 40 of 2007, this branch of the corporation is in compliance with the law since it is in charge of overseeing and representing the business both publicly and internally. Second, the number of commissioners that make up the *BOC* was determined by the *BOC* size (Utama & Utama, 2019). According to the company's articles of association, this body is tasked with supervisory duties and provides direction to the directors in line with Law No. 40 of 2007.

Lastly, the *PIC* variable pertained to members of the *BOC* who were deemed to be "independent". The ratio of the number of independent commissioners to the total number of commissioners is used to calculate this variable. The criteria align with the legal stipulations detailed in Law No. 40 of 2007 and are supported by Utama and Utama (2019), Kusumaningtyas (2022), and Zakaria et al. (2022).

3.2.3. Moderating variable

In assessing the moderating variable related to gender diversity, the proportion of females serving on the *BOD* was utilized as a measure of gender diversity (*GD*). This metric quantifies the ratio of female board members to the total number of board members and aligns with previous research by Oktafiani and Kurnianti (2023), Buchdadi et al. (2023), Ahmad et al. (2022), and Suherman et al. (2021). This metric was employed to gauge the moderating influence of gender diversity on the relationships between corporate governance variables and capital structure within the scope of this research.

3.2.4. Control variables

The authors acknowledge the inherent potential for endogeneity in the proposed empirical models. The presence of correlations between explanatory variables and the error term may introduce bias to

this study's estimated results (Rohim et al., 2024; Siregar et al., 2024). In a proactive effort to mitigate this concern and address the issue of endogeneity, the authors deliberately incorporated a set of control variables into the analysis (aiming to counteract omitted correlated variable bias) (Dalimunthe & Sabila, 2023; Siregar et al., 2023). The chosen control variables encompass firm size (*SIZE*), firm growth (*GROWTH*), firm age (*AGE*), and return on assets (*ROA*) (see Table 3). It is noteworthy that the inclusion of these control variables in this study aligns with established practices in prior research within the field of capital structure. These variables, having been scrutinized and documented in previous studies, are recognized for their associations with a company's capital structure (Alves et al., 2015; Bajagai et al., 2019; Murdayanti et al., 2020; Laili & Dalimunthe, 2022; Kusumaningtyas, 2022; Mardiyati & Siregar, 2022; Harjayanti et al., 2023; Harjayanti, Juniansah, et al., 2024; Verawati et al., 2023).

Table 3. Specification of variables

No.	*Variables*	*Description*	*Calculation method*	*Type of data*	*Sources*
1	*DAR*	Debt-to-assets ratio	Total debt / Total assets	Continuous	IDX
2	*LTD*	Long-term debt-to-assets	Long-term debt / Total assets	Continuous	
3	*BOD*	Board of directors size	The number of directors on the board	Discrete	
4	*BOC*	Board of commissioners size	The number of commissioners on the board	Discrete	
5	*PIC*	Independent commissioners	Percentage of independent commissioners	Continuous	
6	*GD*	Proportion of women on the board	The proportion of women on the BOD compared to the number of board members	Continuous	
7	*SIZE*	Firm size	Ln (Total assets)	Continuous	
8	*GROWTH*	Firm growth	(Total assets *t* - Total assets *t* - 1) / Total assets *t* - 1	Continuous	
9	*AGE*	Firm age	How long has it been since the company was founded until the observed research period	Discrete	
10	*ROA*	Return on assets	Net income / Total assets	Continuous	

4. RESULTS AND DISCUSSION

4.1. Descriptive statistics

Reflecting upon the research findings, this section presents the descriptive statistics pertaining to the principal variables examined. It is imperative to acknowledge that the continuous variables underwent scrutiny to mitigate potential econometric issues attributable to extreme values or outliers within the study's dataset. Consequently, pertinent statistics were detailed, including the mean, standard deviation, minimum, and the 25th, 50th, and 75th percentiles, alongside the maximum values for each variable. Table 4 provides a comprehensive overview of these descriptive statistics in the analysis.

Table 4. Data summaries

No	*Variables*	*Obs.*	*Mean*	*Std. dev.*	*Minimum*	*p.25th*	*p.50th*	*p.75th*	*Maximum*
1	*DAR*	3,836	0.297	0.406	0.000	0.072	0.236	0.397	3.425
2	*LTD*	3,836	0.146	0.202	0.000	0.002	0.076	0.221	1.386
3	*BOD*	3,836	4.732	1.958	1	3	4	6	15
4	*BOC*	3,836	3.383	1.763	1	2	3	4	22
5	*PIC*	3,836	0.528	0.215	0.000	0.333	0.500	0.600	1.000
6	*GD*	3,836	0.134	0.182	0.000	0.000	0.000	0.250	1.000
7	*SIZE*	3,836	28.581	1.724	23.882	27.419	28.626	29.763	32.304
8	*GROWTH*	3,836	0.117	0.319	-0.485	-0.019	0.062	0.171	2.189
9	*AGE*	3,836	31.477	15.814	1	21	30	40	127
10	*ROA*	3,836	0.019	0.128	-0.679	-0.008	0.026	0.070	0.379

Note: Continuous variables (DAR, LTD, SIZE, GROWTH, ROA) have been winsorized at the 1% and 99% levels.

The descriptive statistical findings for the variables being examined are shown in Table 4. Four dependent variables, including *DAR* and *LTD*, were used in this study to quantify capital structure leverage. Specifically, the *DAR* averages at 0.297, or 29.7%. Additionally, the measurement for the duration of debt obligations (*LTD*) is 0.146.

Furthermore, the principal independent variable concerning the *BOD* indicates that, on average, companies have a board comprising four to five members. As for the *BOC*, both the mean and median numbers of members are approximately three. Another significant independent variable, the *PIC*, reveals that 52.8% of board members are independent commissioners. The moderating variable yields equally notable findings. For instance, the representation of female executives (*GD*) shows that, within 384 PLCs, merely 13.4% (0.134) of the board composition consisted of women. To curtail the risk of endogeneity and omitted variable bias, the analysis also incorporated control variables reflective of firm attributes, such as *SIZE, GROWTH, AGE*, and *ROA*.

4.2. Correlation analysis

The independent variables used in the estimations' pairwise correlations are shown in Table 5. Since none of the independent variables has correlation values higher than 0.75, there are no strong correlations that might cause multicollinearity problems or skew the results of the regression studies. This finding supports the assumption that the variables can be considered to be sufficiently independent for the purposes of this analysis, thus enhancing the reliability of the statistical results. Moreover, the low to moderate correlations suggest that each independent variable contributes uniquely to the model, providing distinct informational value to the study.

Table 5. Correlation matrix

Variables	*BOD*	*BOC*	*PIC*	*GD*	*SIZE*	*GROWTH*	*AGE*	*ROA*
BOD	1							
BOC	0.374***	1						
PIC	0.031*	-0.362***	1					
GD	-0.035**	-0.026	-0.027*	1				
SIZE	0.513***	0.384***	0.064***	-0.116***	1			
GROWTH	0.020	0.014	-0.017	0.014	0.090***	1		
AGE	0.134***	0.168***	0.014	-0.073***	0.118***	-0.085***	1	
ROA	0.176***	0.157***	-0.022	0.020	0.209***	0.262***	0.058***	1

*Note: A two-tailed test indicates statistical significance at the 1% (*** p < 0.01), 5% (** p < 0.05), and 10% (* p < 0.1).*

Table 5 presents a correlation matrix that shows the statistical relationships among Indonesian PLCs over a ten-year period between a number of corporate governance indicators, firm characteristics, and financial performance metrics. The sizes of the *BOD* and the *BOC* have a positive and significant correlation ($p < 0.01$, $r = 0.374$), suggesting that larger boards are a characteristic of larger corporate governance bodies. A slightly positive correlation has also been found between the *PIC* and the size of the *BOD* ($p < 0.1$, $r = 0.031$), indicating a subtle rise in independent oversight as board size increases. Interestingly, *BOD* size shows a slight negative correlation with *GD* on the board ($p < 0.05$, $r = -0.035$), hinting at a potential discrepancy between board expansion and the proportional representation of women.

Firm size, as measured by total assets, shares a strong positive correlation with both *BOD* ($p < 0.01$, $r = 0.513$) and *BOC* ($p < 0.01$, $r = 0.384$) sizes, implying that larger entities tend to establish more extensive governance frameworks. This correlation extends to the firm's financial metric, with *ROA* demonstrating a statistically significant positive correlation with the size of both the *BOD* ($p < 0.01$, $r = 0.176$) and *BOC* ($p < 0.01$, $r = 0.157$), reinforcing the premise that larger, potentially more robust boards correlate with stronger financial performance. Notably, firm growth lacks a significant association with governance measures but correlates positively with firm size ($p < 0.01$, $r = 0.090$) and even more strongly with *ROA* ($p < 0.01$, $r = 0.262$), thereby affirming the growth-profitability linkage.

The matrix also reveals that the age of a firm correlates positively with both *BOD* ($p < 0.01$, $r = 0.134$) and *BOC* ($p < 0.01$, $r = 0.168$) sizes, which suggests that older firms have a tendency towards larger governance structures. However, an inverse correlation between firm age and gender diversity ($p < 0.01$, $r = -0.073$) indicates a discrepancy between established firms and the incorporation of women into their boards. Moreover, a negative correlation between firm age and growth ($p < 0.01$, $r = -0.085$) suggests that longevity in the market might not always be synonymous with rapid expansion.

4.3. Main analysis

The panel regression analysis in this research, presented in Table 6, was conducted to explore the dynamics between corporate governance variables — specifically, the *BOD*s, the *BOC*s, and the *PIC*s — and capital structure metrics. This investigation scrutinized the interrelations of these governance variables with two differentiated measures of capital structure: *DAR* and *LTD*.

Table 6. Regression analysis of panel data with independent factors to investigate the dependent variables *DAR* and *LTD*

Variables	*Panel A: DAR*			*Panel B: LTD*		
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
BOD	0.0008			0.0060*		
	(0.1000)			(1.810)		
BOC		0.0050			0.008*	
		(0.6200)			(1.7200)	
PIC			0.0180			0.0140
			(0.3540)			(0.4800)
GD	-0.122**	-0.123**	-1.123**	-0.113***	-0.113***	-0.112***
	(-2.470)	(-2.490)	(-2.480)	(-4.270)	(-4.270)	(-4.280)
*BOD * GD*	-0.023**			-0.023***		
	(-1.970)			(-3.450)		
*BOC * GD*		-0.035**			-0.026***	
		(-2.400)			(-3.190)	
*PIC * GD*			-0.052**			-0.047***
			(-1.980)			(-2.900)
SIZE	-0.100**	-0.101**	-0.101**	-0.0120	-0.0120	-0.0110
	(-2.060)	(-2.090)	(-2.070)	(-0.560)	(-0.570)	(-0.510)
GROWTH	0.0160	0.0150	0.0160	0.0140	0.0140	0.0140
	(0.5900)	(0.5600)	(0.4030)	(0.9700)	(0.9300)	(0.9600)
AGE	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004
	(-1.36)	(-1.35)	(-1.350)	(-1.430)	(-1.380)	(-1.460)
ROA	-0.487***	-0.484***	-0.486***	-0.230***	-0.228***	-0.229***
	(-2.630)	(-2.620)	(-2.630)	(-3.450)	(-3.430)	(-3.430)
Constant	3.148**	3.158**	3.146**	0.4630	0.4670	0.4520
	(2.3100)	(2.3200)	(2.3200)	(0.8100)	(0.8200)	(0.8000)
Industry-FE	√	√	√	√	√	√
Year-FE	√	√	√	√	√	√
Clustered SE	√	√	√	√	√	√
Observations	3,836	3,836	3,836	3,836	3,836	3,836
R-squared	0.023	0.023	0.023	0.03	0.02	0.021
Prob > F	0.048	0.049	0.064	0.024	0.023	0.086

*Note: A two-tailed test indicates statistical significance at the 1% (*** p < 0.01), 5% (** p < 0.05), and 10% (* p < 0.1). T-statistics are available within the parentheses. FE — fixed effects, SE — standard error.*

The initial hypothesis, *H1*, posited that the size of the *BOD*s would be positively linked to the firm's capital structure leverage. This analysis, presented in Table 6, revealed evidence to support this hypothesis, where *BOD* significantly affects the capital structure leverage measured with *LTD*. Hypothesis *H2* aimed at establishing a connection between the size of the *BOC*s and capital structure leverage. By using *BOC* as an independent variable in relation to capital structure leverage measures, the investigation also yielded a discernible association, where *BOC* significantly affects the capital structure leverage measured with *LTD*.

Hypothesis *H3* suggested that the *PIC* might be positively linked to capital structure leverage. However, there was no evidence to support this idea in the results shown in Table 6. In summary, this analysis found no substantial association between the *PIC*s and the measures of capital structure leverage that were employed. In conclusion, this study did not find compelling evidence to substantiate the hypothesis that positive relationships between these corporate governance variables and capital structure leverage, except for *BOD* and *BOC*, which significantly affect the capital structure leverage measured with *LTD*.

In the context of examining the moderating effect of gender diversity, Table 6 presents the results of a panel regression analysis that explored the interaction between the primary independent variables and gender diversity. This study aimed to explore whether the relationships between three corporate governance variables (namely the *BOD*s, *BOC*s, and *PIC*s) and a firm's capital structure leverage are influenced by the presence of females on the board. The authors utilized *GD* as a proxy for female representation on the board, examining them independently.

Hypothesis *H4a* posited that the relationship between the size of the *BOD*s and capital structure leverage would be stronger in companies with female representation on the board. The analysis presented in Table 6 (regressions (1) and (4)) yielded results supporting this hypothesis, suggesting that *BOD* exhibited a negative and significant relationship with *DAR* ($p < 0.05$, $b = -0.023$) and *LTD* ($p < 0.01$, $b = -0.023$), moderated by *GD*. Meanwhile, hypothesis *H4b* proposed that the relationship between the size of the *BOC*s and capital structure leverage would be stronger in firms with female representation on the board. The analysis presented in Table 6 (regressions (2) and (5)) provided results supporting this hypothesis, indicating that *BOC* displayed a negative and significant relationship with *DAR* ($p < 0.05$, $b = -0.035$) and *LTD* ($p < 0.01$, $b = -0.026$), moderated by *GD*. Moreover, hypothesis *H4c* suggested that the relationship between the *PIC* and capital structure leverage would be stronger in companies with female representation on the board. The analysis presented in Table 6 (regressions (3) and (6)) produced results supporting this hypothesis, indicating that *PIC* exhibited a negative and significant relationship with *DAR* ($p < 0.05$, $b = -0.052$) and *LTD* ($p < 0.01$, $b = -0.047$), moderated by *GD*.

4.4. Robustness checks

The authors' panel data analysis incorporated year effects (YE) and industry fixed effects (FE) to account for temporal fluctuations and industry-specific variances in the dependent variables. Still, there is the problem of dynamic endogeneity, which may provide skewed findings. Following Liu et al. (2014)'s methodology, lagged independent variables were used as stand-ins for capital structure leverage in order to counter this problem. The premise that corporate governance procedures take time to affect a firm's capital structure leverage led to the specific use of the independent variables from the prior year (t - 1) to explain capital structure leverage in the current year (t_0) (Liu et al., 2014).

Table 7 presents a panel data regression employing these lagged independent variables, serving as a robustness check that corroborates the initial analysis. According to the findings, corporate governance practices, with the exception of the *BOD*s and the *BOC*s, which significantly impacted leverage as determined by the *LTD* ratio, generally had no discernible impact on firm capital structure leverage models. Furthermore, there was a strong moderating effect of female board presence on the association between corporate governance systems and *LTD* and the *DAR*. These robustness checks align with the findings of the primary analysis.

Table 7. Regression analysis of panel data with lagged independent factors to investigate the dependent variables *DAR* and *LTD* (Part 1)

Variables	*Panel A: DAR*			*Panel B: LTD*		
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
BOD(-1)	0.0010			0.006*		
	(0.0700)			(1.6800)		
BOC(-1)		0.0060			0.007*	
		(0.7300)			(1.8300)	
PIC(-1)			0.0230			0.0210
			(0.6300)			(0.7300)
GD(-1)	-0.007**	-0.006**	-0.005**	0.006***	0.006***	0.007***
	(-2.370)	(-2.380)	(-2.380)	(3.9700)	(3.9600)	(3.9800)
*BOD(-1) * GD(-1)*	-0.023**			-0.023***		
	(-1.980)			(-3.500)		
*BOC(-1) * GD(-1)*		-0.035**			-0.026***	
		(-2.400)			(-3.180)	
*PIC(-1) * GD(-1)*			-0.055**			-0.053***
			(-2.150)			(-3.380)
SIZE(-1)	-0.101**	-0.101**	-0.101**	-0.0120	-0.0120	-0.0120
	(-2.060)	(-2.060)	(-2.060)	(-0.590)	(-0.600)	(-0.590)
GROWTH(-1)	0.0160	0.0150	0.0160	0.0140	0.0140	0.0140
	(0.5900)	(0.5600)	(0.5900)	(0.9700)	(0.9300)	(0.9600)
AGE(-1)	-0.0004	-0.0004	-0.0004	-0.0003	-0.0003	-0.0003
	(-1.380)	(-1.370)	(-1.340)	(-1.400)	(-1.390)	(-1.380)
ROA(-1)	-0.487***	-0.484***	-0.485***	-0.230***	-0.228***	-0.229***
	(-2.630)	(-2.620)	(-2.630)	(-3.450)	(-3.430)	(-3.430)

Table 7. Regression analysis of panel data with lagged independent factors to investigate the dependent variables *DAR* and *LTD* (Part 2)

Variables	*Panel A: DAR*			*Panel B: LTD*		
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Constant	3.146**	3.152**	3.143**	0.4640	0.4700	0.4610
	(2.3200)	(2.3300)	(2.3200)	(0.8200)	(0.8300)	(0.8100)
Industry-FE	√	√	√	√	√	√
Year-FE	√	√	√	√	√	√
Clustered SE	√	√	√	√	√	√
Observations	3,452	3,452	3,452	3,452	3,452	3,452
R-squared	0.023	0.023	0.022	0.028	0.023	0.023
Prob > F	0.068	0.065	0.075	0.019	0.047	0.04

*Note: A two-tailed test indicates statistical significance at the 1% (*** p < 0.01), 5% (** p < 0.05), and 10% (* p < 0.1). T-statistics are available within the parentheses.*

Table 7 details the outcomes from an analysis of panel data regression with lagged independent factors, aiming to elucidate the dependent variables: *DAR* and *LTD*. The obtained empirical results (see Table 7) confirm the finding in the main analysis, in which all hypotheses are consistent when it is seen from the perspective of a lagged independent variable test on the capital structure leverage proxies. For the dependent variable *DAR*, the lagged variables of the *BOD* do not exhibit a statistically significant relationship. In contrast, the interaction between lagged *BOD* and *GD* shows a negative relationship with *DAR* at the 5% significance level in the first lag (-0.023, t = -1.980). *GD*, by itself, is negatively associated with *DAR* at the 5% significance level across the first three lags, suggesting that, as the proportion of female board members increases, *DAR* decreases. *SIZE* is negatively correlated with *DAR* at the 5% significance level, while the *ROA* demonstrates a significant negative relationship with *DAR* at the 1% significance level across all lags.

Panel B of Table 7 reveals the dynamics of *LTD*, where only the lagged *BOC* with *GD* in the first lag shows a significant negative relationship at the 1% significance level (-0.026, t = -3.180). The lagged *GD*, across all three lags, exerts a strong positive correlation with *LTD* at the 1% significance level, suggesting that companies with a greater proportion of female executives have higher *LTD*. This study improves the robustness of the results by taking into consideration industry fixed effects (Industry-FE), year fixed effects (Year-FE) and clustering SE. Observations amount to 3,452 across the models, with varying R-squared values indicating the explanatory power of the models. The probability values (Prob > F) suggest the models' overall fit, with the *DER* model demonstrating a significant fit at the 1% level across all lags.

4.5. Discussion

This study's findings provide insight into the complex dynamics of corporate governance, gender diversity, and their interplay with a firm's capital structure. This discussion explores the implications and broader insights that emerge from this research, as well as the relevance of these results in the context of corporate governance and diversity practices. The first segment of this study examined the relationships between corporate governance variables, specifically the size of the BODs, the BOCs, and the PICs, and measures of capital structure leverage. The initial hypotheses, *H1*, *H2*, and *H3*, postulated that these corporate governance variables would directly impact capital structure leverage. The empirical results presented in Table 6 provide evidence supporting hypotheses *H1* and *H2*. In other words, the size of corporate governance bodies revealed a discernible and significant connection with the firm's capital structure leverage measured with LTD. This finding indicates that a bigger board size results in a greater level of debt. The results suggest that firms with larger boards may have enhanced capabilities to access external funding sources. This could be attributed to the broader network and diverse expertise that a larger board often brings, potentially improving the firm's credibility and connections with external financiers. Nevertheless, it's crucial to note that board size is just one of many factors influencing a company's ability to secure external funding, and the relationship is not necessarily linear. These outcomes were consistent with those of Amin et al. (2022) and Zaid et al. (2020).

The subsequent phase of the study sought to investigate how gender diversity in corporate governance moderates the links between capital structure leverage and governance factors. Hypotheses *H4a, H4b*, and *H4c* posited that these relationships would be intensified in firms with female board representation. The results, as outlined in Table 6, provide compelling evidence that gender diversity played a pivotal role in shaping these interactions. Specifically, the presence of females on the board, as represented by gender diversity, accentuated the relationships between BOD, BOC, and PIC and a firm's capital structure. Notably, BOD and BOC exhibited stronger negative relationships with capital structure leverage, particularly DAR and LTD, in the presence of female board members. This finding highlights the importance of diversity within the boardroom and its potential to influence financial decision-making. These outcomes concurred with the findings of Zaid et al. (2020) and Mathew et al. (2020). One possible explanation for this result is that female members of the board tend to exhibit greater risk aversion behavior and emphasize long-term financial stability, as suggested by prior studies (Muttaqin, 2023; Suherman et al., 2023; Sabila et al., 2023; Mathew et al., 2020). Research has shown that women in corporate leadership roles are generally more cautious in financial decision-making, leading to more conservative financing choices and lower reliance on debt (Siregar et al., 2024). Moreover, gender-diverse boards may enhance monitoring and oversight functions, improving corporate governance quality and reducing excessive risk-taking (Palvia et al., 2015; Cardillo et al., 2021). Overall, the results reinforce the notion that gender diversity contributes to sound corporate governance practices and prudent financial management, offering valuable insights for policymakers and corporate leaders aiming to improve governance structures.

The significance of this result is twofold. Firstly, it highlights the significant impact of board diversity on governance practices, as diversity appears to modify the relationships between governance variables and capital structure. This modification intensifies these relationships, though whether this intensification leads to better or worse outcomes requires further investigation. Secondly, it supports the broader societal and policy-driven efforts to promote gender diversity within corporate leadership, suggesting that gender-diverse boards can have a tangible impact on financial outcomes. These results align with prior research, emphasizing the positive effects of board diversity on decision-making and firm performance.

Another noteworthy observation from this study is the complexity inherent in assessing capital structure. The findings indicate that, while certain corporate governance variables exhibited significant associations with a specific aspect of capital structure (LTD ratio), these relationships did not extend uniformly across all measures. In particular, none of the governance variables displayed substantial evidence of a relationship with DAR. This observation raises questions about the intricate nature of capital structure. The impact of governance variables may vary based on the particular financial metrics being examined, however, companies may base their capital structure decisions on a number of criteria. Further investigation into the complex interactions among governance, gender diversity, and the different facets of capital structure is necessary.

5. CONCLUSION

The intricate relationship between capital structure and corporate governance issues was thoroughly examined by the authors of this study, with a focus on how gender diversity in the corporate boardroom influences this relationship. This analysis involved a diverse array of models and capital structure measurements, allowing for a robust examination of these interrelated factors.

Mixed results were obtained from the initial hypotheses about how capital structure was affected by board size, the number of independent commissioners, and the BOC. Strong evidence to support these ideas was not provided by the findings. These factors seem to indicate that there is no significant and direct correlation between the DAR and these corporate governance aspects. Larger boards are typically linked to greater levels of LTD, as seen by the considerable beneficial impact that both the size of the BOD and the BOC had on the LTD ratio.

However, when the emphasis turned to the moderating influence of gender diversity, a notable change was noted. The hypotheses posited that the relationships between BOD, BOC, and PIC and capital structure would be strengthened in companies with female representation on the board. These findings lend strong support to these hypotheses. Specifically, the authors observed negative and significant relationships between BOD and capital structure, particularly DAR and LTD, when moderated by gender diversity. Similarly, BOC demonstrated negative and significant relationships with DAR and LTD when moderated by gender diversity. This indicates that the impact of the BOD and the BOC on capital structure becomes more pronounced when female members are present on the board. Focusing on the relationship between PIC and capital structure, this also garnered support, particularly when moderated by gender diversity. PIC exhibited pronounced negative relationships with DAR and LTD.

Whilst this study provides valuable insights, it is not without its limitations. The findings' generalisability may be limited by contextual and regional biases in the data used in this study. Moreover, although the study highlights the moderating influence of gender diversity, it did not analyse other facets of diversity, like age and ethnicity. Future research could broaden the focus by examining a greater variety of diversity aspects to investigate their potential influence on financial performance and corporate governance.

In conclusion, this study emphasises how corporate governance, gender diversity, and capital structure interact in a complex and multidimensional way. Although decisions on capital structure may not be solely influenced by corporate governance considerations, gender diversity in the boardroom is a critical moderator in enhancing these relationships. These findings hold valuable implications for organizations aiming to optimize their governance practices and promote inclusive board compositions. They also contribute to the broader discourse on the role of diversity in corporate leadership and its potential to impact financial decisions and outcomes. These findings underscore the need for policymakers to encourage board diversity through regulatory measures such as quotas, incentives, and disclosure requirements. For corporate leaders, fostering inclusive leadership through targeted recruitment, development programs, and a diverse board culture can enhance governance effectiveness, risk management, and long-term financial stability, ultimately boosting investor confidence and corporate performance.

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