Does board diversity affect the cost of debt financing? Empirical evidence from Turkey

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Abstract

Purpose – This study aims to investigate the effects of board characteristics on the cost of debt for non-financial companies in the Turkish capital markets.

Design/methodology/approach – Using a sample of 211 non-financial companies listed on Borsa Istanbul, this study examines how chairperson gender and board characteristics affect the cost of debt by using panel data analysis over the period of 2016–2020. A system generalized method of moments model is also applied to test the endogeneity issue.

Findings – The findings show that the presence of female chairperson and female directors on board reduces the cost of debt and the perceptions of default risk by fund providers, while board independence and board size do not have a significant impact on the cost of debt. The results provide insightful information for companies and policymakers. Companies can alter board composition through gender diversity, while policymakers can introduce new policies in encouraging the presence of female directors on boards.

Originality/value – This study primarily enriches the literature on the effect of board diversity on debt financing cost in a leading emerging market, enabling companies in emerging markets to better mitigate agency costs and finance their investment through effective board composition. Second, it provides evidence that financial institutions consider companies with chairwomen and women directors on the boards less risky and charge them less for debt financing than they do for companies with man chairperson. Finally, the results support policymakers to take actions to increase female presence on board.

Keywords Board composition, Borsa Istanbul, Chairwomen, Cost of debt, Gender diversity

Paper type Research paper

1. Introduction

Access to external financing with a low cost plays a vital role in business growth and sustainable corporate performance. By domination, bank-based financing is a more prevalent channel than capital market financing in emerging markets compared to developed ones due to the low level of capital accumulation and the pivotal role of the banking industry in these countries. Hence, low-level debt financing decreases costs, whereas high-level debt financing may lead to financial distress and affect corporate stability.

In financing the companies, financial institutions are highly concerned with corporate governance and board characteristics as these components greatly influence the financial stability of companies. In this context, corporate governance acts as an institutional mechanism that shapes financial decisions by relying on high-quality financial information.

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Hence, it enables companies to avoid taking excessive risks that may lead to financial distress (Bhagat and Bolton, 2009). Fund providers highly value corporate governance structure and practices as it protects their interests. Prior studies suggest that financial distress reduces the importance of financial statements and increases the role of governance (Bhojraj and Sengupta, 2003; Klock *et al.*, 2005). Li *et al.* (2016) support this argument by claiming that corporate governance has an impact on debt financing cost. Similarly, Fields *et al.* (2012) argue that good governance leads to lower cost of debt, thus increasing financial resources for growth opportunities.

Closely related to the preceding argument, board of directors affect corporate governance through their diverse functions. Board members support decision-making processes and help companies to implement appropriate policies to enhance corporate performance. Some of these policies are directly related to the capital structure and aim to avoid financial distress that may negatively affect firm value. Hence, board members shape investment and financing decisions that may boost business growth. Thus, they follow forward-looking policies and take cautious financial decisions to meet corporate goals.

In recent years, many countries have been increasingly focusing on the composition of boards by mandating policies on board gender diversity, and independence, particularly in publicly listed companies (Garcia and Herrero, 2021). For instance, a minimum quota of 40% for female board members was set by the European Commission by 2020. Similar policies have been introduced in emerging markets. Turkey and Malaysia require public companies to report board diversity statistics and to explain low metrics, while India and Korea require listed firms to appoint at least one woman to the board.

Although there are studies that examine how board composition affects the cost of debt most of them were held on advanced economies that have highly developed capital markets (Bradley and Chen, 2015; Fields *et al.*, 2012; Ghouma *et al.*, 2018; Lorca *et al.*, 2011; Pandey *et al.*, 2020; Usman *et al.*, 2019). There are relatively few studies conducted for emerging markets, focusing on how board structure affects cost of debt, and they provide mixed results (Basar, 2021; Hashim and Amrah, 2016; Li *et al.*, 2016; Thakolwiroj and Sithipolvanichgul, 2021; Zhai, 2019).

This study examines how chairperson gender and board characteristics, i.e. gender diversity, board independence and board size, affect the cost of debt, and whether it matters to fund providers, by covering non-financial companies listed on Borsa Istanbul (BIST) from 2016 to 2020. The present work contributes in three ways. First, it enriches the literature on the impact of board diversity and chairperson gender on debt financing cost in a leading emerging market, providing enlightenment for companies in emerging markets to mitigate cost of debt. Second, it yields evidence that financial institutions consider companies with chairwomen and female presence on board less risky and charge them less for debt financing. This result is in line with the current Turkish corporate governance code which recommends the inclusion of women but does not indicate any quota in this respect. The findings also contribute to the agency and signalling theories by showing how board characteristics and chairperson gender influence companies in reaching lower cost of financing in emerging markets. Finally, the results benefits regulators and policymakers and encourage them to take further actions in increasing female presence on board to help increasing financial strength of companies.

The remainder of this paper is structured as follows. Section 2 reviews the literature and develops research hypotheses. Section 3 describes the data sample and research methodology, while Section 4 documents the results. Finally, the paper concludes with a discussion of the findings, and draws attention to future research avenues.

2. Literature review and hypotheses development

2.1 Related literature review

Financial institutions are the primary source of corporate financing to enhance business growth, and they act as natural external monitors. Companies make efforts to structure an optimum capital composition, particularly by giving leveraging decisions, to achieve low-cost financing. As argued by trade-off theory, they usually follow a trade-off between debt and equity to finance operations, relying on debt financing more than equity financing, particularly in emerging markets (Serrasqueiro and Caetano, 2015).

Alongside these arguments, companies often have difficulties in obtaining low-cost debt due to volatile earnings and the potential of default risk. Corporate governance mitigates agency problems between companies and fund providers and decreases information asymmetry and cost of debt (Aldamen and Duncan, 2012; Bhojraj and Sengupta, 2003; Hashim and Amrah, 2016; Yeung and Lento, 2018). In this sense, board members monitor the management to protect shareholders' interests and to use resources effectively (Ramly, 2013).

There are two prevailing theories that help analyse the relationship between board characteristics and cost of debt: agency theory and resource dependence theory. According to the agency theory, board members act as supervisors in managing conflicts between shareholders and stakeholders, including creditors. The idea is that managers may behave at the expense of fund providers by overinvesting in risky projects (Bhojraj and Sengupta, 2003; Hashim and Amrah, 2016; Lugo, 2019; Ramly, 2013; Sánchez-Ballesta and García-Meca, 2011). Such managerial behaviour raises the risk of default and has an adverse impact on debt financing cost. From this perspective, board diversity benefits shareholders and debtholders. Diverse board members supervise the reliability of financial disclosures, decrease information asymmetry, and ensure the compliance of companies with regulations. These contributions help credit institutions in assessing default risk and allow them to reduce risk premium (Adams and Ferreira, 2009; Anderson *et al.*, 2004; Fields *et al.*, 2012; Guney *et al.*, 2020).

The resource dependence theory claims that companies depend on external resources and thus, the interaction with external environment is quite important. In this context, board composition plays a vital role in the choice of financial resources (Pfeffer and Salancik, 1978). With diverse human and social capital, boards of directors improve financial information reliability, manage external resource dependencies and enhance the confidence of financial institutions (Hillman *et al.*, 2007). All these benefits allow companies to access to debt market and ensure financing resources for business growth (Chuluun *et al.*, 2014).

Board diversity embraces several characteristics including gender, independence, size, experience, expertise, education, knowledge, skills and tenure. This study focuses on board gender diversity, independence and size. The growing concern regarding gender equality puts gender diversity in the first place in our study. Numerous works have mostly provided evidence on the positive influence of female executives, and women directors on corporate decision-making, monitoring and reduction of agency costs (Adams and Ferreira, 2009; Cicchiello and Fellegara, 2021; Liu *et al.*, 2014; Usman *et al.*, 2019). Levi *et al.* (2014) claim that female directors and executives are more risk-averse and less overconfident than men. Hence, they make more cautious decisions. They increase public disclosure quality and reduce financial reporting mistakes (Armstrong *et al.*, 2014; La Rosa *et al.*, 2018; Wahid, 2018).

Gender diversity also matters in risk-taking behaviour. Female directors bring less financial distress due to their lower risk preference, thus reducing financing costs (Harris *et al.*, 2019). Many studies have shown that companies that are run by female CEOs have

lower earnings volatility (Khan and Vieito, 2013; Martín-Ugedo *et al.*, 2017). Faccio *et al.* (2016) explored the relationship between CEO gender, corporate risk-taking and capital allocation in 18 countries. They found that female CEOs prefer less risky financing decisions. Similarly, Martin *et al.* (2009) indicated that female CEOs make less risky investments, and fund providers perceive them as risk averse. They also stated that companies with female CEOs are less leveraged, and their risk-avoidance has significant impact on capital structure. Datta *et al.* (2021) showed that companies run by female executives better manage refinancing risk associated with short-term debt. These attitudes of women executives are important as high debt means greater risk and affects the cost of debt (Dirman, 2020). These findings are also in line with the signalling theory that suggest the presence of female directors on board as a signal to external evaluators to indicate that a company pays attention to risk (Cicchiello *et al.*, 2021). Women board directors execute this mission through decreasing information asymmetry and increasing the diffusion and quality of value-relevant information (Abad *et al.*, 2017; Nalikka, 2009). In this sense, female presence on board promotes more balanced and reliable disclosures and reduces risk for market participants, including credit institutions.

Board independence is also important in corporate financing decisions. Many studies claim that independent board members better supervise the affairs of companies (Bhojraj and Sengupta, 2003; Lorca *et al.*, 2011). They devote efforts to identifying and correcting financial reporting mistakes that influence the views of financial institutions on companies (Desender *et al.*, 2013). The monitoring function improves financial disclosure and reduces information asymmetries that decrease credit risk (Armstrong *et al.*, 2014). In line with this argument, many works document a negative association between board independence and cost of debt (Anderson *et al.*, 2004; Bhojraj and Sengupta, 2003; Ertugrul and Hegde, 2008; Fields *et al.*, 2012; Pandey *et al.*, 2020; Usman *et al.*, 2019).

Finally, resource dependence theory favourably indicates that large boards provide critical external resources to companies with their networks, and experiences (Fields *et al.*, 2012; Gaur *et al.*, 2015). Moreover, they increase financial reporting transparency, reduce default risks and positively influence the views of debtholders on companies as effective and low-cost entities. Most of the prior studies have found a negative relationship between board size and cost of debt (Anderson *et al.*, 2004; Br¨edart, 2014; Ertugrul and Hegde, 2008; Lorca *et al.*, 2011; Manzaneque *et al.*, 2016). Conversely, other works contend that large boards may experience difficulties in managing critical financial situations due to the lack of coordination, leading to a higher cost of debt (Abor, 2007; Fich and Slezak, 2008; Saad, 2010).

2.2 Hypotheses development

2.2.1 Chairperson gender. The number of female executives has been increasing among companies. By June 2021, 8.1% of Fortune 500 companies were run by female CEOs (41 CEOs), whereas it was only 4.2% in 2016 (Hinchliffe, 2021). This progress has its own merits. Prior studies provide evidence that women-run companies are likely to get lower debt due to risk aversion, and safer investment preference (Abor and Biekpe, 2007; Faccio *et al.*, 2016; Powell and Ansic, 1997). They usually avoid taking aggressive decisions. Miah (2019) provides evidence that listed companies with female CEOs in Australia enjoy a lower cost of issuing debt. He suggests that gender diversity in top management has a significant impact on the cost of external sources. In a recent study based in China, Usman *et al.* (2018) indicated that lenders charge companies less for debt if they are managed by female executives as they are more cautious about the future risks. Thus, we propose the following hypothesis:

H1. Companies with female chairperson have a lower cost of debt.

2.2.2 Board gender diversity. Gender diversity plays an influential role in board decisions. Differences in risk aversion of men and women may influence financial decisions (Adams and Ferreira, 2009; García Martín and Herrero, 2018). Jianakoplos and Bernasek (1998) claim that board gender diversity is associated with a lower propensity to invest in high-risk project. Gender diversity also acts as a signal that directly influences investors and lenders as outside evaluators (Bear *et al.*, 2010). Pandey *et al.* (2020) reported that board gender diversity decreases agency conflict between managers and creditors and can reduce the cost of debt. Abobakr and Elgiziry (2016) reported a significant negative relationship between female presence on board and short-term debt for 36 large Egyptian firms. Building on these discussions, we propose the following hypothesis:

H2. Board gender diversity is negatively related to the cost of debt.

2.2.3 Independent board membership. Independent board members control management more strictly regarding financing decisions than directors with less independence. Therefore, companies that need financing from the debt market should have more independent directors to reasonably respond to fund providers. Abor (2007) and Bokpin and Arko (2009) found a positive significant relationship between board independence and debt decision. Bradley and Chen (2015), on the other hand, claim that board independence decreases the cost of debt when credit conditions are strong or leverage low. Drawing on these arguments, we propose the following hypothesis:

H3. Board independence is negatively related to the cost of debt.

2.2.4 Board size. Having a suitable board size influences corporate performance as board of directors have the authority to decide on strategic decisions to achieve the goals. Some authors believe that in crowded boards, board members may have difficulty in sharing their opinions, while in smaller boards they are more likely to share them and make more effective decisions, including financial ones. Most of the prior studies identified the point that when board size is large, leverage is lower (Anderson *et al.*, 2004; Berger *et al.*, 1997; Malakeh, 2021). Heng *et al.* (2012) found that Malaysian companies with larger boards drive management to reduce debt financing. Similarly, Ranti (2013) detected a significant negative relationship between board size and cost of debt. Building on these discussions, we propose the following hypothesis:

H4. Board size is negatively related to the cost of debt.

2.3 Control variables

In line with the prior studies, we used the following firm-specific factors as control variables: firm size, firm profitability, firm risk, sales growth, tangible assets and liquidity.

There is a close relationship between firm size and cost of debt. Prior works show that firm size is negatively related to cost of debt, as large companies are more diversified, have economies of scale and may get more debt than small firms (Alves *et al.*, 2015; Frank and Goyal, 2009). They are perceived less risky by creditors. Küllü and Raymar (2018) claim that large firms are more stable, and they are better known in debt markets. Hence, they can easily access long-term debt due to more collateralizable assets. On the other hand, small firms usually prefer to use more debt rather than equity financing, and they are more likely to face financial distress. Moreover, small companies hardly get favourable terms in getting new debt from financial institutions, and this situation increases the cost of debt (Kim and Sorensen, 1986).

Profitable firms usually have lower default risk, and cost of debt (Küllü and Raymar, 2018). Scholars mostly identify an inverse relationship between firm profitability and cost of debt (Alves *et al.*, 2015; Frank and Goyal, 2009). Lending institutions are more likely to charge lower interest rates to profitable firms due to their better ability to pay back obligations. Hence, they face low level of financial distress (Ertugrul and Hegde, 2008; Frank and Goyal, 2009).

Prior studies claim that cost of debt rises with high leverage, as it is likely to increase the volatility of income, and the likelihood of financial distress. Therefore, firm risk is expected to be positive in case of high leverage as higher gearing increases the expected default cost.

Sales growth is usually used as a proxy for firm performance. Prior research indicates an inverse relationship between sales growth and leverage. However, companies with higher sales growth may prefer investing at a lower level, and thus, fund providers may be unwilling to lend to them in the long run. This situation may lead firms to use more short-term debt and incur higher cost of debt, and financial distress (Briozzo *et al.*, 2019; Frank and Goyal, 2009). Therefore, the effect of sales growth on cost of debt is ambiguous.

Tangible assets are easier to collateralise, and act as a guarantee for backing loans offered by creditors (Setiadharma and Machali, 2017). They also indicate a company's ability to repay its debt (Küllü and Raymar, 2018). Therefore, companies that have more tangible assets are viewed as less risky, and they have a lower cost of debt (Frank and Goyal, 2009; Hashim and Amrah, 2016; Lorca *et al.*, 2011; Pandey *et al.*, 2020).

Companies that have a high liquidity ratio may be able to meet short-term commitments. However, firms with higher liquidity may prefer to pay back their current debt and to use internal resources for business growth opportunities instead of accessing more debt financing.

Firm age shows how long the company has been operating. It is usually used as a proxy for reputation. Firms that are established earlier may have a lower credit risk. In other words, they have had a longer life, and greater competitive ability in meeting their obligations (Stefany and Joni, 2020). Thus, firm age is expected to have a negative influence on the cost of debt.

Finally, following prior studies, we use an industry dummy variable to control for possible industry effects (Hashim and Amrah, 2016; Lugo, 2019; among many others). Figure 1 presents the conceptual framework to examine the relationship between board characteristics and cost of debt.

3. Research methodology

3.1 Data sample

The sample for this study consists of 211 non-financial companies listed on BIST over a five-year period from 2016 to 2020. Financial companies were excluded from the sample due to their unique governance, financing and regulatory characteristics. We also removed observations with incomplete data. The final sample covers 1,055 firm-year observations. We retrieved the data from the Central Depository of Turkey, and the annual reports of companies. The breakdown of the companies on the industrial sector basis is given in Table 1. The services, metal products and machinery, chemical, petroleum and plastic, and food and beverage industries have the most observations, accounting for 24%, 13%, 12% and 10% of the total data set, respectively.

3.2 Variable definition and measurement

We provide the definition and measurement of variables in Table A1 in the Appendix. In regression analysis [equation (1)], we included seven firm-specific variables used in the prior

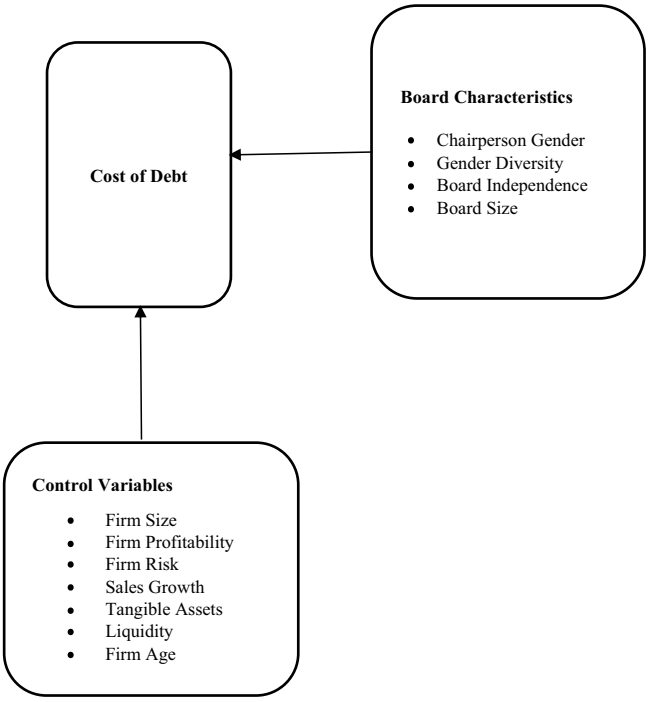

Figure 1.
Research framework

Name of industry	No. of firms	%
Services	51	24
Metal products and machinery	28	13
Chemical, petroleum and plastic	26	12
Food and beverage	22	10
Textile, apparel and leather	17	8
Non-metal minerals products	16	8
Basic metal	16	8
Wood, paper and printing	15	7
Technology	13	6
Mining	4	2
Other	3	1
Total	211	100

Table 1.
Distribution of firms across industries

studies (Alves *et al.*, 2015; Briozzo *et al.*, 2019; Ertugrul and Hegde, 2008; Frank and Goyal, 2009). We included year dummies to control for possible variation over time. Finally, we used industry dummies based on BIST sectoral indices.

Cost of debt (COD) is used as a dependent variable in this study. Following prior studies (Hashim and Amrah, 2016; Lorca *et al.*, 2011; Ramly, 2013; Usman *et al.*, 2019; among many), we measure COD as the firm's financing expenses divided by its short- and long-term debt. The financing expenses is an income statement item that includes interest, exchange rate differences and commissions related to the amounts borrowed from financial institutions.

The chairperson gender, gender diversity, board independence and board size are used as independent variables, while firm size, firm profitability, firm risk, sales growth, tangible assets, liquidity and firm age are used as control variables as described below:

Chairperson gender (CG) is measured using a dummy variable that assumes "1" if the company has a female chairperson, and "0" otherwise.

Gender diversity (GD) is measured by the ratio of female board members to the total number of board members.

Board independence (BIND) is calculated by the ratio of independent board members to the total number of board members.

Board size (BSIZE) shows the total number of board members. We use a natural log of board size.

Firm size (SIZE) is natural log of total assets.

Firm profitability (ROA) is calculated as the ratio of net income to total assets.

Firm risk (LEV) is calculated as the ratio of short- and long-term debt to total assets.

Sales growth (SG) is the percentage change in net sales revenue relative to last year's net sales revenue.

Tangible assets (TA) is calculated by dividing total tangible assets to total assets.

Liquidity (LQ) is calculated by the ratio of current assets to current liabilities.

Firm age (AGE) is log of the number of years since its establishment.

3.3 Data analysis

To investigate the relationship between board characteristics and cost of debt, we conducted panel data analysis via Stata. In line with previous studies, we tested our hypotheses by estimating the model as shown in equation (1). The time and industry dummy variables are also included.

$$COD_{i,t} = X_1 CG_{i,t} + X_2 GD_{i,t} + X_3 BIND_{i,t} + X_4 BSIZE_{i,t} + X_5 SIZE_{i,t} + X_6 ROA_{i,t} + X_7 LEV_{i,t} + X_8 SG_{i,t} + X_9 TA_{i,t} + X_{10} LQ_{i,t} + X_{11} AGE_{i,t} + X_{12} \sum_{k=1}^{10} Industry_{i,t} + X_{13} \sum_{k=1}^{5} Time_{i,t} + e_{i,t} \quad (1)$$

4. Empirical findings

4.1 Descriptive statistics

Table 2 provides the summary of the descriptive statistics and the correlation matrix. The mean value for COD is 12%, and it has a standard deviation of 11%, showing that there is no obvious difference among companies. Looking at board variables, the results in Table 2 show that the mean value of CG and GD is 7% and 15%, respectively. Hence, 7% of the companies listed on BIST have chairwoman, while 15% of the board members are female. The average value for independent board membership is 31%, showing that one-third of the board members are independent. This figure aligns with the regulations of the Capital Markets Board of Turkey. Finally, the average board size is 2. For the control variables, the average firm size is 20.17, while the average ROA and firm risk are 4% and 55%, respectively. Sales growth has a mean value of 27.6%, but it has high standard deviation,

Variables	Variable names	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12
1. COD	Cost of debt	0.12	0.11	1.00											
2. CG	Chairperson gender	0.07	0.26	−0.11*	1.00										
3. GD	Gender diversity	0.15	0.16	−0.06	0.34*	1.00									
4. BIND	Board independence	0.31	0.11	0.03	−0.05	−0.07*	1.00								
5. BSIZE	Board size	1.89	0.29	0.06	−0.05	−0.15*	−0.16*	1.00							
6. SIZE	Firm size	20.17	1.87	−0.01	−0.13*	−0.21*	0.01	0.54*	1.00						
7. ROA	Firm profitability	0.04	0.11	0.07*	−0.08*	−0.04	−0.02	0.03	0.09*	1.00					
8. LEV	Firm risk	0.55	0.32	0.07*	−0.09*	−0.07*	0.03	0.10*	0.17*	−0.48*	1.00				
9. SG	Sales growth	27.66	100.56	−0.02	−0.02	−0.02	−0.03	0.00	0.01	0.13	−0.05	1.00			
10. TA	Tangible assets	0.29	0.22	0.07*	0.17*	0.15*	0.04	0.07*	0.07*	−0.24*	0.07*	−0.05	1.00		
11. LQ	Liquidity	3.33	20.41	−0.06	−0.01	0.12*	−0.06*	0.05	−0.06	0.02	−0.13*	0.02	−0.12*	1.00	
12. AGE	Firm age	40.24	16.98	0.07*	−0.03	−0.01	−0.12*	0.33*	0.30*	0.12*	−0.03	−0.05	0.06	−0.14*	1.00

Table 2.
Descriptive statistics and correlation matrix

indicating that sales growth deviates among companies. The mean value for tangible assets is 29%, while the liquidity ratio is 3.

The correlation analysis is reported in Table 2. All the correlations are modest to low and pose no multicollinearity problem between the independent variables. COD is significantly and negatively correlated with CG, but positively correlated with ROA, LEV, TA and AGE. The variance inflation factors (VIF) in Table A2 in the Appendix indicate that multicollinearity is not a problem.

4.2 Regression results

To estimate regression models, we first used *F*-test. The result of the *F*-test (3.94, $p < 0.01$) showed that the fixed effects regression model is more suitable than the ordinary least squares regression model. Then, we ran the Hausman test to compare the fixed effects and random effects models. The result of the Hausman test (19.61 at $p > 0.10$) indicated that the random effects model is preferred over the fixed effects model. Therefore, we used random effects model to analyse the relationship between board diversity and the cost of debt. The advantage of random effects model is that we can include time invariant variables. The relationship between gender diversity and the cost of debt may be driven by unobservable firm-level characteristics. These characteristics can be correlated with both gender diversity and cost of debt. The fixed effects model controls this issue (Usman *et al.*, 2018, p. 389). Due to that reason, we also estimated the fixed effects model. The results are interpreted according to the random effects model.

After the first step, the tests were carried out to see whether the assumptions of the regression model were violated. The Levene's test (Levene, 1960) and Brown–Forsythe test (Brown and Forsythe, 1974) were used for heteroscedasticity, while Durbin and Watson (1950) and the Baltagi and Wu (1999) tests were applied for autocorrelation. Pesaran's (2004) cross-sectional dependence test was also used. The results indicated that the panel has cross-sectional dependence and heteroscedasticity. Therefore, we estimated a model with Driscoll–Kraay standard errors (Driscoll and Kraay, 1998).

Table 3 provides the results for both the random effects and fixed effects model. The findings show that CG is negatively associated with the cost of debt ($p < 0.05$). Hence, there is a significant decrease in the cost of debt for companies which have chairwoman. Although the sign of the coefficient for GD is negative, it is insignificant. These findings support *H1* in addition to *H2* (partially), suggesting that female presence in top-level management and on the board generates a beneficial effect, i.e. a decrease in the cost of debt, for companies. This may be because chairwomen and female board members are more risk-averse, and concerned with firm profitability and financial distress, resulting in lower borrowing costs. This result is consistent with the findings of the previous studies (Miah, 2019; Harris *et al.*, 2019; Pandey *et al.*, 2020; Usman *et al.*, 2018; Zhai, 2019). On the other hand, there is a positive relationship between independent board membership and cost of debt, thus *H3* is not supported. This result suggests that the common perception that board independence matters for lower cost of debt is not the case in the Turkish markets. This finding is in line with some of the previous studies (Abor, 2007; Berger *et al.*, 1997; Bradley and Chen, 2015).

Unlike many earlier works (Anderson *et al.*, 2004; Heng *et al.*, 2012; Malakeh, 2021; Ranti, 2013), we find a positive relationship between board size and cost of debt, not supporting *H4*. This may stem from the lack of coordination in large boards in managing critical financial situations which leads to a higher cost of financing. This finding is in line with the earlier studies (Abor, 2007; Saad, 2010).

Among the control variables, the cost of debt is negatively and significantly associated with firm size (SIZE, $p < 0.01$), showing that credit institutions have more trust in large

Variables	Variable name	Fixed effects	Fixed effects (Driscoll–Kraay)	Random effects	Random effects (Driscoll–Kraay)
Independent variables					
Chairperson gender	*CG*	−0.037(0.024)	−0.037(0.011)**	−0.046 (0.017)***	−0.046 (0.015)**
Gender diversity	*GD*	−0.024(0.037)	−0.024(0.017)	−0.013 (0.027)	−0.013 (0.014)
Board independence	*BIND*	0.012(0.048)	0.012(0.021)	0.051 (0.035)	0.051 (0.017)**
Board size	*BSIZE*	0.157(0.031)***	0.157(0.052)**	0.084 (0.019)***	0.084 (0.020)***
Firm-specific controls					
Firm size	*SIZE*	−0.025(0.011)**	−0.025(0.005)***	−0.011 (0.003)***	−0.011 (0.002)***
Firm profitability	*ROA*	0.053(0.038)	0.053(0.064)	0.079 (0.034)**	0.078 (0.034)*
Firm risk	*LEV*	0.029(0.022)	0.029(0.015)	0.054 (0.015)***	0.053 (0.012)***
Sales growth	*SG*	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Tangible assets	*TA*	0.044(0.039)	0.044(0.006)***	0.082 (0.023)***	0.082 (0.041)
Liquidity	*LQ*	0.009(0.003)***	0.009(0.004)*	0.010 (0.002)***	0.010 (0.004)*
Firm age	*AGE*	0.009(0.003)***	0.007(0.003)	0.000 (0.000)	0.000 (0.000)
Constant		−0.098(0.176)	omitted	0.031 (0.069)	0.031 (0.033)
Observations		1045	1045	1045	1045
Number of firms		210	210	210	210
R-squared		0.16	0.16	0.15	0.15
Wald chi^2				177.94***	316.27***

Notes: Year and industry dummies are not reported. Standard errors are in parentheses. *$p < 0.10$; **$p < 0.05$; ***$p < 0.01$. All the control variables and the dependent variable are winsorised at the top and bottom 1% of observations

Table 3. Panel regression results

companies. However, the cost of debt is positively and significantly related to firm risk (LEV, $p < 0.01$), indicating that companies that are highly leveraged bear higher cost of debt than low-leveraged ones. Thus, lenders charge large companies less, and leveraged companies more for debt financing than they do other companies. These results endorse the findings of other studies (Ertugrul and Hegde, 2008; Frank and Goyal, 2009). Finally, unlike the findings of the prior studies (Alves *et al.*, 2015; Frank and Goyal, 2009), and contrary to our expectations, ROA ($p < 0.10$) and LQ ($p < 0.10$) are positively and significantly related to the cost of debt.

4.3 Addressing the endogeneity problem

The static fixed or random effects models may not have been strong enough in the presence of a dynamic relationship between the cost of debt and explanatory variables. Therefore, we re-investigated the relationships between board attributes and cost of debt by using the generalized method of moments (GMM) estimator. First, a diagnostic test of strict exogeneity suggested by Wooldridge (2010) was applied to identify the exogeneity among the variables. Table 4 shows the Wooldridge exogeneity test results. The coefficient estimates for the future values of GD_{t+1}, $BSIZE_{t+1}$, ROA_{t+1}, SG_{t+1} and LQ_{t+1} are significantly different from zero for COD. This suggests that neither of these variables is strictly exogenous. An *F*-test of the joint influence of the coefficient estimates of all the future values is also significant. The Wooldridge strict exogeneity test results show high endogeneity in the models, by denying Wooldridge's null hypothesis.

Then, Blundell and Bond's (1998) system GMM was adopted as the most suitable method to cope with the endogeneity problems which may have been caused by the dynamic nature of our model. This model enables us to estimate the relationship of board diversity and cost of debt, while including past cost of debt to account for the dynamic aspects of the board

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Variables	Variable name	Coef. (std. err.)
Chairperson gender	CG	−0.037 (0.028)
Gender diversity	GD	−0.054 (0.046)
Board independence	$BIND$	−0.008 (0.060)
Board size	$BSIZE$	0.106 (0.038)***
Firm size	$SIZE$	−0.029 (0.016)*
Firm profitability	ROA	0.107 (0.047)**
Firm risk	LEV	0.097 (0.047)**
Sales growth	SG	0.000 (0.000)
Tangible assets	TA	0.039 (0.051)
Liquidity	LQ	0.016 (0.003)***
Firm age	AGE	0.013 (0.004)***
Chairperson gender	CG_{t+1}	−0.020 (0.036)
Gender diversity	GD_{t+1}	0.131 (0.047)***
Board independence	$BIND_{t+1}$	0.044 (0.064)
Board size	$BSIZE_{t+1}$	0.171 (0.041)***
Firm size	$SIZE_{t+1}$	−0.022 (0.017)
Firm profitability	ROA_{t+1}	0.093 (0.047)**
Firm risk	LEV_{t+1}	−0.025 (0.036)
Sales growth	SG_{t+1}	0.000 (0.000)***
Tangible assets	TA_{t+1}	0.002 (0.055)
Liquidity	LQ_{t+1}	−0.019 (0.003) ***
Firm age	AGE_{t+1}	Omitted
Constant		0.027 (0.263)
F-test		3.74
R-squared (overall)		0.0266

Table 4.
Tests of strict exogeneity

Notes: This table presents a fixed-effects estimation of the relationship between future cost of debt structure and the current cost of debt. All explanatory variables are one year ahead (future values). Standard errors in parentheses. *$p < 0.10$; **$p < 0.05$; ***$p < 0.01$. All the control variables and the dependent variable are winsorised at the top and bottom 1% of observations

diversity and cost of debt relationship. Moreover, the system GMM was particularly developed to handle panel data, including large numbers of companies and shorter time periods (as was the case here; see Roodman, 2009). Table 5 displays the results of the system GMM with Windmeijer's (2005) correction model. The GMM specifications are well delineated, based on the Hansen test of overidentifying restrictions ($p > 0.1$) and the Arellano–Bond test [AR(1) $p < 0.01$, AR(2) $p > 0.1$] of autocorrelation.

As shown in Table 5, the one-year lagged COD coefficient was positive and significant ($p < 0.05$). This implies that the preceding COD values had significant effects on current COD. The signs on the coefficients of CG ($p < 0.05$) and GD ($p < 0.10$) were negative and significant. The GMM coefficient estimates of LEV and LQ fully corroborate the estimates of random effects in Table 3. On the other hand, the GMM results fail to confirm the existence of the significant relationships between the firm-specific controls of ROA and SIZE. This finding is not particularly surprising, as the dynamic endogeneity and/or simultaneity can produce a bias in the parameter estimates of random effects panel models (Schultz *et al.*, 2010; Wintoki *et al.*, 2012). Hence, we suggest that the relationship between COD and BIND or BSIZE, or the relationship between COD and control variables (ROA, SIZE), may simply be spurious.

Overall, our additional tests support *H1*. Hence, it is beneficial for a company to have a female presence in top-level management. These results corroborate prior studies

Variables	Variable name	System GMM
Cost of debt	COD_{t-1}	0.274 (0.128) **
Independent variables		
Chairperson gender	*CG*	−0.057 (0.027) **
Gender diversity	*GD*	−0.091 (0.048) *
Board independence	*BIND*	0.059 (0.067)
Board size	*BSIZE*	0.020 (0.044)
Firm-specific controls		
Firm size	*SIZE*	−0.004 (0.005)
Firm profitability	*ROA*	0.046 (0.073)
Firm risk	*LEV*	0.083 (0.036) **
Sales growth	*SG*	0.000 (0.000) ***
Tangible assets	*TA*	0.106 (0.027) ***
Liquidity	*LQ*	0.015 (0.008) *
Firm age	*AGE*	0.000 (0.000)
Constant		0.044 (0.075)
Observations		835
Number of groups		209
Number of instruments		74
Arellano–Bond AR(1) (p value)		0.048
Arellano–Bond AR(2) (p value)		0.153
Hansen test (p value)		0.128

Notes: Year and industry dummies are treated as exogenous variables, and they are unreported. The model is estimated with the system GMM and Windmeijer correction. Standard errors are in parentheses. *$p < 0.10$; **$p < 0.05$; ***$p < 0.01$. All the control and dependent variables are winsorised at the top and bottom 1% of observations

Table 5. Results of GMM modelling

(Miah, 2019; Harris *et al.*, 2019; Pandey *et al.*, 2020; Usman *et al.*, 2018), and support the argument that chairwomen enhance governance processes and reduce the cost of debt.

4.4 Additional test

4.4.1 Number of woman directors and cost of debt. Studies on gender diversity in boardrooms report that the number of woman directors are also important (Usman *et al.*, 2018). For additional tests, we created two dummies: a dummy variable that equals 1 if the board is composed of at least one woman, and 0 otherwise (GD1); and a dummy variable that equals 1 if the board is entirely composed of men, and 0 otherwise (GD2). In our sample, we did not find any company with a board of directors composed entirely of female members. We reported the results in Table A3 in the Appendix. For GD1, we found negative and insignificant relationship with the cost of debt. Although the result is insignificant, the negative sign shows that companies with at least one female member on the board have lower cost of debt. For GD2, we identified positive and insignificant relationship with the cost of debt. This result shows that although it is insignificant, companies whose board members are all-men, have higher cost of debt. Our findings partially support *H1* and *H2* only in sign, indicating that it is economically beneficial for a company to have gender diversity on board as it directly increases the transparency and improves monitoring which allows lenders to better evaluate the riskiness of the entity. This is in line with the findings of the previous studies (Abad *et al.*, 2017; Adams and Ferreira, 2009; Nalikka, 2009; Srinidhi *et al.*, 2011).

4.4.2 An alternative measure of the cost of debt. We use firm-level interest rate data (interest rate estimated average) from Worldscope database to construct a proxy for the cost of debt. One reason for choosing this alternative measure is the unavailability of data on the interest rate of bank loans and on the yield of outstanding bonds. The formula for the firm-level interest rate is as follows:

Interest rate estimated average = Interest expense on debt/(Short-term debt and current portion of long-term debt + Long-term debt) * 100

The interest rate may either be zero or positive. Therefore, for the analysis, we used the Tobit model because the data are left-censored. Finally, we used panel Tobit model with continuous endogenous regressors to control for potential endogeneity problem. The results were not reported but are available upon request. The results show that our findings regarding *H1* and *H2* are still valid.

5. Conclusions and discussions

Accessing to external debt financing is important for companies in realising business growth and meeting long-term goals. Empirical evidence has shown that corporate governance mechanisms in many companies, particularly in developed markets, play an important role in reducing the cost of debt, and the financial distress of companies. Using the Turkish market setting, the present study investigates whether chairperson gender and board diversity, i.e. gender diversity, board independence and board size, matter in reducing the cost of debt of non-financial companies listed on BIST for the years 2016–2020.

The results show that companies that have female chairperson and female presence on board experience lower cost of debt. This outcome suggests that financial institutions are more concerned with gender diversity in the top-level management. This may stem from the fact that chairwomen or female board directors are more risk averse, as well as being more concerned with external debt repayment and reducing indebtedness. They also perform improved monitoring which reduces agency cost and information asymmetry. These attitudes increase the confidence level of financial institutions, and their perception of the probability of default, resulting in a lower cost of debt and the steering of companies away from financial problems. This result also contributes to the signalling theory by providing evidence that higher board women presence signal lower cost of debt. Our findings support the idea of legislative quotas for female presence on boards in emerging markets not only on ethical and social-justice grounds but also on the grounds of economic benefit.

The results also reveal that companies that have high percentages of independent board members do not secure financing with a lower cost of debt contrary to the findings of many studies, while companies with larger boards bear a higher cost of debt. Although independent board members can provide external resources with their personal network, it appears that companies derive more benefits from insider board directors for making sound financial decisions as they have better knowledge of the internal and external environment of the company. Finally, fund providers charge large companies less and leveraged companies more for debt financing than they do other companies. This result is obvious as creditors perceive large companies less risky and more stable than small ones.

5.1 Implications of the study

This study has several implications. First, it provides evidence of the board diversity that help companies avoid financial distress and reduce the cost of debt. Second, the findings reinforce legislative initiatives implemented by regulators and the prudence of policies introduced by policy makers to increase female presence on the boards. This result is

particularly important as emerging countries have recently been imposing mandatory gender quotas on boards for listed companies. A greater presence of women on the board of directors could provide support to deal with the financial distress faced by companies in ensuring their increasing commitment to financial stability through getting lower cost of debt financing. Hence, companies should establish policies concerning board gender diversity and set measurable objectives for their implementation to benefit market participants, including investors and credit institutions. Finally, from the regulatory perspective, our results support recent legislative initiatives around the world regarding female presentation on boards.

5.2 Limitations and future research

This research has some limitations. We did not include specific demographic information about the board directors, such as age, nationality, educational background and experience. Future studies may use these data to offer more insightful results. Another research area would be to investigate a similar relationship for the cost of equity, covering a larger number of board attributes and different ownership structures. Finally, the present study focuses only on Turkey; future research could cover other emerging markets where board diversity is improving, and debt financing is playing a vital role in making new investment as the combined effect of these variables may affect financial distress in generating firm profitability.

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Further reading

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La Rocca, M., Neha, N. and La Rocca, T. (2020), "Female management, overconfidence, and debt maturity: European evidence", *Journal of Management and Governance*, Vol. 24 No. 3, pp. 713-747.

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Appendix

Table A1. Measurement of variables

Variable	Code	Measurement
Dependent variable		
Cost of debt	*COD*	Total financing expenses divided by short- and long-term debt
Independent variables		
Chairperson gender	*CG*	A dummy variable that assumes "1" if the company has a female chairperson and "0" otherwise
Gender diversity	*GD*	The ratio of female board members to total board members
Board independence	*BIND*	The ratio of independent board members to total board members
Board size	*BSIZE*	The natural log of the total number of board members
Control variables		
Firm size	*SIZE*	Natural log of total assets
Firm profitability	*ROA*	The ratio of net income to total assets
Firm risk	*LEV*	The ratio of short- and long-term debt to total assets
Sales growth	*SG*	The percentage change in net sales revenue relative to last year's net sales revenue
Tangible assets	*TA*	The ratio of total tangible assets to total assets
Liquidity	*LQ*	The ratio of current assets to current liabilities
Firm age	*AGE*	The number of years since firm¨s establishment

Table A2. Variance inflation factors

Variable names	VIF	1/VIF
BSIZE	1.63	0.62
SIZE	1.61	0.62
LEV	1.61	0.62
LQ	1.59	0.63
ROA	1.55	0.64
TA	1.22	0.82
GD	1.21	0.82
CG	1.19	0.84
AGE	1.18	0.85
BIND	1.10	0.91
SG	1.03	0.97
Mean VIF	1.36	

Variables	Variable name	Fixed effects (Driscoll–Kraay) Model 1	Fixed effects (Driscoll–Kraay) Model 2	Random effects (Driscoll–Kraay) Model 1	Random effects (Driscoll–Kraay) Model 2
Independent variables					
At least one female	*GD1*	−0.008(0.004)		−0.008(0.006)	
All male	*GD2*		0.008(0.004)		0.008(0.006)
Board independence	*BIND*	0.025(0.024)	0.025(0.024)	0.058(0.021)**	0.058(0.021)**
Board size	*BSIZE*	0.154(0.052)**	0.154(0.052)**	0.085(0.019)**	0.085(0.019)**
Firm-specific controls		Included	Included	Included	Included
Year dummies		Included	Included	Included	Included
Industry dummies		Included	Included	Included	Included
Observations		1,045	1,045	1,045	1,045
Number of firms		210	210	210	210
R-squared		0.15	0.15	0.14	0.14
Wald chi2				351.36	351.36

Notes: Standard errors are in parentheses. *$p < 0.10$; **$p < 0.05$; ***$p < 0.01$. All the control variables and the dependent variable are winsorised at the top and bottom 1% of observations

Table A3.
Regression results

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