

The Interplay of Gender and Cultural Diversity on Board Composition and Capital Structure

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Abstract: With the continuous change of cultural dynamics worldwide, its impact particularly on any company boardroom has been shifting. This paper aims to unveil board gender diversity's influence on capital structure in recent years. This paper examines panel data of 2918 firms from 16 countries during 2013 to 2023. The fixed effect GLS regression model is used to diagnose the impact of board gender diversity on capital structure considering cultural differences. In the analysis, total debt to total asset is the dependent variable. Key variables included the Proportion of women on board, Blau index, Shannon index along with Hofstede cultural dimensions (Power Distance, Masculinity), and country-level indices (Global Gender Gap, World Governance Index and its factor). Results reveal a negative relationship at a 5% significance level between board gender diversity and capital structure. This suggests that firms with higher proportions of female directors tend to have lower debt levels. This effect is not robust to the inclusion of cultural factors such as power distance or masculinity are not significantly correlated to capital structure. Therefore, more female board members can reduce the debt load taken by a firm at any cultural surrounding suggesting more efficient decision-making and risk aversion. In addition, the findings reveal that a larger board size, analytic experienced board, and ROA have significantly negative impact on capital structure. Conversely, firm size, CEO duality and ROE are positively significant. Additionally, the global gender gap and world governance index have also been analyzed to be positive.

Keywords: Capital structure, board gender diversity, cultural diversity, country level variables

1. Introduction

Despite a lifetime of research (In the extant Literature), there has been no baseline conclusion on the relationship between board gender diversity and capital structure. Likewise, board composition and capital structure are revealed as strong components of good governance of firms. The concept of 'corporate governance' gained attention after severe high-profile events such as the corporate scandal of Enron and WorldCom (Iatridis, 2010). A good corporate governance structure boosts performance and maximizes shareholder's goodwill by ensuring accountability (Ngatno et al., 2021). As per a seminal paper by M&M, there is no correlation between capital structure and firm performance (Modigliani & Miller, 1958). Later, M&M revised their previous classic theory adding corporate tax hypothesizing that debt has an advantage over equity known as the tax shield advantage (Miller & Modigliani, 1963). Some studies like Maksimovic & Titman (1991), found a negative impact of debt on profitability. Weaker firms need more debt financing due to limited restructuring scope through reinvestment of reserves. These firms also struggle with ownership dilution and circumvent the financial market barrier through debt financing (Hossain, 2021).

Corporate board gender diversity has grabbed the attention of the policymakers and media. For this, some countries have mandatory quotas for increasing gender diversity in the corporate sector (Hordofa, 2023). Studies show those women directors are more conservative and risk averse, increasing transparency without affect relevant capital structure (Pucheta-Martínez et al., 2023). Lee & Thong (2023) examined gender diversity in country level and found countries with strong shareholders right, economic empowerment of women and disclosure regulations have better firm performance. They also reduce financial distress risk. Gender diverse boards make structured decision-making and advanced performance (Arvanitis et al., 2022). Not only that, they are also highly motivated to in meetings and observe the actions of executive directors (Adams & Ferreira, 2009). Alves et al. (2014) found diverse firms more efficient with reduced asymmetric information making the board more dependent on long-term debt.

Women are seen as less confident, risk averse and mentally unstable for decision making (Maxfield et al., 2010). Moreover, in Pakistan Stock Exchange (PSX) women directors of listed non-financial institutions lack the necessary skills and expertise and has no effect on profitability (M. Farooq & Ahmad, 2023). In some European countries, the effect of gender diversity on firm performance has been ignored (Kılıç & Kuzey, 2016). According to European Commission's report in 2019, the score for female is very low in European Union. Relevantly, Farooq et al. (2020) found masculine culture predicts better firm performance. But this paper found no association of power distance with capital structure.

Adams and Raganathan (2015) found mixed findings based on differences across studies in measure of performance, methodologies, time horizon, omitted variables, and other contextual issues. Again, several papers found no significant relationship between these two parameters (Rose, 2007). Empirical Studies on Saudi Arabian context revealed no association between country and cultural factors.

This paper is unique in its segments. Firstly, it determines the impact of cultural indices, power distance, masculinity and country-level variables, world governance indicator and global gender gap. Secondly, this research is the first of its kind considering 16 countries, 10 economic sectors and 10-year data from 2013 to 2023.

Thirdly, this study shows that women tend to be more risk averse, and their presence is negatively associated to the firm's leverage. Finally, our study used econometric methodology using fixed effect generalized least square (F-GLS) in cross section and time series data. Hence, that is to add new insight and fill gaps in existing literature. Moreover, the main objective of this research is to contribute to literature in the way that it takes a distinct approach to the capital structure and boardroom gender relationship. Moreover, to add a unique perspective to the complex relationship mentioned, the study also added cultural diversity and country-level indices.

The remaining parts of this article is structured as follows. The next two sections review the theoretical and empirical literature and hypothesis development. Section 4 describes the methodology. Section 5 analyzed the findings along with its implications with the robustness analysis in section 6. Finally, the last section summarizes all key concepts.

2. Theoretical Background

Our study adopted a comprehensive approach theoretical framework incorporating agency, resource dependency, behavioral and national culture to test board gender's influence on capital structure.

2.1 Agency Cost Theory

The agency cost theory proposed by Jensen et al. (1976) identifies conflict between managers, shareholders and debt holders. These conflicts are twofold; managers have equity related conflicts with shareholders, where managers prioritize self-gain over firm value and between debt and equity holders. Myers (1977) reasoned such conflict to debtholders demanding higher interest rates to compensate for the risk of liquidation, negatively impacting firm value.

Agency theory also demonstrates governance mechanisms' role in combining a shareholder and manager's interest using corporate governance board e.g., gender diversity to supervise financial choices and risks (Sarhan & Ntim, 2018). Agency theory represents the conflicts between the principal (shareholder) and agents (management) when their preferred risk clashes (Zaid et al., 2020). This led to increasing agency cost (Amin et al., 2022). Gender diversity can improve governance- leverage impact on a firm (Ben Saad & Belkacem, 2022). Female directors may be more likely to challenge management and question their decisions, leading to better corporate governance and reduced agency costs

Moreover, Agency costs can be reduced by increasing board size and gender diversity (García & Herrero, 2021). Large boards with more female representatives increase management supervision and lessen discretionary behavior (Zaid et al., 2020). More female staff members can improve tracking, reduce agency expenses and improve business output. When supervision and counter checking is improved by adding female members, this will reduce agency cost and increase trust of shareholders (Post & Byron, 2015).

2.2 Resource Dependency Theory

Resource dependency theory holds that board gender diversity can influence a firm's access to resources and decision-making processes. This theory says that boards use networks, skills and authenticity as resources (Alhossini et al., 2021). This changes the firm's external debt financing. Not only that, both behavioral and resource theory also provides rationale that group diversity motivates towards high quality decision making by oversight biases influencing fund choice (Schneid et al., 2015).

Board of directors formulate the capital structure by developing policies, reducing risk and setting goals. For this, they must follow the code of conduct and promote transparency, accountability and employee well-being. Usually, larger boards have more access to services like network and advisory aid for taking key financial decisions (Ahmed Sheikh & Wang, 2012). More women on board give more access to resources and opportunities to exploit business opportunities (Brieger et al., 2019).

2.3 Behavioral Theory

Behavioral theory links corporate governance, fund structure and female on board. Bilgehan (2014) studied the impact of psychological biases on capital structure. He found that cognitive biases like overconfidence, risk aversion and anchoring behavior affect decisions. Moreover, managers misjudge and miscommunicate available information leading to agency problems. So, a link between behaviour and agency theory was found. Regarding this, Oliver and Mefteh (2010) found a negative effect of emotions on investors' confidence whereas it is positive for managers. Now from a gender perspective, Alqatamin (2018) found that a CEO's internal characteristics i.e. gender positively affect the leverage of firm while age effect negatively. It uses a non-rational systematic way to use cognitive biases and heuristics to alter decisions (Ali et al., 2023). Leventhal & Cameron (1987) found gender roles to direct women's participation on board, known as the theory of social resource. Studies also show that using cognitive mechanisms rather than economic incentives, board gender diversity can positively affect performance (Adusei & Obeng, 2019). So, it can be said that female directors are more likely to include a broader perspective and avoid niche groupthink, leading to a more balanced and informed decisions regarding capital structure.

3. Empirical Literature and Hypotheses Development

3.1 Capital Structure and Gender Diversity Relationship

Critics argued that companies with more female board members increase leverage (Yakubu & Oumarou, 2023). Among just a handful of evidence, Chen et al. (2023) found a positive association between board gender and firm performance. Firms with more female directors have lower debt cost (Pandey & Sahu, 2019).

Some papers found female directors minimize the firm's leverage to lower the financial risk. Female directors decrease financial distress with lesser risk (Kristanti et al., 2016; Mittal

& Lavina, 2018). Huang & Kisgen (2013) found the same results with gender difference theories. Male dominated boards stereotype women as less capable of completing work (Seierstad et al., 2017). In summary, studies suggest negative effect of women in board indicating better financial choices. Therefore, following hypothesis can be proposed:

H₁: Gender diversity on the board is negatively related to capital structure.

3.2 National Culture and Capital Structure

According to Bitar et al. (2020) national culture encompasses the norms, beliefs and shared values that guide human lives. Illiashenko & Laidroo (2020) quoted it as thoughts and combined knowledge navigating livelihood. Hofstede's cultural index investigates the role of a country's cultural pattern using six dimensions constructing the index (Hofstede, 2011).

We consider power distance as the first dimension in this paper. With high-power and remote culture, people tend to restrict independence and decision-making (Frijns et al., 2022). It discriminates against the powerholders having more privileges. The less powerful are trusted less and seen as threats (Ashraf et al., 2016). Lower trust leads to less disclosure of information and more cost of debt (Aggarwal & Goodell, 2009).

As per Gleason et al. (2000) nations having more power distance index prefer equity rather than debt issue. Mac An Bhaird & Lucey (2014) investigated how higher power distance value authority, respect, and hierarchy. For taking loans banks are regarded as powerful and respected. According to Chui et al. (2002) mastery of banks in providing loans is same as power distance negatively impacting debt (Wang & Esqueda, 2014). An organization with high power distance has more power concentrated explicitly to top management. So, more female on board decentralizes the organization leading to a more evenly distributed hierarchical powered organization. The second hypothesis was developed in two sections based on the two national cultural indices:

H₂ (a): Capital Structure is negatively associated with board diversity being moderated by lower power distance.

Masculinity vs femineity indicates the direction of men and women cultural difference. In Hofstede's masculine culture, male has leadership and responsibility taking qualities whereas female is assertive, self-dependent and risk takers. Masculine culture emphasizes competition, achievement, success and are money and asset oriented (Illiashenko & Laidroo, 2020). Countries with more masculinity in organizations give more importance to object-oriented achievement resulting in materialistic rewards. Whereas the risk-taking behavior of female direct towards taking more debt in their capital structure (Willemink, 2018). So, more female in board ensure a greater portion of debt in the capital structure and more risk involved. Hirshleifer & Thakor (1992) found managers of masculine culture chose safer projects with self-enhanced performance and prefer equity. Developing nations have higher levels of masculinity and take lesser loans (Andleeb et al., 2021).

H₂ (b): Capital structure is negatively associated to board diversity, which is controlled by lower masculinity.

4. Methodology

This study investigates the connection between board gender diversity and capital structure along with its impact on cultural diversity. To justify the most efficient regression model, we have first employed Wooldridge test for serial correlation and Dubin-Wu-Hausman (DWH) also known as the Hausman specification test (Hausman, 1978). This test helps select between fixed and random effects using null hypothesis. The Hausman test showed a consistent difference in coefficients indicating the fixed effect model is suitable for the investigation in this study.

Next, Modified Walf test for groupwise heteroskedasticity is conducted with the null hypothesis (H0) that the model is homoscedastic. We rejected the null hypothesis in our analysis because the p value was less than the selected significance level of 0.05. This means that the variance of the error term is not same across all groups. So, there might be presence of groupwise heteroskedasticity, meaning that the variance of error term is not constant across all observation. This can affect the reliability of the regression. So, to solve the issue, we used GLS- fixed effect (FE) estimator. This approach is preferred over fixed effect OLS regression as it estimates variance capturing variability across countries. And lastly, Wooldridge Test for Autocorrelation in Panel Data was conducted to assess whether the residuals exhibit first-order autocorrelation. The results showed no sign of first-order autocorrelation.

4.1 Data Selection

The data is extracted from Thomson Reuter Refinitiv Eikon for cross country financial information comparison. The panel data is strongly balanced with equal time points for each panel and nonexistent gaps between time series. In our regression analysis, the variables are winsorised at 1% and 99% to remove outliers (Detthamrong et al., 2017).

In Table 1, Panel A has 2918 observations of 16 countries as sample. Although 16 countries have been focused on, any misrepresentation is avoided by taking data for a considerable number of years following (Saona et al., 2019). The countries have been selected with complementary governance practices, cultural dynamics, and economic environments. This represents an overall range of economic and cultural context to build a context that can influence the boardroom decision making. This helps in allowing robust findings despite the dataset restriction.

Moreover, Panel B distributed the study into 10 industries based on the Refinitiv Business Classification (TRBC) economic sector division by Thomson Reuters. Although the financial institutions sector and others' capital structure don't match, we have included it in this to provide an overall picture. Companies that have negative equity have been avoiding removing companies that are facing bankruptcy cost in their balance sheets. All the firms included belong to their country's market's index. Not only that, the study spans from 2013 to avoid discrepancies by the subprime mortgage crises shown in Panel C. The time frame was chosen as it captures implementation of regulations aimed at female representation on boards in this period. Moreover, the timeframe also encompassed economic conditions such as the aftermath of COVID-19 pandemic and its impact on the relationship between board gender diversity and capital structure. An overview of the variables is shown in Table 2.

Table 1
Sample Description

Panel A: Process of sample selection		
Initial observation (2013 - 2023)		3729
Less: observations containing missing data		811
Net sample		2918
Panel B: Industry wise comparison		
TRBC Economic Sector	Obs	Mean
Consumer non-cyclicals	307.00	0.27
Consumer Cyclicals	507.00	0.28
Basic Materials	371.00	0.24
Healthcare	272.00	0.22
Financials	102.00	0.23
Industrials	585.00	0.24
Energy	229.00	0.24
Utilities	193.00	0.23
Technology	173.00	0.28
Telecommunication Services	179.00	0.27
Panel C: Year wise comparison		
Year	Obs	Mean
2013	261.00	0.15
2014	265.00	0.17
2015	266.00	0.19
2016	268.00	0.21
2017	273.00	0.24
2018	282.00	0.26
2019	286.00	0.28
2020	300.00	0.30
2021	331.00	0.31
2022	324.00	0.33
2023	62.00	0.33

Note(s): The number of observations, economic sector and number of observations yearly and mean of the sample are exhibited in the table.

Source: Table composed by authors

3.2 Variables

Three categories of research variables presented as dependent, independent and control variables have been used.

3.2.1 Dependent Variables

To meticulously measure capital structure, we followed Bazhair (2023) for selecting the dependent variables. The capital structure is computed using total debt by total asset (TD) (Ahmed Sheikh & Wang, 2012).

3.2.2 Independent Variables

Gender diversity is the main independent variable in this study, measured according to the methodology outlined by Saona et al. (2019). It is calculated as the ratio of female board members to the total number of board members (GD1).

Following Martín-Ugedo & Minguez-Vera (2014) we added two gender diversity indexes. The first is the Blau (1977) index (GD2) and the Shannon (1948) index (GD3).

The Blau Index is calculated: $GD2 = 1 - \sum_{i=1}^n P_i^2$ where P_i represents the portion of director in each $n = 2$ gender types of male and female board members. The values range between 0 to 0.5 where, 0 means there are only female or male members on the board and 0.5 equals same proportion of both.

Both Shannon Index and Blau Index use same set of data input as $GD3 = \left| \sum_{i=1}^n \ln P_i^{P_i} \right| \cdot GD3$. This variable takes no evidence of gender diversity as 0 and when both are equal, the value is 0.693. The underlying assumption is that $GD3 = 0$ when $P_i = 0$. $GD3$ fluctuates more due to its logarithmic transformation (Abad et al., 2017). Both the indexes serve as additional measurements of board gender diversity rather and so we used both in our estimation.

3.2.3: Board Characteristics and Firm Specific Control Variables

We incorporate two sets of control variables to modify the firm-specific effect, Ghardallou (2022) and board-specific controls, (Ciftci et al., 2019; Disli et al., 2022; Kouaib et al., 2020). Board size, proportion of independent board member and CEO duality ($Duality_{it}$) measure corporate governance quality. Now, the natural logarithm of total board members is called board Size ($BSize_{it}$) (Adusei, 2015). The proportion of independent board members ($PIBM_{it}$) represent independent directors by the total directors included in board. CEO dualities occur when board member work both as the CEO and Chairman. Furthermore, the firm specific control variables, ROA and ROE measure the firm profitability. Apart from these, firm size ($FSize_{it}$) is the logarithmic transformation of total asset reported.

3.2.4 Country Level Variables

To examine country level economic empowerment of women in regression model, we considered cross-country heterogeneity impacting earnings management. The country level variable, Z composed from: World Governance Index (WGI_{it}) that summarizes governance quality to improve the firm policies. According to Kaufmann et al. (2011), (WGI_{it}) aggregates from 6 characteristics: political stability and absence of violence and terrorism, government effectiveness regulatory quality, voice and accountability, rule of

law and control of corruption. The (WGI_{it}) works in a scale from -2.5 to 2.5 with higher value meaning developed governance practices.

Global Gender Gap (GGG_{it}) measures gender discrimination with an index value between 0 to 1. Countries with economically empowered women have possibly more competent, skillful and qualified women on corporate boards (Terjesen & Singh, 2008). (GGG_{it})=f (literacy rate, labor force participation rate, primary enrollment, estimated earned income (PPP), professional and technical workers, public sector management, secondary enrollment, healthy life expectancy, seats in parliament, percent of wages paid, ministerial-level positions, female head of state, paid maternity leave days) (Mastracci, 2017).

3.2.5 Cultural Index Variables

Hofstede's cultural index measures the national culture of a country. We used this framework for its use in business literature at country level survey queries (Mourouziadou-Damtsa et al., 2019). We considered 2 in 6 dimensions as of Power Distance (PD_{it}) and Masculinity vs Femininity (MAS_{it}) due to missing country wise data. These dimensions range from 0 to 100. Lastly, the factor of the WGI ($FWGI_{it}$) is added as explanatory variable.

3.3 Baseline Model

Given that in this study we examine the impact of independent variables on capital structure of firms, we have created the regression models here to test the hypothesis described above:

$$\text{Capital Structure}_{it} = \alpha + \beta_1 GD_{it} + \beta_2 (GD_{it} * \text{Cultural dimension}) + \beta_4 \text{Board Size} + \beta_3 \text{Independent board members}$$

Where, $+ \beta_5 \text{CEO Chairman Separation} + \beta_6 \text{ROA} +$

$$\text{Capital Structure}_{it} = \beta_7 \text{ROE} + \gamma Z_{ikt} + \varepsilon$$

capital structure of the

firms as measured by $Leverage_{ikt}$ for the i th firms in the t period.

GD_{it} is composed of GD1, GD2 and GD3

Where both high masculinity and high-power distance's country coefficients are 1. Members of organizations in these countries are more oriented to object and do not require justification for any action related to decision making. For this reason, the performance of the companies declines.

$$\text{Leverage} = f(GD_{it}, GD_{it} * \text{Cultural dimension})$$

Table 2
Variable Comprehension

Main variables	Acronyms	Definition and measures	Expected impacts (+/-)	Source
<i>Firm performance (Dependent variable)</i>				
Total debt	TD	Total debt divided by total asset in a given financial year		
<i>Gender diversity Variable</i>				
Proportion of women on board	GD1	Number of women on board divided by the total members on board	+/-	Custódio & Metzger (2014)
Board Blau index	GD2			Blau (1977)
Board Shannon index	GD3			Shannon (1948)
<i>Country level variables</i>				
World governance index	WGI	Measure six dimensions		
Factor world governance index	FWGI	Factor of the World governance index		
Global gender gap index	GGG		+	Lee & Thong (2023)
<i>National culture (Hofstede cultural dimension)</i>				
Power Distance	PD	Degree to which the less powerful members of society acknowledge and predict that the power is dispersed unequally	-	Hofstede (2011)
Masculinity vs Femininity	MAS	Extent to which the member of the society perceives uncertainty of future threats	-	Hofstede (2011)
<i>Board specific control variables</i>				
Board size	BSize	Number of members of the board	+/-	Berger et al. (1997); Jensen (1986)
CEO duality	CEO	Dummy variable; 1 = CEO also chairperson of company; 0 otherwise	-	Amin et al. (2022)
Proportion of independent board member	PIBM	Ratio of proportion of independent directors to total directors in board	+	Berger et al. (1997)
<i>Firm specific control variable</i>				
Return on asset	ROA	Net income after tax by total asset	-	Appiah et al. (2020); Ngatno et al. (2021)
Return on equity	ROE	After tax net income by total equity	-	S (2016)
Firm Size	FSize	Natural logarithm of total asset ln (TA)	+	Titman & Wessels (1988)
Analytic experienced board	AEB	Ratio of percentage of board member with analytic experience to the total number of board members	+	Kabir et al. (2023)

Note: The table represents a list of variables and their measurement and expected impact expected in this study. The dependent variables are winsorised at 1 and 99% levels.

Where, both low power distance and masculinity has country coefficient value to be 0. The members of the board have a democratic relationship expecting and accepting power in those nations having lower degree of masculinity and power distance. So, countries with low masculinity and power distance have firms with enhanced performance.

We also employed dummy (1) country and (2) industry to represent the unseen heterogeneous effect at firm level and to include the unknown fixed effects (Kong et al., 2020). The fixed effects model has been used to address time invariant omitted variable bias by controlling for unobserved heterogeneity that is constant over time but varies across the institutions. Hence the fixed effects model removed the bias of omitted variables that could have led to endogeneity.

4. Data Analysis

4.1 Descriptive Statistics

Table 3 shows the number of observations (Obs), mean, median, standard deviation (SD), minimum (Min) and maximum (Max). Total debt has a mean value of 0.26. Moreover, it varies greatly from 0% to a maximum of 73% denoting that 26% of the capital structure financing is from external sources. This means that some risk-averse firms try to avoid financial burden.

Table 3
Summary Statistics

Acronyms	Variables	Obs.	Mean	Median	SD	Min	Max
TD	Total debt	3841.00	0.26	0.25	0.15	0.00	0.73
GD1	Proportion of women on board	2918.00	0.25	0.25	0.13	0.00	0.67
GD2	Board Blau index	2918.00	0.34	0.38	0.14	0.00	0.50
GD3	Board Shannon index	2918.00	0.51	0.56	0.18	0.00	0.69
PBIM	Proportion of independent board members	2917.00	0.62	0.62	0.23	0.00	1.00
GGG	Global gender gap index	3630.00	0.77	0.76	0.04	0.66	0.85
WGI	World governance index (0-1)	3630.00	0.79	0.79	0.07	0.58	0.87
FWGI	Factor of World governance index (0-1)	3630.00	0.21	0.28	0.78	-2.22	1.20
MAS	Masculinity index	3993.00	43.47	43.00	25.69	5.00	3993.00
PD	Power distance index	3993.00	39.45	35.00	15.06	11.00	3993.00
BSize	Board size	2917.00	2.39	2.40	0.34	0.69	2917.00
CEO Duality	CEO duality	2926.00	0.22	0.00	0.41	0.00	1.00
AEB	Analytic experienced board	2907.00	6.49	6.06	2.55	0.25	22.92
FSize	Firm size	3819.00	22.58	22.72	1.94	14.22	3819.00
ROA	ROA	3725.00	0.05	0.05	0.06	-0.40	3725.00
ROE	ROE	3735.00	0.12	0.13	0.17	-1.05	3735.00

Notes. The summary statistics of all the observations are characterized in the table above.

Source: Table is compiled by author

Now coming to the main explanatory variables, GD1, GD2 and GD3 depict a standard deviation of 0.13, 0.14, and 0.18 respectively. The min of all three gender diversity indicators is 0 reflecting that the dataset also has firms that only have board composition with male member as well. By summary statistics for each country, we have drawn a general picture presented in Table 4 respectively. It shows that just 25% of the countries' board members are women, with Norway having the highest percentage of female board members—a very low number. When considering the national context, Norway leads with the greatest score across all parameters.

Table 4
Country-wise Descriptive Statistics

Countries	Obs.	Mean	Median	SD	Min	Max
Austria	97.00	0.20	0.20	0.11	0.00	0.42
Belgium	90.00	0.25	0.26	0.13	0.00	0.50
Denmark	182.00	0.22	0.22	0.11	0.00	0.44
Finland	179.00	0.30	0.29	0.10	0.11	0.50
France	324.00	0.34	0.36	0.12	0.00	0.64
Germany	248.00	0.24	0.25	0.11	0.00	0.50
Hungary	32.00	0.15	0.10	0.11	0.04	0.50
Ireland	50.00	0.19	0.17	0.09	0.06	0.38
Italy	20.00	0.20	0.33	0.17	0.00	0.38
Netherlands	160.00	0.24	0.25	0.13	0.00	0.50
Norway	169.00	0.41	0.40	0.07	0.22	0.67
Portugal	74.00	0.14	0.11	0.11	0.00	0.38
Spain	235.00	0.17	0.17	0.11	0.00	0.45
Sweden	193.00	0.30	0.29	0.12	0.00	0.58
Switzerland	173.00	0.18	0.18	0.11	0.00	0.44
United Kingdom	692.00	0.23	0.25	0.12	0.00	0.55

Notes. The summary statistics of all the observations are characterized in the table above.

Source: Table is compiled by author

4.2 Correlation and Multicollinearity Analysis

According to the rule of 10, when the VIF value reaches the threshold of 10, measures to reduce the value are taken by altering independent variable's impact (O'brien, R. M., 2007). The VIF value is below 10, indicating that there is no multicollinearity problem in the analysis. Table 5 represented the correlation among the capital structure measures, country's cultural indicators, board characteristics and control variables. Total debt (TD) has an inverse relationship with the gender diversity proxy variables GD1, GD2 and GD3. This means that when percentage of women in board increases, it would decrease leverage with a correlation value of 0.03 Again, the correlation between the gender diversity variables (GD1, GD2 and GD3) is found to have high significant positive correlation (0.95, 0.92 and 0.99 respectively). This is because all measure the same concept. While the correlation analysis highlights the significant relationship,

It does not imply any causation relation between the variables. Moreover, spurious correlation results can also be formed for omitted or unaccounted variables in the analysis. For this reason, further multivariate regression analysis has been conducted in the next section to better understand the true natural relationship.

Table 5
Correlation Results

Variables	TD	GD1	GD2	GD3	PIBM	BSize	CEO Duality	ROA	ROE	AEB	FSize	GGG	WGI	FWGI	MAS	PD
TD	1.00															
GD1	-0.05*	1.00														
GD2	-0.06*	0.95*	1.00													
GD3	-0.06*	0.92*	0.99*	1.00												
PIBM	0.01	0.19*	0.21*	0.20*	1.00											
BSize	0.08*	-0.08*	-0.04	-0.01	-0.32*	1.00										
CEO Duality	-0.01	0.04	0.02	0.02	-0.10*	0.22*	1.00									
ROA	-0.16*	0.01	0.02	0.02	0.03	-0.16*	-0.04	1.00								
ROE	0.01	0.00	0.00	0.01	0.00	-0.05	-0.03	0.81*	1.00							
AEB	-0.12*	-0.10*	-0.12*	-0.12*	-0.13*	0.08*	0.23*	0.11*	0.07*	1.00						
FSize	0.18*	0.06*	0.09*	0.10*	0.07*	0.52*	0.15*	0.04	0.14*	0.02	1.00					
GGG	-0.13*	0.38*	0.34*	0.32*	0.21*	-0.34*	-0.17*	0.01	-0.05*	-0.16*	-0.10*	1.00				
WGI	-0.17*	0.14*	0.15*	0.14*	0.29*	-0.43*	-0.33*	0.09*	0.02	-0.14*	-0.04	0.75*	1.00			
FWGI	-0.18*	0.14*	0.15*	0.15*	0.29*	-0.43*	-0.33*	0.09*	0.03	-0.14*	-0.02	0.75*	1.00*	1.00		
MAS	0.11*	-0.25*	-0.21*	-0.19*	-0.06*	0.25*	-0.02	0.02	0.04*	0.04	0.18*	-0.65*	-0.48*	-0.47*	1.00	
PD	0.09*	0.06*	0.02	0.01	-0.19*	0.34*	0.48*	-	-0.05*	0.17*	0.19*	-0.38*	-0.67*	-0.67*	0.06*	1.00

Note(s): The signs ***p <1%, ** p <5% and * p <10%. (2-tailed).

Source: Author's own

5. Results and Discussion

In this section, the empirical results regarding the effect of gender diversity on total debt (TD) has been presented. To test the direct effect of capital structure on the gender diversity variables, GD1, GD2 and GD3, we have separately used regression with the moderating effect of Hofstede cultural indices. In the panel GLS regression, total debt (TD) i.e., financial leverage is the dependent variable. Moreover, models have industry and country dummies.

Model (1) is a baseline test, where we added all the variables with masculinity (divMAS2). The result suggests that percentage of women on board (GD1), Board and Firm specific variables are positively related to Total (TD) at 5% level in contingency of World governance indicator (WGI). On the other hand, board size (BSize), analytic experienced board (AEB), ROA, factor of world governance indicator (FWGI) are negatively significantly correlated with TD. Interestingly, as seen WGI and factor of world governance indicator FWGI have inverse relationship with TD. Again, model (2) subtracts divMAS2 and adds power distance (divPD2) to ascertain whether the relationship differs. The main variables in both models are identical.

In the next section, we examine the influence of capital structure through dependent variable total debt (TD) on Board Blau index (GD2) and Board Shannon index (GD2). Model (3) and (5) test for the effect with masculinity (divMAS2) and Model (4) and (6) for power distance (divPD2). None show significant correlation with GD1, GD2 and GD3 which contradicts our hypothesis H (2a) and H (2b). Moreover, board size, ROA and factor of world governance indicator (FWGI) is negatively associated with total debt in presence of divMAS2 and divPD2.

Accounting at 5% significance level, GD1 has a negative significant impact on TD in model 1 and 2. Proceeding toward model 3 and 4 we discover a negative significant relationship at a 10% significance level. Lastly, in models 5 and 6, GD3 has a 5% significance level, respectively. The results demonstrate that companies with higher percentages of female board members generally have lower leverage ratios. This conclusion of the study is consistent with (H1). This also is consistent with the agency cost theory which states that more participation of women on board helps reduce risky and self-benefiting decisions. Papers of Alves & Francisco (2015) also found similar inverse relationship. Berhe & Gebremedhin Berhe (2023) provides partial validation of the agency theory. This means that greater women on the board lead to higher monitoring and lower debt (Agrawal & Knoeber, 1996). Also, the resource dependency theory says that gender diversity increases the connection and advising sources of board where the major decisions depend on. As a result, this broader resource chooses greater financial fitness for the company decreasing dependency on leverage. (Hillman et al., 2007). According to Alves et al. (2014) women perform strict supervision and reduce agency cost and risk in financial decisions.

Table 7
Impact of Board Gender Diversity on TD

Variables	TD					
	(1)	(2)	(3)	(4)	(5)	(6)
GD1	-0.0058** (0.0026)	-0.0058** (0.0026)				
GD2			-0.0188* (0.0099)	-0.0188* (0.0099)		
GD3					-0.0149** (0.0073)	-0.0149** (0.0073)
PIBM	0.0049 (0.0073)	0.0049 (0.0073)	-0.0018 (0.0071)	-0.0018 (0.0071)	-0.0016 (0.0071)	-0.0016 (0.0071)
BSize	-0.0421*** (0.0072)	-0.0421*** (0.0072)	-0.0331*** (0.0068)	-0.0331*** (0.0068)	-0.0330*** (0.0068)	-0.0330*** (0.0068)
Duality	0.0095** (0.0044)	0.0095** (0.0044)	0.0070 (0.0043)	0.0070 (0.0043)	0.0070 (0.0043)	0.0070 (0.0043)
AEB	-0.0017** (0.0007)	-0.0017** (0.0007)	-0.0011 (0.0007)	-0.0011 (0.0007)	-0.0011 (0.0007)	-0.0011 (0.0007)
ROA	-0.9402*** (0.0427)	-0.9402*** (0.0427)	-0.9130*** (0.0425)	-0.9130*** (0.0425)	-0.9128*** (0.0424)	-0.9128*** (0.0424)
ROE	0.2480*** (0.0157)	0.2480*** (0.0157)	0.2401*** (0.0155)	0.2401*** (0.0155)	0.2402*** (0.0155)	0.2402*** (0.0155)
FSize	0.0212*** (0.0024)	0.0212*** (0.0024)	0.0214*** (0.0024)	0.0214*** (0.0024)	0.0214*** (0.0024)	0.0214*** (0.0024)
WGI	2.1229*** (0.5095)	2.1229*** (0.5095)	2.0932*** (0.5044)	2.0932*** (0.5044)	2.0881*** (0.5043)	2.0881*** (0.5043)
FWGI	-0.1795*** (0.0452)	-0.1795*** (0.0452)	-0.1766*** (0.0448)	-0.1766*** (0.0448)	-0.1761*** (0.0448)	-0.1761*** (0.0448)
GGG	0.0571 (0.0583)	0.0571 (0.0583)	0.0564 (0.0580)	0.0564 (0.0580)	0.0550 (0.0578)	0.0550 (0.0578)
divMAS2	0.0009 (0.0008)		0.0008 (0.0010)		0.0008 (0.0010)	
divPD2		-0.0005 (0.0005)		-0.0004 (0.0005)		-0.0004 (0.0005)
Constant	-1.8715*** (0.3988)	-1.7974*** (0.4026)	-1.8522*** (0.3954)	-1.7824*** (0.3986)	-1.8462*** (0.3954)	-1.7759*** (0.3986)
Observations	2,549	2,549	2,726	2,726	2,726	2,726
Number of Iden	312	312	319	319	319	319
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country Dummies	Yes	Yes	Yes	Yes	Yes	Yes

Note (s): The estimated results using fixed effect for relationship between capital structure and gender diversity considering 2549

Observations for dependent variable Total debt (TD) and the independent variables. The signs ***p <1%, ** p <5% and * p <10%.

Source: authors

Moving to the firm specific variables, at 1% significance level, firm size and leverage has a positive significant relation. It is in line with the previous studies of (Danso et al., 2020; Marsh, 1982). This positive relationship suggests larger firms give importance to higher leverage for lesser bankruptcy cost and stronger position to negotiate with lenders

(Baker et al., 1988). Few studies report that larger size of firm means a faster adjustment to the optimum leverage ratio. So bigger firms take more debt as they can be highly diversified with more cash flow as earnings. (Titman & Wessels, 1988).

ROA appears to be negatively significant with total debt in 1% level of significance in all models. This may direct profitable firms to employ less debt in their fund mixes for the relative cost of external source of funding (Moradi & Paulet, 2019). In a study on Saudi firms, higher profitability was rebalanced with lesser debt in the capital structure (Bazhair, 2023). Again, according to Al-Haddad et al. (2023) debt increase cost of capital leading to ROA affecting capital structure negatively.

Moreover, in all models' total debt ratio is negatively associated to board size at 1% significance level. Therefore, for less oversight on the larger board, firms adjust slowly to the desired leverage ratio. This is in line with agency theory arguing that a firm's leverage decreases when the board size increases, affecting the capital structure (Ahmed Sheikh & Wang, 2012). Resource dependency theory also says that board size makes advisory functions active (Hillman et al., 2007). But the coefficient of proportion of independent board member (PIBM) lacks significance. So, the model disagrees with the findings that decreasing the cost of default risk with lower cost of debt is enhanced by independent directors (García & Herrero, 2021). It also contradicts the studies that show independent board members increase leverage and ability to monitor managers by their experience and knowledge increase capital structure (Abor, 2007; Kyriazopoulos, 2017; Tarus & Ayabei, 2016).

In model (1) and (2), the correlation of CEO duality and leverage is positively significant at 5%. It refers to the fact that CEO duality increases a firms' debt use. CEO duality is not wanted by the stakeholders as they can misuse the position. This conforms to the conclusion of (Zaid et al., 2020). Moreover, (Abor, 2007; Fosberg, 2004) also mentioned that companies with CEOs playing dual roles reducing asymmetric information when debt equity ratio is high. The result is like the findings of (Abor & Biekpe, 2007) having a positive but insignificant relationship. Again, both in model 1 and 2, analytic experienced board and total debt have a significantly negative relationship but for rest of the models it is negative but insignificant. This is because more experienced CEO may tend to take lower leverage level. (Wen et al., 2002) Both the Blau and Shannon indices (GD2) and (GD3) show similar degrees of diversity calculation although GD2 being more sensitive toward deviation gender of the board. (Campbell & Mínguez-Vera, 2008). The same hypothesis has been used for developing both the index with women on board directing to greater strategic move of the company.

6. Robustness Check

The results of the variable TDTC show the exact opposite result of the regression result of TD. So, robustness analysis is inconsistent. To ensure the robustness of our findings, we used Total Debt to Total Capital (TDTC) as the dependent variable in our model. Table 8 presents the results of the impact of boardroom gender diversity on capital structure. After addressing endogeneity issues, our results show a positive association between all indicators of gender diversity (GD1, GD2, GD3) and TDTC, which is

consistent with the findings of (Yakubu, I. N., & Oumarou, S., 2023). This contrast suggests that the influence of board gender diversity on capital structure might not be as significant when examined through the Total Debt to Total Assets (TDTA) ratio.

Table 8
Fixed Effect GLS Estimations with TDTC as dependent variable (Robustness Check)

Variables	TDTC					
	(1)	(2)	(3)	(4)	(5)	(6)
GD1	2.4195** (1.0551)	2.4195** (1.0551)				
GD2			1.9432* (1.0082)	1.9432* (1.0082)		
GD3					1.5392** (0.7792)	1.5392** (0.7792)
PIBM	-2.3362*** (0.6542)	-2.3362*** (0.6542)	-2.2551*** (0.6614)	-2.2551*** (0.6614)	-2.2514*** (0.6642)	-2.2514*** (0.6642)
BSize	3.2582*** (0.6804)	3.2582*** (0.6804)	3.1298*** (0.6862)	3.1298*** (0.6862)	3.1223*** (0.6884)	3.1223*** (0.6884)
Duality	0.5313 (0.3962)	0.5313 (0.3962)	0.6150 (0.3994)	0.6150 (0.3994)	0.6139 (0.3994)	0.6139 (0.3994)
AEB	0.2862*** (0.0666)	0.2862*** (0.0666)	0.2651*** (0.0675)	0.2651*** (0.0675)	0.2643*** (0.0678)	0.2643*** (0.0678)
ROA	46.1467*** (4.2002)	46.1467*** (4.2002)	44.7324*** (4.2391)	44.7324*** (4.2391)	44.5651*** (4.2482)	44.5651*** (4.2482)
ROE	-11.0472*** (1.4142)	-11.0472*** (1.4142)	-10.7092*** (1.4218)	-10.7092*** (1.4218)	-10.6562*** (1.4241)	-10.6562*** (1.4241)
FSize	-1.1145*** (0.1936)	-1.1145*** (0.1936)	-1.1405*** (0.1964)	-1.1405*** (0.1964)	-1.1436*** (0.1976)	-1.1436*** (0.1976)
WGI	169.0813*** (47.5884)	169.0813*** (47.5884)	158.2300*** (47.9643)	158.2300*** (47.9643)	158.7683*** (48.0218)	158.7683*** (48.0218)
FWGI	15.6106*** (4.1765)	15.6106*** (4.1765)	14.7299*** (4.2066)	14.7299*** (4.2066)	14.7778*** (4.2122)	14.7778*** (4.2122)
GGG	-11.6602** (5.4394)	-11.6602** (5.4394)	-9.8135* (5.4580)	-9.8135* (5.4580)	-9.7297* (5.4556)	-9.7297* (5.4556)
divMAS2	-0.2794* (0.1467)		-0.2593* (0.1481)		-0.2570* (0.1485)	
divPD2		0.1514* (0.0794)		0.1405* (0.0802)		0.1392* (0.0804)
Constant	167.9892*** (37.9724)	144.2488*** (37.6554)	157.8283*** (38.2758)	135.7977*** (37.9534)	157.9645*** (38.3314)	136.1339*** (38.0007)
Observations	2,614	2,614	2,614	2,614	2,614	2,614
Industrial Dummy	YES	YES	YES	YES	YES	YES
Country Dummy	YES	YES	YES	YES	YES	YES

Note (s): *** p<0.01, ** p<0.05, * p<0.1
 Source: authors

The positive relationship between gender diversity and TDTC implies that a diverse board may promote a balanced approach to using debt and equity, encouraging growth opportunities by using debt strategically. This approach helps finance acquisitions, innovation, and expansion without causing financial distress, leading to a more balanced capital structure. Conversely, a negative relationship with TDTA might indicate that the

company is focusing on asset efficiency or reinvesting earnings to finance its assets. A diverse board may avoid over-leveraging assets, prioritizing asset quality and financing through equity, resulting in a lower TDTA ratio.

Additionally, firm size, return on equity (ROE), and the proportion of independent board members are negatively related to TDTC, highlighting the sensitivity of these control variables to different measures of capital structure. Notably, country-level variables such as the World Governance Indicators (WGI) and the Global Gender Gap (GGG) index show a significant negative relationship with TDTC, whereas they were insignificant in previous analyses. Moreover, power distance is positively and significantly associated with the firm's total debt-to-total capital ratio. By quantifying this finding, it means that the countries with more senior leadership or decision-making roles have greater debt in their capital structure which they use as progressive risk taking. Masculinity has negative coefficient (coeff. divMAS2 = 0.10, p value<10%). Thus, it suggests that traditionally male-dominated fields lead to more traditional and conservative financial decisions and behavior (Kabir et al., 2023). So here companies rely less on debt as a strategic tool taking a conservative approach. In summary, the impact of the independent variables on capital structure appears to be dependent on the specific measure of capital structure taken.

7. Conclusion, Implications and Future Directions

This study determines board gender diversity's impact on capital structure determinant in 16 European countries. It also focused on how cultural and country level indices affect boardroom diversity. The paper backed the impact of female presence in board on capital structural decision of a company.

The findings strongly suggest that gender diversity on the board significantly impacts a firm's capital structure. Across all models, there is a consistent negative association between gender diversity and leverage, indicating that gender-diverse boards lead to better monitoring and a more risk-averse approach to debt management. This aligns with agency theory, which demonstrates that female directors reduce default risk through stricter oversight and more cautious decision-making. These results also support the idea of gender bias in leadership roles, which reinforces findings from Field et al. (2020), showing that women in leadership positions are associated with improved risk management.

Furthermore, firm size has a significant and positive relationship with total debt, suggesting that larger firms are more likely to take on debt, given their larger portfolios and greater access to credit. CEO duality (where the CEO also serves as the board chair) is predictably correlated with higher debt levels, especially when women are present on the board. However, larger board sizes tend to reduce debt levels, likely due to the increased diversity of opinions and enhanced governance, leading to more conservative financial strategies. Corporate stability is dominated solely by capital structure (Gill et al., 2009). This research provides significant insights on how boards operate in emerging

markets with limited resources. The corporate governance's role as variables in general and specifically on how gender diversity a firm's capital structure is highlighted in the paper. In this perspective, it is important to develop regulatory and supervisory reforms to be adapted specifically by the European region. Internal governance mechanisms should also be regulated.

Policymakers could motivate companies to maintain an equilibrium in the mix of genders to ensure smooth and effective governance with minimized agency cost. This will also increase the firm's authenticity and fame by attracting engagement with lenders. Not only that, gender diversity quotas or incentives should also be introduced. Small firms should be assisted in taking debt with financial options like government schemes, venture capital or loan programs customized to their needs. Moreover, financial options can be used as an emergency gateway. Additionally, although companies in different sector have different cultural and gender orientation, they should relentlessly try to make policies to create a healthy corporate governance and women empowerment-based culture leading to a sustainable change. For this they can face resistance related to social norms, cultural mindset, and traditional concerns about the practicality of imposing the initiatives. To overcome these, the policymakers can offer incentives like tax subsidies, breaks, government assistance for firms that meet up diversity quotas to encourage the inclusion. They can also include awareness campaigns and influence industry leaders to join the initiative in shifting perceptions and foster broader acceptance of gender diversity.

There are a few limitations to this study. Critically, the paper has been generalized without any varied condition over time strengthening the research validity. Secondly, there was also a lack of specific data on each firm's directors (age, education, experience) on the database analyzed. For example more experienced directors may change the risk appetite of the company. Moreover, generalization without taking account for time variation can weaken the result in capturing dynamic changes of industry trends, economic cycles, regulatory shifts etc. And lastly, the research could offer better scopes with more data.

As some new avenues to move forward, future researchers can analyze the effect of female employees of the firm on leverage. Moreover, investigating the role of family members in board decisions and their effect on the capital structure as well as corporate governance could be another interesting sector for research. This avenue can shed light on if family members are biased towards long term stability opting to avoid external influence and control. Thus, can also advance knowledge have related to agency theory for firms with concentrated family ownership. This will help make governance policies for family lead business helping to balancing family interest with broader financial goals. Adding macroeconomic conditions can also provide a more comprehensive result by collecting data using surveys and interviews compiled as primary data. This will overcome the data availability limitation and ensure accuracy. Although this study suggests female participation on board leading to lower need for leverage it can vary depending on various factors.

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