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Capital Structure and Gender Diversity: Drivers of Economic Resilience in European Firms

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ABSTRACT
This study examines the influence of capital structure and gender diversity on a firm's financial performance across over 1,000 financial institutions in 41 European countries from 2000 to 2022. Using fixed effects regression models in a panel data framework, this study assesses the critical metrics of capital structure, including capital ratios, firm size, leverage, and debt-to-equity ratio, against the backdrop of significant economic events such as the Eurozone debt crisis and the COVID-19 pandemic. The findings of this study revealed that capital ratios and firm size have a significant and positive impact on financial performance, while leverage has a significant negative influence. Furthermore, the gender diversity of the board does not significantly influence the financial performance in this dataset. The results contribute to the ongoing debate on corporate governance and financial stability by providing empirical evidence to inform policymakers and executives' decisions. Further investigations should examine sector-specific elements and governance methodologies to enhance our comprehension of the dynamics of financial performance across various economic contexts.

KEYWORDS
Financial performance;
Capital structure;
Capital ratio;
Firm's size;
Financial risk.

Introduction

Knowledge integration has emerged as an essential approach to addressing the fragmentation of knowledge across disciplines, particularly in educational and research contexts. Jarin, Mumu, Talukder, and Azad (2021) conducted a bibliometric review, demonstrating that integrating knowledge not only enhances conceptual clarity but also provides a more holistic framework for problem-solving. Their study revealed that knowledge integration contributes significantly to advancing interdisciplinary research, fostering innovation, and aligning educational practices with societal needs. Furthermore, the scope of integration extends beyond traditional disciplines, encompassing social, ethical, and cultural perspectives that strengthen the relevance of education and research. Thus,

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knowledge integration offers a pathway for building coherence across diverse fields, ultimately enriching both theoretical foundations and practical applications.

The Eurozone debt crisis in 2008 marked a surge in bankruptcy events among European firms, primarily due to financial instability (Iqbal et al., 2014). Afterward, European firms also had to adopt additional regulatory changes that hindered the strengthening of financial stability in the short term. Furthermore, the COVID-19 pandemic has presented additional financial challenges for European firms. Despite these challenges, many European firms have achieved remarkable financial performance afterward, which beacons hope for the rest of the world (Recine et al., 2011). The literature revealed ample evidence favoring distinct capital structures among European firms, which leads to their recommendable performance (Harrison et al., 2014). This study examined the financial performance of European financial firms from 2000 to 2022, pinpointing the factors that had influenced their financial performance and capital structure.

The capital structure serves as the primary source of funds for a firm's operations and expansion, significantly impacting its financial performance. A combination of capital ratios, financial risk, Equity, and firm size determines a firm's capital structure; evidence of long-term credibility can influence its financial performance. (Arhinful et al., 2023; Harrison et al., 2014). Furthermore, to maintain consistent financial performance, a firm must optimize its profitability. These financial indicators strengthen a firm's capital structure, leading to improved profitability in terms of return on assets. Furthermore, the control variable – board gender diversity may significantly impact a firm's financial stability and performance. Therefore, it underpinned the modern expansion of board operations, indicating that the most important motivation for gender diversity among firms is to oversee changes in their capital structure.

This study investigated the role of board gender diversity. This crucial governance factor influences decision-making and problem-solving, and it is necessary to observe whether this control variable directly correlates with a firm's capital structure. Furthermore, as previously mentioned, the capital structure has a significant influence on financial performance, suggesting that corporate governance also impacts financial performance. These relationships continue to provoke debate in numerous studies, while some suggest strong correlations between these variables and financial outcomes (Abubakar et al., 2018; Utami, 2023; Yahaya et al., 2023). García and Herrero (2021) stated that a firm's small and independent board, with a higher percentage of female directors, tends to reduce financial distress. On the other hand, evidence from Japan (Wang et al., 2024) indicates a negative relationship between the firm's performance and board gender diversity.

To bridge this gap, this study relies on a profound theory of European firms, examining the impact of capital structures and board gender diversity on their financial performance. This paper utilized a sample of over 1,000 financial

institutions from 41 European countries between 2000 and 2022. Furthermore, we selected return on assets as a financial performance indicator to identify profitability. Previous literature demonstrates both the significance and insignificance of the impact of different financial metrics on previous studies (Abubakar et al., 2018; Azim et al., 2021; Wang et al., 2024; Zaheer et al., 2016). Furthermore, the capital ratio and firm size were used to evaluate the firm's asset condition. Additionally, we used leverage and the debt-to-equity ratio to measure its financial risk. These financial metrics, taken together, have provided valuable insights into the firm's financial health.

We broadly divide this study into five significant sections to explore the impact of many financial metrics—capital structures and board gender diversity—on firm performance. Section 2 outlines the literature review, underpins its theoretical framework, and builds hypotheses. Section 3 covers the methodology and calculations, which include data collection methods, variable selection, and various econometric models to enhance robustness. Section 4 presents the empirical analysis, which includes the regression model results and their interpretation. Finally, Section 5 presents a summary of the work's findings, and the conclusion draws implications for corporate governance and capital structures, offering suggestions for future research to enhance these insights further.

2. Literature review

Different sets of financial indicators can outline capital structure differently, although this differentiation mainly focuses on enhancing firms' financial health and maintaining robust financial performance. Several studies have analyzed capital structure and its impact on profitability and financial performance through different sets of financial indicators. We employed a standard set of financial metrics to analyze capital structure and predict financial performance, considering the most critical factors for a firm's growth, including the capital ratio, firm size, leverage ratio, and debt-to-equity ratio. These studies (Abubakar et al., 2018; Azim et al., 2021; Utami, 2023) have validated the substantial influence of capital structure on financial performance, using various financial indicators. Conversely, a few studies have demonstrated that some of these financial indicators do not significantly influence financial performance (Shamki et al., 2016). As a result, there is a lack of research to determine whether or not these particular financial indicators can influence capital structure and impact financial performance.

A fundamental financial indicator of capital structure is the capital ratio, which assesses its financial capacity to meet operational and credit obligations and can significantly impact its financial performance. Firms with elevated capital ratios generally exhibit less financial risk, resulting in improved financial performance in terms of profitability and solvency. Several studies (Shamki et al., 2016; Zaheer et al., 2016; Rabiu, 2017; Irawati et al., 2019; Azim et al., 2021) examined the impact of capital ratio, defined as total Equity divided by total assets, on a firm's financial performance. (Rabiu 2017; Irawati et al. 2019; Azim et al., 2021) These

studies have demonstrated that the capital ratio significantly influences a firm's performance by impacting its profitability. In contrast, several studies have not identified any substantial effect of the capital ratio (Shamki et al., 2016). This study asserts the following hypothesis based on an abundance of research indicating a strong beneficial effect on profitability:

H1: The capital ratio has a significant positive impact on profitability.

A firm's size is another financial indicator of its capital structure and may impact its financial performance. The size of a firm determines its access to various resources, which directly impacts financial performance. Conceptually, larger companies have better access to finance and other resources, which enables them to benefit from economies of scale, resulting in a higher profit margin and favorable financial performance. Furthermore, several studies (Abubakar et al., 2018; Irawati et al., 2019) have demonstrated a significant relationship with profitability. In contrast, some studies have provided evidence of an insignificant relationship between size and profitability (Shamki et al., 2016; Azim et al., 2021). According to Rabiu (2017), there is a negative and insignificant relationship between company size and insurance companies' performance metrics. Therefore, this study proposes this hypothesis to investigate the impact of a firm's size on profitability:

H2: A firm’s size has a significant positive impact on profitability.

According to regulations, financial risk is a crucial factor in assessing a firm's ability to meet its financial obligations, which can impact its financial performance. A balanced and lower financial risk indicates a sound capital structure; we used the leverage ratio to measure this financial risk. Financial risk aids in understanding potential threats to firms' long-term survival, and the leverage ratio is critical in formulating strategies that mitigate potential adverse effects. Leverage ratios offer valuable insights into a firm's debt management effectiveness, which is crucial for evaluating its financial performance and profitability. Research has shown that firms with higher leverage ratios exhibit superior financial performance, as measured by profitability (A et al., 2018). Conversely, Azaria et al. (2021) demonstrated that while leverage has a significant impact, it does so negatively, indicating that a highly profitable organization will have low leverage. Following this concept between profits and debt, this study proposes the following hypothesis:

H3: The leverage ratio has a significant negative impact on profitability.

As already stated, the significance of financial risk in maintaining a balanced capital structure is another indicator for evaluating the firm's financial performance and debt-to-equity ratio, which measures financial risk. The debt-to-equity ratio is another method to measure financial risk, as is the ability of a firm to manage its

debt and Equity. Research on the impact of the debt-to-equity ratio on financial performance, particularly in terms of profitability, has been observed in many studies. Afolabi et al. (2019) examined the impact of debt-to-equity metrics on financial performance and found a positive and significant effect on profitability. However, the study by Utami (2023) demonstrates that the debt-to-equity ratio has no direct relationship with financial risk, which suggests that if no significant relationship exists, it may not have a direct impact on profitability. By acknowledging this issue and observing the relationship, we propose the following hypothesis:

H4: The debt-to-equity relationship has no significant impact on profitability.

We have already highlighted the importance of board gender diversity in corporate governance, and its growing recognition is a crucial factor to include in the study. Furthermore, the increasing presence of gender diversity on boards has a positive impact on firms. However, this study aims to determine whether or not there is a direct relationship with profitability. The study by García et al. (2021) found that a small, independent board with more female directors is associated with reduced financial distress, whereas Wang et al. (2024) discovered a negative relationship. Furthermore, a study by Govindan et al. (2023a) examined how board structure (BS) influences corporate financial performance (CFP) in the logistics sector and found that having female directors has a minimal effect on CFP. Similarly, other studies indicate that board diversity, specifically the presence of female and independent directors, does not enhance financial performance or company value (Azaria et al., 2021; Yahaya et al., 2023). Based on these findings, this study proposes the following hypothesis:

H5: Board gender diversity has no significant impact on profitability.

3. Data and Methodology

3.1 Data collection and variables

Thomson Reuters provides data for 41 countries; most of these firms are European financial institutions. The data set encompassed financial and non-financial information from over 1,000 organizations, including women in executive and board positions, as well as women managers. These combined to form the diversity of board gender, which served as the study's control variable. The series is from 2000 to 2022.

This study employed an integrated approach, combining mathematical and inferential analysis with various financial metrics, to establish solid and robust evidence. We used the ROA as the dependent variable to assess the firm's performance in terms of profitability. This study includes the capital ratio (CAP), firm size (SIZE), leverage ratio (LEV), and debt-to-equity ratio (DER) as independent variables to investigate the impact of capital structure on determining

a firm's financial stability and flexibility. These variables establish a robust capital structure that enables the firm to assess its financial risk, asset quality, and operational efficiency. The study has used board gender diversity as a control variable to examine any changes in the firm's financial performance that are linked to its capital structure. This study aims to identify the variables that have the most significant influence on financial performance. Table 1 presents an overview of the measurement for the research variables in this study.

Table -1: Variable Description

Variable	Description	Formula	Expected impact	References
Dependent variable: Return on Assets	Return on assets is a dependent variable that measures how effectively these companies utilize their assets to generate profits.	Net income divided by Total Assets		(Amimakmur et al., 2024)
Independent variables:				
CAP	The Capital Ratio measures a company's financial strength, indicating how much of the company's assets are funded by Equity.	Total Equity divided by Total Assets	+	(Cantero-Saiz et al., 2024)
SIZE	These organizations' size	Ln of Total Assets	+ OR N/A	(Cantero-Saiz et al., 2024; Govindan et al., 2023)
LEV	The leverage ratio can indicate the amount of debt these companies have	Total Debt divided by Total Assets	+/-	(Mansour et al., 2024)
DER	The debt-to-equity ratio (DER) measures the company's debt relative to its shareholders' Equity.	Total Liabilities divided by Shareholders' Equity	-	Anugrahwati (2018)
Control Variable: Board Gender Diversity	Board gender diversity functions as a control variable, indicating whether or not the company has gender diversity	Corporate Governance Analytic Board Female, Analytic Executive Members Gender Diversity, Women Managers, Policy Board Diversity—if any of these variables exhibit diversity, BGD signifies 1 and 0 otherwise.	+	(Mansour et al., 2024)

Note: This table outlines the definition and description of each variable. The definition column outlines the calculation or measurement process for each variable, while the description section provides an introduction and highlights the significance of each variable.

3.2 Methodology

The primary objective of this study was to identify which aspect of the capital structure affects a firm's financial performance through various variables. The literature reviewed the necessity of using different financial metrics and different variables to predict a firm's profitability through ROA. We observed the outcome by analyzing a panel data regression test, which helped fulfill the study's objective. However, before conducting the regression test, this study performed various tests to ensure a robust panel data regression model.

As previously stated, various tests provided different insights, enabling us to analyze the outcome with confidence. One such test was the descriptive statistics test, which helped this study achieve a robust outcome by observing the quantity of independent and dependent variables and ensuring consistency. Afterward, the Pearson correlation matrix provides valuable insights into the relationships among variables, and previous studies (Azim et al., 2021; Dey et al., 2018; Jaishi, 2020) have employed similar methods. Furthermore, this study (Azaria et al., 2021) determined that the fixed effect model was the optimal regression procedure by conducting the Hausman test; similarly, this study (Mardawiyah et al., 2020) followed the same method to determine a suitable model among fixed and random effects. We also conducted a Hausman test to determine the most suitable model, following the same procedures as those in previous studies. Another study by Utami (2023) initially recommends conducting informal autocorrelation and heteroscedasticity tests. We have employed fixed effects regression models with robust and clustered standard errors to address potential issues of heteroskedasticity and autocorrelation. Lastly, panel data regression with a fixed effect model was used to determine the final robust effect. This ensured the R-squared value was high enough for a robust outcome and predicted how ROA would relate to other dependent variables. Therefore, we estimated the research model using the following equation:

$$ROA_{it} = \beta_0 + \beta_1 CAP_{it} + \beta_2 SIZE_{it} + \beta_3 LEV_{it} + \beta_4 DER_{it} + \beta_5 BGD_{it} + \epsilon_{it}$$

4. Analysis

Table 2 contains descriptive information about all variables analyzed in this study, which included a large number of observations. Here, Return on Assets is the dependent variable, Board Gender Diversity is the control variable, and the others are independent variables.

Table 2: Descriptive statistics

	N	Mean	Std. Dev.	min	max	p25	Median	p75	kurtosis	skewness
Return on Assets	13312.000	-0.539	27.505	-2379.818	42.466	-0.000	0.009	0.043	5929.290	-74.467
CAP	13306.000	-0.441	76.096	-8681.500	1.134	0.089	0.292	0.836	12736.009	-111.915
SIZE	13324.000	19.581	3.612	5.914	28.645	16.967	19.274	22.237	2.653	0.151
LEV	13287.000	0.299	10.592	0.000	1189.273	0.000	0.044	0.202	11961.065	107.109
DER	12427.000	7.572	115.119	-6534.000	6317.000	0.156	1.953	9.660	2849.159	22.652
Board Gender Diversity	24220.000	0.056	0.229	0.000	1.000	0.000	0.000	0.000	16.013	3.875

Notes: The following symbols—N, mean, standard deviation, min, max, p25, median, p75, kurtosis, and skewness—indicate the number of observations, mean, standard deviation, minimum, maximum, 25th percentile, median (50th percentile), 75th percentile, kurtosis, and skewness.

Table 3**:** Pairwise correlation analysis

Variables	(1)	(2)	(3)	(4)	(5)	(6)
(1) Return on Assets	1.000					
(2) CAP	0.703*	1.000				
	(0.000)					
(3) SIZE	0.059*	0.032*	1.000			
	(0.000)	(0.000)				
(4) LEV	-0.746*	-0.146*	-0.038*	1.000		
	(0.000)	(0.000)	(0.000)			
(5) DER	0.001	0.001	0.054*	-0.001	1.000	
	(0.893)	(0.951)	(0.000)	(0.941)		
(6) Board Gender Diversity	0.007	0.003	0.465*	-0.003	0.023*	1.000
	(0.438)	(0.764)	(0.000)	(0.704)	(0.009)	
*** p<0.01, ** p<0.05, * p<0.1						

Notes: Pairwise correlation analysis was performed to examine the relationships between variables that helped interpret the results of the regression analysis. The P-value ranges indicate the levels of statistical significance.

Table 3 presents the pairwise correlation of each financial indicator, where every pairwise coefficient is less than 0.8, indicating that no multicollinearity exists; therefore, the possibility of obtaining a robust regression result has increased. ROA is highly and positively correlated with the capital ratio (CAP), indicating a significant relationship at the 0.1% level. ROA is also weakly positively correlated with the size of a firm (SIZE), which means that larger firms have an equal opportunity to improve on ROA, but it may not be significant. Additionally, ROA is strongly negatively correlated with the leverage ratio (LEV). The correlation between the debt-to-equity ratio (DER) and ROA is almost zero, at 0.001, which is not significant, as indicated by the high p-value of 0.893. Moreover, board gender

diversity was the control variable, providing a weak and insignificant positive correlation.

Hausman test: This study also conducted a Hausman test to determine which model best fit the data, between the fixed-effect and random-effect models. The resultant **Chi-square (26) is 180.88 with the prob > Chi2 being 0.0000**, indicating that the difference between coefficients is statistically significant. This result suggests that a fixed-effects model is a better fit for this study; therefore, the fixed-effects model was adopted when performing the panel data regression.

Panel Data Autocorrelation: Testing for autocorrelation is crucial for enhancing accuracy and reliability in predictions. Therefore, the Wooldridge test was applied to examine the presence of first-order autocorrelation in panel data. The null hypothesis is that there is no first-order autocorrelation. This is confirmed by F(1, 805) = 8.063 and Prob > F = 0.0046. Because this p-value is less than the standard significance, 0.05, the null hypothesis is rejected.

Fixed Effects with Robust SE and Clustered SE: After detecting the presence of autocorrelation, the use of clustered standard errors has provided a more accurate context for the model's performance and the actual significance of the variables. Clustered standard errors address heteroskedasticity and autocorrelation within clusters by clustering the standard errors at some predefined level. The robust standard errors, on the other hand, account for heteroskedasticity but ignore autocorrelation within clusters.

The coefficients between the two methods and clustered standard errors are the same, indicating that the estimated relationships are stable. In this model, most of the indicators' results are significant.

In the case of the CAP, both the fixed effects with robust SE and those with clustered SE have the same coefficient of 0.219 with a standard error of 0.001. Additionally, this implies that for every unit increase in CAP, the dependent variable increases by 0.219, which, given a standard error of 0.001, is significant at the 1% level. In both models, the SIZE estimated coefficient is 1.117 with a standard error of 0.560; therefore, it implies that a one-unit increase in the SIZE variable results in a significant 1.117-unit increase in the dependent variable at the 5% level. Another variable, LEV, has an estimated coefficient of -1.763 and a standard error of 0.023 in both models. For every 1-unit increase in the LEV, the dependent variable decreases by 1.763, which is significant at the 1% level. For the DER and Board Gender Diversity, the results are constant in both models but have no significant impact.

Table 4: Estimations with Panel Data

	(1)	(2)	(3)	(4)
VARIABLES	FIXED EFFECTS	FIXED EFFECTS	FIXED EFFECTS	FIXED EFFECTS
CAP	0.243***	0.242***	0.219***	0.219***
	(0.002)	(0.002)	(0.001)	(0.001)
SIZE		1.903***	0.691	1.117**
		(0.709)	(0.507)	(0.560)
LEV			-1.712***	-1.763***
			(0.079)	(0.023)
DER				-0.000
				(0.000)
Board Gender Diversity	-0.334	-0.815	-0.523	-0.534
	(0.375)	(0.517)	(0.320)	(0.337)
Constant	-0.206	-36.110***	-13.049	-21.134**
	(0.165)	(13.297)	(9.565)	(10.569)
Observations	13,297	13,297	13,261	12,378
R-squared	0.470	0.474	0.919	0.934
Number of ID	849	849	849	849
Robust SE	YES	YES	YES	YES
Year Dummy	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Notes: The table displays the results of panel data regressions with fixed effects for four model specifications (1 through 4). These models are designed to estimate the impact of various independent variables on the dependent variable, **Return on Assets (ROA)**.

Before conducting this panel data fixed model regression, this research conducted another regression capable of establishing a 95% confidence interval. The fixed effect models examined data from 12,378 to 13,297 observations. A positive and highly significant Capital coefficient at $p < 0.01$ implied that an increase in CAP would significantly increase ROA. In Model 2, the SIZE coefficient is 1.903 and statistically significant ($p < 0.01$), indicating, with its positive sign, that it positively affects ROA. However, this decreased in model 3 to 0.691 (not statistically significant) but increased again in model 4 to 1.117 ($p < 0.05$). Correspondingly, leverage had negative and statistically significant coefficients in models 3 and 4, at -1.712 and -1.763, respectively, with $p < 0.01$. Thus, the higher the use of leverage, the lower the ROA. The Debt-to-Equity Ratio coefficient was -0.000 in model 4, which is not significant and has a minimal effect on ROA. The control variable, Board Gender Diversity, presented negative coefficients in all models but was not statistically significant; hence, it had no significant effect on ROA. The constant varied; model 2 has a significant constant of -36.110, $p < 0.01$. While this is an increase from 0.470 in Model 1 to 0.934 in Model 4, it indicates that the extra predictors could add more explanatory power, especially in Model 4, which explains 93.4% of the variance in ROA. This model is further supported by the statistical robustness of the coefficients, which uses robust standard errors and year dummies to increase the reliability and precision of the estimates in the analysis of the main variables.

A high R-squared value indicates that the model explains a significant portion of the variance in the dependent variable, suggesting explanatory solid power, particularly in Model 4, where the R-squared is notably high. The consistently statistically significant coefficients reflect the model's substantial stability and robustness. The use of robust standard errors further enhances the reliability of the estimates. Additionally, including year dummies ensures that the outcomes are not biased by time-varying external factors, enhancing the precision and reliability of the analysis of key variables such as CAP, SIZE, and LEV.

5. Discussion and Conclusions

The study's findings indicate that these capital structure financial metrics — CAP, SIZE, and LEV — significantly influence financial performance. This study observed a highly significant positive impact of the CAP on ROA. The size of firms has also had a significant positive impact on firms, while LEV has a significant negative relationship; this result has also been confirmed in another research study. (Mansour et al., 2024). A study by Anugrahwati (2018) found that a low debt-to-equity ratio correlates with a high level of funding. In contrast, this research found no significant impact of DER on financial performance. In this study, the Board Gender Diversity (BGD) variable exhibits a negative correlation, serving as a control variable.

Despite including board gender diversity as a control variable in the paper, the statistically insignificant adverse effects on profitability suggest that gender diversity does not significantly impact profitability in this dataset. However, it does not apply to all other contexts or industries. Further research should be conducted to identify what factors moderate the relationship between board diversity and financial performance.

Although the study had some limitations, it highlights the significance of regulatory frameworks and economic conditions in shaping financial strategies across different economies, with valuable implications for European markets. The paper concludes by emphasizing the main findings and implications for companies and policymakers, while also highlighting the importance of this study. This research paper will add to the existing investigation of the relationship between capital structure and financial performance. The study provides detailed information on how the capital ratio, firm size, and leverage ratio, as critical financial indicators, affect profitability. It has addressed the gap in the literature by providing an all-encompassing analysis across multiple models.

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