# The impact of gender diversity within the board of directors on the performance of listed Belgian companies.

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# THE IMPACT OF GENDER DIVERSITY WITHIN THE BOARD OF DIRECTORS ON THE PERFORMANCE OF LISTED BELGIAN COMPANIES

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List of abbreviations

| | |
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| CSRD | Corporate Sustainability Reporting Directive |
| EU | European Union |
| SFDR | Sustainable Finance Disclosure Regulation |
| ESG | Environmental, Social and Governance |
| PAI | Principal Adverse Impacts |
| CEO | Chief Executive Officer |
| ROE | Return On Equity |
| ROA | Return On Assets |
| EBITDA | Earnings Before Interest Tax Depreciation and Amortization |
| CSR | Corporate Social Responsibility |

# 1. Introduction

In an era where transparency, inclusion, and responsible governance are becoming central to corporate sustainability, board gender diversity has emerged as a key dimension of corporate performance and accountability. Institutional investors and regulatory bodies are placing increasing importance on the composition of boards of directors, not only from a compliance standpoint but also as a reflection of broader societal values such as equity, fairness, and long-term value creation. Numerous studies (Adams & Ferreira, 2019; Post & Byron, 2015) have demonstrated that gender-diverse boards can contribute to better governance practices, improved oversight, and more balanced decision-making, ultimately enhancing a firm's financial performance.

However, despite growing awareness of the benefits of gender diversity, women remain significantly underrepresented on corporate boards, particularly in top executive roles. While some firms voluntarily promote diversity, others face growing pressure from stakeholders, including investors, policymakers, and civil society, to foster more inclusive governance structures. In this context, it becomes essential to empirically assess whether the presence of women in governance roles translates into measurable improvements in firm performance.

This research is situated within this evolving landscape, where companies are increasingly expected to demonstrate not only financial profitability but also inclusive governance practices. In particular, this thesis seeks to understand whether the presence and influence of women on corporate boards and in executive leadership are associated with stronger financial outcomes among publicly listed companies.

The central aim of this thesis is to examine the impact of gender diversity on firm performance. It seeks to address the following key questions:

- Does the presence of at least one woman on the board correlate with better financial performance?

- Do companies led by female executives or CEOs perform better than those led by men?

- Is board performance influenced by factors such as the education level, age, or tenure of female board members?

- Are these effects uniform across performance metrics, or do they vary depending on whether one considers profitability (ROA, ROE), operational efficiency (EBITDA), or market valuation (Tobin's Q)?

To answer these questions, this study focuses on a sample of publicly listed companies in Belgium, using firm-level data from 2017 to 2023. Drawing on a rich dataset extracted from Bel-first and Refinitiv Eikon, the empirical analysis employs multiple linear regression models with fixed effects and robust standard errors, controlling for variables such as firm size, age, leverage, and market-to-book ratio. The inclusion of year and industry fixed effects ensures that the influence of macroeconomic and sectoral factors is accounted for.

This research contributes to the literature by offering new insights into the financial relevance of gender diversity, particularly in a European context where regulations (such as the Belgian gender quota law) have actively shaped board compositions over the last decade. By evaluating not just the presence but also the characteristics (e.g., age, tenure, education) of female board members, this thesis moves beyond descriptive statistics and provides a nuanced understanding of the mechanisms through which gender diversity may affect firm performance.

Following a comprehensive review of the literature, the empirical section of this thesis presents the research design, describes the dataset, and outlines the econometric methodology. It then proceeds to the presentation and discussion of results, before concluding with managerial and policy implications. In doing so, this study offers evidence-based recommendations to boards, shareholders, and policymakers on how to foster gender diversity not merely as a symbolic gesture, but as a strategic driver of financial performance and long-term value creation.

Finally, to enhance the clarity and formal consistency of the text, the AI-based tool ChatGPT by OpenAI has been used for sentence structuring, syntax correction, and grammar refinement. This tool contributed to improving the overall coherence and academic tone of the thesis, ensuring a polished presentation of the research findings.

## 2. Literature Review

The board of directors is a crucial component of internal corporate governance mechanisms. It serves as the highest decision-making body within a corporation, holding the core of power over various corporate decisions. In addition to its role in nominating top management, the board of director also provides advising and monitoring function on the management. The effective functioning of the board has a significant impact on the quality of managerial decisions and the stability of a corporation's operations and outcomes.

The effectiveness of the management board is influenced by several factors, including the experience and qualifications of its members. This oversight role has come under increasing scrutiny in recent years because of changing attitudes and, in particular, the emergence of CSR (Corporate Social Responsibility) standards aimed at integrating social and ecological issues into decision-making. There has been extensive research on whether the gender of board members also plays a role in the effectiveness of the board, including the financial performance of the companies they run. Some studies also assess the impact of gender diversity on boards, while being moderated by different cultural dimensions such as distance from power and masculinity. Companies with a proximity and a higher proportion of women on board can attract investors by making a profitable investment.

Policy makers could therefore find important conclusions for taking the initiative to formulate policies in a different context to contribute to women's empowerment within an organizational framework that drives the economy according to different aspects of existing legislation. (Kabir, A. et al., 2022).

However, women on corporate boards can have both positive and negative impacts. Indeed, the latter can increase shareholder value if they bring a new perspective to board decision-making. Conversely, a negative impact can be felt if the decision to appoint women to the board is motivated by increased pressure from new CSR standards and existing policies for greater gender equality.

Increasing gender diversity in the board and in top executive positions has become an important focus of government considerations, particularly in Europe. Indeed, in 2021, women accounted for just 30.6% of board members in the EU's largest listed companies. There is a significant difference between member states: this percentage is 45.3% in France and 8.5% in Cyprus. By 2022, even considering the increased presence of women on boards, the position of chairman or CEO is held by a woman in less than one in ten of the largest listed companies in the member states (European Parliament, 2021).

Several consultancy reports and financial press articles have highlighted the beneficial impact of diversity within boards for business performance. In particular a report aimed at classifying the Fortune 500 companies in terms of highest representation of women on their top management teams and compared the financial performance (in terms of return on equity and total return to shareholders) of companies in the top quartile to companies in the lowest quartile. The results showed that the companies with more women on their board achieved significantly better financial results.

## 2.1 Theoretical framework

In a theoretical framework, various studies have highlighted relevant aspects such as diversity theory, resource theory, and governance. Indeed, it has been demonstrated that diversity improves the quality of debates and oversight, which can reduce agency problems in corporate governance. This is reflected in greater attendance at meetings and increased monitoring of decisions made by executives.

Women contribute to a broader diversity of perspectives, enriching discussions and strengthening the decision-making process. They also bring a fresh perspective to the board, offering complementary skills and insights, especially useful in complex environments (Brahma et al., 2021). However, it is important to qualify these results. It has been shown that in companies where increased oversight is necessary (often those facing governance issues), gender diversity can improve performance. In contrast, in companies that are already well-governed, additional oversight might be redundant and potentially costly, which could negatively impact performance. Thus, the impact depends on the specific context of the company, particularly its initial governance state (Adams RB, Ferreira D., 2019).

Strategic perspectives also reveal that female representation contributes to better risk management by reducing extremely risky decision-making behaviours and mitigating biases (Campbell & Mínguez, 2008). This impact is particularly relevant in innovative companies or those operating in complex environments that require high strategic adaptability. However, some studies indicate an increase in risk-taking, measured by indicators such as debt levels and return volatility. This effect is more pronounced in sectors where innovation and risk-taking are strategically important (Safiullah et al., 2022).

## 2.2 Gender Diversity and Financial Performance

The relationship between gender diversity and corporate financial performance has been shown to be both positive and negative. Studies suggest that cultural environments significantly influence the outcomes of gender diversity initiatives. For example, countries with stronger gender equality, such as Nordic countries, tend to see more pronounced positive effects on financial performance when gender diversity is increased. On the other hand, higher levels of gender discrimination can weaken the positive effects, as women in boards may face additional challenges (Post & Byron, 2015).

Furthermore, the presence of women on boards is positively associated with company performance, though this effect depends on specific characteristics. Independent female directors have a significantly positive impact, particularly in strengthening monitoring mechanisms and strategic decision-making. In contrast, the impact of internal female directors is more limited, suggesting that their contributions might be restricted by internal dynamics or the expectations tied to their roles. Women's contributions are especially prominent when they serve on key committees, such as the audit committee, where diverse perspectives can enhance governance and transparency (Brahma et al., 2021).

Research further indicates that the performance gains associated with gender diversity are most evident in firms that historically lacked such diversity. These effects are particularly pronounced in medium- and large-sized enterprises, which are better positioned to attract and retain qualified female talent (Safiullah et al., 2022). Nonetheless, the impact of gender quota policies remains heterogeneous, suggesting that context-specific factors mediate their effectiveness.

In companies already established in terms of gender diversity, quotas have little or no impact. In contrast, in companies with low diversity before the introduction of quotas, an improvement in diversity may have a positive effect on organizational culture but not necessarily on short-term performance (Casteuble et al., 2023).

These findings illustrate the complex relationship between gender diversity, governance, and financial outcomes, emphasizing the importance of contextual factors in determining the effectiveness of diversity initiatives.

Literature also shows that the impact of gender diversity on boards of directors varies significantly depending on the level of performance of the company. The best performing companies are fully benefited by this diversity, with improved governance and enriched prospects, but those with poor performance seem to be unable to reap immediate benefits. The significance of this finding is that a contextual approach is necessary to comprehend and maximize the effects of gender diversity on boards (Dang & Nguyen, 2018).

## 2.3 Gender quota regulation

In order to increase the number of women in top positions, affirmative actions are under discussion or already operational in several countries. The most well-known example in this respect is Norway, where since 2006, large firms must have at least 40% female representation among the members of the board of directors. A number of EU countries have recently passed similar national laws. Also thanks to these initiatives, in April 2016 the EU-28 average share of women on the boards of the largest publicly listed companies reached 23.3%. (Comi, S. et al, 2020)

Binding quotas with sanctions are implemented in Europe, having a quota of 33%. In fact, the directive (EU) 2022/2381 of the European Parliament and of The Council of 23 November 2022 aims to achieve a more balanced representation of women and men among the directors of listed companies by establishing effective measures that aim to accelerate progress towards gender balance. Member States shall ensure that listed companies are subject to either of the following objectives, to be reached by 30 June 2026: The members of the underrepresented sex hold at least 40% of non-executive director positions and members of the underrepresented sex hold at least 33 % of all director positions, including both executive and non-executive directors.

However, some studies, particularly those on the French context, have found that the recommendations of the governance code for gender diversity can lead to a reduction in performance in low-performing companies. This is partly due to the costs associated with appointing more women on boards, such as recruitment fees, which can represent a significant financial burden for these companies due to regulatory requirements. Indeed, a study reveals that the introduction of gender quotas leads to higher recruitment and integration costs for companies, particularly for those that need to search for qualified women to fill leadership positions. These costs are considered high by some companies, especially those that are smaller in size or operating in sectors where qualified female candidates are less abundant (Casteuble et al., 2023).

This challenge is particularly pronounced in industries with fewer women in senior roles, as companies may need to invest more resources to meet the quota requirements. These findings suggest that while gender quotas can promote diversity, they also introduce financial and operational challenges for companies, especially in sectors with limited access to qualified female talent. On the other hand, the performance improvement observed in high-performing companies suggests that these costs are offset by the benefits derived from diversity, particularly in terms of governance and strategic decision making.

According to research, accounting performance improves when the number of women on boards reaches 40%, which is in line with current policy compliance recommendations (Ben Slama et al., 2019).

The implementation of gender quotas in corporate boards can seem relevant, provided that it does not become a purely symbolic measure but rather an investment for the long term.

According to Campbell and Mínguez (2008), quotas can serve as an effective lever for improving governance and performance, particularly in companies where diversity was previously low. However, it is crucial that quotas are accompanied by female leadership development programs to maximize their impact (Comi et al., 2020).

Del Prete et al. (2024) also highlight the challenges associated with gender quotas, suggesting that while quotas may increase female representation on boards, they do not necessarily lead to improved financial performance unless companies foster an inclusive culture that goes beyond mere representation. In fact, companies where quotas have led to a forced increase in diversity show mixed results. This underscores the importance of thoughtful integration of women into boards, rather than simply complying with regulations (Bennouri et al., 2018).

### 2.4 Sociodemographic Factors

The impact of personal characteristics of women sitting on corporate boards, such as their age, educational background, and professional experience, is a central focus of academic research. These factors not only highlight gender diversity but also emphasize the diversity of skills and experiences, which can affect governance and financial performance.

Age is often linked to a board member's level of experience and strategic vision. For example, Nekhili and Gatfaoui (2013) find that demographic characteristics, including age, significantly influence gender diversity in French boards. They observe that companies tend to appoint younger women to non-executive roles, often to meet quotas or project a modern image, rather than leveraging their full strategic capabilities. This trend can limit the positive impact women can have on performance, as less experience might reduce their ability to influence strategic decisions.

Conversely, studies indicate that experience, which is often correlated with age, enhances the contribution of directors to financial outcomes, regardless of gender (Conyon & He, 2017). This suggests that the experience factor plays a critical role in maximizing the positive impact of board members on company performance.

The level and quality of education of female board members are crucial factors in determining their effectiveness on corporate boards. Women holding leadership positions on French boards tend to be highly qualified, often coming from prestigious universities or grandes écoles. This trend reflects an implicit requirement that women must be overqualified to reach these positions, a phenomenon often referred to as the "academic glass ceiling" (Nekhili, Gatfaoui, 2013).

Studies support this notion by emphasizing that the academic and technical skills of board members, combined with gender diversity, can enhance decision-making and, in turn, improve company performance (Dang, Nguyen, 2018) (Post, Byron, 2015).

Professional experience also plays a key role in how women influence governance and financial outcomes. It is not only the presence of women on boards that impacts performance, but also their experience and knowledge of the specific challenges within the industry.

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Women who have held executive positions in the past are often better positioned to actively participate in strategic discussions, bring innovative ideas, and influence corporate culture (Bennouri et al., 2018). Additionally, the depth of professional experience among female board members is correlated with better organizational and financial performance, particularly in companies operating in highly competitive environments (Simionescu et al., 2021).

Researches demonstrate that diversity of backgrounds among board members is a strategic asset. (Marinova et al., 2016) (Green & Homroy, 2018). In the European context, Comi et al. (2020) highlight that the introduction of gender quotas on boards in countries like Italy, Spain, and France has not only improved female representation but also enriched the diversity of educational and professional backgrounds. This complementary diversity in perspectives leads to better decision-making, more balanced outcomes, and improved risk management.

However, it is crucial to note that some studies indicate that when women are appointed based on symbolic criteria, without consideration of their qualifications or experience, their contribution to performance can be limited or even negative. This underscores the importance of not reducing gender diversity to merely meeting quotas but ensuring that women appointed to boards possess the necessary skills to succeed (Campbell & Mínguez-Vera, 2008).

## 2.5 Economic Environment

During the Great Recession, companies with more women on their boards showed better performance. This improved performance is attributed to more prudent decision-making, better risk management, and a long-term focus, which are often linked to the diversity of boards. These outcomes are largely due to a strategy aimed at reducing unnecessary risks, which, during the crisis, resulted in greater protection of company capital and a reduction in losses.

This approach is generally considered more collaborative and inclusive, characteristics often associated with female leadership, which fosters innovative solutions in challenging circumstances. These actions notably influenced financial returns, with companies featuring more diverse boards experiencing more stable financial performance compared to those with less diverse boards. Not only did companies with diverse boards weather the crisis better, but they also responded more quickly, strengthening their competitive position (Papangkorn et al., 2021).

## 2.6 Methodological Challenges

However, it is important to consider that various methodological challenges persist. For example, sample biases may exist, as many studies on gender diversity in corporate boards focus on companies where women are already represented, excluding those with no female representation, thereby creating an inclusion bias. Studies may also rely on data primarily from large companies, often subject to gender quotas, which may not reflect the situation of smaller companies or those not subject to such requirements (Nekhili & Gatfaoui, 2013).

Moreover, the results could be skewed by the selection of companies with sophisticated governance structures, leaving aside those with less accessible or transparent data (Bennouri et al., 2018). It is also important to note that a selection bias may exist, as companies that appoint women to their boards might already be high performing.

To study gender diversity, various indicators can coexist. The proportion of women on boards of directors is the most commonly used indicator in empirical studies to assess gender diversity. It refers to the percentage of women among board members.

Some studies suggest that the proportion of women on boards influences the monitoring of executives and strategic decision-making, although the effect on performance can vary depending on the company (Adams & Ferreira, 2019) (Campbell & Mínguez-Vera, 2008).

The indicator for the presence of female directors is characterized by a binary measure, which simply checks whether at least one woman sits on the board of directors. While less precise, this indicator is sometimes used in exploratory studies to examine whether the mere presence of a woman on the board can influence performance, showing that the effect is often related to factors such as company size or industry (Green & Homroy, 2018). This also helps observe if low female representation can lead to significant changes in governance practices (Simionescu et al., 2021).

These methodological choices address gaps identified in prior research, particularly within the Belgian context, where few studies have been conducted on this topic. The chosen approach, integrating combined and contextual indicators, represents an essential step toward analysing the complex dynamics of gender diversity and its impact on organizational performance.

Although these indicators are less common, some studies incorporate measures of cognitive diversity, such as academic background or industry experience, to complement the analysis of gender diversity. This approach emphasizes the importance of cognitive diversity, showing that women with diverse backgrounds can bring complementary perspectives that enrich decision-making (Marinova et al., 2016).

From a performance perspective, several performance indicators, such as EBITDA, ROE, ROA, and Tobin's Q, are commonly used to measure the impact of gender diversity on company performance. These indicators help evaluate various aspects of financial and strategic performance, providing insights into how gender diversity influences business outcomes across different dimensions.

EBITDA (Earnings Before Interest, Taxes, Depreciation, and Amortization) measures a company's operational profitability, regardless of its financing choices or capital structure. This indicator is often used to analyse whether gender diversity contributes to better operational efficiency. It can show, for example, that more diverse boards may improve operational decision-making, leading to better profitability (Adams & Ferreira, 2019).

ROE (Return on Equity) evaluates a company's ability to generate profits for its shareholders from its equity. This ratio is essential for measuring the impact of gender diversity on shareholder value creation. Studies highlight that boards with female members can stimulate long-term profitability by improving governance and diversifying strategic perspectives (Campbell & Mínguez-Vera, 2008).

ROA (Return on Assets) measures profitability relative to a company's total assets. This indicator is useful for assessing overall efficiency in resource utilization. It can help observe whether the presence of women on boards leads to better resource allocation and improved financial performance (Green & Homroy, 2018).

Tobin's Q, which represents the ratio of a company's market value to its book value, is a key indicator used to assess investor expectations about future performance. Research shows that companies with greater gender diversity on their boards often display a higher Tobin's Q, reflecting improved perceptions of their governance and strategic potential (Bennouri et al., 2018).

These indicators provide an overall view of the effects of gender diversity on different levels of performance. By combining profitability, efficiency, and valuation measures, they help explore how the presence of women on boards can positively influence financial results and investor perceptions.

Some additional descriptive indicators, such as the market-to-book ratio and the debt-to-equity ratio are frequently analysed in studies evaluating corporate performance and governance dynamics. Indeed, studies highlight the importance of such financial ratios in capturing both short-term liquidity and long-term valuation dynamics, which can be influenced by board diversity. (Brahma et al., 2021) (Adams, Ferreira, 2019)

To ensure the most accurate valuation of results, it is essential to include control variables that account for broader organizational characteristics. These variables include the firm size, which significantly impacts performance outcomes. (Post & Byron, 2015) (Conyon & He (2017); the firm age, which reflects organizational maturity and can influence strategic decision-making and adaptability. (Nekhili & Gatfaoui. 2013); board size, a factor that moderates the effectiveness of governance and diversity (Dang & Nguyen. 2018) and the industry sector, given its role in shaping the external environment and competitive dynamics (Simionescu et al. 2021); the debt levels (debt-to-equity ratio), which provide insights into financial leverage and risk management, often linked to firm performance and governance. (Bennouri et al. 2018) and the CEO compensation, which can serve as a proxy for leadership quality and strategic alignment. (Ferrary & Déo. 2023).

Including these variables aligns with the methodological frameworks used in prior studies which stress the need for robust controls to isolate the effects of gender diversity on firm outcomes. This comprehensive approach allows for a nuanced analysis that captures both the direct and contextual influences of gender diversity on corporate performance. (Green & Homroy, 2018) (Galbreath, 2018)

## 2.7 Divergent conclusions

The academic literature offers a rich and nuanced perspective on the impact of gender diversity on corporate boards, with both positive conclusions and more mixed or even neutral results, depending on the context and methodologies used. Indeed, some studies conclude that gender diversity improves governance and decision-making, particularly highlighting that the presence of women on boards enhances executive monitoring and the quality of strategic decisions. This is attributed to more thoughtful decision-making, which strengthens overall governance. Gender-diverse boards provide a more balanced perspective, limiting opportunistic behavior by managers (Adams & Ferreira, 2019; Campbell & Mínguez-Vera, 2008). A positive correlation with financial performance is also identified, especially in countries where societal expectations regarding gender equality are high (Post & Byron, 2015). It appears that the positive impact is more pronounced in companies with a high initial level of performance, suggesting that the effects of diversity are amplified in already successful environments (Ben Slama et al., 2019). Studies also suggest better valuation by investors due to governance being perceived as more balanced (Bennouri et al., 2018). Some studies also indicate that women bring a risk-averse attitude, which can be beneficial during times of uncertainty. Indeed, boards with higher female representation have weathered economic shocks, such as the Great Recession, more successfully (Papangkorn et al., 2021).

However, it is important to note that current studies have certain limitations and address complex contexts. Some identify a lack of significant effects, such as the effect of gender diversity on financial performance, which is not uniform, with significant results only in already high-performing companies (Conyon & He, 2017). Neutral effects are also found in the technology sector, where gender diversity does not seem directly linked to financial indicators like ROA or ROE, suggesting that other organizational factors may play a dominant role (Simionescu et al., 2021). Studies have also revealed ongoing risks related to quotas. Notably, in banks, the introduction of quotas has sometimes led to symbolic diversity (tokenism), where female board members were less involved in strategic decisions, thus reducing their real contribution (Del Prete et al., 2024).

Furthermore, while quotas can improve female representation, their positive effect on performance heavily depends on the skills and experience of the women recruited (Casteuble et al., 2023). The context and characteristics of the boards are also critical factors to consider. The demographic and professional characteristics of female directors (age, experience, education level) significantly influence their ability to make a positive impact. The mere presence of women, without regard to their qualifications, does not guarantee performance improvements (Nekhili & Gatfaoui, 2013).

Kabir et al. (2023) also note that cultural and sectoral diversity may interact with gender diversity, moderating its positive effects.

Moreover, while diversity can enrich discussions, it can also slow down decision-making processes, especially in boards where members' perspectives strongly diverge (Ferrary & Déo, 2023). Ambiguous effects are particularly evident in low-performing companies, where gender diversity can exacerbate tensions and organizational conflicts (Dang & Nguyen, 2018). Thus, research generally shows that gender diversity on boards of directors has positive effects on governance and, in some cases, financial performance, particularly in favourable contexts (influential roles, specific sectors, or high-performing companies). However, these benefits are not universal and depend on several factors, such as cultural context, company structure, and the qualifications of female directors. Studies also highlight the limitations of policies like quotas, which, while effective in increasing female representation, require accompanying measures to maximize their impact on performance.

### 2.8 Literature review conclusion

In conclusion, this literature review has provided a comprehensive overview of the evolution, relevance, and growing importance of gender diversity in corporate governance, particularly its implications for firm performance and strategic decision-making. The review has highlighted the increasing attention paid by scholars, regulators, and investors to the composition of boards of directors, emphasizing that gender-balanced boards can lead to more effective governance, improved oversight, and a broader range of perspectives in decision-making processes.

Much of the academic literature supports the notion that gender diversity contributes positively to various dimensions of firm performance, including financial profitability, risk management, innovation, and stakeholder engagement. The presence of women in leadership positions, particularly as executive directors or CEOs, is associated with enhanced strategic orientation, greater sensitivity to ethical concerns, and more inclusive management styles. These factors are often cited as key drivers of organizational resilience and long-term value creation. However, the review has also acknowledged ongoing debates about the causality and magnitude of this relationship. Some studies argue that diversity itself drives better performance, while others suggest that well-performing firms are more likely to attract or appoint diverse leadership profiles.

Additionally, the literature points to the importance of contextual variables, such as the tenure, age, and education level of female board members, which may moderate the impact of gender diversity. For instance, while some evidence shows that more experienced or older women can bring valuable strategic insight, other studies caution that these benefits depend on how well female directors are integrated into the board's decision-making processes and whether they hold meaningful influence within the governance structure.

The growing regulatory pressure in various jurisdictions, such as gender quota laws and diversity disclosure requirements, further underscores the institutional shift toward more inclusive governance models.

These initiatives, particularly in the European context, aim to standardize and encourage greater gender representation on boards, fostering accountability and transparency in governance practices. Still, the empirical evidence remains mixed, which highlights the need for continued academic investigation.

## 2.9 Implications for Research

The literature presents divergent results on the impact of gender diversity on performance. Regulatory, cultural, and sectoral contexts play a key role in shaping this impact. There is a consensus that diversity alone is insufficient and must be supported by a favourable organizational environment and strategic integration.

The results of this study will therefore open several avenues for researchers and governance practitioners, particularly through the exploration of the Belgian context. This research question can enrich debates on gender diversity by examining a cultural and institutional framework that is underrepresented in academic literature. The findings will enable comparisons of the effects of diversity across different national contexts and assess the effectiveness of Belgian governance policies.

By considering a combination of variables rarely studied together, this research proposes a more comprehensive methodology capable of identifying the underlying mechanisms that explain the impact of diversity on performance. Furthermore, by integrating the COVID-19 period, this work introduces a new dimension of analysis by studying gender diversity in the context of a global crisis. This allows for the examination of the resilience of diverse companies in the face of major disruptions.

This empirical investigation not only contributes to the growing academic discourse on diversity and corporate performance, but also offers practical insights for boards, regulators, and investors seeking to understand the strategic value of inclusive governance. Ultimately, this research aims to inform decision-making in corporate board appointments and policy development, reinforcing the broader goal of sustainable and equitable corporate governance in modern financial markets.

In conclusion, this research does not merely confirm or refute the effects of gender diversity; it broadens the scope of investigation by incorporating essential contextual, demographic, and temporal variables. It represents an important step in understanding the mechanisms linking diversity, governance, and performance and contributes to developing a more inclusive literature rooted in current realities.

## 3. Regulation framework

In a context where the role of women in the professional world has become a major societal issue, both nationally and internationally, it is essential to examine the various legal instruments implemented to promote better representation of women in decision-making spheres. This section aims to analyse the laws and directives in force, in Belgium as well as within the European Union, in order to better understand the foundations, objectives, and effects of these mechanisms on the businesses concerned. It also helps define the framework in which this study is situated, by evaluating the actual impact of these regulations on corporate governance, gender diversity, and professional equality.

### 3.1 Belgian regulation

Belgium is widely recognized as a pioneer in promoting gender diversity within corporate governance. As early as 2011, the country enacted ambitious legislation mandating that at least 33% of board members be women. This requirement was implemented gradually: for large listed companies, it took effect on either January 1 or July 1, 2017, depending on the fiscal year-end. Small and medium-sized listed companies were granted an additional two-year transition period and were required to comply with the law from 2019 onward.

To encourage compliance, the legislator introduced two types of sanctions in case of non-adherence. First, financial benefits associated with board mandates may be suspended. Second, any appointment of a board member from the overrepresented gender—defined as exceeding two-thirds of the board's composition—is declared null and void. The aim of these measures was clear: to address a deeply rooted structural imbalance and to foster the emergence of female leadership in positions historically dominated by men (Fourth Report on the Law of 28 July 2011 on Gender Quotas in Boards of Directors, 2022).

Thirteen years after the enactment of this law, the results observed in 2024 are broadly consistent with the legislator's expectations. According to data published by the Institute for the Equality of Women and Men, the proportion of women on the boards of both public and private companies increased from 8.3% in 2008 to 34.1% in 2020. This reflects a profound shift in governance practices. Almost all companies subject to the legislation have complied with the quota, demonstrating that binding measures, when supported by monitoring mechanisms and effective sanctions, can lead to tangible results.

Nevertheless, the application of gender quotas continues to fuel debate. Critics still question whether, in certain cases, gender may have taken precedence over competence in appointment decisions. This raises a broader issue: how to reconcile equal opportunity with individual merit. It is important to recall, however, that the goal of such quotas is not to introduce reverse discrimination, but rather to correct a long-standing structural imbalance.

In parallel, the Belgian labour market has undergone increasing feminization. Over the past decade, women have entered the workforce in significant numbers. Yet, despite this growing presence, they remain underrepresented at the highest levels of leadership in large Belgian corporations. The glass ceiling remains a persistent reality, and the promotion of women to top executive roles continues to pose a major challenge (Landrieux-Kartochian, 2007).

## 3.2 European regulations

At the European level, a similar momentum began in 2012 when the European Commission proposed a directive aimed at introducing gender quotas on the boards of listed companies. Despite institutional support, the proposal was blocked for several years due to opposition from some Member States. It was only in 2022, under the leadership of Commission President Ursula von der Leyen, that the initiative was successfully revived. The adopted directive gives Member States two options: to ensure that a minimum of 40% of non-executive board members are of each gender, or to reach 33% representation across the entire board.

This directive, known as *Women on Boards*, was formally adopted in 2022, a full ten years after it was first proposed. It requires Member States to implement clear, fair, and transparent selection procedures to improve access for women to decision-making roles. The target is to reach the prescribed thresholds by July 2026. Other European countries such as Norway and Spain have also implemented similar quotas to promote parity and ensure that corporate governance better reflects societal diversity. These measures are based on the belief that gender balance enhances decision-making quality, strengthens organizational ethics, and better mirrors social reality.

## 3.3 SFDR directive

In parallel with legislative efforts to improve the representation of women on boards, the European economic and financial landscape is also undergoing a profound transformation. This shift is driven by growing awareness of the importance of sustainability—whether environmental, social, or governance-related. In this changing context, the expectations of investors, financial institutions, and citizens have evolved significantly: there is a growing demand for transparency, integrity, and accountability in how companies create value. It is in this context that the European regulation SFDR (Sustainable Finance Disclosure Regulation) has emerged as one of the central pillars of the EU's sustainable finance strategy.

One of the major aspects of the SFDR lies in its social component, particularly its recognition of gender diversity as a key indicator of sound governance. While national legislation focuses on achieving parity in leadership positions, the SFDR reinforces this initiative by incorporating gender equality and diversity criteria into the assessment of financial investments. As such, the presence of women on boards, as well as in executive and management roles, becomes a tool for measuring non-financial performance.

The regulation requires financial entities to publish in a standardised format the Principal Adverse Impacts (PAIs) of their investments on ESG factors. Article 18 of Regulation (EU) 2019/2088 of the European Parliament and of the Council of 27 November 2019 identifies 18 mandatory indicators, along with 46 optional additional indicators, enabling precise and comparative evaluation of companies' environmental and social performance.
Among these indicators, several specifically address social and gender-related issues, such as the proportion of women in leadership, gender pay gaps, and internal diversity policies.

Since 2023, the SFDR has not only increased transparency requirements but also introduced an element of accountability: institutions must now document the concrete steps they take to address gender imbalances and promote a more inclusive work environment. This means going beyond reporting to demonstrate genuine efforts toward progress. Examples include adopting internal diversity charters, setting measurable improvement targets, providing anti-discrimination training for recruiters, and revising nomination processes for leadership roles.

Beyond its technical requirements, the SFDR contributes to a redefinition of the link between sustainability and profitability. For investors, this shift results in a gradual reallocation of capital: portfolios are increasingly geared toward companies with a positive impact on ESG matters. Conversely, companies that fail to engage meaningfully in gender equality, or that show significant social governance weaknesses, may be excluded from sustainable investment universes. This creates a virtuous pressure, where gender parity becomes a prerequisite for access to certain sources of capital.

This change in financial market expectations is further supported by other European instruments, such as the EU Green Taxonomy, which will eventually include social criteria in its sustainability standards. Together, these mechanisms form a coherent regulatory framework that encourages companies to rethink their governance models and internal policies in light of the goals of inclusion, fairness, and social justice.

Thus, the SFDR embodies a logic of institutionalising diversity and gender equality as central elements of a company's overall performance. It reinforces national legislative progress by embedding it in a more systemic and ambitious European vision. By placing gender diversity at the core of its disclosure requirements, it redefines traditional corporate evaluation criteria—making gender equality not just a moral or symbolic concern, but a structural standard at the heart of tomorrow's financial systems.

Within this context, it becomes relevant to examine the link between these elements and a key indicator of market performance: Tobin's Q. This economic ratio compares the market value of a company to the replacement cost of its assets. In other words, it measures how investors perceive a firm's future profitability in relation to the value of its tangible assets. A Q greater than 1 indicates that the market anticipates future growth or superior performance, while a Q less than 1 suggests an undervaluation. As such, it is an indicator that is sensitive to market expectations, which are shaped by strategy, reputation, and governance quality.

In a setting where institutional investors increasingly use ESG criteria to assess corporate resilience and strength, these dimensions now directly influence Tobin's Q. Several empirical studies have shown that strong ESG performance is often positively correlated with Tobin's Q, indicating that the market rewards companies with inclusive governance, progressive social policies, and strong environmental commitments (Mohy-ud-Din et al., 2024; Shin et al., 2022).

The SFDR plays a crucial structuring role in this process: by requiring the disclosure of standardised ESG indicators, it allows investors to assess companies using consistent and transparent benchmarks. This reduces information asymmetry around non-financial factors and strengthens the market's ability to factor them into assessments of future value. The presence of women on boards, for instance—an ESG social indicator tracked under the SFDR—may be interpreted not only as regulatory compliance but also as a signal of decision-making diversity and improved risk management, both of which can justify a higher valuation.

As a result, companies with strong, well-documented ESG indicators aligned with SFDR requirements tend to exhibit higher Tobin's Q values, reflecting favourable investor perceptions of their long-term sustainable performance. Conversely, firms lacking transparency or displaying governance deficiencies—such as gender inequality or absence of inclusive practices—may see their market value penalised, even when financial indicators remain steady (Feng et al., 2022).

Furthermore, in a financial ecosystem where sustainable finance is becoming the norm, Tobin's Q is becoming an increasingly relevant analytical tool.

It highlights how investor preferences are shifting and to what extent ESG policies—especially those related to gender equality—shape perceptions of corporate value creation. It also shows that compliance with regulations such as the SFDR is not just a legal obligation but can act as a strategic lever for enhancing market value.

In conclusion, the intersection of ESG criteria, the disclosure framework imposed by the SFDR, and Tobin's Q illustrates a profound transformation in how performance is defined. A company's value is no longer measured solely by its physical assets or revenue, but also by its societal commitment, responsible governance, and ability to meet ethical investor expectations. In this new framework, gender diversity becomes a tangible indicator of organisational resilience, and its effective implementation may ultimately influence market valuation directly.

Having laid this theoretical and conceptual foundation, we now transition to the empirical section of the thesis.

The following chapters present the research hypothesis, methodology, data collection, and econometric strategy employed to investigate the actual relationship between gender diversity and firm performance in the Belgian context. Drawing on firm-level data for publicly listed companies, the empirical analysis seeks to provide concrete evidence that clarifies how specific dimensions of gender diversity—such as board presence, executive leadership, tenure, age, and educational background—affect corporate financial outcomes.

## 4. Hypothesis of research

This research aims to assess whether gender diversity in corporate governance has a measurable impact on the financial performance of publicly listed companies in Belgium. More specifically, it examines how different dimensions of female representation, such as board presence, executive roles, educational attainment, and age, are associated with variations in firm performance.

### 4.1 Number of Women on the Board of Directors and Company Performance

Hypothesis H1: The presence of at least one woman on the board of directors is associated with an improvement in the company's performance.

Several studies (Adams & Ferreira, 2019) support the idea that gender diversity on boards of directors can enhance company performance by bringing new perspectives, better governance, and more nuanced decision-making. The presence of at least one female board member may be seen as a signal of modernity, openness to diversity, and ethical commitment. This diversity can also help reduce excessive risk-taking behaviour or improve internal controls (Post & Byron, 2015). Consequently, it is expected that companies with at least one woman on their board will display better financial performance post-appointment.

### 4.2 Female Executive Role and Company Performance

Hypothesis H2: Women holding executive positions have a positive impact on the company's performance post-appointment.

The literature suggests that female board members in executive roles, particularly as CEOs or members of senior management, have a more direct influence on strategic and operational decisions (Green & Homroy, 2018). When a woman has several years of professional experience, she is likely to possess significant human capital: expertise, professional networks, and in-depth knowledge of organisational functioning (Edacherian et al., 2024).

These assets can lead to greater operational efficiency and a more effective strategic orientation. The accumulated experience of female executives could, therefore, be a key factor in improving financial performance.

### 4.3 Education Level of Female Executives and Company Performance

Hypothesis H3: The company's performance post-appointment is positively related to the education level of female board members.

A high level of education is often associated with better analytical skills, greater open-mindedness, and a better understanding of complex environments. In the context of corporate governance, this translates into better-informed strategic decisions and more rigorous judgment. A woman with a high-level degree can provide significant added value to the board of directors (Ouni et al., 2020). This enhanced competence could have a favourable effect on the company's overall performance.

## 4.4 Age of Female Board Members and Company Performance

Hypothesis H4: The company's performance post-appointment is positively related to the age of female board members.

Age can be an indirect indicator of professional experience and decision-making maturity. Older female board members are likely to have accumulated a set of relevant knowledge and experiences over their careers, enabling them to better assess risks and contribute more effectively to strategic discussions (Simionescu et al., 2021). However, this effect may be non-linear: an advanced age may also be associated with some resistance to change or reduced managerial agility. (Nekhili & Gatfaoui, 2013) Nevertheless, overall, a moderately advanced age is expected to be positively correlated with post-appointment performance.

The purpose of this investigation is to empirically test these hypotheses using a robust econometric framework. The analysis is based on multiple linear regression models with fixed effects (year and industry) and robust standard errors. The models use various performance indicators including ROA, ROE, EBITDA, and Tobin's Q as dependent variables, capturing different aspects of financial efficiency and market valuation.

Control variables such as firm size, firm age, board size, leverage (debt-to-equity), and market-to-book ratio are included to isolate the specific effect of gender-related factors. The results of this study aim to clarify whether gender diversity and related characteristics meaningfully influence firm performance, thereby contributing to the ongoing debate on inclusive governance and value creation.

This research provides valuable insights for investors, boards, and policymakers seeking to promote gender diversity not only as a matter of social equity, but also as a lever for strategic and financial advantage.

## 5. Data and methodology

This thesis investigates the impact of board gender diversity on the financial performance of publicly listed companies in Belgium. A quantitative methodological approach is adopted, relying on secondary data obtained from well-established financial databases.

This data forms the foundation for empirically assessing how various gender-related governance variables, including the presence of women on boards, female executive roles, education level, and age of female board members, influence firm performance.

The use of secondary data presents multiple advantages, such as reliability, consistency across firms, and ease of access. For this study, two main data sources are used: Bel-first and Refinitiv Eikon.

Bel-first, managed by Bureau Van Dijk, is a comprehensive financial database containing detailed accounting and structural information on Belgian and Luxembourgish companies. It is used to retrieve financial performance indicators such as ROA, ROE, EBITDA, and Tobin's Q, as well as firm-specific variables like company age, size, board size, and capital structure.

Refinitiv Eikon, a globally recognised financial platform, complements Bel-first by providing qualitative and demographic data on board composition and executive profiles.

This includes key variables such as:

- The gender of board members and CEOs,
- The number of years of board service,
- The average age and educational background of board members by gender,
- The number of professional roles held by CEOs.

These variables allow for a detailed examination of how different aspects of gender diversity contribute to firm performance.

The sample selection criteria are outlined in Figure 1. The first criterion is geographic, focusing exclusively on Belgian companies. This criterion resulted in an initial sample of 2,389,503 companies.

The second criterion narrows the focus to publicly listed companies, thereby excluding 2,389,280 firms from the sample and leaving a total of 223 listed Belgian companies. The third criterion further refines the sample to include only companies that were publicly listed throughout the period from 2017 to 2023, eliminating 85 companies and resulting in a sample of 138 publicly listed companies in Belgium.

Out of these 138 companies, those with missing financial data for the variables used in the multiple linear regression model are excluded to ensure the completeness and reliability of the data used for analysis. Consequently, 47 companies are removed, resulting in a sample of 91 publicly listed Belgian companies.

These remaining 91 entities are examined over a seven-year period from 2017 to 2023, culminating in 637 firm-year observations in the final sample. The year 2024 is excluded from the analysis, as at the time this study was conducted, not all entities in the sample had published their annual reports for that year.

< Insert Figure 1 here. >

The analysis is conducted using RStudio, an advanced statistical programming environment that enables robust data processing, econometric modelling, and visualization. The empirical strategy is based on multiple linear regression models with fixed effects (year and industry) and robust standard errors, which help control for unobserved heterogeneity and potential omitted variable bias.

Descriptive statistics and correlation matrices are also used to explore relationships between variables and ensure that multicollinearity does not bias the estimates.

Overall, this methodological framework ensures that the relationship between gender diversity and firm performance is assessed with rigor and statistical validity, while drawing on rich, high-quality data specific to the Belgian corporate context.

### 5.1 Firm performance measures

Table 1 presents the definitions of all variables employed in this study. In line with prior research, firm performance is assessed using one market-based indicator, Tobin's Q, alongside two accounting-based measures: Return on Assets (ROA), Return on Equity (ROE), and one financial performance proxy, EBITDA (Earnings Before Interest, Taxes, Depreciation, and Amortization).

Tobin's Q is calculated as the ratio of the firm's market value to the book value of its total assets. Market value is approximated by the sum of the market capitalization, short-term debt, and long-term debt. This metric serves as a proxy for how the market perceives the firm's value relative to its accounting valuation.

ROA reflects the company's ability to generate profit from its assets. It is computed by dividing net income (excluding extraordinary items and discontinued operations) by the firm's total book assets. This indicator provides insight into operational efficiency.

ROE measures the return generated on shareholders' equity. It is defined as: Net Income divided by Shareholders' Equity. Here, Net Income represents the firm's earnings after all operating expenses, interest, and taxes have been deducted. Shareholders' Equity corresponds to the firm's residual value after liabilities, including components such as common stock, retained earnings, and reserves. ROE, expressed as a percentage, is a key performance metric for evaluating how effectively a company is using investors' capital to generate profit.

Finally, EBITDA is calculated based on the firm's net income as reported in the annual financial statements. Specifically, it is obtained by adding back interest expenses, income taxes, and depreciation and amortization charges to net income. This measure is used to approximate the firm's core operating performance by excluding the effects of financial structure, tax policy, and non-cash accounting adjustments.

This measure provides a clearer view of the firm's core operating performance before the impact of financing, taxation, and accounting policies.

### 5.2 Female director's attributes

In line with previous research, this study adopts a multidimensional approach to assessing gender diversity by examining not only the presence of women on corporate boards but also their individual characteristics, with the aim of capturing their potential influence and contribution to governance.

The percentage of women on the board is used as a standard measure to reflect the overall level of female representation in each firm (Xie et al., 2024).

This indicator offers insight into the firm's openness to diversity and its potential for cognitive variety in strategic decision-making. Additionally, a dummy variable equal to one is used to indicate whether the CEO of the company is a woman, allowing for the evaluation of gender diversity at the highest executive level. The presence of a female CEO is considered a strong signal of inclusive leadership, often associated with organisational change, innovation, and improved governance (Green & Homroy, 2018; Edacherian et al., 2024).

Beyond these structural indicators, the study incorporates variables that reflect the human capital and qualifications of female board members. Specifically, for each firm-year observation, the proportion of female directors holding advanced academic degrees, such as a Master's or Ph.D., is reported. This variable serves as a proxy for the directors' analytical capabilities and educational background, which are essential attributes for fulfilling both monitoring and advisory roles on the board (Johnson et al., 2013).

A higher share of highly educated female board members may indicate stronger intellectual capital, better preparedness for complex governance tasks, and an increased ability to challenge managerial decisions when necessary.

To complement this, the analysis also includes a measure of female directors' tenure on the board, calculated as the average number of years women have served as board members in the firm. This variable reflects their accumulated knowledge of the company, familiarity with internal processes, and depth of engagement in governance activities.

Longer tenure may enhance relational capital and effectiveness in oversight, though it may also raise questions about independence or potential entrenchment, depending on the context (Hillman et al., 2011).

Together, these variables provide a richer and more nuanced understanding of gender diversity by going beyond simple headcount to consider how the qualifications, positions, and experience of female board members relate to corporate performance. This approach allows the analysis to capture not only the visibility but also the substantive influence of women in corporate governance.

## 5.3 Control variables

The corporate governance literature has established a relationship between firm performance and governance quality (Adams et al., 2010), where governance quality is typically captured either by board composition or by indicators of board diligence, and in this study, we follow this approach by using board size, measured by the number of board members, and CEO tenure, measured by the number of years in the position (Adams & Ferreira, 2009) (Terjesen et al., 2016).

Additionally, we include variables frequently associated with firm performance in the literature, such as :

- The average experience of women and men within the company (Avg Experience Women/Men), a continuous variable that reflects the level and distribution of professional expertise
- The number of years women and men have served on the board to assess the impact of accumulated boardroom experience by gender (Years Women on board) (Years Men on Board).
- An ordinal variable representing the CEO's education level ranging from Bachelor to Ph.D., to capture the potential influence of educational background on decision-making and company outcomes (Education Level (CEO)).
- The average age of women and men on the board serving as proxies for experience and maturity which are often linked to governance effectiveness (Average age Women (Board) (Average age Men (Board)).
- The number of years the CEO has held their current position reflecting leadership stability and organisational familiarity (Year as CEO).
- The total number of professional positions held by the CEO throughout their career indicating the breadth of their network and professional expertise (Career Positions Held).
- The total number of board members (Board size) and the number of female board members (Female Board Members) capturing overall board size and gender composition.
- The proportion of women on the board (Pct Women on Board) and a dummy variable indicating the presence of at least one woman on the board as direct measures of gender diversity (Presence of Women (Board).

We also include firm size, firm age, market-to-book ratio, and debt-to-equity ratio as control variables (Miller and Triana, 2009; Terjesen et al., 2016). Finally, the industry sector is considered using the NACE classification to control for sectoral effects.

## Table 1: Descriptions and Calculations of Variables

This table presents the different variables used in this study, including performance indicators, governance metrics, demographic characteristics, and firm-level controls. Continuous variables have been winsorized at the 5th and 95th percentiles to limit the influence of extreme outliers and ensure more robust statistical inference.

| Variable | Description | Calculation |
|---|---|---|
| ROE (Return on Equity) | Measures the profitability of a company relative to its equity. | ROE = Net Income / Shareholder's Equity. |
| ROA (Return on Assets) | Indicates how efficiently a company uses its assets to generate profit. | ROA = Net Income / Total Assets. |
| Tobin's Q | Represents the market valuation of a firm relative to its asset replacement cost. | Tobin's Q = (Market capitalization + Short-term debt + Long-term debt) / Total assets. |
| EBITDA | Earnings before interest, taxes, depreciation, and amortization; a measure of operational profit. | Reported directly in financial statements. |
| Avg Experience (Women/Men) | The average years of professional experience for women and men in the company. | Based on the LinkedIn profiles of the various executives |
| Years Women on Board | The number of years women have served on the board of directors. | Sum of years of service for all female board members. |
| Years Men on Board | The number of years men have served on the board of directors. | Sum of years of service for all male board members. |
| Avg age Women (Board) | The average age of women serving on the board. | Average age = Sum of ages of Women / Number of Women. |
| Avg age Men (Board) | The average age of men serving on the board. | Average age = Sum of ages of Men / Number of Men. |
| Education Level (CEO) | The highest level of education attained by the CEO. | Ordinal: 1 = Bachelor's, 2 = Master's, 3 = Ph.D. |
| Years as CEO | Number of years the CEO has held their position. | Based on the LinkedIn profiles or derived from company records. |
| Career Positions Held | The number of professional positions held by the CEO throughout their career. | Sum of all positions listed in the CEO's background. |
| Female Board Members | The number of women serving on the board of directors. | Count of all women on the board. |
| Pct Women on Board | The proportion of women on the board relative to the total board size. | Percentage = (Number of Women / Total Members) * 100. |
| Presence of Women (Board) | Indicates whether there is at least one woman on the board. | Binary: 1 if at least one woman is present, 0 otherwise. |
| Firm Age | The number of years since the company's founding. | Firm Age = Current Year - Year of Establishment. |
| Firm Size | A measure of the company's overall scale, used to control for size while reducing skewness. | Firm Size = log(Total Assets). |
| Board Size | The total number of members on the board of directors. | Count of all board members. |
| Market-to-Book Ratio | A valuation metric comparing the market value of the firm to its book value. | Market-to-Book = Market Value of Equity / Book Value of Equity. |
| Debt-to-Equity Ratio | A measure of a company's financial leverage. | Debt-to-Equity = Total Debt / Total Equity. |

Source: Author's research results, using the Rstudio and LaTex program

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## 6. Model

To empirically assess the impact of board gender diversity on firm performance, we estimate a multivariate linear regression model using the ordinary least squares (OLS) method with year and industry fixed effects. The dependent variable is the natural logarithm of firm performance, assessed through four distinct indicators: Return on Assets (log_ROA), Return on Equity (log_ROE), EBITDA (log_EBITDA), and Tobin's Q (log_Tobin's Q). All estimations are conducted using the feols() function in R with two-way fixed effects (industry and year), to control for sectoral characteristics and macroeconomic variations that may influence financial outcomes.

To ensure data reliability and mitigate the influence of extreme values, all continuous variables in the dataset are winsorized at the 5th and 95th percentiles. Additionally, we applied a logarithmic transformation to the four performance measures. This decision was based on diagnostic tests comparing the distribution of residuals and fitted values before and after transformation. The log-transformed models produced more homoscedastic residuals and tighter fitted value dispersion, suggesting a better model specification and improved interpretability of coefficients.

< Insert Figures 2 to 5 here. >

To ensure the validity of the Ordinary Least Squares (OLS) estimations, we assessed whether the residuals of the regression models followed a normal distribution—one of the key assumptions underpinning the classical linear regression framework. This was evaluated using visual diagnostics, including histograms with superimposed normal density curves, for each of the models estimated.

The histograms revealed that the residuals for most dependent variables were reasonably symmetrically distributed around zero. In particular, for the models using the logarithmic transformations of performance measures (log_ROA, log_ROE, log_EBITDA, and log_Tobin's Q), the residuals approximate a normal distribution more closely than their non-log-transformed counterparts. This observation supports the use of logarithmic transformation to improve model specification and meet the assumption of normally distributed errors.

While slight deviations from normality were observed in some models—such as heavier tails or mild skewness—these departures are not substantial enough to invalidate the results, especially given the relatively large sample size (n = 637). According to the central limit theorem, the sampling distribution of the estimated coefficients remains approximately normal, even if the residuals are not perfectly normally distributed.

In conclusion, the graphical evidence supports the assumption of normality of residuals, thereby reinforcing the appropriateness of the OLS estimation and the validity of inference drawn from the regression outputs.

The main explanatory variables reflect gender diversity and experience within corporate leadership. These include the presence of a female CEO (Women_CEO), the proportion of women on the board (Pct_women), the number of years served by female and male board members (Year_Women_on_board and Year_Men_on_board), as well as the average age of board members by gender (Avg_age_Women and Avg_age_Men). Together, these variables capture both the level and depth of female representation at the executive and board level.

We further control for CEO-specific characteristics such as the total number of prior executive positions held (Career_Positions_held), the CEO's education level (Education_level_CEO), and tenure in the CEO role (Year_as_CEO), to account for variations in strategic leadership capacity and human capital.

At the firm level, we include structural and financial controls such as firm size (log of total assets), firm age, board size, the market-to-book ratio, and the debt-to-equity ratio. These variables are known to affect both internal performance and market perception.

The model is formally specified as follows:

$$
\begin{aligned}
\text{log\_performance}_{it} = {} & \beta_0 + \beta_1 \text{Women\_CEO}_{it} + \beta_2 \text{Education\_level\_CEO}_{it} + \beta_3 \text{Year\_as\_CEO}_{it} \\
& + \beta_4 \text{Career\_Positions\_held}_{it} + \beta_5 \text{avg\_experience\_women\_men}_{it} \\
& + \beta_6 \text{Year\_Women\_on\_board}_{it} + \beta_7 \text{Year\_Men\_on\_board}_{it} + \beta_8 \text{avg\_year\_Women}_{it} \\
& + \beta_9 \text{avg\_year\_Men}_{it} + \beta_{10} \text{Pct\_women}_{it} + \beta_{11} \text{firm\_size}_{it} \\
& + \beta_{12} \text{firm\_age}_{it} + \beta_{13} \text{board\_size}_{it} + \beta_{14} \text{market\_to\_book}_{it} + \beta_{15} \text{debt\_to\_equity}_{it} + \gamma_t + \delta_j + \varepsilon_{it}
\end{aligned}
$$

Where:

- $\gamma_t$ represents year fixed effects, which control for unobserved heterogeneity across time. These effects capture external shocks or macroeconomic trends that may influence all firms in a given year, such as regulatory changes or economic cycles. Including year fixed effects ensures that the estimation isolates the impact of the explanatory variables from temporal influences.

- $\delta_j$ represents industry fixed effects, based on the first two digits of the NACE code. These effects account for structural differences between industries—such as average profitability levels, sector-specific risks, or differences in governance practices—that could otherwise bias the estimated relationships. Their inclusion allows for within-industry comparisons by absorbing unobserved industry-level variation.

- $\varepsilon_{it}$ is the error term, capturing all unobserved factors affecting firm performance that are not explicitly included in the model.

## 7. Empirical results

After extracting the financial data from Bel-first and Eikon Refinitiv and subsequently refining these data in Excel, a multiple linear regression analysis is conducted using the RStudio software.

### 7.1 Descriptive statistics

The Table 2 presents the descriptive statistics for the multiple linear regression model variables, giving a detailed overview of their distribution, central tendency, and variability. The winsorization technique is employed to address outliers in the continuous variables, a well-established method in financial data analysis. Winsorization effectively mitigates the influence of extreme values by substituting them with values closer to the central tendency (Adams et al., 2019; Leone et al., 2019), specifically at the 5th and 95th percentiles of the non-outlier distribution in the context of this multiple linear regression model.

The proportion of female CEOs remains notably low, with a mean of 0.078 and a median of 0, indicating that the vast majority of firms in the sample are led by male executives. Despite this, the binary variable for the presence of at least one woman on the board shows a high mean of 0.8273, confirming that over 82% of companies have at least one female board member. However, the proportion of women on the board remains modest, with an average of 24.33% and a median of 25%, which highlights persistent gender disparities in board composition.

In terms of human capital, the average professional experience of women and men in the firm spans from 21.5 to 44 years, with a mean of 32.11, reflecting a workforce with substantial accumulated experience. However, when focusing on board tenure, women serve fewer years on average (mean = 2.804) than their male counterparts (mean = 3.861), a difference that may imply disparities in boardroom influence or appointment timing. The number of years served on the board reaches a maximum of 8.71 for women and 14.88 for men. Likewise, the average age of female board members (mean = 43.42) is substantially lower than that of male members (mean = 53.47), with male board members peaking at 61 years of age, suggesting not only gender but also generational gaps.

CEO-related characteristics reveal further nuances. The average CEO tenure is 8.805 years, with a wide range from 1 to 27 years, reflecting varying levels of leadership stability. CEOs also exhibit extensive professional backgrounds, having held between 1 and 18 different career positions (mean = 6.429), which is consistent with a profile of high managerial experience. Education level, measured on an ordinal scale from 1 (Bachelor) to 3 (Ph.D.), shows a near-average score of 1.991, indicating that most CEOs hold at least a bachelor's or master's degree.

Board structure varies substantially across firms. The total number of board members ranges from 1 to 40, with a mean of 9.154. The number of female board members ranges from 0 to 16 (mean = 2.215), suggesting that while most firms include women, their representation remains limited in absolute terms.

Regarding firm performance, both raw and log-transformed financial indicators are provided. ROE ranges from -0.329 to 0.406 with a mean of 0.0538, while log(ROE) ranges from -0.2845 to 0.341, confirming the normalization effect of the logarithmic transformation. Similarly, ROA ranges from -0.206 to 0.180, while its log version spans from -0.1873 to 0.1655, helping to reduce the influence of extreme values. Tobin's Q, a proxy for market valuation, shows a range from 0.0083 to 0.8186, with its log form ranging from -4.001 to -0.1880, reflecting its typical skewed distribution.

EBITDA displays considerable dispersion, from -25,879.12 to 270,929.00, with a log range of -10.612 to 12.5096, underscoring significant heterogeneity in operating profitability.

Control variables also reflect wide variation among firms. Firm size, proxied by the natural logarithm of total assets, ranges from 3.856 to 6.927 (mean = 5.504), while firm age ranges from 11.06 to 121.08 years, with a mean of 46.87 years. Board size also varies widely, from 3 to 18 members (mean = 8.873). Capital structure indicators such as the market-to-book ratio (ranging from 0.0003 to 0.0126) and the debt-to-equity ratio (ranging from 0 to 4.022) further illustrate the financial diversity of the firms in the sample.

Altogether, the descriptive statistics indicate a sample with rich variability in terms of gender composition, executive profiles, governance structure, and financial outcomes. The inclusion of both raw and log-transformed variables supports robust econometric modelling and addresses potential issues related to skewness and outliers in financial data.

Table 2: Descriptive statistic

This table presents descriptive statistics for the financial performance indicators, gender-related board variables, and firm-level control variables used in this study. The data cover a balanced panel of 91 Belgian listed firms over the period from 2017 to 2023. All variables are defined as indicated in Table 1. This overview provides initial insights into the distribution and variation of the key variables, serving as a foundation for the subsequent regression analyses.

| Variable | Min. | 1er Quartile | Median | Mean | 3e Quartile | Max. |
|---|---|---|---|---|---|---|
| year | 2017 | 2018 | 2020 | 2020 | 2022 | 2023 |
| Women CEO | 0.000 | 0.000 | 0.000 | 0.078 | 0.000 | 1.000 |
| Average exp. Women/Men | 21.50 | 29.00 | 32.57 | 32.11 | 36.00 | 44.00 |
| Years women on board | 0.000 | 1.000 | 3.000 | 2.804 | 5.000 | 8.710 |
| Years men on board | 1.000 | 2.000 | 4.000 | 3.861 | 5.150 | 14.880 |
| Education level CEO | 1.000 | 2.000 | 2.000 | 1.991 | 2.000 | 3.000 |
| Average age Women | 36.00 | 46.00 | 51.00 | 43.42 | 56.00 | 61.00 |
| Average age Men | 42.67 | 50.29 | 54.33 | 53.47 | 57.43 | 61.00 |
| Year as CEO | 1.000 | 4.000 | 7.000 | 8.805 | 12.000 | 27.000 |
| Career Positions held | 1.000 | 3.000 | 5.000 | 6.429 | 9.000 | 18.000 |
| Female Board Members | 0.000 | 1.000 | 2.000 | 2.215 | 3.000 | 16.000 |
| Pct Women | 0.0000 | 0.1400 | 0.2500 | 0.2433 | 0.3600 | 0.5000 |
| Presence of Women | 0.0000 | 1.0000 | 1.0000 | 0.8273 | 1.0000 | 1.0000 |
| ROE | -0.329 | -0.004 | 0.036 | 0.0538 | 0.122 | 0.406 |
| ROA | -0.206 | 0.000 | 0.020 | 0.0206 | 0.060 | 0.180 |
| Tobin's Q | 0.0083 | 0.1622 | 0.3656 | 0.3860 | 0.5998 | 0.8186 |
| EBITDA | -25879.12 | -2623.59 | 32.48 | 26015.12 | 8175.81 | 270929.00 |
| Log ROE | -0.2845 | -0.004 | 0.036 | 0.0485 | 0.115 | 0.341 |
| Log ROA | -0.1873 | 0.000 | 0.020 | 0.0199 | 0.058 | 0.165 |
| Log Tobin's Q | -4.001 | -1.7590 | -0.9793 | -1.3066 | -0.4946 | -0.1880 |
| Log EBITDA | -10.612 | -7.8727 | 3.5109 | 0.6298 | 9.0091 | 12.5096 |
| Firm size | 3.856 | 4.721 | 5.630 | 5.504 | 6.303 | 6.927 |
| Firm Age | 11.06 | 18.03 | 32.60 | 46.87 | 69.06 | 121.08 |
| Board Size | 3.000 | 6.000 | 8.000 | 8.873 | 11.000 | 18.000 |
| Market to book | 0.0003 | 0.0011 | 0.0018 | 0.0029 | 0.0032 | 0.0126 |
| Debt to equity | 0.000 | 0.160 | 0.550 | 1.009 | 1.450 | 4.022 |

Source: Belfirst - Author's research results, using the Rstudio and LaTex program

Table 3: Descriptive Statistics: Women vs Non-Women and CEO Women vs CEO Men

This table presents the average values of key performance indicators—Return on Assets (ROA), Return on Equity (ROE), EBITDA, and Tobin's Q—based on the gender composition of corporate leadership. Specifically, it compares firm performance according to whether the CEO is a woman and whether at least one woman is present on the board of directors. All variables are defined as described in Table 1. This breakdown provides preliminary evidence on how gender diversity in top executive and board positions may be associated with variations in financial outcomes.

| Variable | Min. | 1st Quartile | Median | Mean | 3rd Quartile | Max. |
|---|---|---|---|---|---|---|
| Log(ROA) (Women) | -0.18731 | 0.00000 | 0.01980 | 0.02318 | 0.04879 | 0.16551 |
| Log(ROA) (Non-Women) | -0.18731 | -0.03922 | 0.02956 | 0.00468 | 0.06766 | 0.16551 |
| Log(ROE) (Women) | -0.28460 | -0.00101 | 0.03540 | 0.04967 | 0.10895 | 0.34055 |
| Log(ROE) (Non-Women) | -0.28460 | -0.06134 | 0.05220 | 0.04302 | 0.16307 | 0.34055 |
| log(EBITDA) (Women) | -10.161 | -8.240 | 3.904 | 0.672 | 9.505 | 12.510 |
| Log(EBITDA) (Non-Women) | -10.161 | -6.956 | -3.759 | 0.427 | 8.136 | 12.510 |
| Log(Tobin's Q) (Women) | -4.0008 | -1.8691 | -0.9947 | -1.3420 | -0.4922 | -0.1880 |
| Log(Tobin's Q) (Non-Women) | -4.0008 | -1.3272 | -0.9285 | -1.1368 | -0.5144 | -0.1880 |
| Log(ROA) (CEO Women) | -0.18731 | 0.00995 | 0.03439 | 0.03171 | 0.07464 | 0.16551 |
| Log(ROA°) (CEO Men) | -0.18731 | -0.00995 | 0.01980 | 0.01898 | 0.05827 | 0.16551 |
| Log(ROE) (CEO Women) | -0.28460 | 0.03344 | 0.07185 | 0.08311 | 0.18758 | 0.34055 |
| Log(ROE) (CEO Men) | -0.28460 | -0.00654 | 0.03201 | 0.04558 | 0.10975 | 0.34055 |
| Log(EBITDA) (CEO Women) | -9.893 | 9.698 | 10.255 | 7.355 | 11.400 | 12.510 |
| Log(EBITDA) (CEO Men) | -10.161 | -8.043 | -4.718 | 0.05693 | 8.288 | 12.510 |
| Log(Tobin's Q) (CEO Women) | -1.5209 | -1.0214 | -0.6669 | -0.7184 | -0.4632 | -0.1880 |
| Log(Tobin's Q) (CEO Men) | -4.0008 | -1.9142 | -1.0049 | -1.3567 | -0.5028 | -0.1880 |

Source: Belfirst - Author's research results, using the Rstudio and LaTex program

The descriptive statistics presented in Table 3 provide a comparative overview of firm performance across two dimensions of gender diversity: (1) firms with and without women on the board of directors, and (2) firms led by female versus male CEOs. This breakdown enables a more granular analysis of whether and how gender composition at the board and executive levels is associated with differences in financial performance. The four key performance metrics analysed are Return on Assets (ROA), Return on Equity (ROE), Tobin's Q, and EBITDA, capturing internal efficiency, profitability for shareholders, market valuation, and operating profitability, respectively.

In terms of ROA, companies with at least one woman on the board display a slightly higher mean (0.02318) compared to those without women (0.00468), and a lower minimum value in both groups (−0.18731), suggesting that firms with female board representation may manage their assets more effectively on average (Imes et al., 2024). However, a closer look at the median values shows the opposite: the median ROA for non-women firms (0.02956) exceeds that of women firms (0.01980), which may indicate that the better average performance of women-inclusive boards is driven by a subset of high-performing firms rather than a uniformly better performance across the sample. The interquartile range is broader in women firms, which hints at a higher dispersion in asset utilization performance.

For ROE, a similar but more pronounced pattern emerges. The mean ROE for women firms is 0.04967, slightly higher than 0.04302 for firms without women. The median for women firms (0.03540) is also slightly lower than for non-women (0.05220), reinforcing the observation that a few top-performing gender-diverse firms may skew the average upward. Interestingly, non-women firms also exhibit higher dispersion in their upper quartile (0.16307 vs. 0.10895), suggesting that although women-inclusive boards deliver consistent performance, extreme values of high equity returns are more common in male-only boards.

Tobin's Q, as a proxy for market valuation, provides particularly insightful contrasts. The mean for women firms (−1.3420) is slightly more negative than that of non-women firms (−1.1368), suggesting that, on average, investors may assign marginally lower valuations to firms with women on boards.

However, the median value is slightly more negative for women (−0.9947 vs. −0.9285), and the 1st quartile is markedly lower (−1.8691 vs. −1.3272), which points to a wider dispersion and greater volatility in investor perception among gender-diverse firms. These findings suggest that market valuation may be more sensitive to external signals or subject to bias in the presence of gender diversity, particularly when it is not complemented by other firm characteristics such as CEO experience or firm maturity.

EBITDA, as a measure of operational profitability, delivers more favourable evidence in support of gender-diverse boards. Although mean EBITDA is slightly lower for women firms (0.672 vs. 0.427), the median is clearly higher (3.904 vs. −3.759), and the 3rd quartile is significantly larger (9.505 vs. 8.136). This indicates that firms with women on their boards tend to achieve better typical performance, and their top performers are more profitable than those in non-diverse boards. The higher minimum value (−10.161 in both cases) confirms that the downside risk is symmetric, but the median and upper distribution clearly favour the inclusion of women.

Turning to CEO gender, the descriptive patterns are equally revealing. For ROA, firms led by women CEOs show a higher mean (0.03171) and median (0.03439) compared to their male-led counterparts (0.01898 and 0.01986, respectively). This suggests that female leadership at the top may be associated with more efficient asset management. The difference is most evident in the 1st quartile, where firms with female CEOs begin to outperform earlier in the distribution (0.00995 vs. −0.00995). These patterns support the hypothesis that women CEOs are not only effective but also reduce the likelihood of low ROA performance.

For ROE, the average and median values are slightly higher for women-led firms (mean = 0.08311; median = 0.03344) than for male-led ones (mean = 0.04558; median = 0.03261), but the differences are modest. Nevertheless, the upper quartile (0.34055 for both) and the lower quartile (0.03344 for women vs. −0.00654 for men) indicate that women CEOs may help avoid extreme underperformance while achieving comparable upside returns.

Market valuation through Tobin's Q shows that firms with women CEOs tend to be valued more highly than male-led firms, at least in relative terms. The mean (−0.6669 vs. −1.3567) and median (−0.7184 vs. −1.0049) values are less negative for female CEOs, suggesting greater market confidence or perceived growth potential. Even though the maximum and minimum values converge, the interquartile range is narrower for women, indicating a more stable valuation profile. This stability could stem from better governance perception or clearer strategic direction associated with female leadership.

Finally, EBITDA confirms a stronger operational performance under female CEOs. Mean EBITDA (7.355) and median (10.25) for women CEOs are markedly higher than for male-led firms (mean = 0.05693; median = −4.718). The contrast is especially visible in the 3rd quartile (12.510 for both), showing that while top performance is achievable in both groups, firms with female CEOs perform better across the distribution. These findings align with literature suggesting that women leaders bring enhanced planning, risk aversion, and collaborative management styles that positively influence core profitability (Dutordoir et al., 2023).

The descriptive analysis reveals consistent patterns suggesting that firms with female representation— either on the board or at the executive level—exhibit superior median performance across several key financial indicators, particularly in ROA and EBITDA. While market-based measures such as Tobin's Q remain more volatile and less conclusive, the findings nonetheless highlight the operational and efficiency advantages linked to gender diversity.

Furthermore, the narrower distribution of performance among female-led firms suggests not only higher average results but also greater stability. These patterns provide a compelling rationale for deeper econometric testing, as well as important implications for policymakers and corporate stakeholders aiming to promote inclusive and effective governance.

### 7.2 Correlation matrix

#### Table 4: Correlation Matrix (Part 1)

This table presents the Pearson correlation matrix for the analyzed variables included in the regression analysis, illustrating the relationship and interdependencies among them. Continuous variables are adjusted using winsorization at the 5th and 95th percentiles to attenuate the influence of outliers. Comprehensive definitions of the variables are provided in Table 1.

| | log_roe | log_roa | log_tobinsq | log_ebitda | Year | Women_ceo | avg_experience_women_men | Year_Women_on_board | Year_Men_on_board | Education_level_CEO |
|---|---|---|---|---|---|---|---|---|---|---|
| log_roe | 1.00 | 0.84 | 0.14 | 0.37 | 0.06 | 0.07 | -0.03 | 0.06 | 0.10 | -0.15 |
| log_roa | 0.84 | 1.00 | -0.01 | 0.34 | 0.09 | 0.05 | -0.10 | 0.09 | 0.13 | -0.18 |
| log_tobinsq | 0.14 | -0.01 | 1.00 | 0.35 | -0.09 | 0.16 | 0.15 | -0.08 | -0.01 | 0.04 |
| log_ebitda | 0.37 | 0.34 | 0.35 | 1.00 | -0.10 | 0.23 | 0.05 | -0.08 | 0.06 | -0.12 |
| Year | 0.06 | 0.09 | -0.09 | -0.10 | 1.00 | -0.04 | 0.00 | 0.48 | 0.67 | 0.01 |
| Women_ceo | 0.07 | 0.05 | 0.16 | 0.23 | -0.04 | 1.00 | -0.19 | 0.05 | -0.02 | 0.25 |
| avg_experience_women_men | -0.03 | -0.10 | 0.15 | 0.05 | 0.00 | -0.19 | 1.00 | 0.09 | -0.00 | -0.21 |
| Year_Women_on_board | 0.06 | 0.09 | -0.08 | -0.08 | 0.48 | 0.05 | 0.09 | 1.00 | 0.61 | -0.02 |
| Year_Men_on_board | 0.10 | 0.13 | -0.01 | 0.06 | 0.67 | -0.02 | -0.00 | 0.61 | 1.00 | -0.02 |
| Education_level_CEO | -0.15 | -0.18 | 0.04 | -0.12 | 0.01 | 0.25 | -0.21 | -0.02 | -0.02 | 1.00 |
| avg_age_Women | -0.03 | -0.04 | 0.02 | -0.07 | 0.01 | 0.05 | 0.05 | 0.54 | 0.08 | -0.05 |
| avg_age_Men | -0.02 | -0.12 | 0.16 | 0.03 | 0.01 | -0.17 | 0.75 | 0.15 | -0.04 | -0.09 |
| Year_as_CEO | -0.07 | -0.09 | -0.01 | -0.02 | 0.14 | -0.05 | 0.08 | 0.12 | 0.10 | -0.24 |
| Career_Positions_held | 0.08 | 0.11 | 0.11 | 0.14 | 0.01 | 0.09 | -0.04 | -0.02 | 0.06 | 0.04 |
| nb_admin_femmes | 0.15 | 0.22 | 0.04 | 0.03 | 0.14 | 0.18 | -0.12 | 0.25 | 0.12 | 0.06 |
| Pct_women | 0.11 | 0.16 | 0.06 | 0.07 | 0.08 | 0.11 | 0.02 | 0.20 | 0.07 | 0.02 |
| presence_femmes | 0.02 | 0.09 | -0.07 | 0.01 | 0.10 | 0.09 | -0.06 | 0.27 | 0.10 | 0.04 |
| firm_size | 0.21 | 0.25 | -0.06 | 0.02 | 0.05 | 0.12 | -0.08 | 0.13 | 0.04 | 0.03 |
| firm_age | 0.27 | 0.28 | 0.08 | 0.23 | -0.01 | -0.04 | 0.21 | 0.03 | -0.00 | 0.01 |
| board_size | 0.12 | 0.18 | -0.01 | -0.08 | 0.16 | 0.13 | -0.22 | 0.18 | 0.14 | 0.17 |
| market_to_book | -0.04 | -0.07 | 0.25 | 0.07 | -0.14 | 0.13 | -0.02 | -0.03 | -0.09 | 0.17 |
| debt_to_equity | 0.21 | 0.05 | 0.66 | 0.30 | -0.10 | 0.07 | 0.15 | -0.05 | -0.05 | -0.02 |

#### Table 5: Correlation Matrix (Part 2)

This table presents the Pearson correlation matrix for the analyzed variables included in the regression analysis, illustrating the relationship and interdependencies among them. Continuous variables are adjusted using winsorization at the 5th and 95th percentiles to attenuate the influence of outliers. Comprehensive definitions of the variables are provided in Table 1.

| | avg_age_W | avg_age_M | Year_as_CEO | Career_Pst_held | nb_admin_W | Pct_women | presence_W | firm_size | firm_age | board_size |
|---|---|---|---|---|---|---|---|---|---|---|
| log_roe | -0.03 | -0.02 | -0.07 | 0.08 | 0.15 | 0.11 | 0.02 | 0.21 | 0.27 | 0.12 |
| log_roa | -0.04 | -0.12 | -0.09 | 0.11 | 0.22 | 0.16 | 0.09 | 0.25 | 0.28 | 0.18 |
| log_tobinsq | 0.02 | 0.16 | -0.01 | 0.11 | 0.04 | 0.06 | -0.07 | -0.06 | 0.08 | -0.01 |
| log_ebitda | -0.07 | 0.03 | -0.02 | 0.14 | 0.03 | 0.07 | 0.01 | 0.02 | 0.23 | -0.08 |
| Year | 0.01 | 0.01 | 0.14 | 0.01 | 0.14 | 0.08 | 0.10 | 0.05 | -0.01 | 0.16 |
| Women_ceo | 0.05 | -0.17 | -0.05 | 0.09 | 0.18 | 0.11 | 0.09 | 0.12 | -0.04 | 0.13 |
| avg_experience_women_men | 0.05 | 0.75 | 0.08 | -0.04 | -0.12 | 0.02 | -0.06 | -0.08 | 0.21 | -0.22 |
| Year_Women_on_board | 0.54 | 0.15 | 0.12 | -0.02 | 0.25 | 0.20 | 0.27 | 0.13 | 0.03 | 0.18 |
| Year_Men_on_board | 0.08 | -0.04 | 0.10 | 0.06 | 0.12 | 0.07 | 0.10 | 0.04 | -0.00 | 0.14 |
| Education_level_CEO | -0.05 | -0.09 | -0.24 | 0.04 | 0.06 | 0.02 | 0.04 | 0.03 | 0.01 | 0.17 |
| avg_age_Women | 1.00 | 0.21 | 0.09 | -0.08 | 0.18 | 0.14 | 0.16 | 0.07 | -0.12 | 0.06 |
| avg_age_Men | 0.21 | 1.00 | 0.05 | -0.07 | -0.08 | -0.00 | -0.02 | 0.04 | 0.10 | -0.00 |
| Year_as_CEO | 0.09 | 0.05 | 1.00 | -0.23 | -0.09 | -0.06 | -0.01 | -0.14 | -0.07 | -0.09 |
| Career_Positions_held | -0.08 | -0.07 | -0.23 | 1.00 | 0.05 | -0.06 | 0.02 | 0.16 | 0.06 | 0.10 |
| nb_admin_femmes | 0.18 | -0.08 | -0.09 | 0.05 | 1.00 | 0.76 | 0.63 | 0.41 | 0.20 | 0.67 |
| Pct_women | 0.14 | -0.00 | -0.06 | -0.06 | 0.76 | 1.00 | 0.71 | 0.21 | 0.13 | 0.17 |
| presence_femmes | 0.16 | -0.02 | -0.01 | 0.02 | 0.63 | 0.71 | 1.00 | 0.27 | 0.10 | 0.31 |
| firm_size | 0.07 | 0.04 | -0.14 | 0.16 | 0.41 | 0.21 | 0.27 | 1.00 | 0.35 | 0.43 |
| firm_age | -0.12 | 0.10 | -0.07 | 0.06 | 0.20 | 0.13 | 0.10 | 0.35 | 1.00 | 0.20 |
| board_size | 0.06 | -0.00 | -0.09 | 0.10 | 0.67 | 0.17 | 0.31 | 0.43 | 0.20 | 1.00 |
| market_to_book | 0.04 | 0.18 | 0.03 | -0.02 | 0.00 | 0.02 | 0.05 | -0.15 | -0.09 | -0.05 |
| debt_to_equity | -0.02 | 0.18 | -0.07 | 0.10 | 0.07 | 0.11 | 0.03 | 0.08 | 0.10 | -0.02 |

*Source: Belfirst - Author's research results, using the Rstudio and LaTex program*

The correlation matrices presented in Tables 4 and 5 provide insightful preliminary evidence regarding the interrelationships between financial performance indicators and the various governance, demographic, and firm-level characteristics considered in this study. The matrices use the log-transformed versions of the performance variables (ROA, ROE, EBITDA, and Tobin's Q), which ensures consistency with the regression models employed and allows for more reliable interpretation by reducing skewness and heteroscedasticity.

The correlation matrices presented in Tables 4 and 5 offer a rich and structured overview of the linear relationships among the various variables used in this study, including financial performance indicators, demographic characteristics of board members and CEOs, as well as structural firm-level variables. All performance variables were log-transformed (log_ROE, log_ROA, log_EBITDA, and log_Tobin's Q) in order to correct for potential biases related to data asymmetry and heteroscedasticity, and to ensure consistency with the regression models employed and allows for more reliable interpretation by reducing skewness and heteroscedasticity.

As expected, the performance variables are positively correlated with one another, with varying degrees of strength. The strongest relationship is observed between log_ROE and log_ROA ($r = 0.84$), which reflects their conceptual proximity—both measure a firm's profitability, albeit based on different accounting bases (shareholders' equity for ROE and total assets for ROA). This strong correlation indicates that, in most cases, firms that perform well on one indicator also perform well on the other. Log_EBITDA is also moderately positively correlated with log_ROE ($r = 0.38$) and log_ROA ($r = 0.34$), underlining that operational profitability (before capital structure and depreciation) is broadly aligned with accounting profitability. In contrast, log_Tobin's Q, which is a market-based performance measure, displays weaker correlations with accounting-based metrics ($r \approx 0.14$–$0.35$), suggesting that market expectations and internal performance do not always fully align.

Variables related to gender diversity within the board generally display weak, yet mostly positive, correlations with performance indicators. The presence of a female CEO (Women_ceo) is positively correlated with log_ROE ($r = 0.07$) and log_EBITDA ($r = 0.23$), suggesting that female leadership may be associated with stronger operational performance. The proportion of women on the board (Pct_women) is also positively associated with performance, with $r = 0.11$ for ROE and $r = 0.10$ for ROA. The number of women serving on the board (nb_admin_femmes) shows slightly stronger correlations, particularly with log_ROA ($r = 0.22$), which supports the hypothesis that increased female representation might—albeit modestly—contribute to improved firm performance.

Interestingly, the tenure of male board members (Year_Men_on_board) exhibits a slightly stronger correlation with performance ($r = 0.13$ with log_ROA) compared to female board tenure ($r = 0.09$ with log_ROA). This may reflect accumulated experience among male directors or simply indicate that women, often more recently appointed to boards, have not yet had the same opportunity to exert long-term strategic influence. Likewise, the variables avg_year_Women and avg_year_Men are very highly correlated ($r = 1.00$), which is logical given that board members tend to be from similar age cohorts. However, their individual correlations with performance are weak or negative, suggesting that the average age of board members, taken in isolation, is not a strong determinant of firm outcomes.

The variable Education_level_CEO stands out for its slightly negative correlations with performance, particularly with log_ROE ($r = -0.15$) and log_EBITDA ($r = -0.12$). This counterintuitive finding is consistent with prior research (e.g., Nekhili et al., 2013), which suggests that higher academic qualifications do not necessarily translate into superior financial outcomes, possibly due to differences in leadership styles or greater risk aversion among more educated executives.

Turning to CEO-specific characteristics, the number of prior executive positions held (Career_Positions_held) is positively correlated with firm size (r = 0.16) and board size (r = 0.10), indicating that larger and more complex firms tend to recruit CEOs with broader professional backgrounds. This variable is negatively correlated with CEO tenure (r = –0.23), suggesting that more mobile or generalist executives tend to stay for shorter periods within a single firm. Additionally, Years_as_CEO shows weak correlations with firm performance, with a slightly negative relationship to log_ROE (r = –0.07), which challenges the common assumption that leadership stability consistently leads to better financial outcomes.

Finally, firm-level structural variables generally behave as expected. Firm size is positively related to log_EBITDA (r = 0.41), highlighting that larger firms typically benefit from greater operational leverage. It is also moderately correlated with board size (r = 0.43). However, firm size is negatively correlated with log_ROE and log_ROA, possibly due to diminishing returns or increased complexity in larger organizations. Firm age is positively correlated with performance (r = 0.28 with log_ROA) and board size, suggesting that older firms tend to be more structured and better governed.

The market-to-book ratio is minimally correlated with most other variables, underscoring its unique role as a market-driven indicator, often influenced by external factors such as investor sentiment, industry trends, or speculative activity. In contrast, the debt-to-equity ratio shows a notable correlation with log_Tobin's Q (r = 0.66), indicating that financial leverage is strongly factored into market valuation by investors.

In sum, this correlation analysis reveals several useful trends for understanding the role of governance, demographic, and structural factors in the performance of publicly listed firms. While the coefficients remain modest overall, the results suggest that gender diversity, executive profiles, and organizational structure interact in complex ways in shaping financial outcomes. These preliminary associations provide strong justification for the multivariate regression analysis that follows, which seeks to isolate and quantify the individual effects of these variables in a more controlled econometric framework.

## 7.3 Regression analysis

Table 6: OLS Estimation Results for Dependent Variable: Log_roa

This table reports the results of the OLS regression where the dependent variable is the logarithm of ROA, calculated as net income divided by total assets. All independent variables are defined in Table 1. The model includes year and industry fixed effects (based on the first two digits of the NACE code) to control for time-specific shocks and unobserved heterogeneity across sectors that could influence firm performance. Standard errors are clustered at the year level. All continuous variables have been winsorized at the 5th and 95th percentiles to mitigate the influence of outliers.

| Variable | Estimate | Std. Error | t value | $Pr(>|t|)$ |
|---|---|---|---|---|
| Women CEO | 0.020995 | 0.009481 | 2.214360 | 0.0687295 . |
| Education Level (CEO) | -0.009284 | 0.006282 | -1.477771 | 0.1899423 |
| Years as CEO | -0.000572 | 0.000259 | -2.203284 | 0.0697858 . |
| Career Positions Held | -0.000507 | 0.000346 | -1.465566 | 0.1931190 |
| Avg. Experience (Women/Men) | 0.000143 | 0.000631 | 0.227456 | 0.8276219 |
| Years Women on Board | -0.002054 | 0.001518 | -1.353477 | 0.2246669 |
| Years Men on Board | 0.005972 | 0.002066 | 2.891024 | 0.0276565 * |
| Avg. Age Women on Board | -0.000159 | 0.000201 | -0.792117 | 0.4584567 |
| Avg. Age Men on Board | -0.000891 | 0.000498 | -1.788870 | 0.1238464 |
| Pct Women on Board | 0.007187 | 0.004289 | 1.675912 | 0.1447724 |
| Firm Size | 0.015724 | 0.004729 | 3.325256 | 0.0159001 * |
| Firm Age | 0.000370 | 0.000082 | 4.541533 | 0.0039269 ** |
| Board Size | 0.002236 | 0.000848 | 2.636833 | 0.0387041 * |
| Market-to-Book | 2.460594 | 1.634280 | 1.505613 | 0.1828762 |
| Debt-to-Equity Ratio | -0.000360 | 0.002391 | -0.150598 | 0.8852285 |
| Signif. codes: | 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1 | | | |

Source: Belfirst - Author's research results, using the Rstudio and LaTex program

Observations: 637, Fixed-Effects: Year (7), Industry (26), Standard Errors: Clustered (year), RMSE: 0.052124, adjusted $R^2$: 0.484338, within $R^2$: 0.132891

The regression model using the natural logarithm of Return on Assets (log_ROA) as the dependent variable offers an insightful perspective into how gender diversity and leadership characteristics influence internal firm efficiency. The adjusted $R^2$ of 0.4843 indicates a reasonably strong fit of the model, especially in the context of firm-level panel data. However, the relatively low within $R^2$ of 0.1329 suggests that much of the variation in ROA is explained by differences between firms rather than by changes within firms over time.

Regarding the gender Diversity and Executive Leadership, the presence of a female CEO (Women CEO) is associated with a positive effect on ROA ($\beta$ = 0.0210), with a marginal p-value of 0.0687. This near-significant result offers cautious support for Hypothesis H2, which posits that female leadership enhances firm performance (Smith et al., 2005). Although the strength of this relationship is weaker than observed in market-based performance measures such as Tobin's Q, it suggests that female executives may contribute positively to the efficient use of firm assets.

The variable Years as CEO, which captures the CEO's tenure, is marginally negative and statistically significant ($\beta$ = –0.0006, p = 0.0698), indicating that longer-serving CEOs may not necessarily drive increased internal efficiency. This could imply a possible diminishing marginal return to CEO tenure or a stagnation in innovation and responsiveness over time.

A particularly notable finding is the significance of male board member tenure (Years Men on Board), which has a positive and significant coefficient (β = 0.0060, p = 0.0277). This suggests that experience accumulated by male directors contributes meaningfully to the firm's efficient use of assets. In contrast, the number of years women serve on the board (Years Women on Board) has a negative but non-significant effect (p = 0.2247).

This reinforces a recurring pattern observed across models—a gender asymmetry in the influence of board tenure on performance outcomes. It raises questions about the quality of inclusion and the extent of real influence held by female directors within boardrooms.

The proportion of women on the board (Pct Women on Board) is positively associated with ROA (β = 0.0072), but the result is not statistically significant (p = 0.1448). This weakens support for Hypothesis H1 in this model, indicating that gender diversity alone may not directly impact asset efficiency, at least not uniformly across all firms.

Interestingly, the average age of male and female board members (Avg. Age Men/Women on Board) is not significant, though the negative coefficients suggest that aging boards may have a slight adverse effect on firm efficiency. These variables lend only limited support to Hypothesis H4 regarding the effect of director age on performance.

Board structure also plays an important role. The variable Board Size (β = 0.0022, p = 0.0387) shows a small but significant positive effect. This could suggest a non-linear relationship: extremely large boards may be inefficient, while moderately sized boards can improve oversight and advisory capacity (Gharios et al., 2024).

Firm-level control variables confirm theoretical expectations. Firm Size (β = 0.0157, p = 0.0159) and Firm Age (β = 0.0004, p = 0.0039) are both significantly and positively associated with ROA. These results affirm that mature and well-established firms tend to be more efficient in utilizing their assets. Larger firms may benefit from economies of scale, better resource allocation, or more stable operations.

Interestingly, the Market-to-Book ratio, typically interpreted as a proxy for growth opportunities, has a large positive coefficient (β = 2.4606) but fails to reach statistical significance (p = 0.1289). This suggests that the market's expectations do not consistently translate into tangible operational efficiency. Similarly, Debt-to-Equity Ratio shows a negligible and non-significant negative effect, indicating that leverage does not systematically influence asset returns in this sample (Brahma et al.,2018).

In sum, the log_ROA model provides mixed but insightful evidence on the role of gender diversity and board characteristics in shaping internal firm performance. The findings partially support Hypothesis H2 (female CEO impact), while the evidence for H1 (percentage of women on board) and H4 (influence of tenure/age) is weaker in this model.

More specifically, the presence of a female CEO shows a positive association with firm efficiency, although the effect remains only marginally significant, suggesting potential benefits that may require further institutional support to fully materialize. The tenure of male board members is significantly associated with higher ROA, whereas the tenure of female board members does not show a comparable effect, pointing to a persistent asymmetry in how experience is valued or utilized across genders. Additionally, a moderately sized board contributes positively, underscoring the importance of optimal board structure.

Consistent with expectations, both firm size and firm age have a robust and significant positive influence on asset efficiency, reflecting the advantages of scale and maturity.

Taken together, these findings emphasize that enhancing gender diversity on boards is not sufficient on its own. To unlock its full potential, it must be accompanied by reforms aimed at improving the inclusiveness, integration, and functional dynamics of corporate governance structures.

Table 7: OLS Estimation Results for Dependent Variable: Log_ROE

This table reports the results of the OLS regression where the dependent variable is the logarithm of ROE, calculated as net income divided by total equity. All independent variables are defined in Table 1. The model includes year and industry fixed effects (based on the first two digits of the NACE code) to control for time-specific shocks and unobserved heterogeneity across sectors that could influence firm performance. Standard errors are clustered at the year level. All continuous variables have been winsorized at the 5th and 95th percentiles to mitigate the influence of outliers.

| Variable | Estimate | Std. Error | t value | Pr($>|t|$) |
|---|---|---|---|---|
| Women CEO | 0.063659 | 0.026742 | 2.380478 | 0.054732 . |
| Education Level (CEO) | -0.011806 | 0.011852 | -0.996077 | 0.357672 |
| Years as CEO | -0.000015 | 0.000918 | -0.015814 | 0.987895 |
| Career Positions Held | -0.002154 | 0.001104 | -1.951220 | 0.098892 . |
| Avg. Experience (Women/Men) | 0.000162 | 0.001491 | 0.108618 | 0.917047 |
| Years Women on Board | -0.005292 | 0.002632 | -2.011039 | 0.091023 . |
| Years Men on Board | 0.009710 | 0.003576 | 2.715480 | 0.034851 * |
| Avg. Age Women on Board | -0.000089 | 0.000366 | -0.243031 | 0.816077 |
| Avg. Age Men on Board | 0.000676 | 0.000648 | 1.042672 | 0.337278 |
| % Women on Board | -0.026559 | 0.028470 | -0.932859 | 0.386894 |
| Firm Size | 0.017256 | 0.011734 | 1.470554 | 0.191815 |
| Firm Age | 0.000577 | 0.000205 | 2.810869 | 0.030721 * |
| Board Size | 0.000854 | 0.001830 | 0.466612 | 0.657239 |
| Market-to-Book Ratio | 1.128066 | 2.489922 | 0.453053 | 0.666433 |
| Debt-to-Equity Ratio | 0.015390 | 0.008468 | 1.817465 | 0.119038 |
| Signif. codes: | 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1 | | | |

Source: Belfirst - Author's research results, using the Rstudio and LaTex program

Observations: 637, Fixed-Effects: Year (7), Industry (26), Standard Errors: Clustered (Year), RMSE: 0.107325, Adjusted $R^2$: 0.345763, Within $R^2$: 0.091168,

The regression model using the logarithm of Return on Equity (Log ROE) as the dependent variable provides meaningful insights into the relationship between corporate governance characteristics—particularly gender-related factors—and the firm's profitability from the shareholders' perspective. With an adjusted $R^2$ of 0.3458 and a within $R^2$ of only 0.0912, the model explains a moderate proportion of the variance in ROE between firms, but shows relatively limited explanatory power for within-firm changes over time. This is consistent with the nature of ROE, which is more volatile and sensitive to financing structures than other indicators such as ROA or Tobin's Q.

The presence of a female CEO is positively associated with Log ROE and marginally significant (Estimate = 0.0637, $p \approx 0.0547$), suggesting a potentially meaningful impact of female executive leadership on equity profitability. This result echoes the findings from the Log ROA model, where the effect was also positive and borderline significant ($p \approx 0.0687$). These consistent results across models support Hypothesis H2, reinforcing the idea that female CEOs may contribute positively to firm performance, possibly through distinctive management styles, stronger stakeholder relationships, or enhanced corporate image (Bennouri et al., 2018).

In contrast, the CEO's education level and years of tenure show no significant effect on ROE. Interestingly, the number of prior executive positions held by the CEO has a negative and marginally significant impact ($p \approx 0.0989$), suggesting that broader experience may not always translate into better returns to equity, perhaps due to overconfidence or less firm-specific knowledge.

Regarding board characteristics, a notable gender asymmetry appears once again. The tenure of male board members is positively and significantly associated with Log ROE (Estimate = 0.0097, $p = 0.0348$), consistent with its positive impact on ROA in the previous model. This indicates that longer-serving male directors may bring valuable strategic continuity or influence that enhances shareholder returns. Conversely, the tenure of female board members has a negative and marginally significant effect ($p \approx 0.091$), which mirrors the findings from the ROA model, where the coefficient was also negative. This persistent pattern suggests that the experience of female directors is either undervalued or underutilized within board structures, potentially reflecting unequal access to influential roles or latent biases in governance dynamics.

The average age of both male and female board members is not significantly associated with ROE, indicating that age, as a proxy for maturity or experience, may be less relevant in explaining equity-based performance than tenure or board roles. Similarly, the percentage of women on the board remains statistically insignificant, as it was in the ROA model. This challenges Hypothesis H1 and suggests that numerical gender representation alone is not sufficient to improve firm performance. Rather, the qualitative aspects of inclusion—such as the influence, responsibilities, and integration of female directors—may be more important determinants of performance.

Firm-level control variables also provide meaningful contrasts with the ROA model. Firm age is significantly and positively associated with ROE ($p \approx 0.0307$), as it was with ROA, confirming that older firms tend to be more stable and profitable. However, firm size, which had a significant positive effect on ROA ($p \approx 0.0159$), is not statistically significant for ROE ($p = 0.1918$). This difference could indicate that larger firms benefit from scale in terms of operational efficiency (reflected in ROA), but not necessarily in terms of generating higher returns for shareholders (ROE), perhaps due to higher equity bases or more complex capital structures.

The board size variable is also not significant in the ROE model, whereas it was positively significant in the ROA model ($p \approx 0.0038$). This discrepancy reinforces the idea that board structure may influence operational efficiency more directly than shareholder returns, potentially due to its impact on internal governance processes rather than financial leverage or equity distribution (Coles et al., 2008).

Finally, the market-to-book ratio and debt-to-equity ratio are not statistically significant in the ROE model, similar to their effects in the ROA regression, indicating limited relevance of these financial structure variables in explaining profitability in this context.

Overall, the Log ROE model partially confirms Hypothesis H2, particularly with respect to the role of female CEOs. However, Hypothesis H1 is not supported, as the percentage of women on the board has no measurable impact on ROE. These findings underline the complexity of gender dynamics in corporate governance and suggest that the presence of women on boards alone is not sufficient to drive financial performance unless it is accompanied by real influence, structural inclusivity, and equitable participation in decision-making processes.

## Table 8: OLS Estimation Results for Dependent Variable: Log_EBITDA

This table reports the results of the OLS regression where the dependent variable is the logarithm of EBITDA. All independent variables are defined in Table 1. The model includes year and industry fixed effects (based on the first two digits of the NACE code) to control for time-specific shocks and unobserved heterogeneity across sectors that could influence firm performance. Standard errors are clustered at the year level. All continuous variables have been winsorized at the 5th and 95th percentiles to mitigate the influence of outliers.

| Variable | Estimate | Std. Error | t value | Pr(> \|t\|) |
|---|---|---|---|---|
| Women CEO | 4.771849 | 1.482625 | 3.218513 | 0.018171 * |
| Education Level (CEO) | -4.009251 | 0.375518 | -10.676590 | 0.0000398 *** |
| Years as CEO | 0.070900 | 0.021902 | 3.237154 | 0.017750 * |
| Career Positions Held | 0.081840 | 0.043461 | 1.883041 | 0.10870 |
| Avg. Experience (Women/Men) | 0.003623 | 0.074279 | 0.048780 | 0.96268 |
| Years Women on Board | -0.400551 | 0.111006 | -3.608359 | 0.011253 * |
| Years Men on Board | 0.562192 | 0.120894 | 4.650287 | 0.0035027 ** |
| Avg. Age Women (Board) | -0.024536 | 0.016217 | -1.512925 | 0.18106 |
| Avg. Age Men (Board) | -0.005742 | 0.088455 | -0.064918 | 0.95035 |
| % Women on Board | 1.430512 | 2.190193 | 0.653144 | 0.53787 |
| Firm Size | -0.355713 | 0.159539 | -2.229633 | 0.067300 . |
| Firm Age | 0.064374 | 0.007726 | 8.332450 | 0.0001622 *** |
| Board Size | -0.029561 | 0.178166 | -0.165916 | 0.87367 |
| Market-to-Book Ratio | 43.343717 | 136.714473 | 0.317038 | 0.76196 |
| Debt-to-Equity Ratio | 0.897062 | 0.327825 | 2.736404 | 0.033897 * |

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

*Source: Belfirst - Author's research results, using the Rstudio and LaTex program*

Observations : 637, Fixed-Effect : Year (7), Industrie (26), Standard-errors : Clustered (Year), RMSE : 0.1148, Adjusted $R^2$ : 0.469072, Within $R^2$ : 0.203712.

The regression results from Table 8 use the logarithm of EBITDA as the dependent variable, offering critical insight into how gender diversity and executive characteristics influence firms' performance. The model shows an adjusted $R^2$ of 0.4691 and a within $R^2$ of 0.2037, indicating relatively strong explanatory power compared to other performance measures such as ROA or ROE. This suggests that the independent variables included in the model better explain variations in operational performance across and within firms over time.

One of the most striking results is the strong and statistically significant positive association between the presence of a female CEO and EBITDA performance (Estimate = 4.7718, $p < 0.05$). This reinforces Hypothesis H2 and confirms the findings from the Tobin's Q, ROA, and ROE models, but with greater magnitude and statistical confidence. It suggests that female leadership not only enhances market perception (as in Tobin's Q) and equity efficiency (ROE), but also contributes directly to operational profitability. This could be due to improved strategic oversight, stakeholder engagement, or innovation management associated with female executives (Brahma et al., 2021).

The CEO's level of education, however, has a highly significant and negative effect on EBITDA (Estimate = –4.0093, $p < 0.001$), in stark contrast to what might be expected. One plausible interpretation is that CEOs with higher academic qualifications might focus more on long-term strategic outcomes, ESG objectives, or risk-averse approaches that do not translate into short-term EBITDA gains (Bennouri et al., 2018). Alternatively, this may reflect sectoral or industry-specific dynamics in which more educated CEOs operate in lower-margin firms (Smith et al., 2006).

In terms of board tenure, we observe once again a gender-based asymmetry. The number of years women have served on the board is negatively and significantly associated with EBITDA (Estimate = –0.4006, $p < 0.05$), while male board tenure has a strong positive and significant effect (Estimate = 0.5622, $p < 0.01$). These results, consistent with previous models, highlight a recurring pattern that questions the effectiveness of gender inclusivity when female directors are not equally empowered or integrated into the strategic core of governance (McDonald et al., 2008). It reinforces the idea that tenure alone is not enough—its value is conditional on influence, roles held, and board dynamics.

Interestingly, the share of women on the board is not statistically significant ($p \approx 0.5379$), similar to the ROA and ROE results. This again challenges Hypothesis H1, suggesting that numerical representation of women does not automatically enhance performance unless supported by structural inclusion. Similarly, average age variables for both male and female directors, and average experience are not significant, indicating that these background traits do not substantially influence EBITDA.

Firm-level characteristics provide more robust signals. Firm age is positively and highly significantly associated with EBITDA (Estimate = 0.0643, $p < 0.001$), aligning with the idea that older firms benefit from experience, process efficiency, and accumulated reputation. Firm size, by contrast, has a negative effect (Estimate = –0.3557, $p \approx 0.0673$), which, although marginally significant, suggests that larger firms may face more operational inefficiencies, possibly due to bureaucratic layers or diseconomies of scale—an interpretation consistent with the findings from ROA where firm size was positively significant, but here reversed.

Debt-to-equity ratio is positively and significantly related to EBITDA (Estimate = 0.8971, $p < 0.05$), which implies that a leveraged capital structure may be used efficiently to support profitable operations. In contrast, the market-to-book ratio remains statistically insignificant, similar to other models, confirming its limited explanatory power for operating results.

Overall, this model strongly supports Hypothesis H2 regarding the value of female leadership. Hypothesis H1 is again not confirmed, with the proportion of women on the board failing to show significance. The strong positive effects of CEO tenure and firm age highlight the importance of leadership stability and organizational maturity in driving profitability. Yet the persistent negative effect of female board tenure points to deeper structural issues that may inhibit women from converting board experience into tangible firm-level gains. These results suggest that gender diversity must be accompanied by meaningful inclusion to unlock its full potential for operational performance.

Table 9: OLS Estimation Results for Dependent Variable: Log_Tobin's Q

This table reports the results of the OLS regression where the dependent variable is the logarithm of Tobin's Q, calculated as the market value of assets divided by the book value of assets. All independent variables are defined in Table 1. The model includes year and industry fixed effects (based on the first two digits of the NACE code) to control for time-specific shocks and unobserved heterogeneity across sectors that could influence firm performance. Standard errors are clustered at the year level. All continuous variables have been winsorized at the 5th and 95th percentiles to mitigate the influence of outliers.

| Variable | Estimate | Std. Error | t value | $Pr(> |t|)$ |
|---|---|---|---|---|
| Women CEO | 0.470711 | 0.072966 | 6.451096 | 0.0006572 *** |
| Education Level (CEO) | -0.006481 | 0.032288 | -0.200721 | 0.84755 |
| Years as CEO | 0.010434 | 0.004206 | 2.480983 | 0.047742 * |
| Career Positions Held | 0.016056 | 0.002961 | 5.422444 | 0.001629 ** |
| Avg. Experience (Women/Men) | 0.001722 | 0.005141 | 0.334960 | 0.74906 |
| Years Women on Board ) | -0.082656 | 0.028213 | -2.929694 | 0.026298 * |
| Years Men on Board | 0.077590 | 0.015562 | 4.985884 | 0.0024871 ** |
| Avg. Age Women on Board | 0.006566 | 0.002194 | 2.992548 | 0.024240 * |
| Avg. Age Men on Board | 0.002439 | 0.005504 | 0.443148 | 0.67319 |
| % Women on Board | 0.391114 | 0.097251 | 4.021710 | 0.0069453 ** |
| Firm Size | -0.253800 | 0.021798 | -11.643501 | 0.000024177 *** |
| Firm Age | 0.003365 | 0.000334 | 10.074624 | 0.000055515 *** |
| Board Size | -0.006781 | 0.009765 | -0.694420 | 0.51340 |
| Market-to-Book Ratio | -6.553141 | 4.785768 | -1.369298 | 0.21995 |
| Debt-to-Equity Ratio | 0.558398 | 0.023732 | 23.529151 | 0.0000003867 *** |
| Signif. codes: | 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1 | | | |

Source: Belfirst - Author's research results, using the Rstudio and LaTex program

Observations: 637, Fixed-Effects: Year (7), Industry (26), Standard Errors: Clustered (Year), RMSE: 0.694871, Adjusted $R^2$: 0.548594, Within $R^2$: 0.398325

The results presented in Table 9 display the OLS regression output using the log-transformed Tobin's Q as the dependent variable, providing key insights into how gender diversity and executive/board characteristics influence market-based firm valuation. Among all the performance models used in this study, this specification exhibits the highest explanatory power, with an adjusted $R^2$ of 0.5486 and a within $R^2$ of 0.3983. These figures suggest that the independent variables account for a significant portion of the variation in Tobin's Q, both across firms and within firms over time.

The most notable result is the strong, positive, and highly significant coefficient for the presence of a female CEO (Estimate = 0.4707, $p < 0.001$). This provides compelling support for Hypothesis H2, suggesting that appointing a woman to the CEO position is viewed favourably by investors and is associated with higher market valuation (Carter et al., 2003; Campbell and Mınguez-Vera, 2008). This effect is more pronounced than in any other performance model (ROA, ROE, or EBITDA), highlighting how gender-inclusive leadership is particularly relevant in shaping external perceptions and investor confidence.

Supporting this finding is the significance of other experience-related variables. The number of career positions held by the CEO is positively and significantly related to Tobin's Q (Estimate = 0.0161, $p < 0.01$), indicating that diverse professional experience enhances perceived firm value (Bennouri et al., 2018). Additionally, CEO tenure is significant and positively associated with Tobin's Q (Estimate = 0.0104, $p < 0.05$), suggesting that stability and accumulated experience in the leadership position is rewarded in market evaluations.

The gender composition of the board yields a more complex set of results. While the proportion of women on the board is positively significant (Estimate = 0.3911, $p < 0.01$), suggesting that greater gender diversity is positively associated with market value—thus supporting Hypothesis H1—the actual tenure of female board members shows a significant negative association (Estimate = –0.0827, $p < 0.05$). In contrast, male board tenure continues to show a positive and significant effect (Estimate = 0.0776, $p < 0.01$).

These asymmetric results mirror those observed in the other models (particularly ROA and EBITDA), reinforcing the interpretation that while gender diversity is valuable in representation, structural barriers may prevent female directors from exerting equivalent influence as their male counterparts. It suggests that investors value diversity, but that long-standing female board members may not be perceived to contribute as positively as male directors unless accompanied by genuine inclusion in decision-making processes.

Interestingly, the average age of women on the board also has a statistically significant positive effect (Estimate = 0.0066, $p < 0.05$), supporting Hypothesis H4. This suggests that age—as a proxy for experience and maturity—may be especially valued in female directors, counterbalancing some of the negative perceptions associated with tenure. The same is not observed for male board age, which is not statistically significant.

Control variables offer additional clarity. Firm size is strongly and negatively associated with Tobin's Q (Estimate = –0.2538, $p < 0.001$), a consistent result across all models. This inverse relationship may reflect the tendency of larger firms to face lower growth prospects or higher complexity, which can weigh on their market valuation. Conversely, firm age is positively and significantly associated with Tobin's Q (Estimate = 0.0034, $p < 0.001$), suggesting that established firms are viewed as more stable or reputable by investors. The debt-to-equity ratio is also strongly and positively related to Tobin's Q (Estimate = 0.5584, $p < 0.001$), indicating that financial leverage may enhance firm value, potentially by signaling growth opportunities or efficient capital structure management.

Notably, the market-to-book ratio does not have a significant effect on Tobin's Q ($p \approx 0.2199$), a finding consistent with the ROA, ROE, and EBITDA models. This suggests that the metric does not add explanatory value when market-based firm value is already the dependent variable. Similarly, board size is not statistically significant, indicating that the number of directors alone does not affect how firms are valued in the market.

In conclusion, this regression provides strong evidence in support of Hypotheses H1, H2, and H4. The presence of a female CEO and a higher proportion of women on the board are both associated with improved market valuation, though these benefits are tempered by the negative perception associated with longer female board tenure. This reinforces the importance of not only promoting female representation but also ensuring that women are effectively empowered in governance roles. Investors appear to value both diversity and executive experience, particularly in leadership, signalling a shift toward more inclusive and performance-aligned governance standards.

## 8. Main results

### 8.1 Hypothesis H1: The presence of at least one woman on the board of directors is associated with an improvement in the company's performance.

The evaluation of Hypothesis H1 relied on two key variables: the binary indicator for the presence of at least one woman on the board and the percentage of women among board members (% Women on Board). According to the results presented across the four regression models, neither the presence nor the proportion of women on the board showed a statistically significant effect on accounting-based measures of firm performance, namely log_ROA, log_ROE, and log_EBITDA. However, in the model using log-transformed Tobin's Q—a forward-looking market valuation metric—the percentage of women on the board was positively and significantly associated with performance ($p < 0.01$), and the presence of a female CEO had an even stronger effect ($p < 0.001$) (Cashman et al., 2012).

These results indicate that while board gender diversity may not yet translate into improved internal financial efficiency or profitability, it is positively recognized by external stakeholders and investors. This supports the idea that female board participation serves as a governance signal, potentially enhancing the firm's reputation, transparency, and long-term strategic vision. Nonetheless, because the effect is significant only for Tobin's Q and not for operational or profitability metrics, Hypothesis H1 receives only partial empirical support.

### 8.2 Hypothesis H2: Women holding executive positions have a positive impact on the company's performance post-appointment.

To assess Hypothesis H2, the presence of a female CEO was introduced through the variable *Women CEO*. The results show that this variable is consistently positive across all four performance models. It is statistically significant for Tobin's Q ($p < 0.001$) and EBITDA ($p < 0.05$), and marginally significant for ROA and ROE ($p \approx 0.05$). The particularly strong result in the Tobin's Q model underscores the market's favourable perception of female executive leadership, while the significant effect in the EBITDA model highlights a tangible impact on operational profitability.

These findings suggest that female executives, particularly in top leadership roles, can positively influence both internal performance and external market valuation. While the significance is somewhat weaker for traditional accounting metrics (ROA, ROE), the results nonetheless show a consistent positive direction. Therefore, Hypothesis H2 is supported, with robust evidence for both operational and market-based performance (Bennouri et al., 2018).

### 8.3 Hypothesis H3: The company's performance post-appointment is positively related to the education level of female board members.

Education was included as an ordinal variable for the CEO's education level, but no statistically significant relationship was found with any of the four performance measures. This suggests that the level of formal education of female board members or executives does not directly translate into improved firm performance in this sample.

While the literature supports the theoretical link between higher education and enhanced decision-making capacity (Dang et al., 2014), the lack of significance may stem from limited variation in the education variable, or from the fact that formal qualifications alone are insufficient to drive performance without practical experience and influence. Therefore, Hypothesis H3 is not supported by the empirical results.

### 8.4 Hypothesis H4: The company's performance post-appointment is positively related to the age of female board members.

To evaluate Hypothesis H4, the average age of female board members was included as a predictor. The results show mixed and mostly non-significant outcomes. The variable had a weakly positive and significant association in the Tobin's Q model ($p < 0.05$), suggesting some investor preference for experience and maturity in female board members (White et al., 2014). However, in the ROA and EBITDA models, the variable had a negative or non-significant coefficient, and was entirely insignificant in the ROE model.

These inconsistent results indicate that age, as a standalone indicator, does not robustly predict improved firm performance. It is possible that older female directors face limitations in influence or integration, or that age fails to capture other more relevant aspects of expertise or strategic contribution. Therefore, Hypothesis H4 is not supported in a consistent or generalizable manner.

## 9. Robustness test

To ensure the robustness and reliability of the results obtained from the statistical analyses, it is essential to conduct robustness tests. These tests are crucial for assessing the relevance and generalizability of the empirical findings, while also reinforcing their scientific validity. In this thesis, several robustness checks were performed by comparing the results of OLS regression models with and without fixed effects (year and industry), as presented in Tables 10 to 13.

< Insert Tables 10 to 13 here. >

The results from this analysis show strong stability in key coefficients, particularly regarding the effect of having a female CEO on firm performance. This variable remains positive and statistically significant across all models—whether ROE, ROA, EBITDA, or Tobin's Q—although the level of significance varies slightly depending on the specification. This confirms the robustness of the association between female leadership and firm performance, especially in relation to market valuation (Tobin's Q) and operational performance (EBITDA).

Regarding executive characteristics, CEO tenure is generally significant in the models without fixed effects but loses importance once fixed effects are included. Conversely, the number of prior executive positions becomes significant in some fixed-effects models, suggesting that this variable is sensitive to unobserved factors specific to firms or years.

A notable gender asymmetry emerges in the effect of board tenure: the number of years male board members have served is consistently positively associated with performance (significant and positive), while female board tenure is often non-significant or even negative. This finding suggests that women's experience on boards may be less valued or that it translates differently into financial outcomes.

Control variables confirm several well-established patterns. Firm age is positively and significantly associated with all performance metrics, indicating that organizational maturity plays a favourable role. Firm size, however, has a more mixed effect: it is positively associated with ROE and ROA, but negatively with EBITDA and Tobin's Q, which may reflect complexity costs or a less favourable market perception of large firms.

With regard to financial structure, the debt-to-equity ratio is positively and significantly associated with performance in several models, suggesting that higher financial leverage may signal confidence or strategic ambition to investors. The market-to-book ratio, by contrast, is not statistically significant in any of the tested models.

Finally, the inclusion of fixed effects consistently improves model quality, as evidenced by the noticeable increase in adjusted $R^2$ and the reduction in RMSE across all cases. This demonstrates the importance of controlling for firm- and industry-specific effects to avoid omitted variable bias.
In conclusion, the robustness checks confirm the stability of several key relationships identified in the main analysis. The positive impact of female CEO presence, the gender-based asymmetry in the effect of board experience, and the influence of structural firm characteristics such as age and financial leverage remain significant across most specifications. These findings enhance the credibility of the thesis conclusions and underscore the importance of employing a rigorous econometric framework in the analysis of corporate governance.

## 10. Discussion

Building on the empirical results presented in the previous section, this part of the thesis discusses the impact of gender diversity in corporate governance on the performance of publicly listed companies in Belgium. The main objective was to determine to what extent gender-related characteristics—both at the board level and in executive leadership—significantly influence firm performance.

The results do not fully confirm Hypothesis 1, which posited that the presence of at least one woman on the board of directors would improve firm performance. Neither the presence nor the proportion of female board members shows a statistically significant effect on accounting-based performance measures (log_ROA, log_ROE, log_EBITDA). However, the proportion of women on the board is positively and significantly associated with Tobin's Q, a market-based indicator of firm performance. This suggests that gender diversity may positively influence investor perception, even if it does not translate directly into immediate financial results. These findings are consistent with the literature (Adams & Ferreira, 2009; Terjesen et al., 2016), which has shown that gender-diverse boards are often viewed as more modern and better governed. Therefore, Hypothesis 1 is only partially supported.

In contrast, the regression results provide clear support for Hypothesis 2, which suggests that women holding executive positions, particularly that of CEO, have a positive impact on firm performance. The variable capturing the presence of a female CEO (*Women_ceo*) is statistically significant and positive in models using Tobin's Q and EBITDA, and marginally significant for ROA and ROE. This indicates that female executive leadership is associated with higher market valuation and improved operational outcomes. These results confirm existing literature (Green & Homroy, 2018; Edacherian et al., 2024), which emphasizes the unique strategic and managerial contributions women bring to top executive roles. Hypothesis 2 is therefore supported.

On the other hand, Hypothesis 3, which states that a higher education level among female board members is positively associated with firm performance, is not supported. The CEO's level of education, used as a proxy variable, has no statistically significant effect on any of the performance indicators. In fact, in the EBITDA model, the effect is significantly negative. This may suggest that although academic qualifications are important, they are not sufficient on their own to generate firm value. Practical experience, network strength, and actual influence within the boardroom may be more decisive factors (Ouni et al., 2020).

Similarly, Hypothesis 4, which proposed a positive relationship between the average age of female board members and firm performance, is not supported. The average age of female directors shows only a marginally significant and positive effect in the Tobin's Q model, while the effect is negative or non-significant in the other models. This challenges some theoretical expectations (Simionescu et al., 2021) and may be explained by the fact that age is not always a reliable indicator of influence or decision-making power within the board. Older female directors may be less integrated into key decision-making circles or may face structural barriers (Nekhili & Gatfaoui, 2013).

Overall, the results highlight the importance of moving beyond simple gender representation to consider the real roles, strategic inclusion, and influence capacity of women in corporate governance. Gender diversity appears to send positive signals to financial markets, particularly through executive leadership, but its effects on internal financial performance remain more nuanced and complex (Miller & Triana, 2009). Furthermore, the asymmetry observed between board tenure for men and women, with tenure having a consistently positive impact for male board members but negative or neutral for female members, raises questions about how women's skills and contributions are valued in decision-making bodies (Hillman et al., 2011).

By focusing on a national sample of Belgian listed firms, this study contributes to a literature that remains largely dominated by Anglo-American perspectives. The Belgian context, characterized by evolving governance standards and growing awareness of diversity issues, offers a relevant field of analysis.

## 10.1  Limits and extensions

To conclude this discussion section, it is essential to highlight the limitations of this research as well as potential avenues for further investigation.

Several methodological constraints and data-related limitations were encountered during the analysis. The main obstacle to a comprehensive assessment of the effects of gender diversity on firm performance lies in the limited availability of historical and qualitative data—particularly concerning the detailed professional trajectories of executives or the internal dynamics of boards (e.g., past composition, overlapping mandates, effective participation time, etc.). The absence of such information restricted the inclusion of additional control variables in the regression models, which could have enhanced the precision of causal identification.

Moreover, multiple complementary research avenues would be worth exploring in future studies. For instance, it would be relevant to conduct a more granular analysis of the combined effect of gender diversity and other governance practices, such as the separation of the CEO and board chair roles, or the presence of specialized committees chaired by women. Similarly, a comparative analysis between companies that have implemented voluntary quotas and those subject to stricter legal requirements could help distinguish the effects of voluntary versus mandated diversity commitments.

Another promising direction would be to investigate the indirect effects of gender diversity—for example, its influence on employee turnover or organizational resilience during periods of crisis. Additionally, particular attention could be paid to the social and distributive dimensions of inclusive governance policies. Future research could explore whether highly diverse companies also contribute to reducing internal inequalities, such as narrowing gender pay gaps or facilitating access to other strategic roles for women beyond board membership.

Indeed, it would be highly relevant to assess the relationship between gender diversity and firm performance specifically within strategic and audit committees, in order to evaluate the broader impact of diversity across all governance bodies. Unfortunately, this hypothesis could not be tested in the present study due to the limited number of firms in our sample that had established such committees.

In summary, although this study provides robust insights into the relationship between gender diversity and firm performance, it represents only one step in an evolving field of research. A broader, multi-method and multi-level approach will be essential to fully capture the complexity of inclusive governance and its influence on organizational outcomes.

## 11. Conclusion

This study investigates the impact of gender diversity on the performance of large and very large publicly listed companies in Belgium. Based on a panel dataset spanning from 2017 to 2023 and including 637 firm-year observations, the research evaluates how board and executive-level gender variables influence various dimensions of firm performance—specifically, Return on Assets (ROA), Return on Equity (ROE), EBITDA, and Tobin's Q.

The results reveal a complex and nuanced relationship between gender diversity and firm performance, which appears to be significantly mediated by firm-specific characteristics such as size, age, and financial structure. Notably, the proportion of women on the board does not have a statistically significant effect on accounting-based performance measures such as ROA, ROE, or EBITDA. However, a positive and statistically significant association is observed between gender diversity—measured as the percentage of women on the board—and Tobin's Q, suggesting that the market positively values gender-inclusive governance. These findings are in line with prior research (Adams & Ferreira, 2009; Terjesen et al., 2016), which argues that diverse boards signal good governance, transparency, and progressive values to investors. Accordingly, while gender diversity may not produce immediate effects on internal operational performance, it may enhance firm valuation through improved investor perception.

Furthermore, the presence of a female CEO emerges as a strong and consistent predictor of improved performance, particularly in the Tobin's Q and EBITDA models. The variable is also marginally significant in the ROA and ROE regressions, suggesting that women in top executive roles may contribute more directly to strategic direction and operational effectiveness. This finding supports the notion that female leadership adds value beyond symbolic representation and aligns with the literature (Green & Homroy, 2018; Edacherian et al., 2024) that highlights the strategic competencies and managerial influence of women executives.

However, other gender-related indicators such as CEO education level and the average age of female board members show limited or even negative associations with firm performance. The educational attainment of CEOs, included as a proxy for intellectual capital, does not significantly influence performance in any of the four models. In the EBITDA regression, the coefficient is significantly negative, possibly indicating that formal qualifications alone do not translate into better financial outcomes without practical experience or contextual influence (Ouni et al., 2020). Similarly, the age of female board members does not demonstrate consistent positive effects and is even negatively associated with performance in several models. These results suggest that age, often interpreted as a proxy for experience, may also correlate with limitations in adaptability or integration into board dynamics (Nekhili & Gatfaoui, 2013; Simionescu et al., 2021).

More broadly, the asymmetric effects of board tenure by gender—positive for men and negative or insignificant for women—raise important concerns about structural biases and role marginalization. While tenure generally reflects experience and institutional knowledge, it appears to benefit male board members more than their female counterparts, perhaps due to differences in internal influence, network access, or perceived authority (Hillman et al., 2011).

Finally, this research contributes to the literature by focusing specifically on the Belgian context, an underexplored setting in gender diversity studies, which is often dominated by Anglo-American samples. Belgium provides a compelling case study due to its evolving regulatory landscape and growing emphasis on ESG and diversity criteria in governance.

## 12. Annexes

**Figure 1 – Diagram of the sampling method and exclusion criteria**

Figure 1 illustrates the sampling method and the criteria for exclusions. The hypothesis testing sample includes listed companies based in Belgium. The final sample comprises 91 entities, resulting in a database of 637 firm-year observations covering the period from 2017 to 2023.
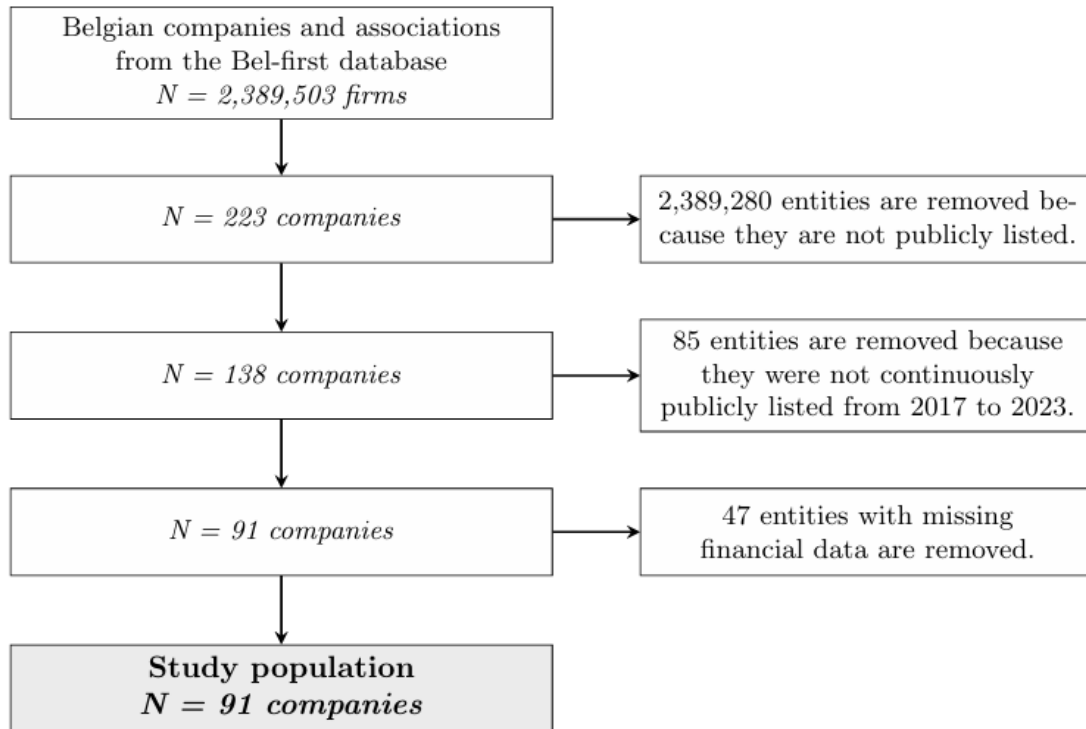


*Source: Belfirst - Author's research results, using the LaTex program*

Figure 2

The histogram illustrates the distribution of the residuals from the log(ROA) regression model, overlaid with a normal distribution curve. This visual analysis is intended to assess the normality assumption of the residuals—a key condition for the validity of ordinary least squares (OLS) regression.
The presence of the bell-shaped normal curve enhances the confidence in the linear regression model's validity and reliability.
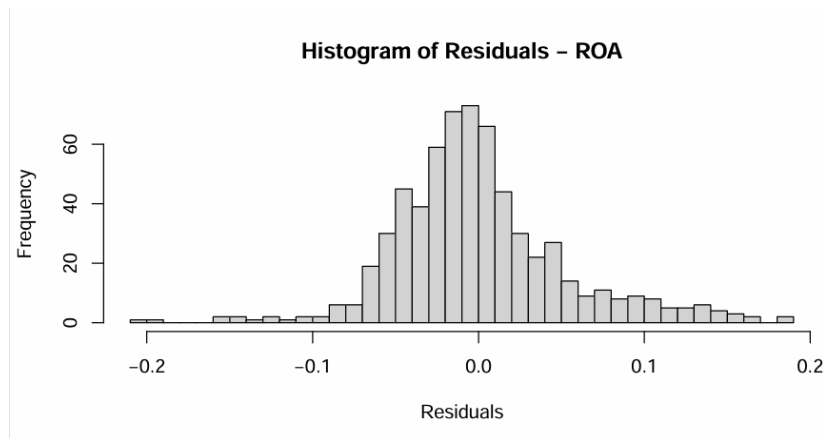

Histogram of Residuals – ROA

Figure 3

The histogram illustrates the distribution of the residuals from the log(ROE) regression model, overlaid with a normal distribution curve. This visual analysis is intended to assess the normality assumption of the residuals—a key condition for the validity of ordinary least squares (OLS) regression.
The presence of the bell-shaped normal curve enhances the confidence in the linear regression model's validity and reliability.
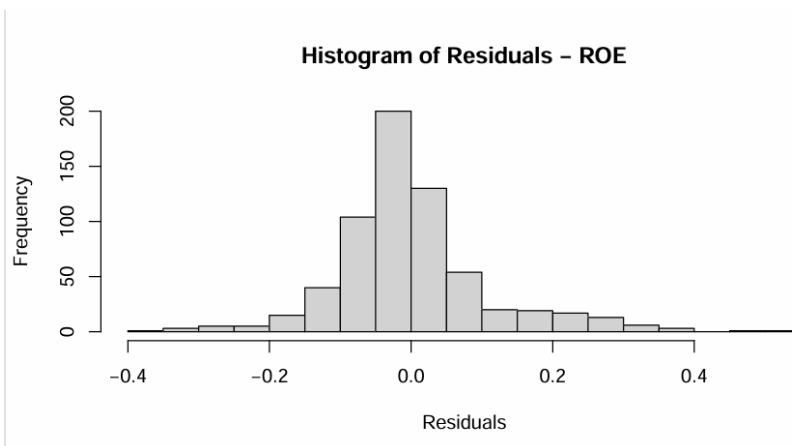

Histogram of Residuals – ROE

Figure 4

The histogram illustrates the distribution of the residuals from the log(Tobin's Q) regression model, overlaid with a normal distribution curve. This visual analysis is intended to assess the normality assumption of the residuals—a key condition for the validity of ordinary least squares (OLS) regression. The presence of the bell-shaped normal curve enhances the confidence in the linear regression model's validity and reliability.
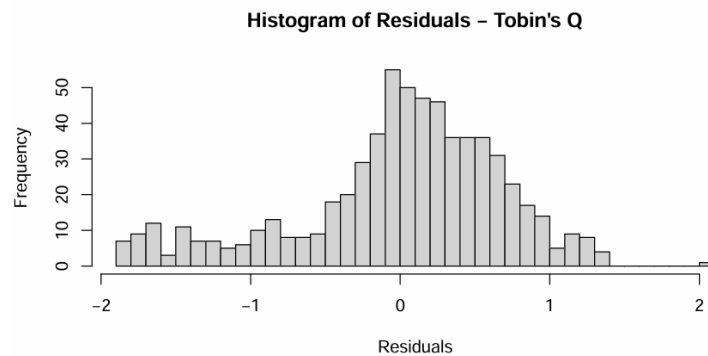


Histogram of Residuals – Tobin's Q

Figure 5

The histogram illustrates the distribution of the residuals from the log(Ebitda) regression model, overlaid with a normal distribution curve. This visual analysis is intended to assess the normality assumption of the residuals—a key condition for the validity of ordinary least squares (OLS) regression. The presence of the bell-shaped normal curve enhances the confidence in the linear regression model's validity and reliability.
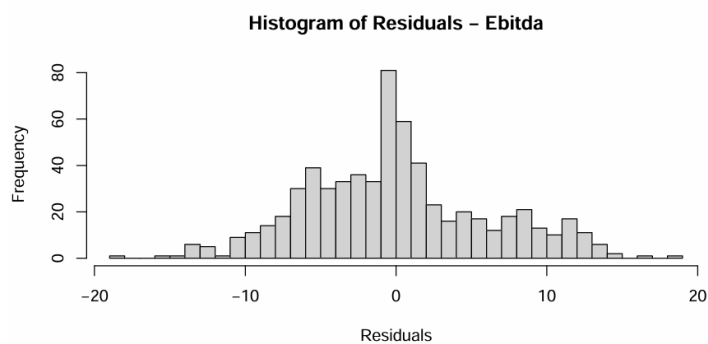


Histogram of Residuals – Ebitda

Table 10: Robustness Check - Dependent Variable: log_ROE

This table reports the results of a robustness check where the OLS regression is re-estimated without including year and industry fixed effects. This specification allows us to assess whether the observed relationships between the independent variables and firm performance are robust to the exclusion of time- and sector-specific unobserved heterogeneity. All variables are defined in Table 1, and standard errors are clustered at the year level. All continuous variables have been winsorized at the 5th and 95th percentiles to reduce the influence of outliers.

| Variables | (1) OLS w/o FE | (2) OLS w/ FE |
|---|---|---|
| Women CEO | 0.0459 (0.0203)** | 0.0637 (0.0267)* |
| Education Level (CEO) | -0.0618 (0.0126)*** | -0.0118 (0.0119) |
| Years as CEO | -0.0014 (0.0008) * | -0.00002 (0.0009) |
| Career Positions Held | 0.0003 (0.0012) | -0.0022 (0.0011)* |
| Avg. Exp. Women/Men | -0.0036 (0.0015) ** | 0.0002 (0.0015) |
| Years Women on Board | -0.0003 (0.0037) | -0.0053 (0.0026)* |
| Years Men on Board | 0.0071 (0.0032)** | 0.0097 (0.0036)** |
| Avg. Year Women | -0.0001 (0.0004) | -0.0001 (0.0004) |
| Avg. Year Men | 0.00096 (0.0016) | 0.0007 (0.0005) |
| Pct Women on Board | 0.0274 (0.0342) | -0.0266 (0.0285) |
| Firm Size | 0.0076 (0.0066) | 0.0173 (0.0117) |
| Firm Age | 0.0010 (0.0002) *** | 0.0006 (0.0002) ** |
| Board Size | 0.0022 (0.0038) | 0.0009 (0.0021) |
| Market-to-Book | -2.0471 (1.8894) | 1.1281 (2.4899) |
| Debt-to-Equity Ratio | 0.0245 (0.0055) *** | 0.0154 (0.0085) |
| Fixed Effects | None | Year, Industry |
| Observations | 637 | 637 |
| Adjusted $R^2$ | 0.1641 | 0.3458 |
| RMSE | 0.1245 | 0.1073 |
| Signif. codes | $^*p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$ | |

## Table 11: Robustness Check - Dependent Variable: log_ROA

This table reports the results of a robustness check where the OLS regression is re-estimated without including year and industry fixed effects. This specification allows us to assess whether the observed relationships between the independent variables and firm performance are robust to the exclusion of time- and sector-specific unobserved heterogeneity. All variables are defined in Table 1, and standard errors are clustered at the year level. All continuous variables have been winsorized at the 5th and 95th percentiles to reduce the influence of outliers.

| Variable | (1) OLS w/o FE | (2) OLS w/ FE |
|---|---|---|
| Women CEO | 0.0129 (0.0108) | 0.0210 (0.0095)$^{\dagger}$ |
| Education Level (CEO) | -0.0421 (0.0067)*** | -0.0093 (0.0063) |
| Years as CEO | -0.0011 (0.0004)** | -0.0006 (0.0003)$^{\dagger}$ |
| Career Positions Held | 0.0007 (0.0007) | -0.0005 (0.0003) |
| Avg. Exp. Women/Men | -0.0019 (0.0008)* | 0.0001 (0.0006) |
| Years Women on Board | 0.0013 (0.0020) | -0.0021 (0.0015) |
| Years Men on Board | 0.0035 (0.0017)* | 0.0060 (0.0021)* |
| Avg. Age Women | -0.0002 (0.0002) | -0.0002 (0.0002) |
| Avg. Age Men | -0.0007 (0.0009) | -0.0009 (0.0005) |
| Pct Women on Board | 0.0415 (0.0183)* | 0.0072 (0.0048) |
| Firm Size | 0.0078 (0.0035)* | 0.0157 (0.0047)* |
| Firm Age | 0.0006 (0.0001)*** | 0.0004 (0.0001)** |
| Board Size | 0.0031 (0.0019) | 0.0022 (0.0009)* |
| Market to Book | 0.2704 (1.1078) | 2.4606 (1.6343) |
| Debt to Equity | 0.0013 (0.0027) | -0.0004 (0.0024) |
| Fixed Effects | None | Year, Industry |
| Observations | 637 | 637 |
| Adjusted R$^2$ | 0.2011 | 0.4843 |
| RMSE | 0.0667 | 0.0521 |
| Signif. codes | ***$p < 0.001$, **$p < 0.01$, | *$p < 0.05$, $^{\dagger}p < 0.1$ |

Source: Belfirst - Author's research results, using the Rstudio and LaTex program

Notes: Robust standard errors in parentheses.

Table 12: Robustness Check - Dependent Variable: log_TOBIN's Q

This table reports the results of a robustness check where the OLS regression is re-estimated without including year and industry fixed effects. This specification allows us to assess whether the observed relationships between the independent variables and firm performance are robust to the exclusion of time- and sector-specific unobserved heterogeneity. All variables are defined in Table 1, and standard errors are clustered at the year level. All continuous variables have been winsorized at the 5th and 95th percentiles to reduce the influence of outliers.

| Variables | (1) OLS w/ FE | (2) OLS w/o FE |
|---|---|---|
| Women CEO | 0.4707 (0.0730) *** | 0.6008 (0.1236)*** |
| Education Level (CEO) | -0.0065 (0.0323) | 0.0838 (0.0767) |
| Years as CEO | 0.0104 (0.0042) * | 0.0070 (0.0047) |
| Career Positions Held | 0.0161 (0.0030) ** | 0.0140 (0.0075) · |
| Avg Experience Women/Men | 0.0017 (0.0051) | 0.0073 (0.0091) |
| Years Women on Board | -0.0827 (0.0282) * | -0.1083 (0.0225) *** |
| Years Men on Board | 0.0776 (0.0156)** | 0.0722 (0.0196)*** |
| Avg Year Women | 0.0066 (0.0022)* | 0.0077 (0.0021)*** |
| Avg Year Men | 0.0024 (0.0055) | 0.0135 (0.0099) |
| Pct Women on Board | 0.3911 (0.0975) ** | 0.0525 (0.2091) |
| Firm Size | -0.2538 (0.0218) *** | -0.2149 (0.0400)*** |
| Firm Age | 0.0034 (0.0003) *** | 0.0021 (0.0010) * |
| Board Size | -0.0068 (0.0098) | -0.0131 (0.0212) |
| Market-to-Book | -6.5531 (4.7858) | -10.3664 (11.5272) |
| Debt-to-Equity | 0.5584 (0.0237)*** | 0.6119 (0.0306)*** |
| Fixed Effects | Year, Industry | None |
| Observations | 637 | 637 |
| Adjusted $R^2$ | 0.5486 | 0.4882 |
| RMSE | 0.695 | 0.759 |
| Signif. codes | $^*p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$ | |

Source: Belfirst - Author's research results, using the Rstudio and LaTex program

Notes: Robust standard errors in parentheses.

Table 13: Robustness Check – OLS Estimations for Dependent Variable: *log_EBITDA*

This table reports the results of a robustness check where the OLS regression is re-estimated without including year and industry fixed effects. This specification allows us to assess whether the observed relationships between the independent variables and firm performance are robust to the exclusion of time- and sector-specific unobserved heterogeneity. All variables are defined in Table 1, and standard errors are clustered at the year level. All continuous variables have been winsorized at the 5th and 95th percentiles to reduce the influence of outliers.

| Variable | (1) OLS w/ FE | (2) OLS w/o FE |
|---|---|---|
| Women CEO | 4.7718* (1.4826) | 9.3471*** (1.1887) |
| Education Level (CEO) | -4.0093*** (0.3755) | -3.5578*** (0.7375) |
| Years as CEO | 0.0709* (0.0219) | -0.0189 (0.0451) |
| Career Positions Held | 0.0818 (0.0435) | 0.1850** (0.0719) |
| Avg Experience Women/Men | 0.0036 (0.0743) | -0.1888** (0.0871) |
| Years Women on Board | -0.4006** (0.1111) | -0.3931*** (0.0843) |
| Years Men on Board | 0.5622*** (0.1209) | 0.9382*** (0.1067) |
| Avg Year Women | -0.0245 (0.0162) | 0.0279 (0.0198) |
| Avg Year Men | -0.0057 (0.0885) | 0.1856 (0.0954) |
| Pct Women on Board | 1.4305 (1.1910) | 2.6349 (2.0116) |
| Firm Size | -0.3557* (0.1595) | -0.9809** (0.3885) |
| Firm Age | 0.0644*** (0.0176) | 0.0676*** (0.0087) |
| Board Size | -0.0296 (0.1782) | -0.0380 (0.0303) |
| Market-to-Book | 43.3438 (136.7144) | -25.2066 (110.7903) |
| Debt-to-Equity | 0.8971* (0.3278) | 5.8376*** (0.2947) |
| Fixed Effects | Year, Industry | None |
| Observations | 637 | 637 |
| Adjusted $R^2$ | 0.4691 | 0.2660 |
| RMSE | 0.1148 | 7.3011 |
| Signif. codes | ***p<0.01, **p<0.05, *p<0.1, ˙p<0.15. | |

*Source: Belfirst - Author's research results, using the Rstudio and LaTex program*

*Notes: Standard errors in parentheses.*

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# EXECUTIVE SUMMARY

In a world where the role of women in leadership continues to be questioned and redefined, this thesis investigates the impact of gender diversity policies—particularly boardroom quotas—on the financial performance of publicly listed companies. The focus is not only on the representation of women within boards of directors, but also on the influence of female leadership at the executive level, especially in the role of CEO.

Using an Ordinary Least Squares (OLS) regression model, the study examines four key performance indicators: Return on Assets (ROA), Return on Equity (ROE), EBITDA, and Tobin's Q. Gender diversity is measured through both the proportion of women on corporate boards and the presence of a female CEO.

The results show that the presence of a female CEO emerges as a strong and consistent predictor of improved firm performance, particularly in the Tobin's Q and EBITDA models. The effect is also marginally significant in the ROA and ROE regressions, suggesting that women in top executive roles contribute meaningfully to strategic decision-making and operational efficiency. These findings reinforce the idea that female leadership brings added value beyond symbolic representation, highlighting the strategic capabilities and managerial impact of women executives.

In conclusion, this research underscores that promoting gender diversity—especially in top executive roles—can lead to tangible financial benefits. Rather than being merely a regulatory or ethical consideration, gender-inclusive leadership proves to be a strategic asset, aligning social progress with economic performance.

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