The Impact of Board Gender Diversity on Firms' Performance, Employment, Productivity, and Financing Mix

By

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Declaration of authenticity

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Signed: *Huda Moh'd Amin*

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Abstract

Gender diversity in corporate leadership has emerged as a central concern in corporate governance research, policy discourse, and business practice. As firms face increasing pressure from stakeholders to improve boardroom inclusivity, regulators worldwide have adopted various measures—from binding quotas to voluntary guidelines—to promote female representation on boards. While significant scholarly attention has focused on the effectiveness of mandatory quotas, relatively less is known about the impact of non-binding, voluntary approaches on board composition and broader corporate outcomes. This thesis addresses this gap by investigating the organisational effects of voluntary gender diversity policies within the UK context, where the 2011 Davies Report introduced a soft-law framework encouraging firms to improve board gender balance without imposing legislative mandates.

The UK's adoption of a non-binding regulatory approach—exemplified by the 2011 Davies Report—offers a distinctive context to assess whether soft-law mechanisms can effect meaningful change in board composition and corporate outcomes. The study is guided by two core research questions: first, whether voluntary targets have successfully increased female representation on corporate boards; and second, whether board gender diversity influences key aspects of firm performance, including financial outcomes, employment practices, and capital structure. Drawing on a panel dataset of non-financial firms listed on the London Stock Exchange between 2001 and 2020, the analysis employs fixed effects and two-step system GMM estimators to address endogeneity concerns and identify causal relationships. The thesis presents three distinct yet interrelated empirical chapters, each focusing on one of the core outcome areas, thereby providing a comprehensive and multi-dimensional assessment of board gender diversity in the UK context.

The first empirical chapter (Chapter 2) examines two interrelated questions: whether the Davies Report's voluntary guidelines led to a significant increase in female board representation, and whether this change influenced firm-level financial performance. The findings suggest a generally negative association between female board representation and firm performance metrics such as ROA and Tobin's Q, particularly in larger firms and capital-intensive industries. These results imply that while voluntary policies may increase numerical representation, integrating female directors into strategic decision-making may not yield immediate financial gains.

The second empirical chapter (Chapter 3) investigates the influence of board gender diversity on employment practices and productivity. The results indicate a significant positive relationship between female board representation and employment inclusivity, employee retention, and productivity, especially in service-oriented and labour-intensive sectors. These effects were amplified after the introduction of the Davies Report, suggesting that gender-diverse boards contribute to more supportive and effective internal governance practices. The chapter highlights the importance of female directors in shaping inclusive workplace policies and enhancing organisational efficiency.

The third empirical chapter (Chapter 4) examines the effect of gender diversity on capital structure decisions, focusing on firm leverage. The analysis reveals that gender-diverse boards are associated with higher leverage levels in the post-Davies Report period, particularly in capital-intensive industries. These findings challenge the assumption that female directors are inherently more risk-averse and suggest that women may support strategic debt financing when aligned with long-term investment objectives. The chapter also finds little to no association between gender diversity and leverage in high-risk sectors, indicating context-sensitive financial behaviour.

Collectively, the findings contribute to the literature in several ways. First, the thesis offers rare longitudinal evidence on the impact of voluntary governance policies, demonstrating that such frameworks, coupled with transparency and stakeholder pressure, can lead to sustained improvements in board composition. Second, it provides multi-dimensional empirical evidence linking board gender diversity to various corporate outcomes, extending the scope beyond financial performance to include employment practices and capital strategy. Third, the study applies robust econometric techniques to account for industry-specific and firm-level variation, enhancing the reliability of causal inference. Finally, the research offers practical and policy-relevant insights, reinforcing the strategic value of gender diversity and supporting voluntary regulation as a viable alternative to binding quotas.

Overall, the thesis concludes that while voluntary diversity initiatives like the Davies Report have successfully increased female board representation, their effectiveness in driving broader organisational change depends on the presence of inclusive governance practices, industry characteristics, and sustained institutional support. These findings inform ongoing debates around gender diversity policy design, providing a foundation for evidence-based governance reform in the UK and internationally.

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Chapter 1: Introduction

1.1 Introduction and Background

Gender diversity in corporate boards traces its roots to the civil rights movements of the 1960s and 1970s, which championed equal opportunities in education, politics, and employment. While these movements established the groundwork for inclusive practices, meaningful female representation on corporate boards remained minimal throughout the 20th century (Terjesen, 2009). The early 2000s marked significant progress in board gender diversity. The European Commission led policy initiatives to increase female boardroom participation, aligning with the United Nations' Sustainable Development Goals, precisely Goal 5 on gender equality. These frameworks provided benchmarks for corporate governance reforms (Seierstad et al., 2017).

Nations adopted distinct approaches to advancing board gender diversity. Norway pioneered mandatory quotas in 2003, requiring 40% female representation on public company boards. This model influenced other European nations, like Spain and France, to implement similar measures. While these quotas increased female representation, they raised questions about tokenism and board quality (Ahern and Dittmar, 2012). The UK chose a different path, implementing voluntary targets through the Davies Report 2011[1], which aimed for 25% female representation on FTSE 100 boards by 2015. This approach allowed firms to develop customised diversity strategies, though critics noted slower progress than quota systems (Davies Review, 2011).

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[1] The *Davies Report*, formally titled *Women on Boards*, was commissioned in August 2010 by the UK government's Department for Business, Innovation and Skills (BIS). The initiative reflected growing political and business concern over the low representation of women on corporate boards. Lord Mervyn Davies of Abersoch, a former chairman of Standard Chartered Bank and Minister of State for Trade, Investment and Small Business, was appointed to lead the review. The steering committee included a range of senior business leaders and experts, although the report itself was largely authored under Lord Davies's chairmanship. After extensive consultations with businesses, investors, and organisations promoting gender equality, the final report was published and submitted to the UK Government in February 2011. The *Davies Report* recommended that FTSE 100 companies aim for a minimum of 25% female board representation by 2015 and encouraged companies to voluntarily set their own targets, relying on a "comply or explain" approach rather than mandatory quotas (Davies Review, 2011).

Australia similarly adopted voluntary measures, focusing on gender diversity disclosures rather than mandated quotas (Sealy, 2019). Corporate recognition of diversity's strategic value has grown alongside regulatory changes. Research demonstrates that gender-diverse boards enhance decision-making and stakeholder relations (Adams and Ferreira, 2009). Companies increasingly pursue gender diversity as part of their governance strategy, responding to business benefits and societal expectations (Bear, 2010).

Private sector initiatives, such as the 30% Club launched in the UK in 2010, promote business-led solutions to gender imbalance. This campaign advocates for voluntary approaches to achieve at least 30% of women on corporate boards, positioning gender diversity as a business advantage rather than just a social imperative (Seierstad et al., 2017). Challenges persist despite these advances. Women remain underrepresented in senior management and board roles, particularly in the technology, finance, and energy sectors. Structural barriers and inadequate pipeline development limit women's advancement to leadership positions (Klettner et al., 2016). While quotas and targets have increased numerical representation, achieving meaningful participation, where women exercise equal influence in decision-making, remains elusive (Joecks et al., 2013).

 The evolution of board gender diversity reflects changing societal attitudes toward leadership roles. Quota systems effectively increase female representation, while voluntary approaches foster sustainable cultural change. Ongoing dialogue between policymakers, businesses, and researchers continues to shape future diversity initiatives to create inclusive leadership structures that enhance organisational outcomes (Post and Byron, 2015).

The representation of women on corporate boards has become a prominent issue in corporate governance research and policy discourse, reflecting both normative concerns for gender equity and strategic imperatives for organisational performance. Theoretical frameworks, particularly resource dependency theory, institutional theory, and stakeholder theory, suggest that gender-diverse boards provide firms with a broader range of cognitive resources, improved oversight capabilities, and enhanced legitimacy

(Hillman *et al.*, 2007; Terjesen *et al.*, 2009). Female directors are often associated with diligence, ethical sensitivity, and a collaborative leadership style, contributing to effective board functioning (Eagly and Carli, 2007). Their presence can disrupt homogeneity, foster innovative thinking, and promote robust deliberation processes that enhance strategic decision-making. From a stakeholder perspective, greater gender diversity on boards signals a commitment to inclusivity, fairness, and social responsibility, which are increasingly valued by investors, consumers, and other external stakeholders (Cook and Glass, 2014; Bennouri *et al.*, 2018).

Empirical research supports these theoretical propositions by demonstrating various organisational benefits linked to board gender diversity. Numerous studies report positive associations between female board participation and financial metrics such as Return on Assets (ROA), Return on Equity (ROE), and Tobin's Q, although results vary depending on firm size, industry, and governance structures (Post and Byron, 2015; Joecks *et al.*, 2013).

Some evidence suggests that diversity's impact is contingent upon reaching a critical mass, often cited as three or more female directors, at this point, their contributions shift from symbolic to substantive (Torchia *et al.*, 2011). Moreover, gender diversity has been linked to improved risk management, as women tend to exhibit higher risk aversion and place greater emphasis on compliance and control systems (Adams and Ferreira, 2009).

In sectors that prioritise creativity and innovation, such as technology and finance, gender-diverse boards are especially beneficial, supporting product development, customer engagement, and strategic adaptability (Dezsö and Ross, 2012). Beyond financial performance, diverse boards are more likely to prioritise ethical governance, environmental sustainability, and corporate social responsibility (Bear *et al.*, 2010), thus enhancing long-term stakeholder trust and firm reputation (Gul *et al.*, 2011).

The international policy landscape reflects diverse approaches to improving board gender diversity. Countries such as Norway, France, and Spain have implemented legislative quotas mandating minimum levels of female representation to accelerate change and institutionalise gender equality in corporate leadership (Ahern and Dittmar, 2012). These top-down interventions have produced measurable gains in female board

appointments, but concerns persist regarding the potential for tokenism, limited influence of appointees, and unintended consequences for board dynamics.

In contrast, other jurisdictions, including the United Kingdom, Canada, and Australia, have adopted voluntary frameworks grounded in self-regulation, transparency, and public accountability principles. The UK's approach to board gender diversity was formalised in the Davies Report (2011), which proposed that FTSE 350 companies aim for a minimum of 25% female representation on their boards by 2015. Unlike legislated quotas, the Davies framework relied on corporate goodwill, reputational incentives, and investor pressure to foster change, positioning diversity as a business imperative rather than a legal obligation. This contrast forms a key part of this research, which evaluates how the UK's voluntary diversity framework—exemplified by the Davies Report—has delivered sustained improvements in board composition and firm performance.

Evaluations of the Davies Report provide critical insights into the functioning and limitations of voluntary diversity initiatives. Between 2011 and 2015, FTSE 100 companies increased the average proportion of female directors from 12.5% to over 26%, and by 2020, the figure had surpassed 33% (Davies Review, 2015; Hampton-Alexander Review, 2016).

Recent data from the FTSE Women Leaders Review indicates that this upward trend has continued, with women now occupying 44.7% of FTSE 100 board positions and 43.4% across FTSE 350 companies as of 2024—placing the UK second only to France among G7 nations in terms of board-level gender diversity (Kollewe, 2025). These figures suggest that when combined with sustained public and investor scrutiny, voluntary targets can drive significant change. However, progress at the executive level remains uneven: in 2024, the number of female chief executives in the FTSE 100 fell below 10, and only 19 women served as Chief Executive Officers (CEOs) across the entire FTSE 350 (Kollewe, 2025). These outcomes underscore a persistent gender gap in senior leadership roles and highlight the limitations of voluntary frameworks in delivering representation at the highest levels of corporate decision-making.

These developments raise two interrelated questions that underpin the purpose of this study. First, to what extent have voluntary gender diversity measures—particularly the

Davies Report—been effective in driving sustained increases in female board representation among UK-listed firms? Second, does greater female representation on boards influence firm-level outcomes such as financial performance, employment practices, and capital structure?

While existing literature has often focused narrowly on the short-term financial effects of diversity or assessed mandatory quota systems, there remains limited empirical evidence on the broader, long-term implications of voluntary frameworks. In particular, whether such initiatives lead to genuine structural change or encourage superficial compliance for reputational purposes is unclear. Addressing these questions is essential for understanding how non-mandatory diversity policies shape corporate governance practices and influence organisational outcomes over time.

This study contributes to this emerging area by systematically evaluating the trend and impact of board gender diversity within the UK context. Drawing on firm-level data from both the pre- and post-Davies Report periods, the research investigates whether voluntary gender diversity policies have fostered sustained improvements in board composition and investigates how board gender diversity affects financial performance, employment patterns, and capital structure. In doing so, it offers a comprehensive assessment of the effectiveness of voluntary diversity reforms in transforming corporate decision-making and governance outcomes.

1.2 Theoretical Framework: Corporate Governance and Gender Diversity

Corporate governance refers to the structures, processes, and mechanisms by which corporations are directed and controlled. It aims to align the interests of shareholders, managers, and broader stakeholders to ensure accountability, transparency, and ethical decision-making (Clarke, 2007). The board of directors is central to this framework, overseeing strategy, risk, and executive performance. In recent years, gender diversity on boards has gained prominence to enhance governance effectiveness, driven by theoretical insights and growing empirical evidence. The following sections examine key theories relevant to board gender diversity and assess how their predictions are supported or contested in the literature.

1.2.1 Agency Theory

Agency theory (Jensen and Meckling, 1976) centres on the conflicts between principals (shareholders) and agents (managers), which can lead to agency costs if managerial actions diverge from shareholder interests. Effective boards serve as monitoring bodies to mitigate these conflicts. From this perspective, increasing board gender diversity may enhance monitoring and oversight, reducing agency costs. Empirical studies suggest that female directors are more diligent in monitoring roles, tend to ask critical questions, and are less tolerant of opportunistic managerial behaviour (Adams and Ferreira, 2009; Srinidhi *et al.*, 2011). These behaviours align with improved corporate governance and shareholder alignment.

However, agency theory's assumptions about homogeneous director behaviour are challenged by the dynamics of board culture. Kanter's (1977) theory of tokenism suggests that unless women reach a critical mass, their ability to influence decisions remains limited. Joecks *et al.* (2013) provide evidence that gender diversity begins to positively impact firm performance only when a critical threshold, typically three female directors, is met. While agency theory supports appointing diverse directors for oversight benefits, these empirical nuances suggest that context and board dynamics mediate the effectiveness of gender-diverse boards.

1.2.2 Resource Dependence Theory (RDT)

Resource Dependence Theory (Pfeffer and Salancik, 1978) posits that boards help firms manage external dependencies by providing access to resources, information, and networks. In this view, gender-diverse boards enhance firms' legitimacy and improve stakeholder engagement, particularly with investors, regulators, and socially conscious consumers. Female directors may bring unique social capital and stakeholder knowledge, particularly in industries reliant on public trust (Hillman *et al.*, 2007; Singh *et al.*, 2008).

Empirical findings support this theoretical claim. Studies indicate that firms with gender-diverse boards are more likely to engage in stakeholder dialogue, attract diverse investors, and adopt sustainability initiatives (Miller and Triana, 2009; Bennouri *et al.*, 2018). Moreover, female directors often exhibit more risk-averse behaviour and long-

term strategic orientation, enhancing board stability (Adams and Funk, 2012; Nadeem *et al.*, 2020). However, these outcomes are not guaranteed. Torchia *et al.* (2011) note that marginalisation or symbolic appointments limit the strategic benefits predicted by RDT. Thus, the theory's predictions hold primarily when female directors are meaningfully included in board deliberations.

1.2.3 Upper Echelons Theory

Upper echelons theory (Hambrick and Mason, 1984) emphasises the influence of top executives' characteristics—values, experiences, and identities—on organisational decisions. As the board plays a crucial role in shaping corporate strategy, gender-diverse boards are presumed to generate broader perspectives, improved innovation, and more socially attuned decisions. Female directors often adopt collaborative and participative leadership styles, contributing to more thorough discussions and ethical decision-making (Roberson and Park, 2007; Bear *et al.*, 2010).

Empirical evidence aligns with this theory. Byron and Post (2016) find that gender-diverse boards are associated with stronger corporate social responsibility (CSR) outcomes and greater responsiveness to stakeholder concerns. Cook and Glass (2014) further argue that female directors influence ethical governance by focusing on long-term outcomes and social legitimacy. However, similar to other frameworks, the theory's effectiveness hinges on reaching a critical mass. Joecks *et al.* (2013) and Kanter (1977) observe that token representation does not significantly shift boardroom dynamics. Integrating diverse voices depends on inclusive boardroom cultures and avoiding stereotyping, as highlighted by Eagly and Karau (2002).

1.2.4 Social Role Theory

Social role theory (Eagly, 1987; Eagly and Karau, 2002) explains gender differences in behaviour based on societal expectations. Women are expected to be communal—collaborative, empathetic, and nurturing—while men are expected to be agentic—assertive, decisive, and independent. These roles shape leadership styles and influence how female directors participate in governance.

In boardrooms, female directors often adopt participative and consensus-driven approaches that support ethical deliberation and stakeholder responsiveness (Post and

Byron, 2015; Cook and Glass, 2014). These traits are increasingly valued in Environmental, Social, and Governance (ESG)-driven governance environments, aligning with demands for transparency, social impact, and sustainability. However, gendered expectations can also reinforce stereotypes and limit women's perceived authority. Eagly and Karau's (2002) role congruity theory finds that women face backlash when they violate traditional norms by being assertive or taking leadership. It can undermine their ability to influence board decisions unless cultural and structural barriers are addressed.

Empirical evidence supports the benefits and the constraints described by social role theory. While female directors improve CSR outcomes (Bear *et al.*, 2010) and stakeholder relations (Gul *et al.*, 2011), their effectiveness depends on inclusive boardroom climates and the breakdown of role-based bias. The critical mass concept remains relevant here as well; Torchia *et al.* (2011) find that three or more women on a board improves engagement and influence, mitigating the constraints imposed by gender stereotypes.

1.2.5 Integrating Theoretical Perspectives into Corporate Governance

Theories of agency, resource dependence, upper echelons, and social roles contribute to a multidimensional understanding of gender diversity in corporate governance. They illuminate how female directors influence firm performance, governance quality, and strategic direction. These frameworks also explain why the effects of board gender diversity may vary across contexts and outcomes.

Over the past two decades, corporate governance reforms have increasingly emphasised diversity as a governance strength. In response to financial scandals such as Enron and Lehman Brothers, global attention turned to improving board composition and oversight capacity (Jensen, 1993; Adams and Ferreira, 2009). Gender diversity is now seen as part of broader reforms aimed at enhancing accountability and reducing risk. Empirical studies show that diverse boards are associated with improved financial oversight, ethical conduct, and risk aversion (Carter *et al.*, 2010; Srinidhi *et al.*, 2011). However, representation remains uneven. Structural barriers, informal networks, and cultural biases impede progress (Eagly and Carli, 2007; Lara *et al.*, 2017).

To address these challenges, countries have adopted varied approaches—from quota-based mandates in Norway and France to voluntary targets in the UK. The UK's Davies Report (2011) introduced a 25% voluntary target for FTSE 100 companies by 2015. By 2025, women held nearly 45% of FTSE 100 board seats, placing the UK second among G7 nations (Kollewe, 2025). However, the number of female CEOs remains low, suggesting persistent executive-level inequality. While empirical evidence affirms that gender diversity improves governance, the effectiveness of such measures depends on regulatory context, cultural acceptance, and meaningful inclusion in decision-making (Post and Byron, 2015; Terjesen *et al.*, 2015).

In sum, a theoretical approach to board gender diversity reveals the potential and limitations of diversity initiatives. These theories help explain how gender diversity contributes to governance quality, strategic adaptability, and organisational legitimacy, while highlighting the cultural and structural barriers that must be addressed to realise these benefits fully.

1.3 Significance and Motivation

The UK provides a compelling context for studying board gender diversity due to its combination of voluntary governance practices and prominence in global financial markets. The Davies Report, introduced in 2011, marked a transformative moment in UK corporate governance policy by establishing voluntary targets for female board representation. Led by Lord Mervyn Davies, the initiative responded to the low proportion of women on FTSE 100 boards—just 12.5%—and aimed to raise this figure to 25% by 2015 through a "comply or explain" approach (Davies Review, 2011). Unlike Norway and France, which mandated gender quotas, the UK relied on self-regulation, allowing companies flexibility while requiring transparency for non-compliance. It reflected the UK's broader corporate governance culture, favouring voluntary, principles-based regulation over rigid mandates (Seierstad *et al.*, 2017; Terjesen *et al.*, 2015).

The Davies Report framed board gender diversity as a social justice issue and a strategic business imperative. It drew on empirical evidence demonstrating the value of diverse

boards for improving decision-making, enhancing corporate governance, and boosting financial outcomes (Adams and Ferreira, 2009). The report outlined actionable recommendations for companies, investors, and executive search firms, encouraging structural and cultural changes in how boards approached gender inclusion. By 2015, the target was met and exceeded, with women holding 26.1% of FTSE 100 board seats. This milestone catalysed further initiatives, including the Hampton-Alexander Review (2016), which extended the target to 33% female representation across FTSE 350 boards and leadership teams by 2020.

Recent data confirms the continued success of this voluntary framework. As of 2024, women hold 44.7% of board positions in FTSE 100 companies and 43.4% across the FTSE 350—placing the UK second among G7 countries in female board representation (Kollewe, 2025). These gains highlight the potential of voluntary targets to drive meaningful change when combined with public accountability and institutional support. However, disparities remain. The number of female CEOs in the FTSE 100 dropped to fewer than ten in 2024, and women remain underrepresented in executive leadership roles, raising questions about the depth of change beyond numerical board presence (Kollewe, 2025; Sealy *et al.*, 2016).

The Davies Report's voluntary approach presents an ideal case study for evaluating the effectiveness of non-mandatory gender diversity measures in corporate governance. This study addresses two central research strands. First, it investigates whether the Davies Report's voluntary guidance led to significant and sustained increases in female board representation across UK-listed firms, contributing to structural change rather than symbolic compliance. Second, it examines how board gender diversity, beyond numerical representation, affects firm-level outcomes in key strategic areas. The study comprehensively analyses how governance reforms shape corporate practice by addressing voluntary regulation's effectiveness and diversity's organisational impact.

Motivated by these objectives, this research is designed to build on the UK's voluntary framework and contribute to ongoing policy and academic debates. The first line of inquiry assesses the outcomes of the Davies Report by examining trends and patterns in female board participation before and after its implementation. This analysis provides insights into whether the voluntary "comply or explain" mechanism can be a credible

alternative to mandatory quotas. The second line of inquiry expands the scope of existing literature by investigating how female board representation affects corporate performance in three distinct areas: financial outcomes, employment practices and productivity, and capital structure decisions. While previous studies have often focused narrowly on financial metrics, this research adopts a multi-dimensional approach to capture the broader organisational implications of gender diversity (Brahma *et al.*, 2021; Terjesen *et al.*, 2015).

A further contribution of this study lies in its longitudinal design, which allows for observing corporate adaptation to voluntary diversity policies over time. Much of the current literature captures static or short-term effects, offering limited insight into how gender diversity influences firms as governance contexts evolve. The research uncovers dynamic shifts in firm behaviour and governance strategy by analysing data from pre- and post-Davies Report periods. This temporal perspective is especially relevant for understanding whether the influence of gender-diverse boards deepens over time, and whether voluntary regulation can prompt lasting cultural and strategic transformation within organisations (Joecks *et al.*, 2013; Seierstad *et al.*, 2017).

The UK's global influence as a financial centre amplifies the significance of this study. UK-based firms often set trends in corporate governance and are closely watched by international investors and regulators. Understanding the outcomes of the Davies Report can inform policy decisions in other jurisdictions considering voluntary targets or quota-based systems. The findings will also be relevant for institutional investors, boards, and policymakers seeking evidence-based strategies to promote diversity and improve governance performance.

In summary, the Davies Report offers a timely and contextually rich foundation for examining the organisational impact of voluntary gender diversity policies. This research contributes to the academic literature by bridging existing gaps with a multi-dimensional analysis of gender diversity's effects across financial and non-financial corporate outcomes. It also provides valuable insights for ongoing policy discussions, offering practical recommendations for designing effective, sustainable diversity strategies in corporate governance (Davies Review, 2011; Conyon *et al.*, 2017; Hillman *et al.*, 2007).

1.4 Research Objectives, Questions, and Contributions

This research aims to examine the impact of board gender diversity on corporate outcomes across three critical dimensions: financial performance, employment practices, and capital structure. By focusing on the period before and after the introduction of the Davies Report's voluntary diversity targets, this study evaluates the effectiveness of non-mandatory governance reforms in promoting meaningful, sustained change in corporate decision-making. The Davies Report provides a distinctive policy context for examining how voluntary frameworks influence corporate behaviour over time, particularly when contrasted with quota-based systems adopted in other jurisdictions such as Norway and France (Terjesen *et al.*, 2015; Seierstad *et al.*, 2017).

Through a comprehensive empirical analysis, this research contributes to the literature on corporate governance and board diversity by addressing two interconnected but distinct areas of inquiry. First, it evaluates the effectiveness of voluntary gender diversity guidance, specifically the Davies Report, by examining shifts in board composition and firm outcomes before and after its implementation. It allows for a contextual assessment of whether soft-law approaches can drive meaningful change in corporate behaviour. Second, it investigates the impact of board gender diversity on firm-level outcomes—namely, financial performance, employment practices, and capital structure—beyond the specific influence of the Davies Report and its voluntary policy framework. By employing advanced econometric techniques and longitudinal firm-level data, the study provides robust evidence on whether and how gender-diverse boards contribute to ethical, strategic, and performance-related objectives in modern corporate governance. The following research objectives and questions guide the empirical chapters of the thesis.

1.4.1 Research Objectives and Questions

1. *How does board gender diversity impact financial performance before and after the Davies Report?*

Chapter 2 examines whether the Davies Report's voluntary guidance led to a significant and sustained increase in female board representation across UK-listed firms. It analyses trends in board composition before and after the Report's implementation, assessing whether these changes reflect structural progress or symbolic compliance. This initial analysis establishes the foundation for exploring how shifts in board gender diversity relate to firm-level outcomes.

Chapter 2 examines this question by investigating the relationship between female board representation and key financial metrics, including Return on Assets (ROA), Tobin's Q, and stock performance. The analysis shows that gender-diverse boards are associated with improved financial outcomes, particularly in the post-Davies Report period. These improvements stem from integrating diverse perspectives in strategic decision-making, contributing to enhanced board oversight, more prudent risk management, and greater responsiveness to shareholder concerns.

The results, however, are not uniform across all firms. Sectoral and firm-level variations emerge as important contextual factors. For instance, in innovation-driven and consumer-facing industries, gender diversity demonstrates a more substantial positive effect. These sectors, which often require greater adaptability, market sensitivity, and customer engagement, benefit from the broader range of perspectives offered by gender-diverse boards (Post and Byron, 2015; Dezsö and Ross, 2012). In contrast, in capital-intensive or traditional sectors, such as manufacturing or energy, the financial impact of gender diversity is less pronounced, possibly due to entrenched hierarchical structures and less stakeholder-facing operations.

Furthermore, the study finds that gender-diverse boards contribute to greater investor confidence, reflected in more stable stock performance and improved perceptions of governance quality. These findings align with theoretical arguments under agency theory and upper echelons theory, suggesting that including women enhances board deliberations, encourages ethical decision-making, and mitigates agency conflicts (Adams and Ferreira, 2009; Hambrick and Mason, 1984). From a policy standpoint, the results reinforce the efficacy of the UK's voluntary diversity framework, providing empirical support for the view that structured but flexible reforms can yield tangible financial benefits.

2. *How does board gender diversity affect employment practices and productivity before and after the Davies Report?*

This question is addressed in Chapter 3, which examines whether gender-diverse boards are more likely to influence internal corporate policies related to human resource management, workplace inclusivity, and employee productivity. The findings suggest a clear shift in board behaviour after the Davies Report: firms with greater female board representation increasingly adopted policies supporting diversity and inclusion, flexible working, and employee well-being.

Gender-diverse boards were particularly associated with higher levels of staff retention, reduced employee turnover, and enhanced productivity. These improvements were attributed to stronger board-level support for policies that promote an inclusive and participative organisational culture. The study finds that women directors tend to advocate for employee-centred initiatives, which contribute to higher morale, increased engagement, and a more supportive work environment (Cook and Glass, 2014; Post and Byron, 2015).

These effects, however, varied across industries. The impact was most significant in service-oriented and knowledge-intensive sectors, such as finance, education, and professional services, where human capital is a core asset and employee well-being directly influences organisational performance. Conversely, these effects were less pronounced in sectors with high operational and technical complexity, such as heavy industry and logistics, likely due to structural rigidity and production-centric management priorities.

These findings extend the current literature by highlighting the social dimension of board gender diversity and its implications for internal governance. They also support social role theory, which suggests that women are more inclined to adopt participatory leadership styles that promote collaboration and inclusivity (Eagly and Karau, 2002). For corporate leaders, the evidence underscores the importance of gender-diverse boards in cultivating supportive and productive workplaces. For policymakers, the results justify promoting gender diversity not only as a matter of equity but also as a driver of workforce effectiveness and firm-level performance.

3. *How does board gender diversity influence capital structure (leverage) before and after the Davies Report?*

This question is analysed in Chapter 4, which examines how gender-diverse boards affect capital structure decisions, particularly using debt (leverage) as a component of financial strategy. Before the Davies Report, the findings show no statistically significant association between gender diversity and leverage ratios, suggesting that female board participation had not yet influenced financial risk strategies meaningfully.

However, the study identifies a clear behavioural shift in the post-Davies Report period. Firms with more gender-diverse boards tended to adopt more conservative capital structures, with a general trend toward reduced financial leverage and enhanced risk aversion. It aligns with existing literature suggesting that women in leadership often exhibit more risk-sensitive financial behaviour, favouring long-term stability over short-term gains (Adams and Funk, 2012; Nadeem *et al.*, 2020).

Notably, the relationship between board gender diversity and leverage decisions is shown to be industry-specific. In capital-intensive sectors such as construction and manufacturing, gender-diverse boards were associated with strategic increases in leverage, likely reflecting an informed response to favourable borrowing conditions and long-term investment opportunities. In contrast, in financially volatile sectors such as retail and services, boards with higher female representation were more inclined to maintain lower debt levels, aiming to reduce exposure to market risk.

These findings significantly contribute to the literature on the resource dependence theory and financial risk management. They suggest that gender-diverse boards possess the capacity to adapt capital structure decisions to specific industry and market contexts, enhancing overall corporate resilience. For policymakers, these insights highlight the broader economic implications of diversity, linking governance reforms to macro-level goals such as financial stability and sustainable growth.

1.4.2 Overall Contributions of the Thesis

This thesis makes significant contributions to corporate governance and board diversity literature across several dimensions:

Methodologically, the study applies advanced econometric techniques—including fixed effects and two-step system Generalised Method of Moments estimators (GMM)—to address endogeneity and support more credible causal inferences. By incorporating policy timelines and industry-specific factors, the analysis provides a nuanced understanding of how gender diversity interacts with firm context to shape corporate outcomes. The study provides robust evidence on the effectiveness of voluntary diversity measures, offering valuable insights for contexts where mandatory quotas may not be feasible or culturally acceptable.

The findings of this study offer practical relevance for corporate leaders and policymakers by illustrating how board gender diversity can contribute to improved corporate governance and performance outcomes. For business practitioners, the research shows that firms with greater female board representation are more likely to benefit from enhanced decision-making processes, workforce inclusivity, and context-sensitive risk management. These results suggest that gender diversity should be treated as a matter of equity and a strategic factor in organisational effectiveness.

This thesis provides empirical support for the UK's voluntary governance framework by documenting (i) a statistically significant and sustained increase in female board representation among FTSE firms following the Davies Report period, and (ii) post-Davies associations between higher female representation and firm-level outcomes (financial performance, employment practices, and capital structure) that remain robust to firm and year fixed effects, industry controls, and endogeneity-aware estimators (e.g., two-step system GMM). Taken together, these results indicate that a principles-based "comply or explain" approach can deliver durable changes in board composition and be accompanied by improvements in organisational outcomes.

This thesis is structured into five chapters, each exploring the influence of board gender diversity on corporate outcomes in the context of the Davies Report's voluntary targets. Chapter 1 introduces the topic, providing the context, significance, and theoretical framework grounded in Agency Theory, Resource Dependence Theory, Upper Echelons Theory, and Social Role Theory. It highlights the evolution of gender diversity in corporate governance, identifies research gaps, and sets the stage for examining

financial performance, employment practices, and capital structure. Chapter 2 analyses the relationship between board gender diversity and financial performance using metrics like ROA and Tobin's Q. Employing longitudinal data and advanced econometric techniques addresses endogeneity issues and investigates whether voluntary diversity measures improve financial outcomes, with findings contextualised across industries and firm sizes.

Chapter 3 focuses on employment practices and productivity by testing whether gender-diverse boards are associated with different firm-level employment outcomes. Using longitudinal panel data for FTSE firms (2001–2020), the analysis compares pre- and post-Davies Report periods and employs interaction terms between female board representation and a post-Davies dummy. Employment practices and productivity are proxied through firm-level indicators such as employee productivity ratios (e.g., revenue per employee) and related operational measures rather than direct HR policy data. This design allows the study to assess whether changes in employment-related outcomes coincide with increased female representation after the Davies reforms.

Chapter 4 assesses the relationship between gender diversity and capital structure, using leverage ratios as a proxy for financial risk management. The analysis tests whether boards with higher female representation adopt more conservative financing policies, reflecting a risk-averse orientation documented in prior literature. By examining these effects across industries, the chapter highlights sector-specific dynamics—for example, lower leverage in volatile sectors versus strategic borrowing in capital-intensive sectors.

Chapter 5 integrates the findings from these empirical studies and develops their theoretical, practical, and policy implications. It emphasises that voluntary diversity measures, such as the Davies Report, can be most effective when combined with supportive organisational changes. The chapter concludes with recommendations for future research to incorporate additional measures of transparency, stakeholder engagement, and HR policies to further deepen understanding of the mechanisms linking board diversity and corporate outcomes.

Chapter 2

Board gender diversity and financial firm performance

2.1 Introduction

In recent years, there has been a resurgence of concern about the effects of females on company boards (Joecks *et al.*, 2012; Carter *et al.*, 2010; Hillman *et al.*, 2007). This research documents that women are considerably underrepresented on the company board. However, it is asserted that, aside from ethical and moral concerns, female corporate board representation could promote access to a broader range of intellectual capital, which has significant potential effects on a company's performance and ability to compete (Dezsö and Ross, 2012). Companies have faced high demands with increasing women's representation in the company's boardroom, specifically after corporate governance corruption cases at Enron and WorldCom in the US and the worldwide economic crises in 2007-2009. Many people, such as decision-makers and scholars, think things would be different if boardrooms had more females on the board in these businesses.

The influence of female directors on boards regarding firm performance has been substantively investigated, yielding a spectrum of insights and perspectives. A wealth of prior studies emphasises the potential advantages of gender-diverse boards, linking female directorship to improved decision-making through diversified perspectives, enhanced governance quality, and strengthened ethical stances (Carter et al., 2003; Erhardt et al., 2003; Gul et al., 2011). Others highlight the capacity of women directors to stimulate innovation, bolster creativity, and foster an ethical climate that enhances competitiveness and financial outcomes (Joecks et al., 2012; Miller and Triana, 2009). However, much of this evidence is either cross-sectional, context-specific, or focused on quota-based regimes. This study contributes by extending the analysis to a long-term UK panel (2001–2020), employing endogeneity-aware estimators (system GMM), and situating the findings within the unique voluntary governance framework of the Davies Report. By doing so, it offers new insights into how voluntary, principles-based reforms

influence the gender diversity–performance relationship across firm sizes and industries.

In corporate governance, the presence of women on boards has been correlated with increased transparency and reliability in financial reporting, potentially elevating stakeholder trust and firm reputation (Gul *et al.*, 2013; Peni and Vähämaa, 2010). Nonetheless, it's imperative to note the existence of divergent findings and perspectives in the literature. Some studies indicate a neutral or even negative impact of female board representation on firm performance, mainly when enforced through stringent regulatory frameworks like quotas (Ahern and Dittmar, 2012).

The increasing pressure on UK firms to enhance gender diversity in boardrooms has reignited debates on the impact of female representation on corporate boards. As global movements towards gender equality intensify, understanding the implications of such diversity on firm performance has become crucial for both academic and policy-making circles. This study assesses whether female board directors positively influence organisational performance, particularly considering the Davies Report policies implemented in 2012. The motivation behind this research stems from the need to provide empirical evidence on the effectiveness of these policies, especially considering the mixed results from previous studies on the relationship between gender diversity and firm performance.

The Davies Report (2011) strongly emphasised the proportion of female board members and offered FTSE 350 businesses voluntary guidelines to enhance female board representation. The Davies Review played a pivotal role in advancing board gender diversity in the UK by presenting a series of practical, business-led recommendations to address the gender imbalance on FTSE 350 company boards. The review set ambitious targets, including a minimum of 25% female representation on FTSE 100 boards by 2015. It encouraged FTSE 350 chairmen to set and disclose their aspirational goals for female board representation. These voluntary, inclusive recommendations created public accountability and drove progress through self-regulation and public commitment (Davies Review, 2011).

The review emphasised transparency and disclosure, requiring companies to report annually on the proportion of women on their boards, in senior executive positions, and

across the entire organisation. The Financial Reporting Council was advised to amend the UK Corporate Governance Code to include policies on boardroom diversity and measurable objectives. Companies were also encouraged to provide detailed information about their appointment processes and how they addressed diversity in their annual reports, increasing transparency and promoting best practices in recruitment.

To expand the pool of qualified female candidates, the review recommended periodically advertising non-executive board positions. It encouraged executive search firms to adopt a voluntary code of conduct promoting gender diversity in their search criteria and processes. Additionally, it emphasised the need for training and development opportunities for women within and outside the corporate sector.

The impact of these recommendations has been both significant and sustained. The percentage of women on FTSE 100 boards increased from 12% in 2011 to 25% in 2015, and on FTSE 250 boards from 9% to 22% during the same period. As of 2024, female representation reached an all-time high of 44.7% on FTSE 100 boards and 43.4% across FTSE 350 companies, surpassing the UK's voluntary target of 40% and positioning the UK second only to France among G7 nations for board-level gender diversity (Kollewe, 2025). This sustained progress signals a profound cultural shift toward greater inclusivity in corporate leadership. However, representation at the executive level remains uneven, with only 19 female chief executives in the FTSE 350, down from 20 in the previous year. Despite this, business leaders consistently report that improved gender balance has brought tangible governance benefits, including more rigorous boardroom discussions, enhanced strategic oversight, and broader stakeholder engagement.

Building upon the key objective of investigating the influence of board gender diversity on the financial performance of firms listed on the London Stock Exchange, this study delves deeply into how gender diversity on boards affects firm outcomes before and after implementing the Davies Report policies in 2012. By addressing the critical question of how these policies have reshaped the relationship between female board representation and firm performance, the study offers a nuanced analysis that considers variations in firm size and industry classification. This research not only employs rigorous econometric methodologies, such as the Generalised Method of Moments

(GMM), to tackle pervasive endogeneity issues (Adams and Ferreira, 2009; Liu *et al.*, 2014) but also expands its investigative lens to a comprehensive dataset, encompassing FTSE ALL SHARE companies from 2001 to 2020. By intertwining an analysis of firm sizes, especially considering the distinct pressures exerted upon large UK firms (Mallin and Ow-Yong, 2008), and introducing a thorough examination across varied industry classifications, this study aims to distil clearer insights into why and how female directors influence firm performance. The study not only enhances our understanding of the conditions under which gender diversity influences firm performance but also provides valuable insights that can inform and refine gender diversity policies and corporate strategies, ensuring that female board representation effectively contributes to corporate success across different contexts.

While extensive research has examined the effects of board gender diversity on corporate outcomes, significant gaps remain, particularly concerning the long-term impact of gender diversity policies like the Davies Report in the UK. Most existing studies either focus on short-term effects or do not consider the nuanced impacts across different firm sizes and industries. Firm size is important because larger firms face stronger regulatory and market scrutiny, often leading to more rapid compliance with diversity targets. In comparison, smaller firms may adopt changes more slowly or in a more symbolic manner. Industry context also matters, as some sectors (e.g., consumer services, healthcare, technology) are more conducive to integrating diverse perspectives. In contrast, capital-intensive or male-dominated industries (e.g., industrials, real estate) may experience slower adjustment or weaker performance effects. Additionally, few studies have directly assessed the Davies Report. Gregory-Smith et al. (2014) document an increase in female appointments after 2011, but find no short-term performance gains. Pasaribu (2017) finds that while board diversity rose significantly after the Report, its relationship with firm performance remained weak or negative in the short run. These mixed findings highlight the need for a longer-term, industry- and size-sensitive analysis, which this study provides using a two-decade FTSE All-Share panel.

According to Labelle *et al.* (2015), several nations are implementing various strategies to enhance gender equality on the board of directors. As stated by these writers, there are three primary methods for female board presence around the globe. The first method

is restrictive and involves the implementation of affirmative laws, such as a quota system, to ensure a sufficient level of women's involvement in boardrooms. Second, by legislation, businesses are typically obligated to conform to prescribed standards or clarify why they do not. The third is the voluntary method, in which organisations are left to economic forces to determine whether to assign females to their boards. Market mechanisms and "soft" or "hard" legislations are all based on the assumption that female participation has a beneficial and significant impact on corporations' leadership and organisational strategy. Thus, their success poses the issue of the efficacy of these methods.

This research builds on prior studies of female representation on UK corporate boards by focusing on the voluntary, principles-based initiatives introduced through the Davies Review and later reinforced by the Hampton-Alexander Review. Unlike countries that have implemented mandatory quotas, the UK has relied on soft-law mechanisms, such as voluntary targets and public disclosure, to encourage change. These initiatives have significantly increased the proportion of women on FTSE-listed company boards, but their implications for firm performance remain less well understood. This study contributes by examining whether the effects of these policies differ across industries and firm sizes, providing a more granular perspective on how voluntary governance reforms interact with organisational and sectoral characteristics.

The theoretical underpinnings of this study are grounded in agency theory and resource dependence theory. Agency theory suggests that gender-diverse boards can enhance corporate governance by improving oversight, increasing autonomy, and reducing fraudulent practices, thereby potentially improving firm performance (Jensen and Meckling, 1976; Carter *et al.*, 2003). On the other hand, resource dependence theory posits that gender diversity on boards provides access to a wider array of resources and external networks, which can contribute to a firm's competitive advantage and long-term success (Pfeffer and Salancik, 2003; Hillman *et al.*, 2007). However, empirical findings have been mixed, with some studies reporting positive outcomes associated with gender diversity (Miller and Triana, 2009; Liu *et al.*, 2014), while others have found neutral or even negative effects, particularly in contexts where gender quotas have been enforced (Ahern and Dittmar, 2012). This study builds on these theoretical frameworks and empirical findings by applying rigorous econometric methodologies to a comprehensive

dataset, examining the long-term effects of gender diversity policies within the unique context of the UK corporate landscape.

This study makes several key contributions to the literature on corporate governance and gender diversity. First, it provides a detailed analysis of the impact of the Davies Report policies on firm performance, offering insights into the effectiveness of voluntary gender diversity initiatives in the UK. The findings indicate that these policies successfully increased female representation on boards but were also associated with a short-term decline in firm performance, particularly in larger firms and specific industries. It challenges the assumption that increased gender diversity universally leads to better corporate outcomes and suggests that the benefits of diversity may be context-dependent. Additionally, the study highlights the complexities involved in integrating female directors into established governance structures. These include challenges of tokenism, where women are too few in number to exert meaningful influence (Kanter, 1977; Torchia et al., 2011), and cultural or structural resistance in male-dominated industries, which may slow the acceptance of diverse perspectives (Nielsen & Huse, 2010). These factors help explain why the short-term impact of diversity on firm performance appears uneven across industries in the UK context.

This study suggests that having more women on boards does not always lead to better company performance, echoing findings from various previous research studies, such as those by Adams and Ferreira (2009), Carter *et al.* (2010), Ahern and Dittmar (2012), and Matsa and Miller (2013). A notable negative relationship is observed between female board representation and firm performance indicators, such as Return on Assets (ROA) and Tobin's Q. Interestingly, larger firms exhibit a pronounced negative impact from female board representation, considering company size. In comparison, smaller firms exhibit a less clear, albeit still negative, relationship. Moreover, when observed through an industry lens, the relationship between female representation and performance is not uniform. In consumer-facing and innovation-driven industries, greater gender diversity is associated with stronger positive effects, likely because diverse boards contribute to adaptability, creativity, and closer stakeholder engagement (Dezső & Ross, 2012). By contrast, in capital-intensive or male-dominated industries, entrenched governance practices and structural rigidity may limit the immediate influence of female directors, producing weaker or even negative short-term outcomes

(Joecks et al., 2013). These results underscore the importance of considering industry context in both research and policy applications in board gender diversity.

The practical implications of these findings are significant for both corporate decision-makers and policymakers. For companies, the study underscores the importance of adopting a strategic approach to increasing gender diversity on boards, ensuring that new appointments are made to enhance board effectiveness rather than merely meeting diversity targets. It may involve additional support and training for new directors to help them integrate effectively into existing governance frameworks. For policymakers, the results highlight the need to consider the potential short-term economic impacts of gender diversity initiatives and provide ongoing support for firms adjusting to new governance practices. It could include measures to ensure that diversity policies are implemented in ways that maximise their positive impact on firm performance, policymakers can complement voluntary targets with pipeline development initiatives, governance training to support the effective integration of new directors, and enhanced disclosure requirements that promote transparency and accountability.

The structure of this chapter is as follows: Section 2 highlights the commonly used theories. Section 3 provides an overview of a gender diversity literature review. Section 4 presents the hypotheses' development. Section 5 describes research data collection, a model specification, and a strategy for dealing with endogeneity problems. Section 6 discusses the main results using different estimations, followed by a robustness check. Section 7 concludes and highlights the limitations and recommendations for further research.

2.2 Theoretical framework:

According to Finkelstein *et al.* (2009), boards' two main characteristics affect organisational performance. The corporate board is the company's most influential player, defining enterprise strategy and making decisions. Second, boards of directors perform their supervisory duties to the managerial staff, including overseeing the appropriate usage of the corporation's resources and assets, representing shareholders to protect their interests, and dealing with acquisition risks.

Previous studies on female participation on company boards suggest that increasing gender diversity can enhance board oversight and strategy by bringing varied perspectives, ultimately benefiting firm performance. For example, research finds that female directors exhibit leadership styles focused on mentorship, risk management, and stakeholder interests, strengthening governance quality (Matsa and Miller, 2013; Faccio *et al.*, 2016). Additionally, greater cognitive diversity associated with gender-balanced boards is linked to improved problem-solving, innovation, and attentiveness to human capital development (Miller and Triana, 2009; Lückerath-Rovers, 2013). These improved governance capabilities associated with increased female representation are argued to translate into higher financial returns, more substantial productivity, enhanced culture, and greater employment stability (Byron and Post, 2016; Liu *et al.*, 2014).

According to Daily *et al.* (2003), using various methods in corporate governance studies is critical for comprehending the connected dynamics and framework of gender boards and company findings. According to Carter *et al.* (2010), no one supposition may anticipate the essence of the correlation between female representation and business outcomes. Theoretical approaches promote the importance of female participation in boardrooms and its consequences for financial results in several ways. As a result, this study examines various theories concerning board gender diversity and its implications for firm performance. We discuss the most often adopted ideas for assessing the effects of gender diversity on organisational outcomes. Agency theory, resource dependency theory, and critical mass theory are used to investigate the impact of various proportions of female managers on corporate results.

2.2.1 Agency Theory

According to agency theory, a fundamental conflict can exist between a company's shareholders and management team. This conflict occurs because management may prioritise their interests over those of the owners, leading to what is known as agency costs (Jensen and Meckling, 1976). The company board is accountable for overseeing the management team and ensuring that their actions align with the best interests of the shareholders. Therefore, the primary goal of corporate governance is to minimise agency costs and ensure effective management.

Research has shown that effective corporate governance can enhance corporate performance (Core *et al.*, 1999). Agency theory is often utilised to study corporate governance and its relationship with financial success (Hermalin and Weisbach, 2001). When applied to board gender diversity, agency theory suggests that having a gender-diverse board can improve the board's ability to supervise management, increase the board's autonomy, and reduce fraudulent practices.

First, a gender-diverse board can improve the board's ability to supervise management. Dewatripont and Tirole (1999) contend that diverse boards may cause better decision-making by reducing information biases and providing different perspectives. It can lead to more conscientious and informed decisions and reduce the influence of self-interest. A diverse board can also help to limit agency costs by completing tasks more effectively than a non-diverse board, which is more likely to be related to top managerial positions (Fama, 1980).

Second, gender diversity on the board can boost the board's autonomy. Carter *et al.* (2003) argue that female representation can increase the board's independence by providing diverse viewpoints and skills that encourage questioning. They concluded that corporations with a greater percentage of females on the board of directors are typically more independent than those with fewer women. An independent board can limit agency costs by providing oversight and preventing unethical practices.

Third, gender diversity on the board can reduce fraudulent practices by spreading more accurate information and reducing information asymmetry. Insufficient or inaccurate information provided to shareholders can lead to agency problems and harm corporate performance. Diverse boards can control information flow and increase public disclosures, improving the quality of information presented to shareholders (Gul *et al.*, 2011). Female managers have also been shown to improve earnings quality and management, reducing agency costs (Srinidhi *et al.*, 2011).

However, despite the potential benefits of board gender heterogeneity, female members are often underrepresented. Female contributions may be disregarded when male directors outnumber female directors (Carter *et al.*, 2003). Additionally, gender heterogeneity may not always improve board oversight if female participants are

underrepresented, leading to tokenism and weak influence on decision-making (Adams and Ferreira, 2009).

In conclusion, agency theory suggests that gender diversity on the board can improve a company's financial performance by improving decision-making, increasing the board's autonomy, and reducing fraudulent practices. However, the underrepresentation of female directors may lead to ineffective oversight and weak influence on decision-making. Promoting gender diversity on firm boards may cause improved corporate governance and performance.

2.2.2 Resource dependence theory

The predominant application of agency theory might result in contradictory outcomes in diversity and performance research due to its limited focus on monitoring and shareholder wealth (Lan and Horacleous, 2010). It also downplays diversity's potential sustainable impacts on stakeholders like employees (Freeman *et al.*, 2010). Furthermore, agency theory's financially focused performance metrics may miss diversity's benefits for innovation, CSR, and employee relations crucial for long-term success (Rhode and Packel, 2014).

Resource dependence theory argues that the survival and success of a company are influenced by its external resources and surroundings (Salancik and Pfeffer, 1978). According to advocates of this theory, boards of directors play a vital role in connecting firms with these external resources and environmental responsibilities (Carter *et al.*, 2010). Pfeffer and Salancik (2003) identify four essential resources that boards offer to organisations, including directors who provide valuable information to assist in the company's decision-making procedures, serve as a key point of contact to external users, demonstrate networks with other businesses, and support legislation in the firm. Directors are considered insiders, business experts, support professionals, and community influencers in social networks (Hillman *et al.*, 2007). Heterogeneous boards broaden the boards' profile and develop potential ties with crucial internal and external sources since various directors offer access to varied resources for an organisation. Gender-heterogeneous boards also increase the firm's interaction with its users, vendors, and competitors, as well as the board's understanding of the industrial features

and accessibility to the available financial and other outside resources that assist a business when compared to all-male boards (Carter *et al.*, 2010).

Research indicates that diversified boards increase the value of organisations by generating a challenging environment within the boards (Erhardt *et al.*, 2003). According to Hillman *et al.* (2007), boards must acquire a diverse collection of specific skills, experience, and knowledge to establish a competitively innovative and imaginative firm. Board gender diversity contributes to better judgment, owing to an ideal base of skills and creativity (Erhardt *et al.*, 2003). Female directors with varied viewpoints, abilities, expertise, experiences, and conduct provide diverse helpful resources and valuable knowledge to the organisation. These crucial and distinct resources of female members can distinguish them from their colleagues, particularly in various workplaces, and can effectively deal with unpredictability in the market. The extra women managers on the firm's board could aid decision-making and allow corporations to enter markets more successfully. Gender-diversified boards are advantageous in collecting and conveying ideas with external sources, shareholders, and top internal leadership because crucial information is shared among enterprises and external organisations through the boards (Hillman *et al.*, 2007). Female board members bring significant talents, diverse viewpoints on life, and a unique combination of qualifications and attitudes to the board, all of which contribute to more robust board debates and operations. Variations in directors' qualities mean that they could act differently, which can have ramifications for how managers communicate with one another, their appetite for risk, and their level of moral considerations. Female directors are observed to place more substantial ethical importance on decision-making over individual interests (Bart and McQueen, 2013).

According to McInerney-Lacombe *et al.* (2008), female managers are generally the instrument of change in a company world to boost a firm's competitive position and reach the diverse demographic of the marketplace. Female directors are typically younger than men and are more tolerant of different notions and thoughts regarding the enterprise. They tend to establish distinct ties between the corporate goals and the workforce and product sectors. It contributes to more inventive board decisions, and innovative and creative organisations prefer to outperform their competition. Women managers have a favourable impact on boardroom composition by altering

communication and social engagement. It increases the board's creative and inventive decision-making, enhancing corporate financial success (McInerney-Lacombe *et al.*, 2008).

Overall, the evidence suggests that female directors bring unique viewpoints and resources to the boardroom, which may cause enhanced decision-making and corporate performance. Gender-heterogeneous boards offer the potential for greater access to external resources, an improved understanding of industry features, and greater accessibility to available financial and other resources, which can assist a business in outperforming its competitors (Carter *et al.*, 2010). Furthermore, female directors are observed to place higher ethical importance on decision-making over individual interests, providing a more socially responsible and sustainable approach to corporate decision-making (Bart and McQueen, 2013).

In conclusion, resource dependence theory and empirical research suggest that gender diversity can enhance board decision-making and corporate performance. Diverse boards broaden the boards' profile and develop potential ties with crucial internal and external sources, utilising a wider range of resources and knowledge. Moreover, women directors bring unique viewpoints and resources to the boardroom, leading to more robust board debates and operations and positively impacting corporate financial success. Promoting gender diversity on corporate boards is crucial in establishing competitively innovative and imaginative firms that can adapt to unpredictable market conditions and secure their position in the marketplace.

2.2.3 Empirical literature review

Board diversity investigation has been prevalent since the 21st century. Initially, the studies concentrated on the role of top management and its impact on overall success. The diversity among directors has been more examined as the topic has progressed, with a study focusing on variables such as age, nationality, education, and, most typically, gender. The style of board structure determines the impact of gender diversification on corporate outcomes.

According to Adam and Ferreira (2009), over-monitoring diversified boards contributes to mitigating and impeding efficient decisions in well-governed boards. Prior diversity-

performance research results can differ because of variances in regulatory constraints, governance systems, and market circumstances. Overall, studies show a mixed picture of the effect of board gender diversity on company success; some studies assert a positive correlation between gender diversity on boards and enhanced corporate performance and value, attributing improved outcomes to varied perspectives and robust governance (Carter *et al.*, 2003; Erhardt *et al.*, 2003; Reguera-Alvarado *et al.*, 2017; Luckerath-Rovers, 2013; Ntim, 2015; Gul *et al.*, 2013). This viewpoint is further supported by findings from different global contexts, such as in Vietnam and China, where gender diversity on boards correlates with improved corporate performance (Nguyen *et al.*, 2015; Liu *et al.*, 2014). Furthermore, the critical mass theory, which suggests that a minimum number of female directors is necessary to impact board operations positively, finds support in several contexts (Torchia *et al.*, 2011; Arena *et al.*, 2015).

Conversely, some studies present a neutral or even negative relationship between gender diversity and firm performance. For instance, some research suggests that mandated gender quotas, such as those implemented in Norway, can lead to the hurried appointment of less experienced directors, potentially hindering corporate performance (Ahern and Dittmar, 2012). Other studies indicate an inverse relationship between female executives in leadership and firm efficiency in specific contexts, such as in Indonesia (Darmadi, 2013). Moreover, a substantial body of research finds no definitive link between gender diversity on boards and firm performance, indicating that the relationship might be modulated by numerous factors like the firm's focus, industry, and socioeconomic context (Carter *et al.*, 2010; Dezsö and Ross, 2012; Marinova *et al.*, 2016; Joecks *et al.*, 2012; Sila *et al.*, 2016; Charles *et al.*, 2018).

Robinson and Dechant (1997) present some reasons for the inconsistent results, illustrating that board diversity is not always connected with greater company performance. Organisations must invest in diversity tied to their strategic business goals to take full advantage of diversity, including supporting the company's operation within the regulatory framework, recognising that its operating structures must be developed to take advantage of the new skills and experiences that the board diversity brings.

This section of the research will examine many points of view about gender diversity among management members in organisations and its influence on corporate progress. Some studies have discovered a positive relationship between them. In contrast, others have found a negative or no connection. Some researchers have paid attention to the existence of a conditional association.

According to the agency theory, gender diversity on boards improves business performance. For instance, Carter *et al.* (2003) discovered a substantial beneficial correlation between the female proportion on boards and corporate value as evaluated using Tobin's Q. Erhardt *et al.* (2003) examined the 127 top US corporations during 1993 – 2002 and discovered a favourable relationship between gender-heterogeneous boards and ROI and ROA. According to Erhart *et al.* (2003), greater business financial results for diverse directors are connected to efficacy in the board's monitoring role because gender-diverse bodies give a more comprehensive range of perspectives.

Prior research indicates that female board members enhance market competitiveness by serving as vital connectors between the firm and its environment, a concept aligned with resource dependence theory (Luckerath-Rovers, 2013; Ntim, 2015). The resource dependence theory posits that organisations depend on resources from their external environment, and to minimise dependency, they seek to understand and influence their external context, often through strategic board appointments to access crucial resources and knowledge. Thus, by providing diverse perspectives and networks, women directors can facilitate access to essential external resources, thereby elevating the firm's market valuation. Moreover, Richard (2000) believes that gender-diverse companies must connect to external and internal resources. He argues that board composition promotes a diverse workforce, particularly among brilliant female workers, and improves firm competitiveness through creativity and effectiveness, which results in enhanced corporate success. Likewise, Miller and Triana (2009) show that diversified committees increase a business's reputation and inventiveness. These intermediaries have a favourable effect on a corporation's performance.

Reguera-Alvarado *et al.* (2017) investigate the recent evolution of board composition in Spain following the application of required gender parity on boards in 2015. They

contend that required board diversity legislation in Spain enhances the selection of women members on the board; however, an increase in female board presence is positively connected with superior economic performance. Gender-diverse boards provide different, unique talents from various views to the boardroom, resulting in a rise in corporate values compatible with resource dependence theory. The beneficial relationship between women's board participation and companies' success is consistent with Martin-Ugedo and Minguez-Vera's (2014) analysis of Small and Medium-sized Enterprises (SMEs) in Spain between 2003 and 2008. This research implies that female representation and success are endogenously linked, with females serving in higher-performing firms and higher-performing corporations more willing to appoint women to the company (Farrell and Hersch, 2005).

Following the increase in the number of women in senior management, the favourable impact on overall business financial performance and the public's confidence, shareholders responded positively to the nomination of women managers. They believe that board diversity brings value to the organisational management framework. According to Gordini and Rancati (2017), a review of Italian publicly traded firms over 2011-2014 reinforces that increasing female representation on boards delivers economic improvements while not diminishing shareholders' wealth. They recommend that corporations concentrate on the correct mixture of men and women members and illustrate that merely selecting one woman to highlight the existence of women directors has no substantial influence on corporate performance.

Prior research has also found that gender-diverse committees boost public trust by exhibiting greater quality corporate governance standards. The company's disclosures' integrity and validity enhance clarity in corporate governance practices. Gul *et al.* (2013) found in the analysis of 2200 American firms that gender diversity improves transparency, so there is a beneficial association between board diversity and the accuracy of profit estimates. According to this research, gender-diverse companies make informed and precise disclosures, which helps analysts anticipate more accurately. Their research endorses the idea, indicating that board diversity increases economic reporting transparency and integrity.

Similarly, Gul *et al.* (2011) found that diversified boards of directors in big corporations are more honest in their reporting, improving the reliability of public data. It suggests that gender diversity on boards is more conscientious in the context of general transparency and has greater financial reporting quality. Furthermore, Peni and Vähämaa (2010) argue that female Chief Financial Officers (CFOs) minimise discretionary accruals in annual disclosures, leading to more prudence and management opportunism, more reliable financial statements, and strong corporate governance standards.

Board features and governance in developed economies may vary from those of transitional or developing economies. There are many studies investigating board diversity in emerging markets and developing nations. Nguyen *et al.* (2015) investigated publicly traded firms in Vietnam between 2008 and 2011 and discovered that female directors benefit a firm's financial results. They believe that companies with at least one woman leader outperform organisations with all male leaders and that companies including at least two women board members outperform companies with at least one woman director. The enhanced supervision of diverse committees in poor enterprises in the Vietnamese economy is associated with a good effect on performance. Within the agency theory framework, board composition plays a pivotal role in enhancing the supervisory function of boards, particularly in firms with suboptimal governance, thereby influencing company financial performance. Agency theory emphasises the potential conflict of interest between owners (principals) and managers (agents), advocating for mechanisms that align managers' actions with the owners' interests. Consequently, the board's composition becomes crucial as it seeks to mitigate any misalignment of interests by exerting oversight over managerial actions and decisions, ensuring they are in tandem with shareholders' objectives and thereby positively impacting financial performance.

Additionally, Liu *et al.* (2014) studied publicly traded Chinese corporations from 1999 to 2011; they found that boardroom diversity based on gender is positively connected with corporate accounting performance. They highlight that female board directors' involvement in regular tasks is more significant than the overseeing duty of independent women supervisors. It has a greater impact on the company's operations. According to resource dependence theory, women executive directors

have valuable communication networks, resulting in a greater influence on firm performance. They also indicate that the immature Chinese corporate governance framework would give women directors the advantage of overseeing board debates on complicated problems and minimising the likelihood of decision errors. They find the influence of tokenism and gender preconceptions of the single woman manager. The research suggests that a single female member on the board does not affect firm performance. Still, it confirms the critical mass hypothesis and ensures companies, including at least three women members, have a greater effect on the firm's success.

Post and Byron (2015) found that female board membership is positively connected in economies with more substantial investor protection and a gender-balanced culture. They believe improved owner protection helps corporations from women directors' abilities, skills, and expertise. A gender parity philosophy allows females to obtain suitable human capital and develop a greater quality of female directors, contributing to corporate performance. Shareholders consider social inequalities in human capital and view firms with more gender parity favourably regarding potential earnings.

Similarly, Terjesen *et al.* (2016) analysed publicly traded firms in 47 countries. They concluded that, while independent boards represent an efficient tool for controlling the managerial staff, external independent directors do not enhance a corporation's performance unless the directors are gender diverse. They additionally show that independent female directors improve board growth and efficiency.

Furthermore, Song *et al.* (2020) examined the association between gender diversification and business progress in 320 lodging enterprises listed in the United States from 1993 to 2018. Tobin's Q was employed to assess a company's financial performance. Based on the findings, there is an association between board gender heterogeneity and corporate success. Similarly, Tleubayev *et al.* (2020) discovered a statistically significant connection between board gender diversity and business success in 2016. They used 261 randomly chosen agri-food enterprises as a research sample, and Return on Assets (ROA) and Return on Sales (ROS) determine company performance. Brahma *et al.* (2021) also use data from the FTSE 100 index for corporations traded between 2005 and 2016. Tobin's Q and ROA are used to evaluate the company's performance, and they discovered that female board directors improve

the corporation's performance. Furthermore, organisations with at least three female board members outperform other corporations.

While the positive correlations between gender heterogeneity on boards and corporate financial results are indicated, some research does not agree with the beneficial effects of implementing gender-diversified boards and shows a detrimental effect of implementing additional female board involvement. For instance, Ahern and Dittmar (2012) investigate Norwegian enterprises and argue that firms generate more income when female representation is minimal. When mandated diversity quotas are implemented, the company's performance decreases. They additionally show that the 40 % required gender quota for firms in Norway has led to several corporations hurrying to nominate youthful and inexperienced female directors, negatively impacting corporate performance. They point to a significant conclusion regarding the imposition of mandated gender quotas and seriously question the inadequate hiring policy that forces corporations to boost women's presence on boards to ensure compliance with statutory obligations.

Moreover, the senior management group of a corporation is critical in deciding the firm's performance. Darmadi (2013) examines the performance of firms in Indonesia and discovers an inverse relationship between female executives in upper management and business efficiency. They, therefore, show that it is more difficult for women to represent boards of major corporations, whereas family-controlled corporations are more likely to select female executives for committees. Similarly, Martin-Ugedo and Minguez-Vera (2014) explain the detrimental effect of less risky methods undertaken by including females on the boards of SME enterprises in Spain from 1998 to 2003. Female directors seem unable to affect significant board membership through board decision-making because they are viewed as inferior directors and the only female members on boards (Nielsen and Huse, 2010).

The other research finds no links between gender diversity and corporate performance. According to these experiments, board composition does not affect a corporation's financial results. For instance, Carter *et al.* (2010) found no relation between diverse boards and performance in a set of S&P 500 corporations from 1998 to 2002. They relate the insignificance of females in the boardroom on performance to the

contingent theory, so the influence of gender parity on companies is balanced across numerous businesses and periods. According to Dezso and Ross (2012), based on 15 years of data sets from S&P 500 firms in the United States, female presence in senior leadership increases the financial performance of the companies unless the company strategy is concentrated on invention. They argue that the management characteristic of women bosses in higher administration is an essential modulator of firm progress. Women's participation in senior management boosts the firm's strategy's innovation level. Nevertheless, the data also demonstrate that if the firm's goal is not tied to creativity, gender diversity in senior teams does not substantially impact corporate success.

According to Marinova *et al.* (2016), female directors in Dutch and Danish publicly traded enterprises are quite weak, which is the principal cause for the negligible link between board diversity and business progress. Similarly, Joecks *et al.* (2012) agree with the results of poor women's board involvement and claim that the inconsequential outcomes of diversified boards of directors on firm performance are influenced by the low women's board engagement, making the findings meaningless. The minimal influence of female board involvement on corporate financial outcomes might be attributed to the absence of a noticeable effect since female board inclusion has not reached the critical mass required to contribute significantly to the company's performance. Chappel and Humphrey (2014) similarly investigated the Australian listed firms between 2004 and 2011. According to the research, there is an insignificant negative relation between gender diversity and overall economic success.

Furthermore, there is no discernible difference in performance among organisations with or without female directors. The portfolio technique evaluates the economic impact on the board's diversity. It reveals that larger and more well-known organisations have more diverse boards for commercial purposes rather than financial purposes. Sila *et al.* (2016) discovered no indication that company boards with women's representation increase business risk in non-financial enterprises in the United States. This research employs different GMM parameters to solve the endogeneity issue in board diversity research. Compared to prior conclusions, gender-diversified firms of financial institutions are less risk-averse, and women have a lower risk tolerance than the overall population. They find that a greater percentage of female supervisors on boards are no

more or less risky than on boards with predominantly male supervisors. The results imply that the negative correlations between board composition and business risk are fictitious and mediated by unobserved heterogeneity. Charles *et al.* (2018) demonstrate that board gender heterogeneity does not influence business financial results using Tobin's Q as a performance estimator. This study's data is derived from the S&P 500 index from 1995 to 2010.

2.3 Hypothesis Development

Based on previous research, evidence suggests that women directors significantly affect UK companies' progress (Brahma *et al.*, 2021; Hosny and Elgharbawy,2020). Specifically, research has shown that the participation of women members on corporate boards is positively associated with measures such as Return on Assets and Tobin's Q, which are common indicators of financial performance (Erhardt *et al.*, 2003; Carter *et al.*, 2003; Đặng *et al.*, 2018; Brahma *et al.*, 2021; Hosny and Elgharbawy,2020).

Studies conducted by Terjesen *et al.* (2016) and Brahma *et al.* (2021) concluded a positive and substantial relation between gender diversification on boards and business results, indicating that firms with more women's representation have greater market wealth and accounting returns. Similarly, Bennouri *et al.* (2018) found that women directors improve ROA while decreasing Tobin's Q in the French environment.

Moreover, studies have also suggested that female representation on boards enhances company governance and corporate progress. Adams and Ferreira (2009) indicate that females significantly impact company governance since they are more committed to having discussions, which encourages men to be more engaged in boardroom discussions. Dah *et al.* (2020) revealed that female CEOs are less likely to be ignored when the corporation performs poorly than male CEOs. Additionally, having females in the boardroom indicates that the company does not face discriminatory practices; thus, a positive view is shown to the public (Kaur and Singh 2017). Overall, the previous research indicates a positive relationship between the presence of women members on company boards and financial performance measures such as ROA and Tobin's Q.

Considering the above, the first hypothesis is:

H2.1: Board gender diversity and corporate performance are positively associated.

The association between board gender heterogeneity and company outcomes may differ according to company size. Various studies have investigated this relationship, and the findings have been inconsistent. Carter *et al.* (2003) concluded that gender heterogeneity benefited company performance in smaller firms. Erhardt *et al.* (2003) discovered a beneficial association between gender heterogeneity and company progress, but only in larger firms. In contrast, Haslam *et al.* (2010) concluded an insignificant association between gender diversity and company outcomes, regardless of the firm's size.

Furthermore, the company size has an essential role in various areas of economic research, such as asset pricing (Fama and French 1993), capital structure decisions (Berger and Udell 1995), merger and acquisition decisions (Moeller *et al.* 2004), and board efficiency (Setia-Atmaja 2008). The UK market regulator also enforces different disclosure requirements and governance practices based on the company's size. For example, listed companies in the Alternative Investment Market (AIM) are not required to apply all Corporate Governance Codes (Mallin and Ow-Yong 2008).

Dahya *et al.* (2002) discovered a considerable disparity following the Cadbury guidelines between large and small enterprises. Smaller companies have fewer board committee meetings, delayed boards, fewer independent directors, and fewer female directors than larger companies. Furthermore, previous research has found that larger firms have more non-executive directors (Denis and Sarin 1999) and entrenched CEOs (Hazarika *et al.* 2012), which can contribute to their inadequate level of governance (Farag *et al.* 2014).

The appointment of women members is strongly linked with board efficiency, improved governance, accountability, transparency in financial disclosure, and better decision-making in funding and investment choices (Adams and Ferreira 2009; Chen *et al.* 2016). However, as proxied by larger companies, appointing women members to organisations with excellent governance can lead to over-monitoring.

Based on the above literature, this research hypothesises that:

H2.2: *Gender diversity has a stronger impact on larger firms' performance than on the performance of smaller firms.*

Previous studies have shown that the effect of gender heterogeneity on company performance might differ by industry. For example, some industries may have more gender heterogeneity in their workforce and leadership positions, while others may be more male-dominated. A study by Adams and Ferreira (2009) discovered that the positive impact of gender heterogeneity on corporate results was stronger in industries where females were better represented in the workplace, such as healthcare, consumer goods, and services. Similarly, a study by Rose (2007) reported that gender diversity favoured company performance in the banking industry but not in the technology industry.

Conversely, some studies have discovered an insignificant association between gender diversity and company performance when considering the industry. For example, in their analysis of the FTSE 100 companies, Tien *et al.* (2019) concluded that there is no substantial correlation between gender diversity and corporate outcomes when controlling for industry effects.

Based on the above literature, it is evident that the relationship between board gender diversity and corporate progress might vary by industry. Thus, this study hypothesises that:

H2.3: The relationship between gender diversity and corporate performance is industry-dependent.

2.4 Sampling procedures, Data collection, and Variable Definition

2.4.1   Sampling procedures and Data collection

A panel data design was used for a sample of 737 listed firms in the FTSE ALL SHARE index, except financial and utilities firms, from 2001 to 2020, with 8,545 observations. Financial and utilities firms were removed from the sample because of the uniqueness of their operations, capital structures, and regulatory requirements, making them different from other non-financial organisations (Arun *et al.*, 2015; Klein, 2002). BoardEx provides information on the features of the board of directors. Furthermore, accounting information for the companies in our sample was obtained from DataStream. Because the dataset spans a relatively long period (2001-2020), new companies are

added to the database regularly, and some companies may be delisted, acquired, or merged during this period. Hence, the dataset's structure in this study is an unbalanced panel.

The FTSE All-Share index was selected because it covers approximately 98% of UK market capitalisation and incorporates large-, mid-, and small-cap firms, thereby providing a more representative and comprehensive view of UK corporate governance than narrower indices such as the FTSE 100 or 250. This breadth allows the study to capture heterogeneity across firm sizes and industries, consistent with the research objectives. With respect to firm exits, companies that were delisted, acquired, or merged during the sample period are included up to the year of exit, after which they drop out of the dataset. This approach results in an unbalanced panel and ensures that the analysis avoids survivorship bias while making full use of the available firm-year observations.

Table 2.1 represents the sampling process for the final sample and summarises the firms with N (years) of continuous observations. Table 2.2 shows the sample's distributions per industry group.

Table 2.1 displays the sampling procedures followed in this study, covering 2001 to 2020. The initial sample size in 2001 was 724 companies, which was reduced to 474 after excluding financial and utilities firms (200 firms), and 50 companies were excluded because of missing data, resulting in a final sample size of 474. This procedure was repeated annually, as reported in the table. Noticeable annual fluctuations exist in the number of firms omitted due to being financial and utilities firms, and the absence of relevant data. The number of financial and utilities firms excluded ranged from 162 in 2008 to 282 in 2020. Table 2.1 also presents the number of firms with continuous observations number. It shows that there were 12 firms with only one year of observation, while the largest number of firms (327 firms) had 20 years of continuous observation. Sufficient continuous observations for each firm are essential for conducting panel data analysis, such as year fixed effects regression (FE) or GMM. These methods require panel data, which includes both cross-sectional and time-series variation. The larger the number of continuous observations for each company, the more reliable the analysis results will likely be. Firms with a small number of continuous observations are less valuable in panel data analysis because they provide less

information for the analysis. The number of firms with only one year of observation is relatively small, which indicates that most firms in the sample had a continuous presence in the market throughout the analysis.

Table 2.2 shows the distribution of observations and firms by industry categories in the sample period from 2001 to 2020. This study is based on the ICB (Industry Classification Benchmark), a standardised system for categorising companies and securities based on their primary business activities. The ICB classification system is divided into four levels of increasing specificity: industry, supersector, sector, and subsector. There are 11 industries in the ICB classification system, including Technology, Telecommunications, Healthcare, Financials, Real Estate, Consumer Discretionary, Consumer Staples, Industrials, Basic Materials, Energy, and Utilities (the definition for these groups is reported in *Appendix 2.B*. The financial and utilities were excluded from this research.

The sector with the highest number of observations is Industrials, with 2421 observations, followed by Consumer Discretion, with 2248 observations. These two sectors accounted for approximately 55% of the total observations. In terms of the number of firms, Consumer Discretion had the highest number of firms, with 204, followed by Industrials, with 203 firms. The sector with the lowest number of observations and firms is Telecommunications, with 236 observations and 17 firms. Interestingly, the Basic Materials sector had only 39 firms in the sample, but it had 567 observations. While Industrials and Consumer Discretionary firms represent 55% of the sample observations, the results are not driven solely by these sectors. The inclusion of industry fixed effects controls for sector-specific heterogeneity. This provides confidence that the observed relationships are not confined to a narrow set of industries but are representative across the wider sample.

2.4.2 Variables' Definition

The definition and measurement for all variables are summarised in *Appendix 2.A*. The relevance of these variables is examined in greater depth in the following subsection.

1. Dependent Variable (Firm Performance)

Most studies have employed ROA, Tobin's Q, or both as estimators of a company's performance (Adams and Ferreira, 2009; Nguyen *et al.*, 2015; Tien *et al.*,2019). In this research, we utilised Tobin's Q as a market measurement; it is calculated as the book value of total assets minus the book value of common equity plus the market value of common equity, all divided by the book value of total assets at the end of the financial year, and ROA as an accounting measurement, it is measured by dividing the firm's annual net income at the end of the financial year by the average total assets ((total assets at the end of the previous year plus total assets at the end of the current year) divided by two).

In board gender diversity studies, ROA assesses success by demonstrating to shareholders the level to which the company has produced profits from its invested capital (Epps and Cereola, 2008). ROA reflects management success concerning the available assets, as directors are accountable for employing the company's resources as part of the company's activities. ROA is a performance proxy calculated as a company's annual net income ratio to its average total assets over a financial year.

In research, Tobin's Q has been widely used as a proxy for company performance (Carter *et al.*, 2003; Barnhart *et al.*, 1994). Tobin's Q is preferred over other standard accounting metrics since it assesses a firm's market performance of wealth while emphasising the predicted earnings capability of the corporation. Although most accounting measurements (such as ROA) reflect historical performance, they do not reflect a firm's prospective development and profitability (Demsetz and Villalonga, 2001). As a result, Tobin's Q is an appropriate measure for a business's competitive edge since it evaluates market price and indicates market anticipations for potential profits (Montgomery and Wernerfelt, 1988).

Tobin's Q is calculated as 'total assets minus book value of equity plus the market value of equity, over total assets' (Adams and Ferreira, 2009). Investors anticipate that the business will generate positive returns using available resources if Tobin's Q is more than one. It indicates the firm's significant competitive advantage with development opportunities (Campbell and Mnguez-Vera, 2008; Rose, 2007). A Tobin's Q less than one indicates a poor perspective of resource utilisation, implying that the organisation

fails to generate additional value with its available assets. Because Tobin's Q is a market indicator that reflects the market's expectations of a corporation's economic success, it allows the market to estimate future earnings and evaluate the company's investment.

Table 2.3 shows the statistics summary for the variable of interest, Return on Assets (ROA) and Tobin's Q across the sample period from 2001 to 2020. The table shows the firm's number and the mean, median, standard deviation, and minimum and maximum values for each year. The mean and median values for ROA and Tobin's Q vary across the years, indicating the existence of fluctuations in corporate performance and market value of the companies over time. For instance, the mean ROA value was highest in 2007 (7.35) and 2006 (6.67), while the lowest value was recorded in 2020 (0.91). Similarly, the mean Tobin's Q was highest in 2006 (2.02) and lowest in 2008 (1.43) (as shown in *Appendix* 2.D (*figure* 2.D.1 and *figure* 2.D.2)).

Overall, the average ROA and Tobin's Q values for all the years are 4.54 and 1.74, respectively. These values provide a baseline against which we can compare the results obtained from the econometric models. Additionally, the standard deviation values indicate the extent to which ROA and Tobin's Q values vary from the mean value each year, with larger standard deviations indicating greater variability.

2. **Key Explanatory Variable (Female Percentage)**

The female percentage is measured by (dividing the female number in the boardroom by the total number of directors)*100%. The female percentage represents a more reliable indicator of board gender diversity than the ultimate women members number or a dummy variable attempted to analyse the presentation of women representatives on the board. It is due to the percentage of females on the board that affects the board's size.

Table 2.4 shows the annual statistics of the female percentage on the board from 2001 to 2020. The average percentage of females is 10.61%, with a minimum value of 0 and a maximum of 66.70%. The median is 9.10%, and the standard deviation is 12.06%.

As shown in Table 2.4, the number of companies with at least one female member on the board has risen over the years, from 130 in 2001 to 312 in 2019. The percentage of companies with at least one female member grew from 27% in 2001 to 92% in 2020.

The number of female members on firms' boards has also increased, from 166 in 2001 to 742 in 2020. These statistics demonstrate that the female percentage on boards has increased over the years, with more companies having at least one female member and a higher percentage of companies having at least one female member on the board.

3. Control Variables

This research adds control variables to identify the impact of female involvement on corporate results. Previous studies are used to determine appropriate control variables that could impact the firm's performance. Prior research, such as Schultz *et al.* (2010), has divided these variables into board features and corporate-level groups. We categorise the control variables into two groups: The first category concerns board features such as board size, board independence, and CEO duality.

Board size: The size of the board, defined as the total number of directors at the end of the financial year, often viewed through the lens of agency theory, is postulated to possess a tangible impact on firm performance, with some researchers, such as Adams and Ferreira (2009), positing an inverse relationship between board size and efficiency. Larger boards can potentially exacerbate agency conflicts due to the challenges in coordination and decision-making, leading to a dilution of the oversight role (Jensen, 2010). Lipton and Lorsch (1992) recommend a board size of seven or eight, asserting that beyond this, the board may grapple with inefficiencies, reflecting a consensus in some research circles regarding an inverse relationship between board size and firm outcomes (Bhagat and Black, 2001). Smaller boards, theoretically, can facilitate more effective communication and coordination among directors, enhancing their capacity to strategise and align on organisational objectives.

However, the effects of board size on firm performance are nuanced and may be contingent upon the firm's characteristics and situational contexts. Coles *et al.* (2008) articulate that larger boards can potentially be advantageous for larger enterprises, where the complexity of operations may require diverse expertise and knowledge. Therefore, board size impacts may not be universally applicable but may oscillate based on firm attributes and geographical contexts due to variances in board responsibilities across nations.

Board Independence: Board independence is measured as the percentage of independent directors on the corporate board, delineated as the extent to which a company's board is populated by directors free from managerial influence, pivotal in scrutinising and shaping management actions and decisions (Fama, 1980). In a theoretical framework steered by agency theory, board independence surfaces as a crucial mechanism to mitigate agency conflicts by enhancing the board's capacity to oversee and critically evaluate management activities impartially. Kiel and Nicholson (2003) underscore that a board enriched with independent directors is likely to harness objectivity and unbiased decision-making, which enhances the rigour and quality of board deliberations and decisions.

Furthermore, independent directors, detached from management, are inherently positioned to question and challenge managerial decisions, providing a layer of oversight that could potentially elevate firm performance (Pfeffer and Salancik, 1978). However, the relationship between board independence and firm outcomes has been subject to divergent findings across the scholarly landscape. While Hermalin and Weisbach (2001) found a statistically insignificant relationship between independent directors and firm performance, contrasting studies by Chen and Tjosvold (2013) underscored a positive correlation between board independence, disclosure quality, and enhanced company outcomes.

The empirical landscape further unveils varied perspectives on the board independence-firm performance nexus. Yermack (1996) unearthed a positive correlation between a predominance of independent directors and enhanced market value. Similarly, Core *et al.* (1999) identified a positive trajectory between board independence, profitability, and return on assets. From an economic standpoint, the anticipated coefficient sign between board independence and firm performance is positive, signifying an anticipated positive interplay between these variables. It is congruent with past empirical evidence, underscoring a positive relationship between board independence and firm performance (Core *et al.*, 1999; Yermack, 1996).

CEO duality: CEO duality is a dummy variable with a value of one if the Chief Executive Officer and Chairman are the same members and a value of zero otherwise. The Chairman is tasked with fortifying the conduit between executive management and

the board, ensuring strategic alignment, and orchestrating an efficacious board, as elucidated by Ammari *et al.* (2014). The segmentation between the CEO and Chairman roles, underscored by Jensen and Meckling (1976), is theoretically grounded in agency theory, suggesting that the bifurcation of managerial (CEO) and oversight (Chairman) responsibilities may attenuate agency conflicts, curtail potential abuses of power, and thereby, augment firm performance.

CEO Duality serves as a double-edged sword in corporate governance, on one edge safeguarding efficient decision-making and, on the other, potentially mitigating the efficacy of oversight mechanisms. Carty and Weiss (2012) contend that unifying the CEO and Chairman roles may not proffer tangible benefits and could impede the board's capacity to effectively monitor management due to the concentration of power in a single individual, thereby diminishing the robustness of internal control systems. A cascade of studies underscores a potential inverse relationship between CEO duality and firm outcomes (Dalton *et al.*, 1998), attributing this to deficiencies in oversight and checks and balances on CEO decisions, which could adversely impact firm performance.

Conversely, other scholarly explorations, such as those undertaken by Chen *et al.* (2010), have not discerned a statistically significant relationship between CEO duality and firm outcomes, illuminating this governance structure's multifaceted and context-dependent nature. From an economic standpoint, CEO duality could streamline decision-making and strategic implementation by consolidating leadership; however, it also poses the risk of attenuating the board's objectivity and critical oversight over management decisions and actions.

The second category of variables concerns company indicators. These are as follows:

Firm age: Company age is an essential control variable because it conveys a firm's maturity and experience level, which could influence its efficiency and productivity (Beyer *et al.*, 2012). Companies that have been consistent in the market for a long time could probably prioritise their reputational results. This premise resonates with the findings of Chen *et al.* (2018), who discerned a tangible link between a firm's age and financial performance, suggesting that organisational maturity could be positively correlated with enhanced financial outcomes.

Agency theory underscores the intrinsic agency conflicts between managers and shareholders, which might be ameliorated in older firms through the evolution of robust governance structures honed over years of navigating through internal and external organisational challenges and stakeholder pressures (Black *et al.*, 2006). Older firms, having weathered diverse market conditions and navigated through varied strategic landscapes, might inherently possess more refined governance mechanisms which could, in theory, bolster their financial performance by mitigating agency conflicts and aligning managerial actions with shareholder interests.

Conversely, resource dependence theory provides a lens through which the trajectory of younger firms can be viewed. Coad *et al.* (2013) posit that nascent enterprises might find themselves where fortifying their corporate governance structures becomes imperative to attract resources and optimise their capital structures in the competitive marketplace. Younger firms grappling with establishing their foothold and carving out their niche might need to demonstrate governance prowess to garner external resources and navigate through the complexities of the market, thereby influencing their financial performance.

Firm size: The magnitude of firm size unfurls as a paramount variable, seamlessly intertwining with the tendrils of corporate performance and potentially anchoring variations, particularly through the lens of scale economies. Nguyen *et al.* (2015) elucidate that larger corporations often navigate through the economic seascape with a distinctive advantage, notably accessing financial resources at relatively diminished costs compared to their smaller counterparts, thereby influencing their ensuing financial outcomes. In an empirical light, Dang *et al.* (2018) corroborated a positive linkage between firm size and financial outcomes, indicating that the size of a corporation can be positively correlated with its financial efficacy.

According to theoretical realms, the nuanced relationship between firm size and financial performance can be dissected through agency and resource dependence theories. Roberts and Whited (2013) contend that larger firms, enveloped by their intricate organisational frameworks, necessitate heightened managerial insight and skill, thereby becoming more challenging to navigate and administer. This complexity and the requirement for enhanced oversight and leadership might amplify agency costs,

aligning with the theoretical underpinnings of agency theory that larger firms might encounter heightened agency conflicts due to the expansive divergence between managerial and shareholder interests.

Resource dependence theory might illuminate how larger firms, by their scale, could mitigate dependencies on external resources and stakeholders, thereby refining their financial performance through optimised resource allocation and minimised external dependencies. The theoretical tenet that firms seek to minimise dependencies and safeguard their autonomy might manifest distinctly in larger firms, potentially influencing their financial metrics.

Woven into the narrative of gender heterogeneity on boards and its impact on corporate performance, firm size emerges as a potentially significant variable. Terjesen *et al.* (2016) propound that the effect of gender heterogeneity on corporate performance may be distinctly pronounced in larger firms, attributed to their inherently complex governance structures and multifaceted decision-making processes. Conversely, smaller entities, characterised by potentially simpler governance frameworks, may not witness as significant an impact of gender diversity on corporate outcomes.

Leverage: Leverage is calculated as the total debt divided by the total equity of the firm at the end of the financial year, exemplifying a firm's financial strategy through debt proportion, emerges as a pivotal control variable, notably within board diversity and corporate outcomes, as underscored by Schultz *et al.* (2010) and Adams and Ferreira (2009). The intricate weave of leverage threads through agency and resource dependence theories, potentially impacting corporate performance through varied theoretical and empirical pathways.

Jensen and Meckling (1976) illuminated the potential ramifications of leverage on agency conflicts, navigating through the complex waters of management and shareholder interests. Theoretically, while ostensibly aligned to act beneficially for shareholders, management may witness their strategic decisions being swayed by the firm's leverage, influencing corporate outcomes. Additionally, Khan *et al.* (2012) contend that leverage, particularly debt, is a mitigating force against agency conflicts of free cash flows, constraining corporations from embarking on projects encapsulating negative net present values by necessitating a meticulous and judicious use of resources.

From the resource dependence theory perspective, leverage could amplify a firm's dependency on external financial resources, potentially impacting its autonomy and strategic manoeuvrability, which could subsequently cascade into its financial performance metrics.

The empirical landscape exploring the nexus between leverage and corporate performance, particularly within corporate governance, presents a nuanced picture. Drobetz *et al.* (2004) and Chen *et al.* (2011) unearthed a positive association between leverage and firm performance, albeit predominantly within firms fortified with robust governance structures and high board independence, thereby hinting towards a potential conditional relationship contingent on governance quality. In contrast, Setia-Atmaja (2008) and Yermack (1996) examined the darker alleyways of leverage, elucidating an inverse relationship between leverage and corporate performance, particularly pronounced within firms characterised by fragile governance structures and non-independent boards, respectively.

Net sales: Net sales are measured as the natural log of net sales, which represents gross sales and other operating revenue less discounts, returns and allowances at the end of the financial year. From the lens of agency theory, organisations, especially those with higher net sales, may be navigating through a landscape where investment opportunities are abundant, subsequently driving accelerated growth and enhanced functionality (Ntim, 2015). Barnea *et al.* (2010) and Liu *et al.* (2014) have empirically woven this thread, unearthing a positive correlation between net sales and firm performance, measured through return on assets and Tobin's Q.

Furthermore, resource dependence theory potently accentuates that firms, particularly those with substantial net sales, may be nestled in a complex, multifaceted operational and market environment, necessitating a board that mirrors this diversity to effectively navigate and leverage various resources and opportunities. In this vein, Kulik (2018) enunciated that the affirmative impact of board gender heterogeneity on firm performance might be augmented in companies with heightened net sales due to the intrinsic complexity and diverse customer bases embedded within such firms. A diversified board, reflective of this customer diversity, could potentially harness varied perspectives, thereby enhancing decision-making and strategy formulation.

Gupta and Misra (2020) further adorned this empirical tapestry, revealing that the positive effect of board gender diversity on corporate performance was notably potent within entities marked by substantial net sales, particularly within the crucible of highly competitive industries. They posited that a diverse board within such a vibrant, competitive landscape might be adept at identifying and capitalising on market opportunities, cascading into improved financial performance. Conversely, it is pivotal to navigate through the corridors of contrast, where Huse and Solberg (2006) did not discern a significant influence of net sales (or firm size) on the impact of board gender diversity on firm performance, underscoring the need to investigate and understand the potential contingent, nonlinear, or nuanced relationships embedded within.

Year2012: The Year2012 dummy variable is a crucial control in this study, designed to account for the potential effects of the Davies Report policies on firms' performance. By assigning a value of 1 for the year 2012 and subsequent years and zero otherwise, this variable helps distinguish between the periods before and after implementing the gender diversity guidelines recommended by the Davies Report. Including Year2012 as a control variable allows the study to isolate the impact of board gender diversity on firm performance from other temporal factors that might influence performance over time. This approach ensures that any observed changes in performance can be more confidently attributed to the introduction and influence of the Davies Report's gender diversity policies rather than to unrelated time-based effects.

2.5 Results and Analysis
2.5.1   Univariate Analysis
According to Table 2.5, the ROA mean (median), which is a measure of firm performance, is 4.54 (5.65), which is qualitatively similar to the findings of Hosny and Elgharbawy (2020), who determined that the average ROA equals 6.69 for FTSE 350 companies during the period 2013-2019. Note that all FTSE 350 companies are included in the FTSE ALL SHARE index, including smaller companies. Therefore, the average FTSE 350 company is larger than the average company in the FTSE ALL SHARE index. Companies with a strong ROA promote efficient use of their assets to earn revenue. Companies with the highest ROAs have values of 69.85, while companies with

the lowest ROAs have -58.97. Note that the mean (median) of Tobin's Q of 1.74 (1.39) reveals that most firms in this sample efficiently employ corporate resources and create a positive return for shareholders. It is in line with the results of Brahma *et al.* (2021), who determined 1.85 as the Tobin's Q mean. Although this study's sample covers the FTSE All-Share index rather than the FTSE 350, the figures remain broadly consistent with prior studies. The FTSE 350 is a subset of the FTSE All-Share and represents the largest firms, while the inclusion of smaller firms in the All-Share index lowers the overall averages for ROA and Tobin's Q. This explains the slight differences in means across studies, while still demonstrating qualitative comparability.

The mean of the female percentage is 10.61%, or 0.1061. The female percentage is the female director's percentage to the total size of a corporate board; this statistic is considerably higher than the 0.05 observed by Gregory-Smith *et al.* (2014) from 1996 to 2011. Males continue to dominate the board of directors' positions in businesses. The highest value of female representation is 66.7%, while the minimum is zero, suggesting that firms have no female directors on their boards.

The board size average is approximately eight members, as shown in this table, consistent with Guest (2009). A company's board size has several consequences. First, it establishes the scope of knowledge and experience that controls the corporation. More directors imply a broader range of expertise in various management fields. The mean rate of board independence is 50%, which equals the minimum rate by the UK corporate governance code (50%), and the average rate of duality is 0.03, which is consistent with Hosny and Elgharbawy (2020), revealing a mean of 0.08 for CEO duality. The average market leverage is 22%, comparable to the 51% reported in the Pasaribu (2017) study. Finally, the average firm age is roughly 34 years, from 1 to 117 years, like Brahma *et al.* (2021).

In Table 2.6, correlation analysis was performed to determine whether the correlation between the independent variables was high enough to create multicollinearity. As presented in Table 6, the female percentage positively correlates with company performance indicators (ROA and Tobin's Q). However, company age and net sales negatively correlate with Tobin's Q but positively with ROA. Furthermore, firm size positively correlates with ROA and Tobin's Q, whereas leverage negatively correlates

with ROA and Tobin's Q. Overall, correlations between variables are less than 0.70. Nevertheless, the study conducted a variance inflation factor (VIF) test for the variables after each regression, and the values of the variables were below the benchmark of 5. Thus, the correlation matrix and VIF support the idea that multicollinearity is not a problem in this research.

2.5.2 Multivariate analysis

A panel data design was used for a sample of 737 listed companies in the London Stock Exchange, except financial and utilities firms, from 2001 to 2020, with 8,545 observations. Hence, the dataset's structure in this study is an unbalanced panel. Performing a balanced panel data analysis in which all companies must have the same observation numbers may result in an unfavourable sample size (Hillier *et al.*, 2011). Thus, unbalanced panel data analysis, including companies that no longer exist, is more appropriate for this study. Because this is a panel dataset, the residuals may correlate strongly in both dimensions. Therefore, clustered standard errors are determined at the company level to account for heteroskedasticity and correlation within companies (Petersen, 2009).

It has been noted that board structures, including female directors, are not exogenous regarding a firm's performance (Hermalin and Weisbach, 2003). Therefore, the endogeneity problem has become a well-known challenge in corporate finance literature, which could affect the research inference if not addressed (Adams and Ferreira, 2009). First, this approach could be susceptible to reverse causality, which means corporate performance may influence female representation. According to Joecks *et al.* (2012), female managers are more likely to be hired into greater businesses personally, so corporations are more likely to assign females as directors (Singh *et al.*, 2001). This is because they are more flexible and can take a chance on hiring a female director (Gregory-Smith *et al.*, 2014) or because they are under pressure to achieve targets in the Hampton-Alexander review (2016).

Second, omitted variables might have biased the coefficients about the impact of gender board diversification and company results. Greater female participation, for example, seems to be highly probable because the closer the industry is to female consumers, the

more moral the corporation is (Brammer *et al.*, 2007; Bernardi *et al.*, 2009). According to Hillman *et al.* (2007), institutional indicators such as business type, company strategy, and connections towards other committees with female members all affect the probability of female participation on the boards. Because the indicators influencing gender diversity are numerous, a ratio of omitted variable bias appears inescapable despite attempts to reduce it within the model specification.

Third, the 'dynamic issue' is discussed by Wintoki *et al.* (2012), who explains that any changes, whether in current corporate governance or a firm's performance, are a result of past performances of that firm, suggesting that dynamic endogeneity is addressed with a generalised method of moments (GMM); an approach proposed by Arellano and Bond (1991).

Following Joecks et al. (2012), I employ the panel data method to address prospective endogeneity issues, with the year fixed effects method (FE) solving the problem of time-constant omitted variables (Wooldridge, 2009). Additionally, this study employs Blundell and Bond's (1998) two-step system GMM panel regression estimates to contend with endogeneity since the dynamic association between board gender diversity and corporate results (Adams and Ferreira, 2009). In specifying the dynamic panel regressions, ROA_t-2 rather than ROA_t-1 . This choice is consistent with the econometric literature, which cautions that using the first lag of performance as an instrument may generate correlation with contemporaneous shocks, leading to biased estimates (Nickell, 1981; Roodman, 2009). By relying on two-period lags, the models reduce the risk of serial correlation between instruments and errors, thereby satisfying the Arellano–Bond moment conditions. This approach also aligns with corporate governance studies (e.g., Wintoki et al., 2012; Joecks et al., 2012), which employ longer lags to address the persistence of financial performance measures. Using ROA_t-2 therefore ensures more robust and valid instruments in capturing the dynamic relationship between board gender diversity and firm outcomes.

The lagged dependent variables (ROA, Tobin's Q) are treated as endogenous because past firm performance is likely correlated with current performance, creating dynamic endogeneity (Wintoki et al., 2012). Similarly, variables such as female percentage, board size, board independence, CEO duality, leverage, net sales, and the policy dummy

(Year2012) are considered potentially endogenous, as they may be jointly determined with firm performance or influenced by unobserved shocks. These are therefore instrumented using their own lagged values. In contrast, firmage, firm size, and industry dummies are classified as exogenous instruments. Firm age and size evolve more slowly and are less likely to be driven by contemporaneous performance shocks, while industry dummies capture structural sectoral differences that are predetermined and exogenous to firm-level governance dynamics. This classification is consistent with prior corporate governance research and ensures the instrument set is both theoretically justified and econometrically valid (Roodman, 2009; Wintoki et al., 2012).

Table 2.7 presents the results of the analysis of the impact of female directors on ROA. The year Fixed Effects (FE) results and the two-step system Generalised Method of Moments (GMM) models indicate a negative and statistically significant relationship between the percentage of female directors on boards and ROA. Specifically, the coefficient for the female percentage variable in the FE model is -0.647 (significant at the 1% level), while the GMM model reports a coefficient of -0.139 (also significant at the 1% level). These findings suggest that increased female board representation is associated with decreased firm performance as measured by ROA.

The negative and significant relationship observed is consistent with previous research, such as Adams and Ferreira (2009), Carter *et al.* (2010), and Ahern and Dittmar (2012), which also found that increased female representation on boards does not necessarily enhance firm performance. This result rejects the first hypothesis (H2.1), positing a positive association between board gender diversity and corporate performance.

The control variables in the model show consistent results across both estimation methods. Firm size is positively and significantly correlated with ROA, with coefficients of 3.634 (significant at the 1% level) in the FE model and 3.434 (significant at the 1% level) in the GMM model, indicating that larger firms tend to perform better. On the other hand, firm age and board size are negatively correlated with ROA, with significant coefficients of -0.353 and -0.356 in the FE model and -1.070 and -1.150 in the GMM model, respectively. It suggests that older firms and those with larger boards may experience diminished performance.

The Year2012 variable, included as a control to capture the effect of the Davies Report policies, is also negative and significant in both models. The FE model reports a coefficient of -1.572 (significant at the 1% level), while the GMM model reports a coefficient of -1.273 (significant at the 1% level). It indicates that implementing the Davies Report policies is associated with declining firm performance. It may reflect the initial adjustment period or challenges firms faced when increasing female board representation in response to the policies. The negative and significant coefficient on the Year2012 variable suggests that the introduction of the Davies Report policies coincided with a short-term decline in firm performance. This likely reflects an initial adjustment period, during which firms incurred restructuring and recruitment costs, and newly appointed female directors required time to integrate into board processes and decision-making. These transitional effects may have temporarily outweighed the longer-term benefits of improved board diversity.

Interpreting the significant negative relationship between female board representation and ROA within the agency theory framework, it could be argued that increasing female representation might introduce coordination costs, slower consensus-building, or tokenism effects, particularly when women remain a small minority. These complexities can initially disrupt board dynamics and reduce efficiency in decision-making, which may explain why greater diversity does not always translate into improved short-term financial performance.

These results are in line with studies from other markets, such as Norway, where the implementation of mandated gender quotas led to a negative impact on firm performance, as reported by Ahern and Dittmar (2012). Like the UK, Norway's experience with gender diversity policies suggests that while increasing female board representation improves governance and performance, the short-term economic impact may be negative, particularly if the appointments are made primarily to meet regulatory requirements rather than enhance board effectiveness. The expectation of short-term impacts arises because voluntary or mandated diversity initiatives often require rapid board adjustments, generating recruitment costs, integration challenges, and transitional frictions. These factors may temporarily depress financial performance, as observed in both the UK and Norway. However, the longitudinal design of this study (2001–2020) allows the distinction between short-term adjustment costs and longer-term structural

effects. The Year2012 policy dummy captures immediate post-Davies changes, while the extended data period enables assessment of whether the diversity–performance relationship stabilises or improves once new directors are embedded into board processes.

Table 2.8 presents the analysis of the impact of female directors on ROA with a specific focus on firm size. The results indicate a nuanced relationship between female board representation and firm performance, depending on whether the firm is classified as small or large based on market capitalisation. For small firms, the mean percentage of female directors is 7.24%, while for large firms it is 16.14%. This disparity suggests that larger firms were quicker to increase female representation, likely due to greater scrutiny and external pressure, which may also explain why the negative short-term performance effects are more pronounced among large firms. For small firms, diversity on the board does not affect the firm's performance in any way, with coefficients of -0.416 and -0.760, respectively. In contrast, the female percentage variable demonstrates a significant negative relationship with ROA for large firms. Specifically, the FE model reports a coefficient of -0.626 (significant at the 1% level), while the GMM model reports a coefficient of -0.217 (also significant at the 1% level). These findings suggest that increasing female board representation is associated with decreased firm performance, particularly for larger firms.

The negative and significant impact of female board representation on ROA in large firms could be interpreted within agency and resource dependence theory frameworks. From an agency theory perspective, introducing more female directors may add complexity to board dynamics, potentially leading to less efficient decision-making in larger organisations, where coordination and consensus-building are already more challenging. On the other hand, resource dependence theory suggests that while female directors may bring valuable external resources and networks, these resources' integration and strategic use might not be as effective in larger firms, possibly due to the more complex and established nature of their operations.

The results for the control variables are largely consistent across both firm sizes. Firm size shows a positive and significant correlation with ROA in small and large firms, indicating that larger companies within each category tend to perform better financially.

For instance, in the FE model for large firms, a one-unit increase in log firm size is associated with a 3.423 percentage-point increase in ROA, relative to a sample mean of 4.54%. This indicates that larger firms are more efficient in asset utilisation, likely reflecting economies of scale, enhanced market power, and greater access to financial and managerial resources.

Firm age exhibits a negative relationship with ROA, but this relationship is significant only in large firms, with coefficients of -1.416 (significant at the 5% level) and -0.243 (significant at the 1% level) in the FE and GMM models, respectively.

Board size negatively impacts ROA across small and large firms, with significant coefficients in all models suggesting that larger boards may be less effective in driving firm performance. The coefficients for board size are -0.451 (significant at the 5% level) and -0.849 (significant at the 5% level) for small firms in the FE and GMM models, respectively, and -0.245 (significant at the 5% level) and -0.571 (significant at the 1% level) for large firms. Interestingly, board independence and CEO duality do not significantly correlate with ROA in either firm size category. This indicates that these governance factors might not play a crucial role in influencing performance in this context.

Leverage consistently shows a significant negative relationship with ROA, reflecting the financial burden and risk associated with higher debt levels. The coefficients for leverage are -1.837 (significant at the 1% level) and -1.736 (significant at the 1% level) for small firms, and -1.866 (significant at the 1% level) and -1.997 (significant at the 1% level) for large firms. Net sales also show a significant negative correlation with ROA in small and large firms, suggesting that higher sales do not necessarily translate into better financial performance, possibly due to increasing costs or inefficiencies.

The Year2012 variable, included to capture the effect of the Davies Report policies, is negative and significant across all models. For small firms, the coefficients are -0.902 (significant at the 1% level) in the FE model and -1.055 (significant at the 1% level) in the GMM model. For large firms, the coefficients are -1.052 (significant at the 1% level) in the FE model and -1.383 (significant at the 1% level) in the GMM model. This consistent negative impact suggests that implementing the Davies Report policies was

associated with a decline in firm performance across both small and large firms, potentially due to the challenges of adapting to the new gender diversity guidelines.

These findings lead to the rejection of the second hypothesis (*H2.2*), which posited that gender diversity would have a stronger positive impact on the performance of larger firms compared to smaller ones. Instead, the results indicate that the negative effects of female board representation are more pronounced in larger firms, contrasting with some prior studies, such as Pasaribu (2017), which found a positive relationship between gender diversity and firm performance in smaller firms and a less significant negative relationship in larger firms. The divergence in results could be attributed to differences in the regulatory environments and market conditions between the UK, where this study is conducted, and other markets, such as Indonesia, examined in Pasaribu's study. In the UK, where there has been a strong push for gender diversity on boards through initiatives like the Davies Report, the short-term impact on firm performance appears negative, particularly in larger firms where integrating diverse perspectives might be more challenging.

Table 2.9 analyses the impact of female board representation on ROA across various industries. The results reveal that the relationship between the percentage of female directors and ROA is generally negative, though it is statistically significant only in the industrial and real estate sectors. Specifically, for the industrials group, the FE model reports a coefficient of -1.049 (significant at the 1% level), while the GMM model reports a coefficient of -1.432 (significant at the 1% level). Similarly, in the real estate sector, the FE model shows a coefficient of -1.143 (significant at the 5% level), and the GMM model reports a coefficient of -1.596 (significant at the 1% level). These findings suggest that in these specific industries, increasing female board representation is associated with a decline in firm performance, as measured by ROA.

Interestingly, the technology sector shows a positive, albeit statistically insignificant, relationship between female board representation and ROA, with coefficients of 0.996 in the FE model and 1.545 in the GMM model. This suggests that having more women on boards might have a potentially positive impact on performance in technology firms, although the evidence is not strong enough to be conclusive.

The Year2012 variable, included to control for implementing the Davies Report policies, shows a negative relationship with ROA across most industries, although this is statistically significant only in certain sectors. For instance, in the consumer staples industry, the FE model reports a coefficient of -1.422, and the GMM model reports -0.991, neither of which is statistically significant. However, in the telecommunications industry, the coefficients are -1.788 in the FE model and -1.980 in the GMM model, indicating a significant negative impact. This suggests that the introduction of the Davies Report policies may have disrupted firm performance in certain sectors, as firms faced accelerated recruitment pressures, integration challenges for new directors, and sector-specific barriers, such as limited pipelines of qualified female candidates in male-dominated industries. These transitional factors likely created short-term frictions, which may explain the negative performance effects observed in industries such as telecommunications.

The negative relationship observed in certain industries, particularly in industrials and real estate, may be interpreted through the agency theory perspective. Introducing more female directors may initially complicate decision-making because greater diversity brings a wider range of perspectives that can extend deliberation and slow consensus-building. In industries with traditionally male-dominated leadership, cultural resistance or tokenism effects may also create transitional frictions in boardroom dynamics. These challenges are typically short-term, and once inclusivity improves, diversity is expected to strengthen rather than hinder decision-making. This could lead to inefficiencies or conflicts that negatively impact performance. On the other hand, resource dependence theory would suggest that while female directors could bring valuable external resources and perspectives to the board, these benefits might not be fully realised in certain industries, either due to the nature of the industry itself or because of potential resistance to change within the firm's culture.

The control variables in the analysis provide additional insights. Firm size shows a consistently positive and significant correlation with ROA across all industries, suggesting that larger firms tend to perform better financially. On the other hand, firm age is negatively correlated with ROA in all groups, indicating that older firms may struggle to maintain high-performance levels, possibly due to outdated practices or resistance to innovation.

Board size shows a significant negative relationship with ROA in the consumer discretion, healthcare, technology, and telecommunications sectors. This suggests that in these industries, larger boards may be less effective in driving firm performance, possibly due to difficulties in coordination or slower decision-making processes. Leverage and net sales generally correlate negatively with ROA across all industries, indicating that higher levels of debt and sales do not necessarily translate into better financial performance. This is likely due to the increased financial risk and operational costs associated with higher leverage and sales volumes.

The hypothesis (*H2.3*), which posits that the relationship between gender diversity and corporate performance is industry-dependent, is partially supported by these findings. Evidence shows that the effect is negative and significant in industrial and real estate sectors, while in other sectors, such as technology, the relationship is positive but insignificant. This indicates that industry context does matter, although the strength and direction of the effect vary across sectors, hence only partial rather than full support for the hypothesis.

Additionally, entrenched gender biases or cultural norms in specific sectors may resist or undervalue the contributions of female leaders, limiting their effectiveness. Some industries prioritise short-term financial performance over long-term strategy, potentially undermining the benefits of diverse boards, which often have a more significant impact over time. Moreover, industries with more diverse customer bases, such as technology, might see stronger positive correlations between gender diversity and performance as boards reflect and understand their markets better.

In contrast, sectors like real estate or industrials may show differing results due to operational differences and capital-intensive business models. Challenges also arise when gender diversity is implemented through tokenism rather than meaningful inclusion, particularly in traditional sectors, or when female board members lack sector-specific experience, impacting their ability to contribute effectively. Finally, industries that are slower to adapt to regulatory changes or operate under different compliance requirements for diversity may initially show negative or negligible impacts. These results align with the findings of other studies, such as those by Ahern and Dittmar (2012), which observed industry-specific effects in the context of Norway's gender

quota policies. Like the UK, Norway also experienced challenges in specific industries when increasing female representation on boards, suggesting that the impact of gender diversity on firm performance is indeed context and industry-dependent. Table 2.10 offers a comprehensive analysis of the impact of female directors on ROA before and after the implementation of the Davies Report policies in 2012. The study splits the sample into two periods to capture the effect of the policy change on the relationship between board gender diversity and firm performance.

As shown in Table 2.10**,** before 2012, the effect of female board representation on firm performance was statistically insignificant, indicating that an increase in the proportion of female directors did not have a measurable impact on ROA during this period. However, after implementing the Davies Report 2012, the relationship between gender diversity and firm performance became negative and statistically significant. The FE model reports a coefficient of -0.492 (significant at the 1% level), while the GMM model reports a coefficient of -0.104 (also significant at the 1% level). This suggests that post-2012, an increase in female board representation is associated with a decrease in ROA.

This shift in significance highlights the potential challenges of implementing gender diversity policies. The adverse effect observed after the Davies Report could reflect short-term adjustments in response to mandated diversity targets, including potential issues such as tokenism or insufficient alignment between the newly appointed directors' skills and the firm's strategic needs. Alternatively, it could indicate underlying structural or cultural resistance in certain firms or industries that might have impacted the effectiveness of newly diverse boards. These findings emphasise the importance of considering the context and implementation strategies when assessing the impact of gender diversity on corporate performance.

The observed shift in the relationship could be attributed to the challenges that firms faced in implementing the new gender diversity guidelines. The transition to a more gender-diverse board may have initially disrupted board dynamics and decision-making processes, leading to a temporary decline in firm performance. This effect might also be due to the focus on meeting diversity targets, which could have led to the appointment of directors who, while increasing gender diversity, may not have had the necessary experience or industry-specific expertise, thus negatively affecting performance.

Understanding that the negative relationship observed after 2012 does not imply that female directors inherently reduce firm performance is crucial. Instead, this finding likely reflects the short-term adjustment costs associated with significant changes in corporate governance practices, as evidenced by the empirical analysis, which remains crucial for quantifying the timing, magnitude, and sectoral variation of these effects. The Davies Report's policies brought about a substantial shift in board composition norms, and the initial phase of adjustment might have introduced challenges that temporarily impacted performance. As companies and boards adapt to these changes and fully leverage the diverse perspectives brought by female directors, the impact on performance may change over time. Therefore, the negative effect observed in this study could be a temporary phase during the adjustment period following the policy implementation, which, consistent with evidence from comparable governance reforms, is likely to span three to five years as boards adapt and new directors consolidate their roles.

These findings are consistent with previous studies in other markets implementing similar gender diversity policies. For instance, Ahern and Dittmar (2012) found that introducing mandatory gender quotas in Norway initially led to declining firm performance as companies rushed to comply with the new regulations. Similarly, the Davies Report's voluntary guidelines in the UK appear to have had a short-term negative impact on performance, particularly as firms adjusted to the new expectations.

2.5.3   Robustness check

To ensure the robustness of our findings, we conducted additional analyses using Tobin's Q as an alternative measure of firm performance. Tobin's Q is often considered less susceptible to managerial manipulation than accounting-based measures like ROA (Papangkorn *et al.*, 2019), making it a suitable metric for evaluating the market's perception of a firm's long-term operational outcomes.

Table 2.11 examines the impact of female directors on Tobin's Q, providing a robustness check against the earlier results using ROA. The findings reveal a significant negative relationship between the percentage of female directors on boards and Tobin's Q, consistent with the results reported in Table 2.7. Specifically, the Fixed Effects (FE)

model reports a coefficient of -0.207 (significant at the 1% level), and the Generalised Method of Moments (GMM) model reports a coefficient of -0.710 (significant at the 1% level). These results suggest that the market may perceive an increase in female board representation as a negative signal, potentially due to concerns about the rapid implementation of diversity policies rather than the inherent value of gender diversity.

Table 2.12 presents the impact of female directors on Tobin's Q based on firm size. For small firms, the relationship between female board representation and Tobin's Q remains negative but statistically insignificant, with coefficients of -0.128 in the FE model and -0.231 in the GMM model. In contrast, large firms show a significant negative relationship, with coefficients of -0.445 (significant at the 1% level) in the FE model and -0.595 (significant at the 1% level) in the GMM model. These findings align with the earlier ROA analysis, as shown in Table 2.8, where the negative impact of female board representation was more pronounced in larger firms. The results may reflect the complexities and challenges associated with integrating gender diversity in larger, more established companies, where traditional governance structures might resist change, thereby affecting market perceptions and firm valuation.

Table 2.13 examines the relationship between female directors and Tobin's Q across different industries. The results mirror those found using ROA, as shown in Table 2.9, showing a generally negative but statistically insignificant relationship between female board representation and Tobin's Q across most industries. However, the relationship is negative and significant in the industrial and real estate sectors, with the FE model reporting a coefficient of -0.417 (significant at the 1% level) and -0.713 (significant at the 1% level), respectively. These findings suggest that in industries where operational efficiency and traditional hierarchies are particularly valued, the market might react unfavourably to increased female board representation, perhaps due to perceived disruptions in established governance practices.

Conversely, the technology and telecommunications sectors show an insignificant positive relationship with Tobin's Q, indicating that in more innovation-driven industries, gender diversity may be viewed more favourably, albeit not strongly enough to impact market valuation significantly. These results could imply that female directors

might align better with market expectations in sectors where adaptability and new perspectives are crucial, although the impact is not yet substantial.

Finally, Table 2.14 analyses the impact of female directors on Tobin's Q before and after implementing the Davies Report policies. Similar to the ROA-based analysis in Table 2.10, the results show that before 2012, the presence of female directors did not significantly impact Tobin's Q, with the FE model reporting a coefficient of -0.193 and the GMM model reporting -0.485, both statistically insignificant. However, after the implementation of the Davies Report, the relationship became significantly negative. The FE model reports a coefficient of -0.356 (significant at the 5% level), and the GMM model reports -0.172 (significant at the 1% level). These findings suggest that the market reacted negatively to the increased female representation on boards following the policy implementation, possibly due to concerns about the rapid changes in board composition and the potential short-term disruptions these changes could cause.

The robustness checks using Tobin's Q reinforce the earlier findings based on ROA, confirming that the increased female representation on boards, particularly following the Davies Report, is associated with a negative impact on firm performance. From an economic perspective, these results might indicate market scepticism regarding the effectiveness of gender diversity initiatives, particularly in the short term. The market may perceive these initiatives as potentially disruptive, especially if they are seen as compliance-driven rather than value-driven.

Within the frameworks of agency theory and resource dependence theory, these findings suggest that while increasing gender diversity can theoretically enhance board oversight and access to valuable external resources, the practical implementation of these changes might introduce challenges. For instance, agency theory would suggest that more diverse boards might face coordination difficulties or conflicts that could reduce decision-making efficiency. On the other hand, resource dependence theory might argue that the benefits of diversity, such as improved external relations and resource access, are not immediately apparent or valued by the market, particularly if the new directors are perceived as lacking industry-specific expertise.

2.6 Conclusion

In response to the growing pressure on UK firms to enhance gender diversity in boardrooms, this research aimed to assess the impact of female directors on organisational performance, focusing on the effects of policy implementation, firm size, and industry context. The study utilised fixed effects and two-step system GMM methodologies to analyse panel data from 737 listed firms on the London Stock Exchange from 2001 to 2020.

The findings reveal a significant and complex relationship between female board representation and firm performance, as measured by ROA and Tobin's Q. Contrary to the expectations that increased gender diversity would enhance firm performance, the results consistently show a negative impact. This negative relationship is particularly pronounced in larger firms, where the integration of female directors appears to present more challenges, potentially due to established governance structures and operational complexities. The relationship remains negative in smaller firms but is less pronounced and often statistically insignificant.

The analysis also uncovered industry-specific variations in how female board representation affects firm performance. In sectors like industrials and real estate, introducing more female directors is associated with a significant decline in performance, which may reflect the disruption of traditional decision-making processes in industries where male-dominated leadership has historically been the norm. Conversely, in the technology sector, the relationship is slightly positive, though not statistically significant, suggesting that the benefits of gender diversity may be more easily realised in industries driven by innovation and adaptability.

A key contribution of this study is its examination of the impact of policy implementation on the relationship between gender diversity and firm performance. The findings indicate that introducing the Davies Report policies in 2012, which aimed to increase female representation on boards, negatively impacted firm performance. This suggests that while the policies successfully increased gender diversity, the rapid changes in board composition may have initially disrupted corporate governance and decision-making processes, leading to a decline in performance.

These results have important implications for companies, board members, decision-makers, and policymakers. For companies, the findings highlight the need for a strategic approach to increasing gender diversity on boards, ensuring that new appointments bring relevant expertise and sector-specific skills that enhance board effectiveness rather than serving merely to satisfy numerical targets. For policymakers, the study underscores the importance of considering the potential short-term economic impacts of gender diversity initiatives and of providing ongoing support, such as director training, pipeline development, and guidance on best practices, to help firms adjust to new governance practices.

However, this research has certain limitations. Despite significant advances in female representation on boards during the study period, the average proportion of female directors remains relatively low, which may limit the ability to capture the relationship between gender diversity and corporate performance fully. Future research should revisit this topic as female representation increases, exploring potential non-linear correlations or the critical mass theory.

Another limitation is the scope of the data. The study focused on non-financial firms from the FTSE ALL SHARE index, excluding financial and utilities companies. While the findings apply to non-financial firms, they may not extend to other sectors. Future research should consider a broader dataset that includes financial firms and analyse the impact of gender diversity in different regulatory environments and market conditions. Additionally, further studies could incorporate alternative theories, such as social identity theory, to examine these associations from various perspectives and employ cross-country comparisons to investigate differences in board gender diversity between voluntary and quota-based systems. Future research could also investigate other dimensions of board composition, such as age, ethnicity, and cultural background, while accounting for corporate structure and liquidity (i.e., a firm's short-term financial flexibility and ability to meet obligations, which may interact with governance practices to shape performance outcomes).

Table 0.1: Sample distribution over the years

Year	Initial sample	Excluded financial and utilities firms	Excluded firms with missing data	Final sample	Number of years with continuous observations	Number of firms having continuous observations
2001	724	200	50	474	1	12
2002	702	196	0	506	2	21
2003	702	169	0	533	3	45
2004	709	173	0	536	4	65
2005	683	163	0	520	5	44
2006	698	195	0	503	6	57
2007	674	195	0	479	7	40
2008	619	162	0	457	8	29
2009	623	190	0	433	9	28
2010	627	209	0	418	10	22
2011	624	221	0	403	11	27
2012	605	225	0	380	12	14
2013	623	245	0	378	13	14
2014	644	258	13	373	14	26
2015	643	260	12	371	15	22
2016	636	264	0	372	16	20
2017	641	272	0	369	17	18
2018	637	274	0	363	18	22
2019	629	281	0	348	19	33
2020	609	282	0	327	20	178

This table summarises the annual distribution of observations during the sample period from 2001 to 2020. Financial and utilities companies are excluded. It also shows the number of firms with continuous observations from 2001 to 2020.

Table 2.2: Distribution of observations and firms by industry

No.	Category	Number of Observations	Number of firms
1	Basic Materials	567	39
2	Consumer Discretion	2248	204
3	Consumer Staples	551	53
4	Energy	348	30
5	Health Care	501	51
6	Industrials	2421	203
7	Real Estate	770	52
8	Technology	903	88
9	Telecommunications	236	17
	Total	**8545**	**737**

This table summarises the distribution of observations and firms by industry category from 2001 to 2020. The industry classification is based on ICB (Industry Classification Benchmark), a standardised system for categorising companies and securities based on their primary business activities (*see Appendix 2.B*). There are 11 industries in ICB; financial and utilities firms were excluded from the sample due to the uniqueness of their operations, capital structure, and regulatory requirements, making them different from other non-financial organisations (Arun *et al.*, 2015; Klein, 2002).

Table 2.3: Summary statistics of firm performance indicators (dependent variable)

Year	Variable	Obs	Mean	Std Dev.	Min	25%	Median	75%	Max
2001	ROA	474	3.38	11.57	-53.13	1.25	5.44	8.98	34.11
	Tobin's Q		1.78	1.36	0.40	1.04	1.36	2.08	12.62
2002	ROA	506	2.40	12.10	-51.59	1.06	4.46	8.18	40.86
	Tobin's Q		1.51	0.92	0.24	0.97	1.25	1.71	8.52
2003	ROA	533	2.22	12.22	-56.65	0.71	4.51	8.07	44.42
	Tobin's Q		1.61	1.29	0.48	1.01	1.24	1.77	13.83
2004	ROA	536	3.32	12.25	-58.74	0.97	5.09	8.87	50.41
	Tobin's Q		1.80	1.15	0.71	1.14	1.49	2.03	11.03
2005	ROA	520	4.56	12.23	-58.97	1.74	6.17	10.27	47.85
	Tobin's Q		1.90	1.11	0.70	1.23	1.58	2.18	10.94
2006	ROA	503	6.67	13.18	-54.93	3.73	7.55	11.00	69.80
	Tobin's Q		2.02	1.16	0.73	1.32	1.67	2.32	10.44
2007	ROA	479	7.35	13.33	-58.97	3.77	7.53	11.87	69.85
	Tobin's Q		1.95	1.30	0.59	1.21	1.59	2.24	11.92
2008	ROA	457	4.21	13.38	-58.13	0.88	5.95	9.69	65.80
	Tobin's Q		1.43	1.08	0.20	0.89	1.16	1.60	10.79
2009	ROA	433	1.39	13.24	-58.89	-1.52	3.63	8.00	61.81
	Tobin's Q		1.45	1.13	0.29	0.95	1.18	1.63	15.64
2010	ROA	418	5.70	9.48	-49.06	2.68	5.98	9.98	40.08
	Tobin's Q		1.61	1.26	0.49	1.03	1.26	1.81	15.96
2011	ROA	403	5.69	10.95	-51.94	2.65	6.18	9.79	66.95
	Tobin's Q		1.51	0.96	0.34	0.96	1.25	1.71	8.73
2012	ROA	380	5.65	10.55	-55.47	2.71	6.28	10.93	39.78
	Tobin's Q		1.63	1.06	0.33	1.02	1.30	1.85	9.37
2013	ROA	378	5.21	10.02	-58.30	2.47	6.05	9.55	38.22
	Tobin's Q		1.82	1.12	0.24	1.09	1.47	2.10	9.54
2014	ROA	373	5.84	12.22	-53.22	2.24	6.41	10.94	64.20
	Tobin's Q		1.89	1.28	0.43	1.13	1.54	2.26	10.88
2015	ROA	371	5.14	11.57	-52.32	2.11	6.21	10.28	39.93
	Tobin's Q		1.86	1.21	0.37	1.10	1.55	2.15	10.02
2016	ROA	372	5.20	11.19	-52.69	2.43	5.75	9.66	50.29
	Tobin's Q		1.84	1.30	0.30	1.07	1.50	2.11	11.05
2017	ROA	369	6.45	10.43	-52.30	2.63	5.98	10.64	57.96
	Tobin's Q		1.95	1.40	0.51	1.13	1.59	2.23	11.17
2018	ROA	363	6.02	10.62	-41.69	2.45	5.80	10.76	62.56
	Tobin's Q		1.75	1.27	0.39	1.03	1.33	2.03	9.33
2019	ROA	348	4.47	10.51	-58.94	1.44	5.29	8.96	54.53
	Tobin's Q		1.87	1.46	0.34	1.07	1.40	2.14	11.80
2020	ROA	327	0.91	11.53	-54.66	-3.06	2.95	6.84	44.58
	Tobin's Q		1.73	1.35	0.23	1.01	1.32	1.93	13.73

This table presents the descriptive statistics for the main variables of interest, namely ROA and Tobin's Q, from 2001 to 2020. *ROA* is measured by dividing the firm's annual net income at the end of the financial year by the average total assets ((total assets at the end of the previous year plus total assets at the end of the current year) divided by two). *Tobin's Q* is defined as the book value of total assets minus the book value of common equity plus the market value of common equity, all divided by the book value of total assets at the end of the financial year. Accounting information for the companies in our sample was obtained from the DataStream dataset.

Table 2.4: Summary statistics of female percentage on board (explanatory variable)

Year	Number of firms	Mean of female percentage on the board	Std. dev.	Min	Max	Number of firms with at least one female	Percentage of firms with at least one female	Total female members on board	Total number of board members	Percentage of female members
2001	474	4.10	7.62	0	50	130	27 %	166	3880	4.3 %
2002	506	4.37	7.66	0	50	149	29 %	190	4080	4.7 %
2003	533	5.17	8.17	0	50	180	34 %	234	4245	5.5 %
2004	536	5.42	8.59	0	37.5	184	34 %	238	4202	5.7 %
2005	520	5.85	8.53	0	50	201	39 %	250	4094	6.1 %
2006	503	6.02	8.85	0	50	195	39 %	253	3952	6.4 %
2007	479	6.37	9.46	0	50	189	39 %	259	3741	6.9 %
2008	457	6.49	9.34	0	50	186	41 %	252	3555	7.1 %
2009	433	6.74	9.54	0	50	179	41 %	240	3295	7.3 %
2010	418	7.21	9.46	0	50	184	44 %	253	3215	7.9 %
2011	403	8.34	9.67	0	50	200	50 %	282	3148	9.0 %
2012	380	10.64	10.27	0	50	228	60 %	342	2966	11.5 %
2013	378	12.65	10.09	0	40	262	69 %	398	2964	13.4 %
2014	373	15.19	10.99	0	44.40	281	75 %	468	2905	16.1 %
2015	371	15.95	11.11	0	50	289	78 %	498	2935	17.0 %
2016	372	17.82	11.45	0	60	307	83 %	538	2877	18.7 %
2017	369	19.16	12.16	0	57.1	306	83 %	577	2839	20.3 %
2018	363	21.20	12.40	0	57.1	311	86 %	630	2817	22.4 %
2019	348	24.71	12.71	0	57.1	312	90 %	704	2712	26.0 %
2020	327	27.74	13.40	0	66.7	301	92 %	742	2573	28.8 %

This table presents the descriptive statistics for the explanatory variables (female percentage) from 2001 to 2020. The *female percentage* is measured by dividing the number of female board directors by the total number of board directors*100%. It also shows the number and percentage of firms with at least one female director on the board and the percentage of female directors over the years.

Table 2.5: Summary statistics for all variables

Variable	Obs	Mean	Std. Dev.	Min	25%	Median	75%	Max
ROA	8,545	4.54	11.90	-58.97	1.72	5.65	9.77	69.85
Tobin's Q	8,545	1.74	1.22	0.20	1.06	1.39	2.00	15.96
Female percentage	8,545	10.61	12.06	0	0	9.10	16.70	66.70
Firm size (billions)	8,545	2.58	9.68	0.01	1.10	3.40	1.2	120
Firm age	8,545	33.90	29.20	1	12	23	51	117
Board size	8,545	7.84	2.33	2	6	8	9	20
Board independence	8,545	0.50	0.16	0	0.4	0.5	0.6	1
CEO Duality	8,545	0.03	0.17	0	0	0	0	1
Leverage	8,545	0.22	0.19	0	0.06	0.20	0.32	1.95
Net sales (millions)	8,545	1.73	4.75	0	0.09	0.32	1.10	65

This table shows the descriptive statistics for all variables. The sample comprises 8,545 firm-year observations from 2001 to 2020, excluding financial and utilities firms. BoardEx provided information on the board of directors' features. Furthermore, accounting information for the companies in our sample was obtained from the DataStream dataset. *ROA* is measured by dividing the firm's annual net income at the end of the financial year by the average total assets ((total assets at the end of the previous year plus total assets at the end of the current year) divided by two). *Tobin's Q* is defined as the book value of total assets minus the book value of common equity plus the market value of common equity, all divided by the book value of total assets at the end of the financial year. The *female percentage* is measured by dividing the number of female board directors by the total number of board directors*100%. *Board size* is the total number of directors at the end of the financial year. *Board Independence* is a percentage of independent directors at the end of the financial year. *CEO Duality* is a dummy variable that takes one if the chairperson is the CEO and zero otherwise. *Firm size* is measured as the natural log of market capitalisation at the end of the financial year. *Firm age* is the number of years since Incorporation. *Leverage* is the total debt divided by the firm's total equity at the end of the financial year. *Net sales* are measured as a natural log of net sales representing gross sales and other operating revenue less discounts, returns and allowances at the end of the financial year. All variables are defined in *Appendix 2.A* of this chapter.

Table 06: Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) ROA	1.00									
(2) Tobin's Q	0.235*	1.00								
(3) Female percentage	0.052*	0.044*	1.00							
(4) Firm size (billions)	0.086*	0.048*	0.168*	1.00						
(5) Firm age	0.047*	-0.142*	0.048*	0.038*	1.00					
(6) Board size	0.100*	-0.001	0.169*	0.415*	0.043*	1.00				
(7) Board independence	0.032*	-0.003	0.363*	0.209*	0.070*	0.102*	1.00			
(8) CEO duality	-0.010	-0.001	-0.059*	-0.024*	-0.029*	-0.029*	-0.092*	1.00		
(9) Leverage	-0.006	-0.072*	0.045*	0.048*	0.021	0.158*	0.053*	0.003	1.00	
(10) Net sales (millions)	0.052*	-0.038*	0.211*	0.654*	0.042*	0.411*	0.240*	-0.035*	0.062*	1.00

This table shows the correlation matrix for all variables. The sample comprises 8,545 firm-year observations from 2001 to 2020, excluding financial and utilities firms. BoardEx provided information on the board of directors' features. Furthermore, accounting information for the companies in our sample was obtained from the DataStream dataset. *ROA* is measured by dividing the firm's annual net income at the end of the financial year by the average total assets ((total assets at the end of the previous year plus total assets at the end of the current year) divided by two). *Tobin's Q* is defined as the book value of total assets minus the book value of common equity plus the market value of common equity, all divided by the book value of total assets at the end of the financial year. The *female percentage* is measured by dividing the number of female board directors by the total number of board directors*100%. *Board size* is the total number of directors at the end of the financial year. *Board Independence* is a percentage of independent directors at the end of the financial year. *CEO Duality* is a dummy variable that takes one if the chairperson is the CEO and zero otherwise. *Firm size* is measured as the natural log of market capitalisation at the end of the financial year. *Firm age* is the number of years since Incorporation. *Leverage* is the total debt divided by the firm's total equity at the end of the financial year. *Net sales* are measured as a natural log of net sales representing gross sales and other operating revenue less discounts, returns and allowances at the end of the financial year. All variables are defined in *Appendix 2.A* of this chapter. *Correlation is significant at the 5% level.*

Table 0.7: Impact of a female director on the board on ROA

VARIABLES	FE	GMM
ROA_{t-2}		0.605***
		(0.130)
Female percentage	-0.647***	-0.139***
	(0.188)	(0.066)
Firm size	3.634***	3.434***
	(0.312)	(1.847)
Firm age	-0.353**	-1.070***
	(0.567)	(0.515)
Board size	-0.356***	-1.150***
	(0.114)	(0.975)
Board independence	-1.658	-2.621
	(1.514)	(1.802)
CEO duality	0.470	0.707
	(0.355)	(0.674)
Leverage	-1.903***	-1.707***
	(1.988)	(1.917)
Net Sales	-0.355**	-1.158***
	(0.433)	(1.885)
Year2012	-1.572***	-1.273***
	(0.467)	(1.500)
Constant	-2.961***	-1.926***
	(1.898)	(1.811)
Firm effect	YES	
Year effect	YES	
Industry effect	YES	
Observations	8,545	7,750
R-squared	0.183	
AR(1)		0
AR(2)		0.229
Hansen		0.276

This table shows the effect of female directors on firm performance using ROA as a dependent variable. Column 1 shows the year Fixed Effect (FE) results, and column 2 shows the two-step system Generalised Method of Moments (GMM) results. ROA_{t-2} is the second lag of ROA. The *female percentage* is a ratio of the total number of female directors divided by board size*100%. Definitions of all variables are in *Appendix 2.A*. Robust standard errors clustered by firm are in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Table 0.8: Impact of female directors on the board on ROA based on firm size

VARIABLES	Small firms		Large firms	
	FE	GMM	FE	GMM
ROA_{t-2}		0.296***		0.330***
		(0.396)		(0.529)
Female percentage	-0.416	-0.760	-0.626***	-0.217***
	(0.337)	(0.553)	(0.189)	(0.076)
Firm size	3.282**	1.784**	3.423***	1.359***
	(0.443)	(0.840)	(0.459)	(1.546)
Firm age	-1.312	-0.0748	-1.416**	-0.243***
	(0.952)	(0.519)	(0.652)	(0.351)
Board size	-0.451**	-0.849**	-0.245**	-0.571***
	(0.205)	(0.417)	(0.126)	(0.797)
Board independence	-0.450	-0.157	-0.958	-0.645
	(0.322)	(0.501)	(1.612)	(1.273)
CEO duality	1.030	0.729	0.952	1.112
	(1.461)	(0.889)	(1.685)	(1.787)
Leverage	-1.837***	-1.736***	-1.866***	-1.997***
	(2.556)	(1.415)	(2.467)	(2.142)
Net Sales	-0.385**	-1.077**	-0.670***	-1.433***
	(0.496)	(1.194)	(0.737)	(1.752)
Year2012	-0.902***	-1.055***	-1.052***	-1.383***
	(0.661)	(1.311)	(1.424)	(1.612)
Constant	-3.362***	-1.901***	-1.599***	-2.119***
	(3.323)	(0.866)	(1.645)	(2.666)
Firm effect	YES		YES	
Year effect	YES		YES	
Industry effect	YES		YES	
Observations	4,262	3,738	4,283	3,934
R-squared	0.250		0.227	
AR(1)		0		0
AR(2)		0.279		0.399
Hansen		0.292		0.351

This table shows the effect of female directors on firm performance using ROA as a dependent variable based on firm size. The firms are categorised into two groups based on their market capitalisation. Small firms have a market capitalisation below the median value of 3.40 (billions), while large firms possess a market capitalisation equal to or exceeding this median value. Columns 1 and 3 show the year Fixed Effect (FE) results, and columns 2 and 4 show the two-step system Generalised Method of Moments (GMM) results. ROA_{t-2} is the second lag of ROA. The *female percentage* is a ratio of the total number of female directors divided by board size*100%. Definitions of all variables are in *Appendix 2.A*. Robust standard errors clustered by firm are in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Table 2.9: Impact of female percentage on boards on ROA based on Industry

VARIABLES	(1) FE	(1) GMM	(2) FE	(2) GMM	(3) FE	(3) GMM	(4) FE	(4) GMM	(5) FE	(5) GMM	(6) FE	(6) GMM	(7) FE	(7) GMM	(8) FE	(8) GMM	(9) FE	(9) GMM
Female Percentage	-2.335	-2.447	-1.235	-0.510	-1.318	-1.904	-0.199	-1.520	-2.270	-1.691	-1.049***	-1.432***	-1.143**	-1.596***	0.996	1.545	-1.788	-1.980
	(1.353)	(1.399)	(1.151)	(0.782)	(1.018)	(1.436)	(0.847)	(1.198)	(2.205)	(1.863)	(1.435)	(1.271)	(0.856)	(0.967)	(0.760)	(1.259)	(1.565)	(0.868)
Firm Size	3.428***	2.077***	2.174***	3.351***	2.570***	0.963***	3.767***	2.332***	0.752**	1.843***	0.325***	2.577***	2.836***	1.191***	2.694***	2.171***	2.152***	1.729***
	(0.745)	(3.332)	(0.457)	(1.831)	(0.629)	(1.468)	(1.378)	(4.050)	(0.881)	(1.905)	(0.388)	(1.689)	(0.839)	(1.567)	(0.797)	(3.310)	(1.458)	(1.340)
Firm Age	-2.314**	-1.244**	-1.317***	-1.177***	-1.174**	-1.019***	-0.743**	-0.819**	-0.548**	0.395**	-1.105***	-0.936***	-1.939**	-1.057***	-1.826**	-0.845**	-0.476**	-1.016***
	(1.294)	(0.925)	(1.105)	(0.921)	(1.403)	(0.713)	(0.540)	(0.885)	(1.240)	(0.619)	(0.781)	(1.099)	(0.840)	(1.026)	(1.702)	(0.662)	(0.342)	(0.944)
Board Size	-0.538	-2.499	-0.328**	-1.302***	0.253	0.301	-0.754	-0.170	-0.583***	-1.790***	0.081	0.089	0.323	0.400	-0.856***	-2.743**	-1.449**	-2.473***
	(0.351)	(1.963)	(0.141)	(0.687)	(0.189)	(0.413)	(0.295)	(2.967)	(0.441)	(0.585)	(0.142)	(0.519)	(0.200)	(1.420)	(0.314)	(1.370)	(0.544)	(0.512)
Board Independence	-0.159	-2.509	-1.027	4.718	0.264	-2.245	2.062	-7.940	-2.344	0.235	-0.850	10.151	-2.088	-10.93	-9.490**	-10.810	-0.670	-2.305
	(4.310)	(1.743)	(2.191)	(7.878)	(1.926)	(3.709)	(8.843)	(2.76)	(5.113)	(8.328)	(1.770)	(7.720)	(2.467)	(14.41)	(4.122)	(9.851)	(9.838)	(5.906)
CEO Duality	1.054	0.785	1.111	1.261	1.608	0.246	0.628	1.278	2.436	2.310	1.381	1.021	1.722	0.332	0.582	1.231	1.089	0.709
	(0.594)	(1.256)	(1.673)	(2.876)	(0.596)	(1.490)	(2.345)	(2.066)	(2.685)	(1.077)	(1.005)	(0.891)	(0.939)	(0.448)	(1.180)	(1.117)	(0.841)	(0.793)
Leverage	-2.017**	-3.816**	-0.998**	-1.127***	-1.996***	-0.604***	-1.780*	-3.369*	-2.630**	-3.155**	-0.681**	-1.250***	-0.310***	-0.854***	-2.462**	-2.807**	-0.788***	-1.237***
	(0.997)	(3.233)	(0.385)	(1.536)	(0.609)	(1.830)	(1.116)	(2.122)	(1.087)	(1.978)	(0.294)	(1.929)	(0.999)	(0.656)	(1.108)	(3.743)	(1.186)	(0.944)
Net Sales	-1.665	-2.967*	-1.839***	-1.658***	-1.234***	-1.409***	-0.983*	-1.039**	-1.088**	-0.578*	-3.613***	-2.150***	-1.785**	-0.457***	-2.740***	-1.131***	-1.306**	-2.526**
	(1.277)	(2.424)	(0.595)	(2.522)	(0.873)	(1.977)	(0.546)	(3.789)	(1.913)	(1.928)	(0.667)	(2.315)	(0.807)	(1.054)	(0.921)	(0.598)	(2.734)	(1.225)
Year2012	-0.820	-0.736	-1.300*	-1.006**	-1.422	-0.991	-1.503	-1.385	-0.772**	-0.881**	-0.612***	-1.319***	-1.010***	-1.077***	-0.637	-0.822	-0.901	-0.815
	(1.442)	(1.115)	(0.826)	(1.262)	(1.503)	(0.907)	(0.631)	(0.965)	(0.968)	(1.315)	(0.585)	(1.070)	(0.850)	(0.624)	(0.713)	(0.702)	(1.001)	(0.767)
ROA$_{t-2}$		0.672***		0.895***		0.237***		0.249***		0.644***		1.249***		0.590***		0.630***		0.226***
		(0.277)		(0.235)		(0.074)		(0.799)		(0.238)		(0.280)		(0.461)		(0.131)		(0.164)
Constant	-2.805***	-1.345***	-2.038***	-1.227***	-2.820***	-2.056***	-3.159***	-3.719***	-2.096***	-2.709***	-1.431***	-2.303***	-3.965***	-2.668***	-3.512***	-1.308***	-0.638***	-2.90***
	(1.812)	(0.857)	(1.062)	(1.443)	(1.123)	(2.769)	(1.897)	(1.088)	(0.466)	(0.899)	(1.411)	(0.662)	(1.361)	(1.020)	(1.791)	(1.112)	(1.162)	(1.302)
Firm effect	YES		YES		YES		YES		YES		YES		YES		YES		YES	
Year effect	YES		YES				YES		YES		YES		YES		YES		YES	
Observations	567	514	2,248	2,005	551	501	348	302	501	460	2,421	2,240	770	715	903	821	236	192
R-squared	0.287		0.251		0.268		0.403		0.139		0.219		0.420		0.202			0.264
AR(1)		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
AR(2)		0.183		0.341		0.123		0.493		0.178		0.201		0.204		0.273		0.377
Hansen		0.456		0.218		0.409		0.282		0.240		0.218		0.181		0.179		0.263

This table shows the fixed effect and two-step system GMM regression results based on industry. (1) Basic materials, (2) Consumer discretion, (3) consumer staples, (4) energy, (5) healthcare, (6) industrials, (7) real estate, (8) technology, and (9) telecommunications Definitions of all variables are in *Appendix 2.A*. Robust standard errors clustered by firm are in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Table 2.10: Impact of a female director on the board on ROA before and after policy

VARIABLES	Before policy		After policy	
	FE	GMM	FE	GMM
ROA_{t-2}		0.293***		0.371***
		(0.421)		(0.606)
Female percentage	-0.285	-0.190	-0.492***	-0.104***
	(0.344)	(0.761)	(0.247)	(0.465)
Firm size	3.397***	2.564***	3.650***	3.392***
	(0.385)	(2.900)	(0.506)	(2.109)
Firm age	-0.268**	-0.367***	-1.391***	-0.343***
	(0.740)	(0.546)	(1.155)	(0.521)
Board size	-0.499***	-0.697***	-0.106***	-1.675***
	(0.154)	(0.996)	(0.176)	(0.701)
Board independence	-1.143	-1.379	-1.865	-1.230
	(1.996)	(1.760)	(1.935)	(1.913)
CEO duality	1.135	1.409	1.050	1.317
	(1.306)	(1.870)	(1.168)	(1.512)
Leverage	-1.286**	-1.382***	-1.349***	-1.939***
	(1.109)	(1.391)	(1.188)	(2.675)
Net Sales	-0.316***	-1.324**	-1.029**	-1.759**
	(0.576)	(1.926)	(0.583)	(2.150)
Constant	-3.512***	-1.433***	-3.697***	-3.348***
	(3.963)	(2.780)	(3.890)	(3.735)
Firm effect	YES		YES	
Year effect	YES		YES	
Industry effect	YES		YES	
Observations	5,264	4,531	3,281	3,141
R-squared	0.162		0.197	
AR(1)		0		0
AR(2)		0.372		0.284
Hansen		0.220		0.319

This table shows the effect of female directors on firm performance using ROA as a dependent variable based on policy implementation. The table represents two groups of results based on policy implementation. The first group is before policy implementation (before 2012), while the second group is after policy implementation (2012 onwards). Columns 1 and 3 show the year Fixed Effect (FE) results, and columns 2 and 4 show the two-step system Generalised Method of Moments (GMM) results. ROA_{t-2} is the second lag of ROA. The *female percentage* is a ratio of the total number of female directors divided by board size*100%. Definitions of all variables are in *Appendix 2.A*. Robust standard errors clustered by firm are in parentheses *** p<0.01, ** p<0.05, * p<0.

Table 2.11: Impact of female directors on the board on Tobin's Q

VARIABLES	FE	GMM
Tobin's Q$_{t-2}$		0.676***
		(0.0728)
Female percentage	-0.207***	-0.710***
	(0.111)	(0.342)
Firm size	0.552***	0.137***
	(0.138)	(0.126)
Firm age	-0.151***	-0.165***
	(0.307)	(0.291)
Board size	-0.259**	-0.354***
	(0.699)	(0.492)
Board independence	-0.370	-0.722
	(0.185)	(0.663)
CEO duality	0.079	0.571
	(0.067)	(1.101)
Leverage	-0.583***	-0.971***
	(0.766)	(0.341)
Net Sales	-0.329***	-0.117***
	(0.172)	(0.131)
Year2012	-0.875***	-1.016***
	(0.667)	(0.998)
Constant	0.455***	0.678***
	(0.220)	(0.350)
Firm effect	YES	
Year effect	YES	
Industry effect	YES	
Observations	8,545	7,750
R-squared	0.214	
AR(1)		0
AR(2)		0.371
Hansen		0.256

This table shows the effect of female directors on firm performance using Tobin's Q as a dependent variable. Column 1 shows the year Fixed Effect (FE) results, and column 2 shows the two-step system Generalised Method of Moments (GMM) results. *Tobin's Q$_{t-2}$* is the second lag of Tobin's Q. The *female percentage* is a ratio of the total number of female directors divided by board size*100%. Definitions of all variables are in *Appendix 2.A*. Robust standard errors clustered by firm are in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 2.12: Impact of female directors on the board on Tobin's Q based on firm size

VARIABLES	Small Firms		Large Firms	
	FE	GMM	FE	GMM
Tobin's Q_{t-2}		0.547***		0.491***
		(0.649)		(0.166)
Female percentage	-0.128	-0.231	-0.445***	-0.595***
	(0.182)	(0.534)	(0.130)	(0.324)
Firm size	0.442***	0.788***	0.862***	0.814***
	(0.213)	(0.793)	(0.237)	(0.981)
Firm age	-0.189	-0.114	-0.141***	-0.180***
	(0.058)	(0.416)	(0.363)	(0.276)
Board size	-0.367***	-0.493***	-0.226***	-0.349***
	(0.120)	(0.535)	(0.067)	(0.453)
Board independence	-0.460	-0.763	-0.273	-0.701
	(0.123)	(0.670)	(0.111)	(0.499)
CEO duality	0.141	0.192	0.088	0.376
	(0.094)	(0.497)	(0.258)	(0.715)
Leverage	-0.726***	-0.228***	-0.416***	-0.169***
	(0.110)	(0.883)	(0.105)	(0.553)
Net Sales	-0.244***	-0.185**	-0.644***	-0.119***
	(0.023)	(0.152)	(0.0274)	(0.181)
Year2012	-0.227***	-0.628***	-0.255***	-0.907***
	(0.417)	(0.888)	(0.320)	(1.273)
Constant	0.181***	3.338***	0.699*	1.870***
	(0.321)	(0.825)	(0.372)	(0.570)
Firm effect	YES		YES	
Year effect	YES		YES	
Industry effect	YES		YES	
Observations	4,262	3,738	4,283	3,934
R-squared	0.281		0.328	
AR(1)		0		0
AR(2)		0.277		0.360
Hansen		0.390		0.411

This table shows the effect of female directors on firm performance using Tobin's Q as a dependent variable based on firm size. The firms are categorised into two groups based on their market capitalisation. Small firms have a market capitalisation below the median value of 3.40 (billions), while large firms possess a market capitalisation equal to or exceeding this median value. Columns 1 and 3 show the year Fixed Effect (FE) results, and columns 2 and 4 show the two-step system Generalised Method of Moments (GMM) results. *Tobin's Q_{t-2}* is the second lag of Tobin's Q. The *female percentage* is a ratio of the total number of female directors divided by board size*100%. Definitions of all variables are in *Appendix 2. A*. Robust standard errors clustered by firm are in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Table 2.13: Impact of female percentage on boards on Tobin's Q based on Industry

VARIABLES	(1) FE	(1) GMM	(2) FE	(2) GMM	(3) FE	(3) GMM	(4) FE	(4) GMM	(5) FE	(5) GMM	(6) FE	(6) GMM	(7) FE	(7) GMM	(8) FE	(8) GMM	(9) FE	(9) GMM
Female percentage	-0.679	-0.456	-0.202	-0.158	-0.292	-0.642	-1.311	-4.087	-1.054	-1.138	-0.417***	-0.557***	-0.713***	-0.123***	0.414	0.811	1.010	0.785
	(0.588)	(1.086)	(0.256)	(0.402)	(0.475)	(0.897)	(0.511)	(2.747)	(0.744)	(1.490)	(0.184)	(0.269)	(0.256)	(0.351)	(0.504)	(1.128)	(0.576)	(0.131)
Firm Size	0.452***	0.235***	0.532***	0.453***	0.586***	0.135***	0.458***	0.468***	0.734***	0.731***	0.661***	0.471***	0.927***	0.144***	0.742***	1.030***	0.704**	0.194***
	(0.968)	(0.227)	(0.505)	(0.200)	(0.948)	(0.827)	(0.838)	(0.178)	(0.108)	(0.219)	(0.452)	(0.159)	(0.628)	(0.038)	(0.601)	(0.524)	(0.103)	(0.494)
Firm Age	-0.359**	-0.570**	-0.267***	-0.557***	-0.634**	-0.145***	-0.262***	-0.387***	-0.967**	-0.452**	-0.774**	-0.799***	-0.652**	-0.857**	-0.194**	-0.334**	-0.178**	-0.430***
	(0.844)	(0.288)	(0.543)	(0.141)	(0.578)	(0.129)	(0.161)	(0.432)	(0.159)	(0.262)	(0.354)	(0.840)	(0.266)	(0.147)	(0.902)	(0.762)	(0.123)	(0.119)
Board Size	-0.180**	-0.198***	-0.714***	-0.767***	-0.140***	-0.187**	-0.157*	-0.572**	-0.922**	-0.143***	-0.210***	-0.300***	-0.266**	-0.370**	-0.935***	-0.276***	-0.158***	-0.370***
	(0.358)	(0.695)	(0.141)	(0.372)	(0.182)	(0.424)	(0.177)	(0.826)	(0.446)	(0.108)	(0.182)	(0.263)	(0.130)	(0.195)	(0.249)	(0.111)	(0.477)	(0.332)
Board Independence	-0.998	-0.892	-0.205	-0.257	-0.112	-0.266	-0.243	-0.676	-1.627	-1.309	-0.829	-0.585	-0.978	-0.446	-0.461	-0.275	-0.412	-0.281
	(0.554)	(0.911)	(0.174)	(0.509)	(0.360)	(0.481)	(0.269)	(1.772)	(0.372)	(1.313)	(0.127)	(0.293)	(0.136)	(0.278)	(0.241)	(0.783)	(0.514)	(0.415)
CEO Duality	0.448	0.608	0.242	0.477	0.761	0.153	1.208	0.910	0.228	0.382	0.617	0.103	0.264	0.179	0.109	0.397	0.821	0.624
	(0.172)	(1.034)	(0.133)	(0.304)	(0.967)	(0.239)	(0.677)	(1.256)	(0.270)	(0.525)	(0.907)	(0.188)	(0.317)	(0.430)	(0.202)	(0.756)	(0.228)	(0.166)
Leverage	-0.874**	-0.445***	-0.192*	-0.797**	-0.332***	-0.156***	-0.441**	-0.338**	-0.251***	-0.342***	-0.132**	-0.410**	-0.948***	-0.101***	-0.195	-0.4700**	-0.154**	-0.349***
	(0.601)	(0.790)	(0.311)	(0.656)	(0.602)	(0.126)	(0.788)	(0.221)	(0.117)	(0.186)	(0.333)	(0.766)	(0.105)	(0.193)	(0.553)	(0.308)	(0.554)	(0.425)
Net Sales	-0.254**	-0.183***	-0.364***	-0.407*	-0.592***	-0.715***	-0.994**	-0.812**	-0.349**	-0.459**	-0.635***	-0.496**	-0.470**	-0.128**	-0.649***	-0.738**	-0.654***	-0.339***
	(0.117)	(0.224)	(0.814)	(0.240)	(0.118)	(0.109)	(0.774)	(0.154)	(0.135)	(0.202)	(0.773)	(0.211)	(0.397)	(0.154)	(0.679)	(0.626)	(0.131)	(0.110)
Year2012	-0.730	-0.832	-1.203**	-1.311**	-0.854	-0.734	-1.441	-1.027	-0.539**	-0.749**	-0.822***	-1.114***	-1.350***	-1.005***	-0.237	-0.573	-0.882	-0.735
	(1.502)	(1.755)	(0.966)	(1.021)	(1.003)	(0.923)	(0.831)	(0.755)	(0.708)	(1.265)	(1.025)	(1.434)	(0.939)	(0.823)	(0.417)	(0.662)	(1.211)	(0.977)
Tobin's Q$_{t-2}$		0.553***		0.485***		0.705***		0.635***		0.303***		0.354***		0.507***		0.369***		0.785***
		(0.205)		(0.101)		(0.134)		(0.184)		(0.0946)		(0.108)		(0.155)		(0.154)		(0.131)
Constant	-1.940***	0.462***	1.077***	0.990***	1.908***	-0.194***	-1.299***	-0.919***	-0.518***	-0.618***	1.391**	1.336***	3.764**	0.432***	-4.825***	-0.494***	1.672***	1.352***
	(3.974)	(0.565)	(2.822)	(0.913)	(3.437)	(0.644)	(2.909)	(0.548)	(0.328)	(0.729)	(2.156)	(0.934)	(1.638)	(0.641)	(2.871)	(1.513)	(1.945)	(0.427)
Firm effect	YES		YES		YES		YES		YES		YES		YES		YES		YES	
Year effect	YES		YES		YES		YES		YES		YES		YES		YES		YES	
Observations	567	514	2,248	2,005	551	501	348	302	501	460	2,421	2,240	770	715	903	821	236	192
R-squared	0.413		0.398		0.444		0.368		0.523		0.407		0.183		0.529			0.428
AR(1)		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
AR(2)		0.239		0.125		0.403		0.310		0.161		0.323		0.284		0.175		0.375
Hansen		0.259		0.147		0.370		0.429		0.256		0.240		0.460		0.246		0.382

This table shows the fixed effect and two-step system GMM regression results based on industry. (1) Basic materials, (2) Consumer discretion, (3) consumer staples, (4) energy, (5) healthcare, (6) industrials, (7) real estate, (8) technology, and (9) telecommunications Definitions of all variables are in *Appendix 2.A*. Robust standard errors clustered by firm are in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Table 2.14: Impact of a female director on the board on Tobin's Q before and after policy

VARIABLES	Before Policy		After Policy	
	FE	GMM	FE	GMM
Tobin's Q_{t-2}		0.614***		0.773***
		(0.0847)		(0.159)
Female percentage	-0.193	-0.485	-0.356**	-0.172***
	(0.195)	(0.659)	(0.146)	(0.586)
Firm size	0.527***	0.104***	0.550***	0.132***
	(0.180)	(0.175)	(0.228)	(0.110)
Firm age	-0.158***	-0.116**	-0.265***	-0.423***
	(0.435)	(0.459)	(0.608)	(0.376)
Board size	-0.184**	-0.126**	-0.386***	-0.224***
	(0.938)	(0.501)	(0.113)	(0.578)
Board independence	-0.228	-0.172	-0.243	-0.617
	(0.114)	(0.551)	(0.144)	(0.655)
CEO duality	0.108	0.115	0.310	0.623
	(0.766)	(0.843)	(0.178)	(1.256)
Leverage	-0.745***	-0.936***	-0.114**	-0.546***
	(0.106)	(0.780)	(0.113)	(0.646)
Net Sales	-0.384***	-0.162***	-0.122***	-0.624***
	(0.252)	(0.209)	(0.267)	(0.107)
Constant	0.423***	1.554***	-2.644***	0.144***
	(0.293)	(0.528)	(0.412)	(0.395)
Firm effect	YES		YES	
Year effect	YES		YES	
Industry effect	YES		YES	
Observations	5,264	4,531	3,281	3,141
R-squared	0.173		0.186	
AR(1)		0		0
AR(2)		0.203		0.232
Hansen		0.218		0.205

This table shows the effect of female directors on firm performance using Tobin's Q as a dependent variable based on policy implementation. The table represents two groups of results based on policy implementation. The first group is before policy implementation (before 2012), while the second group is after policy implementation (2012 onwards). Columns 1 and 3 show the year Fixed Effect (FE) results, and columns 2 and 4 show the two-step system Generalised Method of Moments (GMM) results. *Tobin's Q_{t-2}* is the second lag of Tobin's Q. The *female percentage* is a ratio of the total number of female directors divided by board size*100%. Definitions of all variables are in *Appendix 2.A*. Robust standard errors clustered by firm are in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Appendices

Appendix 2.A: **Variable definitions**

Variable name	Definition
Dependent variables (firm performance)	
Return on assets (ROA)	ROA is measured by dividing the firm's annual net income at the end of the financial year by the average total assets ((total assets at the end of the previous year plus total assets at the end of the current year) divided by two)
Tobin's Q	Tobin's Q is a market-based measure. It is calculated as the book value of total assets minus the book value of common equity plus the market value of common equity, all divided by the book value of total assets at the end of the financial year.
Explanatory variables	
Female Percentage	(Total number of female board directors/Total number of board directors at the end of the financial year) *100.
Control variables	
Board size	Board size is the total number of directors at the end of the financial year.
Board Independence	Percentage of independent directors at the end of the financial year.
CEO duality	A dummy variable that takes the value of 1 if the chairperson is also the CEO and zero otherwise
Firm size	Natural log of market value at the end of the financial year.
Firm age	The number of years since incorporation
Leverage	Calculated as the total debt divided by the total equity of the firm at the end of the financial year.
Net sales	The natural log of net sales represents gross sales and other operating revenue less discounts, returns and allowances at the end of the financial year.
Year2012	A dummy variable that takes the value of 1 if the year is 2012 or after, and zero otherwise

This table reports the definition and measurement of variables used in this study.

Appendix 2.B: Industry Classification Benchmark

No.	Industry Group	Definition
1	Basic Materials	It comprises companies that extract or process raw materials and manufacture semi-finished goods such as chemicals, textiles, paper, forest products and related packaging products. Metals and minerals miners, metal alloy producers, and metal fabricators are also included.
2	Consumer Staples	It contains companies that provide products and services directly to the consumers, and their purchasing habits are cyclical (staples). Includes companies that manufacture, distribute, and retail food, beverages, and other non-durable household goods. It also includes drug-retailing and agriculture, fishing, ranching and milling companies.
3	Consumer Discretionary	It contains companies that provide products and services directly to consumers, and their purchasing habits are non-cyclical (discretionary). This includes companies that manufacture and distribute household durable goods, apparel, home electronic devices, leisure equipment, and automotive and related parts. The services segment includes hotels, restaurants, retail/e-retail, passenger transportation, and other leisure facilities. It also includes media companies that engage in entertainment content creation and traditional advertisement. It excludes web portals/hosts that generate revenue through advertisement and are classified under Technology – Consumer Digital Services.
4	Real Estate	Consists of companies engaged in real estate investment, development, and other real estate-related services. It also includes Equity REITs. Mortgage REITs are classified under the Financials Industry.
5	Health Care	It comprises companies manufacturing healthcare equipment and supplies or providing healthcare-related services such as lab services, in-home medical care, and operating healthcare facilities. Also included are companies involved in research, development and production of pharmaceuticals and biotechnology products and medical marijuana producers.
6	Telecommunications	It contains companies operating telecommunication infrastructures to provide content delivery services. Manufacturers of telecommunication equipment and components are also included.
7	Technology	Companies that are primarily engaged in the advancement of the information technology and electronics industries. It includes companies developing integrated computer systems and services, application software not specific to industry market segments, and digital platform providers that generate revenue from advertising content and derive subscription fees from advertisers. Companies that develop next-generation electronics and related components are also included. Disruptors leveraging "new" technology are placed in the Technology Industry. Rather, individual company technology applications and services will be reviewed regarding their markets. Examples include companies providing health care, technology equipment, electronic entertainment (video games), e-retailers, and transaction processing services.
8	Industrials	It comprises companies manufacturing and distributing capital goods and providing business support services. Includes aerospace, weapons/defence, commercial vehicles, construction materials,

		industrial machinery, and equipment manufacturers. The service segment includes commercial transportation, business support, maintenance and security services, international trade, transaction processing, and diversified logistic support services.
9	Energy	It contains companies that use energy extraction, process, and production activities and produce related energy equipment. Includes both renewable and non-renewable energy companies. Companies that primarily engage in energy distribution are classified in the Utilities Industry.
10	Financials	It consists of companies engaged in savings, loans, security investment, and related activities, such as financial data and information providers. Other examples include mortgage/consumer/corporate financing, investment banking and brokerage, asset management and custody, insurance, and Mortgage REITs.
11	Utilities	It contains companies that distribute electricity, gas, and water. Most companies in this industry are heavily affected by government regulation. It also includes companies providing waste, recycling, and related environmental services.

The ICB uses a four-tier structure with industry, supersector, sector, and subsector levels. The ICB uses a system of 11 industries partitioned into 20 supersectors, further divided into 45 sectors containing 173 subsectors. (Note: These numbers are subject to change.) As of 2022, the 11 industries are Technology, Telecommunications, Healthcare, Financials, Real Estate, Consumer Discretionary, Consumer Staples, Industrials, Basic Materials, Energy, and Utilities.

Appendix 2.C: Additional summary statistics

Appendix 2.C.1: Annual distribution of observations by industry

Year	Basic Materials	Consumer Discretion	Consumer Staples	Energy	Health Care	Industrials	Real Estate	Technology	Telecommunications	Total
2001	23	133	34	16	31	134	33	58	12	474
2002	25	140	36	19	33	140	36	64	15	506
2003	26	148	35	20	34	147	38	69	16	533
2004	26	151	34	22	32	151	37	67	16	536
2005	27	137	31	22	34	150	36	66	17	520
2006	29	130	29	22	32	146	37	65	13	503
2007	31	120	26	24	29	135	40	61	13	479
2008	31	117	28	22	29	128	41	50	11	457
2009	29	109	26	19	26	128	41	44	11	433
2010	30	107	29	17	21	120	40	43	11	418
2011	31	102	25	19	20	116	36	41	13	403
2012	31	95	25	18	21	108	37	33	12	380
2013	31	93	25	17	20	107	40	32	13	378
2014	31	91	23	17	20	107	39	32	13	373
2015	29	98	24	13	20	110	40	27	10	371
2016	29	99	25	13	19	107	40	31	9	372
2017	30	99	25	12	22	100	41	32	8	369
2018	29	96	25	13	21	98	41	32	8	363
2019	25	94	24	12	20	95	40	31	7	348
2020	24	89	22	11	17	94	37	25	8	327
Total	**567**	**2,248**	**551**	**348**	**501**	**2,421**	**770**	**903**	**236**	**8,545**

This table shows the distribution of observations in the study sample based on industry groups from 2001 to 2020. The industry classification is based on ICB (Industry Classification Benchmark), a standardised system for categorising companies and securities based on their primary business activities (*see Appendix 2.B*). There are 11 industries in ICB; financial and utilities firms were excluded from the sample due to the uniqueness of their operations, capital structure, and regulatory requirements, making them different from other non-financial organisations (Arun *et al.*, 2015; Klein, 2002).

***Appendix 2.C.2*: Summary statistics of firm performance indicators based on industry.**

Industry	Variable	Obs	Mean	Std. Dev	Min	Max
Basic Materials	ROA	**567**	4.58	13.14	-58.97	64.83
	Tobin's Q		1.60	1.02	0.30	10.02
Consumer Discretion	ROA	**2248**	5.44	11.22	-58.13	66.65
	Tobin's Q		1.73	1.17	0.20	13.73
Consumer Staples	ROA	**551**	6.70	5.57	-20.61	42.88
	Tobin's Q		1.63	0.71	0.50	5.48
Energy	ROA	**348**	3.67	13.09	-48.93	69.85
	Tobin's Q		1.46	0.75	0.22	5.74
Health Care	ROA	**501**	-3.66	18.64	-58.97	40.86
	Tobin's Q		2.29	1.53	0.29	12.62
Industrials	ROA	**2421**	5.86	8.91	-58.94	55.75
	Tobin's Q		1.71	0.97	0.49	11.76
Real Estate	ROA	**770**	4.88	10.05	-51.13	65.80
	Tobin's Q		1.10	0.68	0.58	12.45
Technology	ROA	**903**	2.12	15.40	-57.14	69.80
	Tobin's Q		2.32	2.01	0.30	15.96
Telecommunications	ROA	**236**	4.06	14.27	-56.65	51.02
	Tobin's Q		1.89	1.20	0.42	10.94

This table presents the descriptive statistics for the main variables of interest, namely ROA and Tobin's Q, from 2001 to 2020, based on industry. The industry classification is based on ICB (Industry Classification Benchmark), a standardised system for categorising companies and securities based on their primary business activities (*see Appendix 2.B*). There are 11 industries in ICB; financial and utilities firms were excluded from the sample due to the uniqueness of their operations, capital structure, and regulatory requirements, making them different from other non-financial organisations (Arun *et al.*, 2015; Klein, 2002). *ROA* is measured by dividing the firm's annual net income at the end of the financial year by the average total assets ((total assets at the end of the previous year plus total assets at the end of the current year) divided by two). *Tobin's Q* is defined as the book value of total assets minus the book value of common equity plus the market value of common equity, all divided by the book value of total assets at the end of the financial year.

Figure 2.D.1: Mean of ROA from 2001 to 2020

Mean of ROA
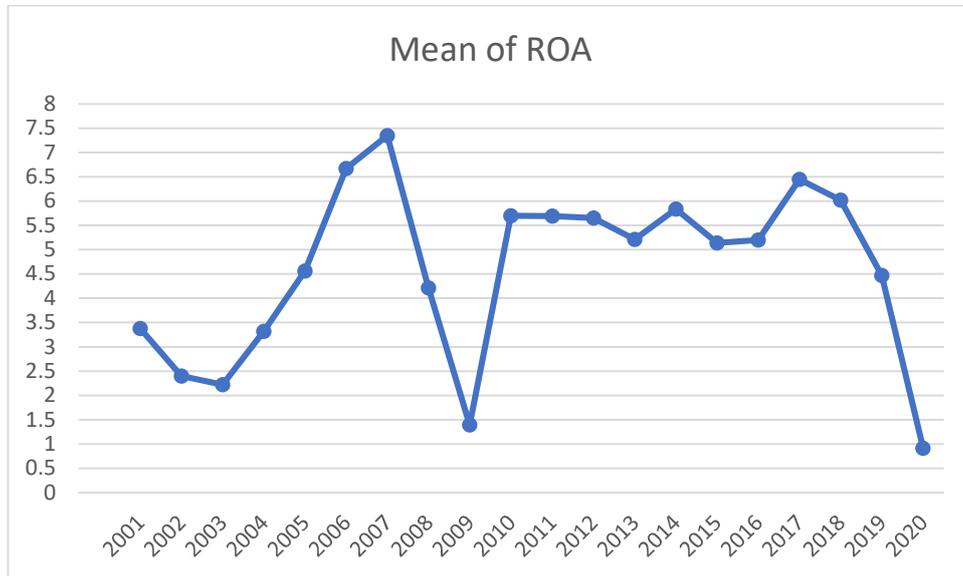
Figure 2.D.2: Mean of Tobin's Q from 2001 to 2020

Mean of Tobin's Q
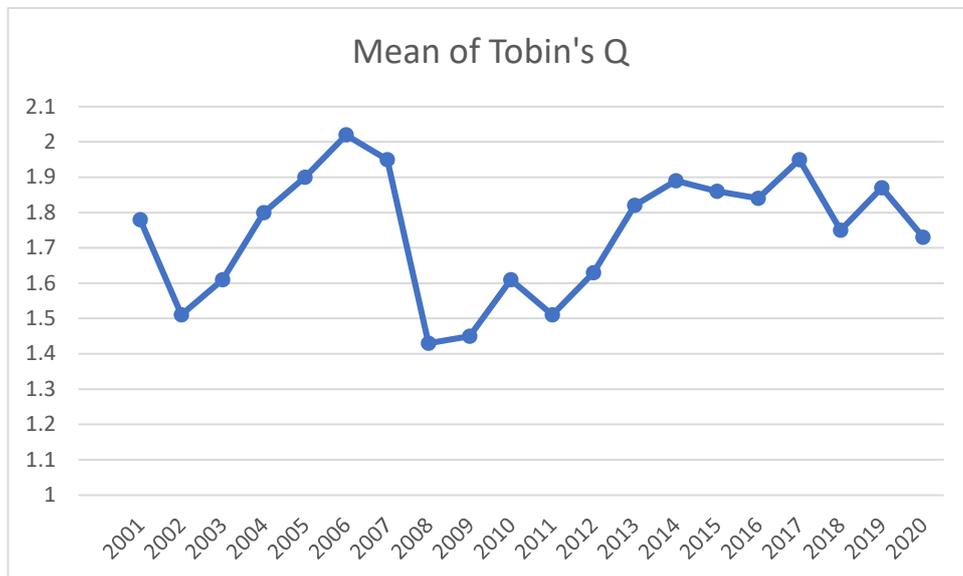
Appendix 2.E: Robustness Analysis – FTSE 350 Subsample

For robustness checks, the baseline regressions (FE and GMM models) were rerun for the FTSE 350 Index as a subsample of the broader FTSE All Share dataset. The FTSE 350 sample allows for direct comparability with firms most explicitly targeted by the Davies Report recommendations. The following tables report the results for this subsample and compare them with the baseline results presented in Chapter 2.

The findings confirm that the results for the FTSE 350 are broadly consistent with those reported for the FTSE All Share sample:

- **Impact on ROA (Table 2.E.1 vs. Table 2.7):**

    Female board representation is negatively and significantly associated with ROA in both samples. The FTSE 350 results are significant at the 5% level **,** while the FTSE All Share results are significant at the 1% level .

- **Impact on ROA pre- and post-Davies Report (Table 2.E.2 vs. Table 2.10):**

    Both samples show no significant relationship before the policy implementation and a significant negative relationship after the policy implementation. For the FTSE 350, the result is significant at the 5% level , while for the FTSE All Share, it is significant at the 1% level **.**

- **Impact on Tobin's Q (Table 2.E.3 vs. Table 2.11):**

    Female board representation is negatively and significantly related to Tobin's Q in both samples, with strong significance at the 1% level .

- **Impact on Tobin's Q pre- and post-Davies Report (Table 2.E.4 vs. Table 2.14):**
    Both samples show no significant impact before the policy and a significant negative impact after the policy implementation. The results are strongly significant at the 1% level in both cases.

Overall, the FTSE 350 subsample results corroborate the main findings, providing further robustness to the conclusion that board gender diversity is associated with a negative impact on firm performance, particularly following the Davies Report policy changes.

Table 0.E.1: Impact of a female director on the board on ROA

VARIABLES	FE	GMM
ROA$_{t-2}$		0.381***
		(0.570)
Female percentage	-0.069**	-0.166**
	(0.034)	(0.872)
Firm size	4.358***	1.508***
	(0.515)	(2.326)
Firm age	-0.562	-0.275
	(0.937)	(0.616)
Board size	-0.349**	-0.100**
	(0.156)	(1.123)
Board independence	-0.547*	-0.801
	(2.135)	(1.801)
CEO duality	0.933	0.791
	(1.889)	(0.631)
Leverage	-1.339*	-0.384**
	(0.379)	(0.108)
Net Sales	-1.635**	-0.520*
	(0.789)	(0.276)
Year2012	-1.157*	-1.036***
	(0.634)	(1.220)
Constant	-2.159**	-2.280
	(1.503)	(1.078)
Firm effect	YES	
Year effect	YES	
Industry effect	YES	
Observations	2,542	2,370
R-squared	0.120	
AR(1)		0
AR(2)		0.736
Hansen		0.401

This table shows the effect of female directors on firm performance using ROA as a dependent variable. Column 1 shows the year Fixed Effect (FE) results, and column 2 shows the two-step system Generalised Method of Moments (GMM) results. *ROA$_{t-2}$* is the second lag of ROA. The *female percentage* is a ratio of the total number of female directors divided by board size*100%. Definitions of all variables are in *Appendix 2.A*. Robust standard errors clustered by firm are in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Table 2.E.2: Impact of a female director on the board on ROA before and after policy

VARIABLES	Before policy		After policy	
	FE	GMM	FE	GMM
ROA$_{t-2}$		0.378***		0.320***
		(0.919)		(0.946)
Female percentage	-0.039	-0.083	-0.058**	-0.126**
	(0.044)	(0.235)	(0.034)	(0.086)
Firm size	3.937***	1.590**	4.917***	3.333***
	(0.795)	(5.606)	(0.935)	(4.189)
Firm age	-0.807	-0.540	-0.604**	-1.006
	(1.323)	(0.903)	(1.744)	(1.434)
Board size	-0.473**	-1.019**	-0.203**	-1.251*
	(0.243)	(2.677)	(0.195)	(0.710)
Board independence	-0.609	-1.600	-1.084*	-1.027
	(2.714)	(2.104)	(2.907)	(3.891)
CEO duality	0.160	1.587	1.921	0.045*
	(1.006)	(1.044)	(3.925)	(3.450)
Leverage	-1.912	-1.336	-1.616*	-2.407**
	(2.126)	(2.123)	(5.080)	(2.136)
Net Sales	2.522*	1.373	1.044	1.092
	(1.432)	(5.102)	(0.751)	(4.367)
Constant	-8.882	-4.068	-4.995***	-6.446***
	(13.36)	(15.89)	(1.512)	(5.294)
Firm effect	YES		YES	
Year effect	YES		YES	
Industry effect	YES		YES	
Observations	1,290	1,151	1,252	1,219
R-squared	0.084		0.206	
AR(1)		0		0
AR(2)		0.258		0.220
Hansen		0.444		0.149

This table shows the effect of female directors on firm performance using ROA as a dependent variable based on policy implementation. The table represents two groups of results based on policy implementation. The first group is before policy implementation (before 2012), while the second group is after policy implementation (2012 onwards). Columns 1 and 3 show the year Fixed Effect (FE) results, and columns 2 and 4 show the two-step system Generalised Method of Moments (GMM) results. *ROA$_{t-2}$* is the second lag of ROA. The *female percentage* is a ratio of the total number of female directors divided by board size*100%. Definitions of all variables are in *Appendix 2.A*. Robust standard errors clustered by firm are in parentheses *** p<0.01, ** p<0.05, * p<0.

Table 2.E.3: Impact of female directors on the board on Tobin's Q

VARIABLES	FE	GMM
Tobin's Q$_{t-2}$		0.612***
		(0.135)
Female percentage	-0.062***	-0.064***
	(0.180)	(0.499)
Firm size	0.754***	0.294***
	(0.276)	(0.187)
Firm age	-0.133***	-0.152***
	(0.510)	(0.519)
Board size	-0.720	-0.014
	(0.112)	(0.631)
Board independence	-0.110	-0.116
	(0.148)	(0.963)
CEO duality	-0.023	-0.576
	(0.109)	(0.970)
Leverage	0.599**	1.646**
	(0.154)	(0.884)
Net Sales	-0.358***	-0.211***
	(0.321)	(0.214)
Year2012	-0.195***	-0.716***
	(0.460)	(0.398)
Constant	-3.309***	1.002**
	(0.401)	(0.595)
Firm effect	YES	
Year effect	YES	
Industry effect	YES	
Observations	2,542	2,370
R-squared	0.265	
AR(1)		0
AR(2)		0.574
Hansen		0.312

This table shows the effect of female directors on firm performance using Tobin's Q as a dependent variable. Column 1 shows the year Fixed Effect (FE) results, and column 2 shows the two-step system Generalised Method of Moments (GMM) results. *Tobin's Q$_{t-2}$* is the second lag of Tobin's Q. The *female percentage* is a ratio of the total number of female directors divided by board size*100%. Definitions of all variables are in *Appendix 2.A*. Robust standard errors clustered by firm are in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 2.E.4: Impact of a female director on the board on Tobin's Q before and after policy

VARIABLES	Before Policy		After Policy	
	FE	GMM	FE	GMM
Tobin's Q_{t-2}		0.482***		0.928***
		(0.103)		(0.139)
Female percentage	-0.051	-0.159	-0.043***	-0.077***
	(0.032)	(0.140)	(0.022)	(0.092)
Firm size	0.607***	0.105**	0.981***	0.131**
	(0.033)	(0.279)	(0.441)	(0.458)
Firm age	-0.106	-0.035	-0.453*	-0.076
	(0.072)	(0.058)	(0.109)	(0.144)
Board size	-0.020	-0.071*	-0.028*	-0.085**
	(0.014)	(0.084)	(0.018)	(0.108)
Board independence	-0.310*	-0.320	-0.499*	-1.719
	(0.178)	(0.741)	(0.263)	(1.637)
CEO duality	-0.168	-0.848	-0.704	-0.761
	(0.118)	(0.644)	(0.219)	(0.737)
Leverage	-0.832***	-0.853	-0.573***	-0.347**
	(0.209)	(0.832)	(0.219)	(1.499)
Net Sales	-0.561***	-0.056**	-0.298***	-0.074***
	(0.053)	(0.255)	(0.047)	(0.469)
Constant	1.015*	1.190*	-6.361***	0.829
	(0.593)	(0.657)	(0.657)	(0.592)
Firm effect	YES		YES	
Year effect	YES		YES	
Industry effect	YES		YES	
Observations	1,290	1,151	1,252	1,219
R-squared	0.235		0.342	
AR(1)		0.052		0.002
AR(2)		0.159		0.375
Hansen		0.570		0.273

This table shows the effect of female directors on firm performance using Tobin's Q as a dependent variable based on policy implementation. The table represents two groups of results based on policy implementation. The first group is before policy implementation (before 2012), while the second group is after policy implementation (2012 onwards). Columns 1 and 3 show the year Fixed Effect (FE) results, and columns 2 and 4 show the two-step system Generalised Method of Moments (GMM) results. *Tobin's Q_{t-2}* is the second lag of Tobin's Q. The *female percentage* is a ratio of the total number of female directors divided by board size*100%. Definitions of all variables are in *Appendix 2.A*. Robust standard errors clustered by firm are in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Chapter 3

Board gender diversity and firm employment and productivity

3.1 Introduction

In recent decades, enhancing gender diversity in corporate leadership has become a critical issue for companies worldwide (Joecks *et al.*, 2013; Carter *et al.*, 2010; Hillman *et al.*, 2007). A range of factors, including the growing recognition of the business case for diversity (Miller and Triana, 2009), government regulations imposing gender quotas (Ahern and Dittmar, 2012), and intensified pressures from activist investors for more inclusive board composition (Kolev *et al.*, 2021), have driven efforts to increase female representation on boards of directors. As a result, the proportion of women directors on corporate boards has risen substantially over the past years across developed economies (Liao *et al.*, 2015).

This increasing trend in board gender diversity has sparked significant research interest in examining its implications for organisational outcomes. One of the key questions is whether the rise in female representation in boardrooms influences crucial aspects of firm performance, including financial results, productivity, and employment outcomes (Terjesen *et al.*, 2009). The potential impact of gender diversity on firm employment and productivity has become particularly pertinent as companies strive to maintain a competitive edge in a rapidly evolving global market.

Research suggests that gender-diverse boards may positively influence employment outcomes within firms by fostering a more inclusive and supportive work environment (Skaggs *et al.*, 2012). Drawing from diverse perspectives and experiences, female directors are often associated with greater advocacy for employee welfare and human capital development. This can lead to increased workforce stability, lower turnover rates, and a stronger emphasis on long-term employment strategies. Studies have shown that companies with higher percentages of female directors tend to have lower workforce reductions and layoff rates, indicating a commitment to employee retention even in challenging economic conditions (Lenard *et al.*, 2014). However, the

relationship between board diversity and employment is not universally positive. In some contexts, particularly where cultural or institutional barriers exist, the presence of female directors may have limited influence on employment practices (Liu *et al.*, 2016). Thus, while there is evidence to support the role of gender diversity in enhancing firm employment, its impact may vary depending on the broader organisational and cultural context.

The influence of board gender diversity on productivity is another critical area of interest. Productivity, often measured through metrics such as revenue per employee or operational efficiency, reflects a company's ability to maximise output from its resources. Gender-diverse boards enhance productivity by bringing varied perspectives to strategic decision-making, particularly in cost management, innovation, and human capital utilisation (Carpenter *et al.*, 2004). For example, Liu *et al.* (2014) found that companies with higher percentages of female board members exhibited increased revenue per employee, suggesting that diverse leadership can positively impact labour productivity.

However, not all studies align with this view. Some research, such as that by Adams and Ferreira (2009), has indicated a negative correlation between female board representation and financial returns, suggesting that potential costs, such as increased coordination challenges or decision-making delays might offset the benefits of diversity. This underscores the complexity of the relationship between gender diversity and productivity, highlighting the need for further research to investigate how diversity contributes to enhanced productivity—for example, by fostering inclusive employment practices, reducing turnover through better staff retention, encouraging innovation, and promoting more effective utilisation of human capital. Despite the growing body of literature on diversity outcomes, the findings remain inconclusive and contradictory (Nguyen *et al.*, 2020). Some studies suggest a positive correlation between female representation and firm financial performance, as well as productivity and employment (Byron and Post, 2016; Liu *et al.*, 2014), while others find no significant relationship or even negative associations with firm outcomes (Pletzer *et al.*, 2015; Adams and Ferreira, 2009).

The mixed evidence on the impact of gender diversity on employment and productivity highlights the need for a more nuanced understanding of how diversity influences these aspects of firm performance. This study aims to address gaps in knowledge by investigating the impacts of corporate board gender diversity on employment and productivity within the UK context. The UK market is particularly appropriate for testing this relationship due to the implementation of the 2012 policy guidelines, which mandated FTSE 100 companies to achieve at least 25% female board representation by 2015 (Davies Report, 2011). This policy created a regulatory environment conducive to studying the effects of increased gender diversity on corporate boards, fostering a broader cultural shift towards gender inclusivity in corporate governance. The UK's approach provides a unique context for analysing these dynamics. While other economies have implemented similar policies, such as Norway's 40% quota (Ahern and Dittmar, 2012; Matsa and Miller, 2013) and Germany's 30% quota (Bertrand *et al.*, 2019; Adams and Kirchmaier, 2016), this study examines the UK's policy implications to understand how regulatory frameworks drive corporate governance changes and improve firm performance.

The conflicting findings in the existing literature underscore the issue's complexity, suggesting that a simplistic approach to increasing the number of women on boards may not necessarily lead to the desired improvements in performance, productivity, or employment outcomes (Joecks *et al.*, 2013). A more nuanced understanding is imperative to comprehend the mechanisms, boundary conditions, and contextual factors that shape how gender diversity manifests in observable changes in firm strategy, practices, and outcomes (Conyon *et al.*, 2017). Unravelling these underlying dynamics is crucial for developing more sophisticated, context-specific theoretical perspectives and deriving practical implications (Luckerath-Rovers, 2013).

Previous literature has examined gender diversity's impact on board dynamics and firm outcomes (Adams and Ferreira, 2009; Terjesen *et al.*, 2009), but the specific effects of the UK's 2012 policy remain under-researched. This study addresses this gap by providing empirical evidence on how these guidelines have shaped employment and productivity in leading UK firms. Examining the policy's effects will yield new insights into how regulatory frameworks can drive corporate governance changes and improve firm performance (Davies, 2011).

Additionally, this study will contribute by investigating how board gender diversity affects employment and productivity across different industries. By analysing industry-specific impacts, the research will provide a deeper understanding of the conditional processes through which gender diversity shapes organisational effectiveness, offering crucial guidance to companies seeking to optimise diversity to enhance performance across various industry environments. Industry analysis is particularly relevant because employment issues are more relevant in labour-intensive than capital-intensive industries.

The findings from this study will hold significant practical implications for corporate decision-makers and policymakers. For companies, the results will offer insights into how gender diversity can be strategically managed to enhance employment and productivity outcomes, thereby improving overall firm performance. This could involve adopting practices supporting female directors' integration into existing governance frameworks, ensuring that diversity contributes positively to organisational effectiveness. For policymakers, the study's outcomes will provide valuable guidance on designing and implementing gender diversity policies, highlighting the potential benefits and challenges of such regulations. Ultimately, this research will contribute to the ongoing discourse on achieving and sustaining gender diversity in corporate leadership, focusing on tangible outcomes that align with broader economic and social goals.

This research is organised as follows: Section 2 examines the theoretical framework and literature review. Section 3 presents the hypotheses' development. Section 4 covers the sample selection process, data collection, and variable definition. Section 5 presents the results and analyses, and Section 6 concludes the research.

3.2 Theory and Empirical Literature:

Gender diversity on boards can lead to certain levels of conflict and affective discomfort, which can benefit decision-making. Moderate levels of diversity can stimulate constructive conflict, leading to better group decision-making processes (Phillips *et al.*, 2009; Van Knippenberg *et al.*, 2004). Constructive conflict encourages the exploration of different ideas and perspectives, ultimately resulting in more

informed and robust decision-making outcomes. Gender-diverse boards can enhance an organisation's customer orientation, improve market share, and positively influence bottom-line outcomes. A diverse workforce, including gender-diverse boards, provides greater access to and legitimacy with different consumer segments, leading to improved performance outcomes (Dwyer *et al.*, 2003). The presence of women on boards can contribute to a better understanding of the diverse customer base, leading to targeted strategies and improved organisational performance. While gender diversity can stimulate constructive conflict, excessive diversity may lead to communication problems and reduced social cohesion among board members (Wiersema and Bantel, 1992). Striking a balance between diversity and cohesion is crucial to leverage the benefits of gender diversity while maintaining effective teamwork and collaboration.

3.2.1 Upper Echelons Theory:

Upper Echelons Theory, initially proposed by Hambrick and Mason in 1984, is a prominent perspective in management research that examines the influence of the board of directors' characteristics on strategic decision-making and organisational outcomes. This theory posits that the personal attributes, experiences, values, and cognitive frames of the board of directors' members shape their interpretation of strategic situations, which in turn affects their decision-making processes and, ultimately, organisational performance (Hambrick and Mason, 1984; Roberson and Park, 2007).

The central premise of Upper Echelons Theory is that board of directors members' cognitive frames are influenced by their prior knowledge, experiences, and values (Byron and Post, 2016; Hambrick and Mason, 1984; Post and Byron, 2015). These cognitive frames serve as lenses through which the board of directors' members perceive and interpret the strategic environment. Different board of directors' members may have distinct cognitive frames based on their backgrounds and characteristics, such as gender, education, and career experiences.

The theory suggests that the diversity in the board of directors, including gender diversity, can significantly impact strategic decision-making and organisational outcomes. Gender-diverse boards contribute to a broader range of perspectives,

experiences, and skills within the board, which can enhance decision-making processes, problem-solving, and creativity (Dezsö and Ross, 2012; Hillman *et al.*, 2007; Hunt *et al.*, 2015). The diverse backgrounds and viewpoints of women leaders can provide a better understanding of the needs and preferences of female customers, leading to improved market insight and decision-making (Ali *et al.*, 2011; Mensi-Klarbach, 2014; Van Knippenberg *et al.*, 2004).

 For instance, gender-diverse boards may bring broader perspectives, experiences, and values to decision-making (Byron and Post, 2016). Women directors may contribute alternative experiences, knowledge, and perspectives that enable the boards to consider a wider range of stakeholder interests (Hillman *et al.*, 2002). The presence of women on the board may enhance the board's ability to understand the implications of strategic decisions for various stakeholders, including employees.

Furthermore, gender-diverse boards may exhibit different orientations and values influencing decision-making processes. Research suggests that women directors often possess stronger moral orientations, social sensibilities, and ethical attitudes, leading to greater responsibility for others' well-being (Hillman *et al.*, 2002). This can lead to a more stakeholder-conscious decision-making and strategy formulation approach.

Studies have shown that gender-diverse boards can bring various benefits to organisations. For example, gender diversity can enhance problem-solving capacity by providing broader perspectives, skills, and information within the boards (Roberson and Park, 2007; Smith *et al.*, 1994). The diverse knowledge and skills associated with gender diversity can lead to enhanced creativity, innovation, and higher-quality group decision-making processes (Hoffman and Maier, 1961; Taylor and Greve, 2006). Moreover, moderate levels of conflict arising from diversity within the board can stimulate constructive debates and lead to better decision-making outcomes (Phillips *et al.*, 2009; Van Knippenberg *et al.*, 2004).

In summary, Upper Echelons Theory suggests that the characteristics and backgrounds of board members, including their gender, influence strategic decision-making and organisational outcomes. Gender diversity within the board can bring diverse perspectives, enhance problem-solving capacity, stimulate creativity, and contribute to better decision-making processes. Empirical studies support the positive

relationship between board gender diversity and various performance indicators (Skaggs *et al.*, 2012; Liu *et al.*, 2014). By incorporating the insights from the Upper Echelons Theory, organisations can leverage the benefits of gender diversity to improve employment and productivity outcomes.

3.2.2 Social Role Theory:

Social Role Theory is a sociological and psychological theory that focuses on the influence of social roles, particularly gender roles, on individuals' behaviour, attitudes, and decision-making processes. The theory suggests that individuals' experiences, socialisation, and the expectations associated with their gender roles shape their behaviours and perceptions (Byron and Post, 2016; Post and Byron, 2015).

Social role theory contends that perceived gender differences in leadership behaviours stem from gender role expectations rooted in societal norms and culture (Eagly *et al.*, 2000). These socially constructed role beliefs prescribe communal traits like nurturance and empathy for women, while men are ascribed agentic qualities like assertiveness and dominance. Social role theory extends this notion by proposing that prejudice arises when women exhibit leadership approaches diverging from feminine communal roles, such as demonstrating confidence or ambition stereotyped as masculine (Eagly and Karau, 2002). Behaviours aligned with feminine ideals of caretaking may be deprecated as weak or ineffective.

Therefore, social role theory suggests that as more women occupy leadership roles, leadership styles and priorities may gradually shift toward greater collaboration, mentorship, risk aversion, and concern for employee welfare (Cook and Glass, 2014). Given their alignment with communal gender norms, female leaders are expected to excel in participative engagement. However, organisational cultures play a pivotal role in determining whether feminine leadership styles are accepted and activated versus suppressed or penalised (Matsa and Miller, 2013). Deeply embedded masculine norms may resist change.

In summary, social role theory contends that increased female leadership representation has the potential to reshape leadership approaches based on gender role socialisation progressively. However, actualising benefits requires dismantling

restrictive gender biases. This study will empirically examine whether board gender diversity shifts firm practices in line with social role propositions.

Social Role Theory emphasises the influence of gender roles and socialisation on individuals' behaviours and decision-making processes. In the context of board gender diversity, Social Role Theory suggests that the presence of women on boards brings different experiences, knowledge, and perspectives compared to their male counterparts. These diverse perspectives can enhance the board's creativity, innovation, and problem-solving capacity (Hoffman and Maier, 1961; Taylor and Greve, 2006). Additionally, gender-diverse boards can minimise the tendency towards "groupthink" and foster higher-quality decision-making by including diverse perspectives (Egan, 2005; Janis, 1972; Smith *et al.*, 1994).

3.2.3 Empirical literature

The impact of board gender diversity on firm productivity and employment outcomes has been a subject of considerable research interest. Several studies have examined this relationship and provided valuable insights into the effects of gender diversity on various aspects of organisational performance.

1. Board Diversity and Firm Employment

Upper echelon theory underpins the prediction that expanding gender diversity on corporate boards will lead to increased employment and workforce stability by enhancing human capital oversight and focusing on employee welfare (Hambrick and Mason, 1984; Carpenter *et al.*, 2004). This theory suggests that diverse boards bring a wider range of perspectives, experiences, and values, which can shape strategic priorities toward more inclusive and employee-focused outcomes.

Skaggs *et al.* (2012) empirically support upper-echelon theory by investigating female board representation and employment levels across European companies. Using cross-national data from the mid-2000s, they found that companies with higher percentages of female directors were positively associated with increased firm-level employment. The authors argue that gender-diverse boards are more likely to advocate for initiatives that support workforce growth and stability, influenced by social role theory, which emphasises communal goals and employee welfare typically associated with feminine

social roles. Despite these positive findings, the study's cross-sectional design poses significant limitations, particularly the inability to establish causality or account for potential confounding factors that might influence employment levels.

Sabatier (2015) expands on these findings by examining the impact of gender diversity on employment within French companies during the early 2010s. Sabatier's study also supports the view that gender-diverse boards contribute to employment stability, finding that firms with a higher proportion of female directors experienced more stable employment levels. This consistency in findings across different European contexts reinforces that gender diversity on boards may promote employment stability. However, like Skaggs *et al.* (2012), Sabatier's reliance on a cross-sectional methodology limits the ability to draw causal conclusions, and the study does not account for potential long-term effects or broader economic variables.

Lenard *et al.* (2014) shift the focus to the US context, exploring the relationship between female board representation and employee layoffs in US firms. Their study, which utilised cross-sectional data from the early 2010s, found that companies with higher proportions of women on their boards exhibited lower rates of workforce reductions. This finding suggests that gender-diverse boards may prioritise employee welfare and job security, even during economically challenging periods. The theoretical grounding for this study is rooted in upper-echelon and social role theories, which posit that diverse boards, enriched with varied perspectives and values, are better equipped to make decisions that safeguard employee stability. However, similar to the European studies, the cross-sectional nature of Lenard *et al.*'s research limits its ability to establish a causal link between board diversity and reduced layoffs, leaving open the possibility of reverse causality or unmeasured external factors.

Following these US-based studies, Kunze and Miller (2017) provide further insights into the role of gender diversity by examining how female leadership affects women's career progression within the US private sector firms. Their research, based on data from the mid-2010s, found that female leaders are more likely to support the advancement of other women, contributing to improved career progression and higher retention rates for female employees. This study extends the discussion from board-level diversity to broader leadership roles, highlighting how gender-diverse boards can

positively influence organisational culture and long-term employee development. By grounding their analysis in upper-echelon theory, Kunze and Miller demonstrate that female leadership can enhance organisational outcomes related to employee advancement and retention. However, the study's reliance on cross-sectional data is limited, as it restricts the ability to draw definitive causal conclusions and control for all potential influencing factors, such as company size or industry-specific trends.

Expanding the geographic scope, Cardoso and Winter-Ebmer (2010) examine how female leadership influences employment practices in Austrian firms, focusing on wage policies and employee turnover during the late 2000s. Their research utilised firm-level data to investigate whether firms led by women were more likely to adopt equitable wage policies compared to male-led counterparts. The study found that female-led firms were more inclined to implement fair wage practices, contributing to higher employee satisfaction and lower turnover rates. This study provides a nuanced view of how gender diversity affects specific employment aspects, such as wage equity and employee retention, complementing the broader employment outcomes analysed in studies like Skaggs *et al.* (2012) and Sabatier (2015). However, the study's focus on Austria and its specific time frame may limit the generalizability of its findings to other cultural or economic contexts. Moreover, while the study offers valuable insights into wage policy, it does not examine other potential outcomes of gender diversity, such as innovation or financial performance, which could provide a more holistic view of the impacts of female leadership.

Ahern and Dittmar (2012) critically examined the effects of Norway's gender quota mandate, which required companies to achieve a minimum of 40% female board representation by 2008. Utilising a difference-in-differences methodology, they compared Norwegian firms affected by the quota with a control group of firms from other Nordic countries not subject to the same regulation. The study revealed mixed outcomes: while some firms showed positive effects regarding increased employment levels, others experienced negative impacts, such as higher layoff rates. These mixed results suggest that the immediate disruptions caused by rapidly integrating women into board roles could outweigh the potential benefits of gender diversity in the short term. This study underscores the importance of considering the implementation context and the potential unintended consequences of gender diversity policies. The

strength of this study lies in its robust methodological approach, which provides causal evidence of the quota's effects, enhancing internal validity compared to the correlational studies discussed earlier. Nevertheless, the focus on Norway's unique regulatory environment raises questions about the applicability of these findings to other countries with different institutional settings.

Matsa and Miller (2013) further investigate the impact of Norway's gender quota using a natural experiment design. Their study compared Norwegian companies subject to the quota with a control group of Nordic firms not affected by the regulation, using a difference-in-differences approach to isolate the effects of the quota. The results indicated that Norwegian firms experienced significant increases in employment levels post-quota, consistent with upper echelon theory's predictions that greater gender diversity on boards enhances organisational focus on employee welfare and human capital development. This study's robust methodological approach offers stronger causal evidence of the quota's positive impact on employment than earlier cross-sectional designs. However, the narrow focus on Norway raises concerns about the generalizability of these findings to other cultural and institutional contexts. Additionally, while the study effectively demonstrates causal impacts, it does not examine the mechanisms through which the quota influences employment levels, such as changes in strategic priorities or decision-making processes within firms, leaving an area for future research to address.

Liu *et al.* (2016) present a broader European perspective by examining the effects of board gender quotas across multiple countries from 1996 to 2013. Their study utilised a comprehensive dataset to assess the impact of increased female board representation on corporate employment practices and levels. Contrary to upper echelon theory, their findings revealed that the gender diversity resulting from these quotas had no significant effect on employment practices or overall employment levels. Liu *et al.* argue that this lack of significant impact can be attributed to prevailing national cultural norms and insufficient supportive policies that hindered the effectiveness of the quotas. They suggest that substantial increases in board diversity might not lead to positive employment outcomes if the underlying social and institutional barriers are not addressed. This study challenges the assumption that gender diversity alone can drive meaningful change, highlighting the necessity for complementary policies and

cultural shifts to fully realise the benefits of increased female representation on boards. The study's longitudinal design is a notable strength, providing a more comprehensive view of trends over time, but its focus on European contexts may limit its applicability to non-European settings.

In summary, while existing studies provide preliminary evidence supporting upper echelon theory's predictions about the benefits of gender diversity for employment stability, the findings are mixed and highly context-dependent. The generalizability of these results across different cultural and institutional settings remains uncertain, underscoring the need for more rigorous, longitudinal research designs to draw definitive conclusions about the causal linkages between board diversity and employment outcomes. Future research should also investigate how gender diversity influences these outcomes, providing deeper insights into how diverse boards can effectively leverage their composition to benefit organisations.

2. Board Diversity and Firm Productivity

Aligned with the principles of upper echelon theory, which posits that the characteristics of top management teams influence organisational outcomes, gender diversity on corporate boards is proposed to enhance firm productivity. This theory suggests that diverse boards bring a wider array of perspectives, experiences, and decision-making styles, which can optimise key productivity drivers such as cost control, technological innovation, and human capital management (Hambrick and Mason, 1984; Carpenter *et al.*, 2004). Social role theory complements this by highlighting how gender roles influence behaviour, with women often bringing collaborative and community-focused approaches that could positively affect board dynamics and firm performance (Eagly and Karau, 2002).

Liu *et al.* (2014) conducted a cross-sectional study in China, examining data from 2003 to 2010 to examine the relationship between female board representation and firm productivity. They found a positive correlation between the proportion of women on boards and revenue per employee, a key measure of labour productivity. This study supports upper-echelon theory by suggesting that gender-diverse leadership can improve governance and oversight, utilising human capital more effectively.

Additionally, social role theory is reflected in the findings as the communal values often associated with female leadership likely contribute to enhanced workforce productivity. However, the study's reliance on cross-sectional data limits its ability to establish causality, and the narrow focus on revenue per employee may overlook other significant productivity dimensions like innovation and operational efficiency.

Similarly, Sabatier (2015) investigated the impact of gender diversity on firm productivity in France during the early 2010s. His study also found that firms with higher female board representation exhibited improved productivity levels, as measured by revenue per employee. These findings reinforce Liu *et al.*'s conclusions, suggesting that the positive impact of gender diversity on productivity might be consistent across different cultural and economic contexts. Grounded in the upper-echelon and social role theories, Sabatier's research underscores how diverse boards can lead to better strategic decision-making and foster a supportive organisational culture. However, like Liu *et al.*, Sabatier's reliance on a cross-sectional design limits the ability to draw definitive causal conclusions and may miss broader organisational performance impacts.

Deszö and Ross (2012) provided further evidence from a US context by examining female representation in top management and its impact on firm performance from 1992 to 2006. Their study used panel data to demonstrate that increased female leadership was associated with enhanced innovation and productivity, particularly in firms pursuing innovative strategies. This longitudinal design offers stronger evidence of causality, suggesting that gender diversity in leadership roles fosters improved decision-making and organisational outcomes. Social role theory supports these findings, as female leaders' collaborative styles likely contribute to the observed innovation and productivity gains. However, the study's focus on innovative firms might limit the generalizability of its results to more traditional industries, potentially narrowing the scope of its implications.

Expanding on the link between diversity and productivity, Garneroe *et al.* (2014) analysed workforce diversity's effects on productivity across various European firms between the mid-2000s and early 2010s. They found that gender diversity positively influenced productivity, especially in human capital-intensive industries. This aligns

with the upper-echelon theory's premise that diverse leadership teams enhance governance and strategic decision-making, leading to better organisational outcomes. Additionally, social role theory suggests that women's communal values promote a supportive and collaborative work environment, further boosting productivity. The study's use of panel data across different contexts strengthens its findings, although it faces challenges in isolating gender diversity's specific effects from other productivity influences. The industry-specific focus also raises questions about the generalizability of these results across all sectors.

Providing experimental evidence, Hoogendoorn *et al.* (2013) conducted a field experiment in the Netherlands during the early 2010s. They compared the performance of gender-diverse teams with homogeneous teams in tasks requiring innovation and creativity, finding that the former significantly outperformed the latter. This study supports the argument that gender diversity enhances productivity through more dynamic and effective decision-making processes. The experimental design offers a strong basis for causal inference, directly linking gender diversity to improved team performance. However, the study's focus on team settings and controlled environments may limit its generalizability to broader organisational contexts where real-world complexities could alter outcomes.

Pfeifer and Wagner (2014) examined the relationship between workforce gender composition and innovative behaviour in German enterprises during the late 2000s and early 2010s. Their findings indicate that a higher proportion of women in the workforce correlates positively with increased innovation, subsequently leading to improved productivity. This suggests that gender diversity's benefits extend beyond the boardroom, influencing organisational innovation and productivity. The upper-echelon theory supports these findings, as diverse leadership teams are better equipped to foster innovative environments. Social role theory also plays a role, with women's collaborative traits contributing to more effective teamwork and creative problem-solving. Despite these insights, the study's cross-sectional nature limits the ability to establish causality, and the focus on German enterprises may constrain the findings' applicability to other national contexts.

Rose (2007) investigated the impact of female board representation on firm performance in Danish companies during the early 2000s. The study found a positive relationship between gender-diverse boards and employee productivity, suggesting that women in leadership contribute to better utilisation of human capital and overall firm performance. These findings align with upper-echelon and social role theories, emphasising the strategic and collaborative advantages of gender diversity. However, the study's cross-sectional design and focus on Danish companies may limit its generalizability. The absence of exploring mediating factors, such as corporate culture or strategic shifts, further narrows the study's scope.

Contrasting these positive findings, Adams and Ferreira (2009) examined US firms and found a negative correlation between female board representation and firm productivity, as measured by financial returns. They hypothesised that the costs associated with increased diversity might outweigh the benefits, challenging upper echelon theory's predictions. However, their reliance on a narrow productivity measure like financial returns may not capture the full impact of gender diversity. The study lacks an exploration of potential mediators that could explain the negative relationship, and the absence of a more comprehensive productivity measure weakens the argument.

Finally, the impact of national and organisational contexts is crucial in moderating the relationship between board diversity and productivity. Research shows more positive associations between gender diversity and productivity in countries with strong institutional support for gender equality, such as those offering paid parental leave and childcare subsidies (Shehata *et al.*, 2017; Terjesen *et al.*, 2015). These findings suggest that the benefits of gender diversity are contingent on supportive environments that empower diverse perspectives to influence decision-making. In contrast, in countries lacking such policies, the potential for gender diversity to enhance productivity may be significantly diminished, aligning with upper echelon theory's contention that the effectiveness of diverse leadership is context-dependent.

3.3 Hypothesis Development:

1. Firm employment:

Drawing upon the upper echelon theory, this study predicts a positive association between board gender diversity and firm employment levels. The upper-echelon theory suggests that increasing demographic diversity among corporate directors brings a wider range of perspectives, experiences, and values that shape strategic priorities (Carpenter *et al.*, 2004).

Increased gender diversity can lead to strategic decisions that promote workforce stability and expanded employment levels, particularly in labour-intensive firms (Skaggs *et al.*, 2012). Female directors often bring unique perspectives that enhance oversight of human resource practices, which can support employment growth through more inclusive and empathetic workplace policies (Cook and Glass, 2014). This might include initiatives such as flexible working hours, improved maternity leave, and employee development programs.

In contrast, in capital-intensive firms, gender diversity might drive strategic decisions that focus on optimising capital utilisation and efficiency. Female directors in these settings may prioritise risk management, cost control, and long-term strategic planning (Adams and Ferreira, 2009). This can enhance operational efficiency and improve asset management, but may not always increase employment. Instead, the focus might be on leveraging technological advancements and automation to optimise productivity, potentially affecting employment differently than labour-intensive industries.

This leads to our first hypothesis that:

H3.1: There is a positive association between board gender diversity and the employment level of firms.

The impact of female directors on boardrooms varies significantly across different industries, influenced by whether the sector is labour or capital-intensive. The upper-echelon theory highlights how diversity impacts leadership behaviours and strategic priorities but does not fully account for contextual factors that can influence these

effects (Hambrick, 2007). Different industries have distinct cultures, production methods, competitive dynamics, regulations, and talent requirements that shape how increasing gender diversity on boards impacts employment policies and workforce stability.

Labour-intensive industries, such as healthcare and consumer discretion, often see direct benefits in employment levels due to the presence of female directors. These sectors emphasise human capital, and female directors are associated with more inclusive and empathetic workplace policies, positively impacting employee satisfaction and retention (Cook and Glass, 2014). Female board representation may positively influence employment in service-oriented industries, emphasising customer experience (Simionescu *et al.*, 2021).

In contrast, capital-intensive industries such as technology and energy focus more on asset management. Female directors in these sectors contribute to strategic insights and risk-averse tendencies, enhancing financial stability and long-term planning (Adams and Ferreira, 2009). Studies have shown that in the technology sector, female board representation is linked to better decision-making and innovation, leading to improved firm performance. Wang Jr. *et al.* (2018) noted that women CEOs possess more human capital than their male counterparts, contributing to better firm outcomes (Simionescu *et al.*, 2021).

The positive impact of female board representation on firm performance is not uniform across all industries. Brahma *et al.* (2021) highlighted that the effect of board gender diversity on firm performance is stronger in sectors where access to a wider pool of human capital is crucial for competition and performance. A gender-diverse board can bring varied experiences and perspectives, driving improved performance and innovation. Conversely, in traditional manufacturing or resource-based sectors, where competitive advantage relies less on human capital diversity, the impact of board gender diversity may be weaker. In labour-intensive industries, female directors can influence higher employment levels by fostering a supportive and inclusive work environment, leading to lower turnover rates and higher employee morale (Heilman, 2012). Employment levels may not significantly increase in capital-intensive

industries, but they can benefit from more strategic hires and better human capital management (Nadeem *et al.*, 2019). This leads to our hypothesis that:

H3.1a: The relationship between board gender diversity and firm employment levels varies between labour-intensive and capital-intensive industries.

2. Firm Productivity:

Next, we examine the relationship between board gender diversity and firm productivity. The upper-echelon theory suggests that greater gender diversity can bring varied perspectives that enhance oversight and decision-making regarding drivers of productivity (Carpenter *et al.*, 2004).

Compared to male directors, female board members may emphasise monitoring costs, leveraging technologies, incentivising employees, and exploring innovations to enhance productivity, given role congruity influences (Eagly and Karau, 2002). Women directors are posited as more risk-averse, which could sharpen the focus on cost efficiencies, asset utilisation, and revenue-generating activities (Faccio *et al.*, 2016). By increasing attention to these priorities, more gender-diverse boards may make decisions that improve productivity metrics, including expense ratios, asset turnover, and revenue per employee (Lückerath-Rovers, 2013).

With a more diverse board composition, organisations are likely to benefit from a broader range of perspectives and experiences that inform strategic decisions related to cost management. Female directors are known to bring a heightened focus on cost efficiency and resource allocation, leading to more prudent spending decisions and reduced unnecessary expenses. Consequently, this emphasis on cost management practices can decrease the expense ratio, reflecting improved efficiency in resource utilisation.

Furthermore, gender-diverse boards foster a more inclusive and innovative organisational culture, where strategies to enhance asset utilisation are prioritised. Female directors may advocate for initiatives such as investing in technology, optimising production processes, and diversifying product offerings to maximise returns on investment. Leveraging diverse perspectives and insights, boards with

greater gender diversity can identify opportunities to enhance asset utilisation and generate higher returns from existing resources.

Moreover, the presence of women on corporate boards contributes to improved employee productivity by promoting diversity, inclusion, and employee engagement initiatives. Female directors will likely prioritise policies and programs to enhance workforce well-being, professional development, and work-life balance, leading to higher employee satisfaction, motivation, and performance. This alignment with employee interests and preferences, facilitated by diverse boards, enhances organisational productivity. This leads to another hypothesis that:

H3.2: There is a positive association between board gender diversity and firm productivity.

Upper echelon theory, initially postulated by Hambrick (2007), provides valuable insights into how gender diversity in top management impacts organisational decision-making and performance outcomes. This theory posits that the composition of an organisation's top leadership team, including gender diversity, significantly shapes its strategic choices and performance outcomes. However, the strength and nature of this relationship are contingent upon the specific industry in which an organisation operates.

When examining the impact of board gender diversity on employment and productivity, it's essential to distinguish between labour-intensive and capital-intensive firms. Labour-intensive firms, which rely more on human labour, often see direct productivity gains from increased employment, as additional workers can significantly boost output. In contrast, capital-intensive firms, which depend heavily on machinery and equipment, may not see proportional increases in employment with productivity gains due to the role of automation and advanced technologies (Petreski *et al.*, 2023).

In labour-intensive industries, employee productivity is directly influenced by female directors' collaborative and inclusive leadership styles, leading to a more motivated and engaged workforce (Milliken and Martins, 1996). These industries benefit from policies that enhance employee engagement, resulting in higher productivity.

Moreover, the expense ratio in labour-intensive industries can be positively impacted by female directors' emphasis on cost-efficiency and resource management, resulting in better control over operational expenses and improved financial performance (Simionescu *et al.*, 2021). Additionally, asset utilisation in these industries benefits from the strategic oversight of female directors, as their diverse perspectives and attention to detail lead to more effective use of assets, enhancing overall productivity and efficiency (Terjesen *et al.*, 2016).

Conversely, productivity improvements are linked to female directors' strategic and analytical strengths in capital-intensive industries. Their ability to implement effective governance and oversight can lead to more efficient operations and higher productivity (Terjesen *et al.*, 2016). Capital-intensive sectors also benefit from the risk-averse tendencies of female directors, which help maintain financial stability and control costs, resulting in a lower expense ratio and better financial health for the firm (Simionescu *et al.*, 2021). Furthermore, the asset utilisation ratio in these industries improves due to female directors' strategic management and long-term planning capabilities. Their focus on efficient asset use and risk management contributes to better utilisation of resources (Adams and Ferreira, 2009).

Numerous studies have corroborated the idea that the impact of gender diversity on organisational outcomes varies across industries. For instance, Herring (2009) found that gender diversity on boards had a more substantial positive effect on innovation outcomes in technology-intensive industries than in traditional manufacturing sectors. This variation underscores the importance of considering industry-specific dynamics when assessing the impact of gender diversity. Faccio *et al.* (2016) highlighted that in mature, asset-heavy industries like manufacturing, female directors often bring risk-aversion and cost-efficiency perspectives that positively influence productivity. Similarly, Erhardt *et al.* (2003) found that gender-diverse boards were associated with reduced risk-taking in banking. Conversely, in innovative high-tech sectors, gender-diverse perspectives may face stiffer competition from other drivers of productivity, such as technological disruption and rapid changes in market conditions (Catalyst, 2013; Klein *et al.*, 2012).

Thus, we propose to test the hypothesis that:

H3.2a: The relationship between board gender diversity and firm productivity levels varies between labour-intensive and capital-intensive industries.

The relationship between employment levels and firm productivity is complex and multifaceted, often shaped by factors such as industry type, firm size, and specific economic conditions. Studies have consistently shown a positive correlation between productivity growth and employment growth within firms. For example, a comprehensive research by Calligaris *et al.* (2023) analysed the Organisation for Economic Co-operation and Development (OECD) database, which included data from 13 countries, and found that firms experiencing productivity growth also saw employment growth over time. This study highlighted that firms at the top of the productivity distribution experienced higher employment growth, and firms that improved their productivity more significantly also saw stronger employment growth than their peers (Calligaris *et al.*, 2023).

Another study by William Nordhaus, published by the National Bureau of Economic Research (NBER), examined the relationship between productivity and employment in the US manufacturing sector over several decades. It found that higher productivity growth led to higher employment in manufacturing, suggesting that productivity improvements were associated with increased demand and, thus, more jobs (Nordhaus, 2005).

Furthermore, the OECD (2021) has documented that productivity gains generally lead to higher employment levels. As firms become more efficient, they can lower prices and increase product demand, and subsequently, they need more employees to handle the increased production and sales.

Research indicates that diverse boards bring varied perspectives and innovative ideas, leading to better decision-making and improved firm performance. Firms with higher gender diversity at the board level tend to perform better in terms of both employment growth and productivity. This positive impact can be attributed to enhanced governance, better risk management, and a more inclusive workplace culture that attracts and retains talent (OECD, 2021; NBER, 2005).

3.4 Variables Definition:

1. Dependent Variables:

The research examines the impact of board gender diversity on firm employment and productivity outcomes. The first dependent variable is employment, calculated as the ratio of total employees to total assets. The second dependent variable is productivity, measured using three indicators: the expense ratio, the asset utilisation ratio, and the employee productivity. See *Appendix 3.A* for the definition of all variables.

1. *Employment Ratio:* It is measured using the ratio of the total number of employees to market capitalisation at the end of the year. It serves as an indicator of how gender diversity in the boardroom influences workforce levels. Upper-echelon and social role theories suggest that increased gender diversity promotes perspectives favouring workforce stability and employment growth, leading to a higher employment ratio (Skaggs *et al.*, 2012). A longitudinal analysis of this ratio will reveal whether changes in board gender composition correlate with increased size-adjusted workforce levels, consistent with the theoretical predictions. Support for this hypothesis would indicate that gender diversity contributes to enhanced strategic oversight and prioritisation of human capital.

2. Productivity Indicators:

   a. *Employee Productivity:* This ratio is measured as operating revenue divided by the number of employees; it reflects workforce efficiency. According to upper-echelon theory, gender-diverse boards enhance leadership focus on human capital productivity (Carpenter *et al.*, 2004). Female directors may emphasise training, engagement, and technological initiatives that boost individual output (Cook and Glass, 2014). A positive relationship between female board representation and employee productivity over time would indicate that gender diversity improves workforce efficiency, potentially leading to overall firm productivity gains.

   Therefore, a positive relationship is hypothesised between greater female board representation and employee productivity over time. Testing this longitudinal

effect will provide insights into whether increased gender diversity is associated with higher revenue per employee, as female directors focus more on human capital performance. The results will also give nuanced perspectives on whether women directors advocate for strategies, policies, and programs that strengthen individual employee productivity. Findings will reveal if increased workforce efficiency underlies potential gains in overall firm revenue and productivity as gender diversity expands on boards. Analysing revenue per employee will complement expense and asset efficiency ratios to capture multiple facets of productivity that may be enhanced by increased demographic variety among top directors.

b. *Expense Ratio* is calculated as operating expenses divided by total sales revenue, measuring cost efficiency. A lower expense ratio suggests effective cost management and lower agency costs. Research indicates that female directors contribute to better cost control and ethical management practices, which can lead to lower expense ratios (Nguyen *et al.*, 2021; Alluwia and Sarun, 2019). The upper-echelon theory supports that gender-diverse boards enhance oversight and decision-making regarding cost management, leading to more efficient operations (Carpenter *et al.*, 2004). Evidence from Ain and Yuan (2020) and Amin *et al.* (2021) supports this view, showing that female directors help reduce agency costs and improve financial performance through more stringent oversight and ethical governance. These dynamics suggest that increased gender diversity could lead to sustained reductions in operating costs, improving overall firm efficiency.

c. *Asset Utilisation Ratio:* The asset utilisation ratio is calculated as total sales divided by total assets; it indicates how effectively a firm uses its assets to generate revenue. A higher ratio reflects more efficient asset use and lower agency costs. Research suggests that female directors contribute to more effective asset management, aligning with upper-echelon theory's assertion that diverse leadership improves strategic decision-making (Carpenter *et al.*, 2004). Female directors may prioritise the judicious use of assets, avoiding risky capital investments in favour of strategies that optimise asset productivity (Faccio *et al.*, 2016). Studies by Ain and Yuan (2020) and Amin *et al.* (2021)

demonstrate that gender diversity on corporate boards enhances asset utilisation by promoting transparency, accountability, and ethical governance. This focus on maximising asset productivity is reflected in improved financial performance, as seen in Wellalage and Locke (2012), who discuss how female board representation fosters a collaborative culture that enhances decision-making and oversight.

2. Explanatory Variable:

The impact of board gender diversity on firm employment and productivity outcomes is a significant research area that has garnered attention in recent years. The key explanatory variable used to study this relationship is the percentage of female directors on the board of directors, often referred to as the female percentage. This variable measures the representation of women on corporate boards and serves as an indicator of gender diversity within the top leadership of organisations.

Theoretical reasons to use the female proportion as an explanatory variable in studying the impact of board gender diversity on firm employment and productivity outcomes can be drawn from various perspectives. Firstly, gender diversity is argued to enhance cognitive diversity and decision-making processes within boards. Including women in boardrooms brings diverse perspectives, experiences, and expertise, leading to more effective decision-making, innovation, and problem-solving (Biswas *et al.*, 2023; Pandey *et al.*, 2022). The female proportion captures the extent of gender diversity and allows researchers to assess the potential impact of these diverse perspectives on employment and productivity outcomes.

Economically, the female proportion as an explanatory variable in studying the impact of board gender diversity on firm employment and productivity outcomes is relevant due to the potential for improved firm performance. Research has suggested that gender-diverse boards can lead to positive financial and non-financial outcomes for firms. For example, studies have found a positive relationship between board gender diversity and firm performance, including profitability, return on assets, and market value (Simionescu *et al.*, 2021; Dang *et al.*, 2020). Increased gender diversity may also contribute to a better organisational reputation, increased employee satisfaction, and reduced discrimination (Pandey *et al.*, 2022; Kang *et al.*, 2022). The female proportion

allows researchers to examine the potential economic benefits of gender diversity and understand its impact on firm employment and productivity outcomes.

In summary, the explanatory variable of the female proportion, which represents the proportion of female directors on the board of directors (executive and non-executive), is essential in studying the impact of board gender diversity on firm employment and productivity outcomes. Theoretical perspectives highlight the potential for enhanced decision-making and cognitive diversity within diverse boards. Economically, gender diversity is associated with improved firm performance and other positive outcomes. The female proportion is a quantifiable measure of gender diversity and enables researchers to analyse the relationship between board gender diversity and various employment and productivity indicators.

3. Control Variables:

When studying the impact of board gender diversity on firm employment and productivity outcomes, it is crucial to control for the potential effects of other factors likely to influence the dependent variable.

Leverage, measured as the ratio of total debt to total equity, is a crucial control variable in assessing the impact of board gender diversity on firm employment and productivity outcomes. The inclusion of leverage is theoretically anchored in upper-echelon perspectives, which assert that a firm's financial structure significantly shapes its strategic priorities and leadership behaviours (Hambrick and Mason, 1984). High leverage typically signals greater financial risk and potential resource constraints, which can restrict the implementation of initiatives that align with the communal leadership approaches often associated with women directors (Eagly and Karau, 2002; Haynes and Hillman, 2010). Conversely, social role theory suggests that women directors might improve a firm's access to capital, enabling investments in employment and productivity-enhancing initiatives (Flabbi *et al.*, 2016).

The influence of leverage on firm outcomes can manifest in positive and adverse effects. On the positive side, leverage can drive firm performance by disciplining management and encouraging efficient resource allocation, as firms must generate sufficient returns to service their debt obligations (Jensen, 1986). This pressure can

lead to better productivity as firms optimise asset use and control costs to meet financial commitments (Low *et al.*, 2015). Firms with moderate leverage levels might also leverage debt to finance growth and expansion initiatives, potentially leading to increased employment and higher productivity (Simionescu *et al.*, 2021). For example, debt-financed investments in technology or workforce training can enhance employee productivity, resulting in higher revenue per employee and improved operational efficiency.

However, high leverage carries significant risks, particularly in employment and productivity. Excessive debt levels can constrain a firm's ability to invest in long-term growth and human capital, as financial resources are diverted to meet debt service requirements (Jensen, 1986). This can reduce employment stability, as firms may resort to layoffs or hiring freezes to preserve cash flow (Simionescu *et al.*, 2021). Furthermore, high leverage may inhibit productivity by limiting the firm's capacity to invest in innovation, technology, and employee development initiatives crucial for maintaining competitive advantage (Low *et al.*, 2015). In periods of financial distress, heavily leveraged firms may also be forced to cut operational expenses aggressively, potentially compromising product or service quality and diminishing overall productivity (Haynes and Hillman, 2010).

Free cash flow, calculated as cash from operations minus capital expenditures and normalised by total assets, is an essential control variable that reflects the financial resources available for investments and growth initiatives (Marquez-Cardenas *et al.*, 2022). According to upper echelon theory, resource availability is critical in shaping strategic priorities and leadership behaviours (Hambrick and Mason, 1984). For firms with abundant free cash flow, these resources can provide the discretionary funds needed for female directors to champion employment and productivity-enhancing investments, particularly those that align with communal leadership approaches, which emphasise workforce development and stability (Eagly and Karau, 2002).

From a social role theory perspective, female directors are likely to direct surplus capital towards human capital programs, such as employee training, mentoring, and engagement initiatives, which are anticipated to improve productivity and retention (Cook and Glass, 2014). By controlling for free cash flow, the analysis can more

accurately isolate the effects of gender diversity on firm outcomes, independent of the availability of financial resources.

The inclusion of free cash flow as a control variable is economically justified as it represents the funds available for discretionary initiatives that can impact key aspects of firm performance, including employment stability, cost efficiency, asset utilisation, and revenue generation, following necessary capital investments (Yilmaz *et al.*, 2022). Firms with higher free cash flow have greater flexibility to invest in projects that enhance employee welfare and productivity, potentially leading to improved operational efficiency and revenue per employee.

However, the presence of excess free cash flow can also have adverse effects on firm performance. According to Jensen's (1986) agency theory, excess free cash flow can increase agency costs, as it may incentivise managers to invest in unproductive projects, luxury perks, or other expenditures that do not align with shareholder interests. Such misallocation of resources can detract from overall firm productivity and reduce the effectiveness of investments intended to benefit employees. For instance, rather than focusing on value-enhancing initiatives like workforce training or technological advancements, managers might divert free cash flow to less productive uses, weakening the firm's operational efficiency and financial performance (Jensen, 1986; Yilmaz *et al.*, 2022).

Moreover, abundant free cash flow without robust governance oversight can lead to complacency in cost management, as the availability of surplus funds may reduce the pressure on managers to maintain strict financial discipline (Jensen, 1986). This could result in higher operating expenses, underutilisation of assets, and a general decline in productivity. The potential for free cash flow to exacerbate agency problems highlights the importance of effective board oversight, including gender-diverse boards, to ensure that surplus capital is allocated towards genuinely productive and value-enhancing projects (Cook and Glass, 2014).

Tangibility: Tangibility, measured as the ratio of net property, plant, and equipment to total assets, is a crucial control variable that reflects the asset intensity of a firm and its potential impact on employment and productivity outcomes. Including tangibility in the analysis is theoretically grounded in upper-echelon theory, which emphasises

how the resource structure of a firm shapes leadership priorities and behaviours (Hambrick and Mason, 1984). Firms with high tangibility typically require significant investments in physical assets, which can influence how resources are allocated. This may limit the availability of funds for employment and human capital initiatives, often prioritised by female directors due to their communal leadership style and focus on workforce development (Eagly and Karau, 2002).

From a social role theory perspective, female directors may exhibit greater risk aversion, particularly in contexts that involve substantial investments in tangible assets (Faccio *et al.*, 2016). This cautious approach could lead to a preference for more conservative capital allocation strategies, potentially impacting the firm's decisions related to employment expansion and productivity enhancements. In high-tangibility firms, where capital is often tied up in physical assets, fewer resources may be available for investments in human capital, which could constrain efforts to improve employee productivity and engagement.

The positive effects of asset tangibility on firm employment and productivity are largely related to physical assets' stability and predictability. High-tangibility firms often benefit from steady cash flows generated by their assets, which can support sustained employment levels and contribute to operational efficiency (Anderson and Reeb, 2003). Tangible assets can also enhance a firm's ability to secure financing, as these assets can be used as collateral in capital markets, thereby improving access to funds needed for productivity-enhancing investments (Almeida and Campello, 2007). This increased access to capital can facilitate investments in technology, infrastructure, and human capital, critical to driving firm productivity.

However, the adverse effects of high tangibility must also be considered. Firms with a high proportion of tangible assets may face significant capital constraints, as substantial funds are often tied up in maintaining and upgrading physical assets (Almeida and Campello, 2007). This can limit the flexibility to invest in human capital or other productivity-enhancing initiatives. Additionally, emphasising physical assets may reduce the firm's ability to adapt quickly to market changes or innovate, as the capital structure is heavily weighted towards fixed investments. This could negatively impact the firm's agility and long-term productivity (Faccio *et al.*, 2016).

Asset tangibility also plays a critical role in a firm's capital-raising options. Tangible assets provide collateral that can be used to secure debt financing, often at more favourable terms, due to the reduced risk for lenders (Myers and Rajan, 1998). This ability to raise capital more effectively can enhance a firm's capacity to invest in productivity-improving initiatives, such as upgrading technology or expanding operations. However, the reliance on tangible assets for financing can also lead to over-leverage, where the firm becomes burdened with high levels of debt, potentially leading to financial distress and reducing the resources available for employment and productivity enhancements (Anderson and Reeb, 2003).

Firm age: It is measured as the natural logarithm of the number of years since incorporation and will be included as a control variable to account for the potential effects of organisational maturity and experience on employment and productivity outcomes (Alshammari, 2015; Allini *et al.*, 2021). The inclusion of firm age in the analysis is theoretically grounded in upper-echelon theory, which suggests that the maturity of an organisation influences leadership decisions, strategic behaviours, and overall firm performance (Hambrick and Mason, 1984). Firm age is a critical factor because it reflects the level of established routines, organisational culture, and accumulated experience that can either facilitate or hinder strategic changes, including those related to employment and productivity.

Younger firms, often characterised by less entrenched cultures and more flexible organisational structures, may offer greater latitude for women directors to implement transformative agendas that align with social role expectations and progressive strategic initiatives (Eagly and Karau, 2002). These firms are typically more open to innovation and change, allowing female directors to effectively influence employment policies and productivity strategies. In such environments, women leaders might advocate for more dynamic human capital strategies, including aggressive hiring, employee development programs, and adopting new technologies to boost productivity (Smith *et al.*, 2018).

Conversely, older, more established firms may have deeply ingrained cultures and standardised practices that can resist change. These organisations often prioritise stability and risk aversion, which could limit the ability of women directors to

implement new employment practices or productivity enhancements (Fich and Shivdasani, 2006). The maturity of such firms might constrain the scope for strategic innovation, as established firms tend to adhere to proven methods and traditional practices. This can lead to a focus on maintaining existing productivity and employment levels rather than seeking significant improvements or changes (De Kok *et al.*, 2006).

The positive effects of firm age on employment and productivity are often linked to mature firms' accumulated knowledge and experience. Older firms benefit from established customer bases, refined operational processes, and strong industry networks, which can contribute to stable employment levels and consistent productivity (Coad *et al.*, 2016). These firms may also have the financial resources and risk management capabilities to support sustained investment in employee training and productivity-enhancing technologies, leading to gradual but steady improvements in organisational performance (Sorensen and Stuart, 2000).

However, the adverse effects of firm age should not be overlooked. As firms grow older, they may become bureaucratic and less responsive to changes in the market environment, which can stifle innovation and limit productivity gains (Hannan and Freeman, 1984). Older firms may also face challenges in attracting and retaining young talent, who may prefer the dynamic and flexible environments. This can lead to stagnation in workforce development and a decline in overall productivity as the firm becomes less competitive in a rapidly evolving marketplace (Autio *et al.*, 2000).

Additionally, the age of a firm can impact its ability to adapt to new leadership styles, such as those brought by female directors. In older firms with entrenched leadership practices, the integration of diverse perspectives may face more resistance, potentially limiting the effectiveness of gender diversity initiatives to improve employment and productivity outcomes (Agarwal and Gort, 2002). This resistance can manifest in slower adoption of innovative practices and a reluctance to shift away from traditional strategies, diminishing the potential positive impacts of increased female representation on the board.

Firm size is measured as the natural logarithm of market capitalisation and will be included as a critical control variable in this study. This choice is informed by a

substantial body of literature that identifies firm size as a pivotal factor influencing a wide range of organisational policies, practices, and outcomes (Chen and Hambrick, 1995; Dalton *et al.*, 1999). The theoretical foundation for including firm size is rooted in upper-echelon perspectives, which suggest that larger firms, with their greater resource availability, provide executives with the flexibility to pursue a broader array of strategic initiatives (Hambrick and Mason, 1984).

In larger firms, abundant resources may empower women directors to champion transformative agendas, particularly those focused on human capital development, work-life balance policies, and productivity-enhancing investments. These initiatives align with feminine leadership approaches, emphasising employee welfare, engagement, and long-term organisational sustainability (Eagly and Karau, 2002). The extensive resources of large firms allow for the implementation of comprehensive programs that smaller firms may find challenging to afford, such as advanced training and development initiatives, employee wellness programs, and investments in cutting-edge technology designed to boost productivity (Huselid, 1995).

Moreover, larger firms often operate under greater scrutiny from shareholders, regulatory bodies, and the public. This heightened visibility can motivate women directors to actively pursue diversity and inclusion efforts, as these initiatives are increasingly recognised as critical components of corporate social responsibility and governance (Terjesen *et al.*, 2015). Consequently, in larger firms, the push for gender diversity at the board level may be stronger, and the potential impacts on firm outcomes may be more pronounced.

However, the influence of firm size on employment and productivity is not uniformly positive. While large firms may have more resources, they often grapple with bureaucratic inertia and a slower decision-making process, which can hinder the quick implementation of innovative employment practices or productivity improvements (Weber and Weber, 2001). The complex hierarchical structures typical of large organisations can dilute the impact of individual board members, including women directors, reducing their ability to influence significant changes in employment or productivity (Mintzberg, 1979). Additionally, the larger the firm, the more likely it is to face coordination challenges across different departments and locations, potentially

leading to inefficiencies that can negatively impact overall productivity (Bloom *et al.*, 2012).

In contrast, smaller firms, despite their resource constraints, can exhibit greater agility in decision-making and implementation of strategic initiatives. The leaner organisational structures typical of smaller firms often mean that board decisions, including those made by women directors, can directly and immediately impact employment practices and productivity outcomes (Wiklund and Shepherd, 2005). However, the limited resources available in smaller firms may restrict the scope of initiatives that can be undertaken, potentially curbing the effectiveness of strategies to enhance human capital or boost productivity (Penrose, 1959).

Furthermore, smaller firms may be less able to absorb the risks associated with significant changes in employment policies or investments in productivity-enhancing technologies. The financial pressure in smaller firms can lead to a focus on short-term survival rather than long-term growth, which may limit the ability of female directors to advocate for comprehensive changes aligned with communal leadership styles (Coad, 2009).

Board size: Measured as the total number of directors on the board and will be included as a control variable in this study to account for the potential effects of board composition on strategic priorities and firm outcomes (van Essen *et al.*, 2015; Ruigrok *et al.*, 2006). Including board size is theoretically grounded in upper-echelon theory, which suggests that board dynamics significantly influence leadership behaviours and decision-making processes (Hambrick and Mason, 1984). The board's size can have positive and negative effects on firm employment and productivity, making it an essential variable to control for when assessing the impact of gender diversity on corporate boards.

On the positive side, larger boards may bring a broader range of skills, experiences, and perspectives, enhancing the board's ability to make informed and strategic decisions that benefit the firm (Dalton *et al.*, 1999). This diversity in viewpoints can lead to more comprehensive discussions and innovative solutions, potentially improving firm outcomes such as employment stability and productivity (Coles *et al.*, 2008). For example, larger boards may be more likely to implement human capital

development initiatives and productivity-enhancing strategies, as the varied expertise and insights can contribute to more well-rounded decision-making processes (Adams and Ferreira, 2007).

However, larger boards face several challenges that can negatively impact firm performance. One significant issue is the potential for coordination difficulties, where the increased number of directors can lead to slower decision-making processes and diluted accountability (Jensen, 1993). The presence of many voices may result in a lack of clear direction or consensus, which could impede the implementation of effective employment practices and productivity initiatives (Lipton and Lorsch, 1992). Furthermore, the impact of female directors may be less pronounced on larger boards, as their influence might be diluted among the greater number of directors (Joecks *et al.*, 2013). This potential dilution effect underscores the importance of controlling for board size when analysing the impact of gender diversity on firm outcomes.

Additionally, larger boards may face challenges related to group dynamics, such as social loafing or increased potential for conflicts, which can hinder effective decision-making and reduce overall board effectiveness (Ruigrok *et al.*, 2006). These dynamics can negatively affect the board's ability to drive initiatives that enhance employment and productivity, as well as limit the board's capacity to respond quickly to market changes or internal challenges (Forbes and Milliken, 1999). The complexity of managing a larger group may also reduce the effectiveness of board oversight, potentially leading to suboptimal strategic decisions that do not fully leverage the benefits of gender diversity (Zahra and Pearce, 1989).

On the other hand, smaller boards may offer more streamlined decision-making processes and greater individual accountability, allowing directors, including women, to substantially impact firm strategies related to employment and productivity (Yermack, 1996). In smaller boards, the contributions of female directors may be more visible and influential, leading to more direct effects on the firm's human capital and productivity initiatives. However, smaller boards might lack the diversity of perspectives and the breadth of expertise that larger boards can provide, potentially limiting the range of strategies considered (Eisenberg *et al.*, 1998).

Board Independence, measured as the percentage of independent directors on the corporate board, will be included as a control variable in this study due to its well-established relevance for governance quality and firm outcomes (Nguyen *et al.*, 2015). The inclusion of board independence is theoretically grounded in upper-echelon theory, which asserts that the affiliations and backgrounds of directors significantly shape their strategic perspectives and decision-making processes (Hambrick and Mason, 1984). Independent directors, who do not have ties to the firm or its executives, are expected to provide more objective oversight that aligns closely with shareholder interests rather than managerial preferences (Fama and Jensen, 1983). This objectivity is critical for ensuring that strategic decisions, including those related to employment and productivity, are made in the firm's and its stakeholders' best interests.

Independent directors are generally associated with enhanced governance quality, as these directors are more likely to challenge management decisions and advocate for policies that maximise shareholder value (Nguyen and Nielsen, 2010). In the context of firm employment, independent directors may push for more transparent and fair hiring practices, leading to better workforce stability and morale. This could improve employee retention and productivity, as employees may feel more secure and valued in a well-governed environment (Kim and Lu, 2011). Additionally, independent directors might encourage investments in human capital, such as training and development programs, which can further enhance employee productivity (Kang *et al.*, 2007).

Moreover, independent directors can also positively impact firm productivity by allocating resources efficiently and effectively (Adams *et al.*, 2010). Their objective oversight can prevent wasteful spending and promote more strategic investments in technology and innovation, which are critical drivers of productivity. Independent directors are also more likely to hold management accountable for performance, leading to more disciplined and results-oriented management practices (Baysinger and Butler, 1985).

However, the influence of board independence on firm outcomes is not universally positive. One potential downside is that independent directors, due to their lack of deep knowledge about the firm's operations, may rely heavily on external benchmarks and

standard governance practices, which might not always fit the firm's specific context (Raheja, 2005). This could lead to a one-size-fits-all approach to governance that overlooks unique opportunities or challenges within the firm, potentially stifling innovation and reducing the firm's competitive edge (Hwang and Kim, 2009).

In terms of employment, independent directors may advocate for cost-cutting measures, including layoffs, to meet short-term financial targets, especially during periods of economic downturns or poor financial performance (Wang and Zhao, 2020). Such actions, while potentially improving short-term financial metrics, can negatively affect employee morale, loyalty, and overall productivity (Bebchuk and Fried, 2003). Furthermore, emphasising shareholder value maximisation could lead to decisions prioritising financial outcomes over employee welfare, potentially increasing turnover rates and reducing the firm's ability to attract and retain top talent (O'Connor, 2004).

Additionally, a high proportion of independent directors might reduce board cohesion and increase the likelihood of conflicts, as these directors may challenge management and other board members more frequently (Jensen, 1993). While constructive dissent is valuable, too much discord can slow decision-making processes and create a less collaborative board environment, which may impede the implementation of effective employment and productivity strategies (Forbes and Milliken, 1999).

CEO Duality: CEO duality, representing when the CEO also holds the position of board chair, will be included as a control variable based on extensive research on its governance implications (Krause *et al.*, 2014). CEO duality often indicates a limitation in structural board oversight, potentially enabling unilateral decision-making that may overlook or sideline diverse perspectives (Joecks *et al.*, 2013). By controlling for CEO duality—typically measured as a binary indicator set to 1 when the CEO is also the board chair and zero otherwise (Rao and Tilt, 2016)—this study can isolate the specific effects of gender diversity on firm outcomes, independent of the governance structure. This approach allows for a nuanced understanding of how gender diversity interacts with leadership dynamics to influence firm performance.

CEO duality can offer several potential benefits, particularly in streamlined decision-making and strategic alignment. When the CEO also serves as the board chair, there is

a clear, unified vision for the company, which can accelerate decision-making processes and reduce conflicts between management and the board (Krause *et al.*, 2014). This concentration of power can lead to more decisive actions and coherent strategic direction, which may positively impact firm productivity by aligning resources and efforts toward clearly defined goals (Boyd, 1995).

Regarding employment, a unified leadership structure under CEO duality might facilitate the rapid implementation of strategic changes, including hiring and workforce management decisions. This could be particularly advantageous in dynamic environments where quick responses are crucial (Daily and Dalton, 1997). Additionally, if the CEO is strongly committed to workforce stability and productivity, duality could enable swift and effective deployment of resources toward human capital development and employee engagement initiatives, potentially boosting overall firm productivity.

However, the potential drawbacks of CEO duality are significant and well-documented. One primary concern is the reduction in board independence and oversight, which can lead to a lack of checks and balances in corporate governance (Jensen, 1993). This concentration of power can result in decisions that prioritise the CEO's interests over those of shareholders and other stakeholders, potentially leading to suboptimal outcomes for the firm. For example, in the context of employment, CEO duality might result in decisions that prioritise cost-cutting measures or short-term financial gains at the expense of long-term workforce stability and development (Lorsch and MacIver, 1989).

In terms of productivity, CEO duality might limit the diversity of thought and strategic input at the highest levels of the company, which could stifle innovation and adaptability. The absence of rigorous board oversight could allow the CEO to pursue not fully vetted strategies, potentially leading to inefficiencies or missed opportunities for improving productivity (Finkelstein and D'Aveni, 1994). Furthermore, the lack of diverse perspectives in decision-making processes could result in a narrow focus on traditional or established practices rather than encouraging innovative approaches to enhance firm performance.

CEO duality may also have implications for the gender diversity of the board itself. Research suggests that when the CEO also serves as the board chair, selecting new directors may be less inclusive, potentially inhibiting the board's diversification (Terjesen *et al.*, 2009). This could hinder efforts to increase female representation, thereby limiting the positive impacts of gender diversity on employment and productivity outcomes. In cases where the CEO holds both roles, there may be a tendency to maintain the status quo, which could reduce the likelihood of appointing female directors with different perspectives and leadership styles.

Year2012: A dummy variable will be employed as a crucial control in this study to account for the potential effects of the Davies Report policies on firms' employment levels and productivity. This variable is coded as 1 for the year 2012 and subsequent years and 0 for the years before 2012. Including this variable is particularly important as it allows the study to differentiate between the periods before and after implementing the gender diversity guidelines recommended by the Davies Report.

This variable helps to account for any systemic changes or shifts in the corporate governance environment following the introduction of the Davies Report's gender diversity policies. For instance, if there is a noticeable increase in employment levels or improvements in productivity post-2012, the Year2012 variable will help determine whether these changes are attributable to the broader policy environment introduced by the Davies Report rather than simply the passage of time or other unrelated factors.

In the context of firm employment levels, controlling for Year2012 ensures that any observed increases in the ratio of employees to assets or other employment-related outcomes can be more confidently linked to the board gender diversity initiatives rather than to external economic or regulatory changes that occurred around the same time. Similarly, for firm productivity, this variable will help to clarify whether improvements in productivity metrics, such as revenue per employee or asset utilisation, are a result of the enhanced gender diversity on corporate boards following 2012 rather than due to other time-related factors.

3.5 Results and analysis:

3.5.1 Univariate Analysis

Table 3.1 shows the summary statistics for all variables of interest, employment ratio, employee productivity, expense ratio and assets utilisation ratio across the sample period from 2001 to 2020. Among the observed 8,545 companies, the employee ratio has a mean value of 0.93. This ratio is defined as the number of employees divided by market capitalisation, and a mean close to 1 suggests that, on average, firms employ roughly one worker per unit of market value. In other words, the ratio indicates the intensity of labour relative to firm size as measured by market capitalisation. The expense ratio exhibits a mean of 0.90, suggesting that operating expenses constitute around 90% of total sales revenue. Meanwhile, the asset utilisation ratio data presents a mean value of 1.02, indicating that companies, on average, generate slightly more revenue than the value of their total assets. The employee productivity measure presents a mean value of 0.04, which might appear low in absolute terms. However, this result is not surprising given the way the variable is scaled and the inclusion of a broad cross-section of FTSE All-Share firms, many of which operate in capital-intensive industries such as industrials and real estate. In such sectors, productivity is driven more by capital than labour, which naturally produces lower ratios when expressed on a per-employee basis.

Furthermore, the female percentage on corporate boards is captured with an average percentage of 10.61%, highlighting that while there is some female representation, boards are still male-dominated. The firm size variable reveals an average value of approximately £2.58 million, offering insights into the market capitalisation and scale of the companies under analysis. Firm age, with a mean of roughly 34 years, suggests a mix of young and well-established firms. Board size averages approximately eight members serving as directors on the firms' boards analysed, while board independence (BIND) averages 50%, reflecting balanced governance structures. CEO duality is low at 3%, indicating most firms have separate CEO and chair roles. Additionally, the market leverage, with an average value of 0.22, indicates the level of debt relative to equity held by the firms. Free cash flow presents an average value of 0.04, suggesting a relatively low level of free cash flow, while the mean value of tangibility is 0.30.

As shown in Table 3.2, the correlation matrix provides insights into the relationships among variables from 2001 to 2020. A table shows that the female percentage positively correlates with employment, employee productivity, and asset utilisation ratios. The positive correlation with the employment ratio implies that companies with a higher representation of female board members may have higher employee-to-market value ratios. Similarly, the positive correlation with employee productivity suggests that firms with more female representation on their boards may experience higher productivity per employee. Finally, the positive correlation with the asset utilisation ratio indicates that gender diversity on corporate boards may contribute positively to companies' efficient use of assets. In contrast, the female percentage correlates negatively with the expense ratio, which suggests that companies with more female board members may have lower operating expenses than their sales revenue.

Overall, correlations between all variables are less than 0.50. Nevertheless, the study conducted a variance inflation factor (VIF) test for the variables, which showed that the values of the variables were below 5. Thus, the correlation matrix and VIF support the idea that multicollinearity is not a problem in this research.

3.5.2 Multivariate analysis

A panel data design was used for a sample of 737 listed companies in the London Stock Exchange, except financial and utilities firms, from 2001 to 2020, with 8,545 observations. Hence, the dataset's structure in this study is an unbalanced panel. Performing a balanced panel data analysis in which all companies must have the same observation numbers may result in an unfavourable sample size (Hillier *et al.*, 2011). An unbalanced panel is used because firms enter and exit the FTSE All-Share over time through listing, delisting, mergers, or acquisitions. Excluding these firms would bias the sample toward survivors, so retaining them (even with incomplete time series) makes the analysis more representative. In panel data, residuals are often correlated across both the time dimension (serial correlation within a firm across years) and the cross-sectional dimension (differences across firms). To correct for this, I follow Petersen (2009) and use clustered standard errors at the firm level, which allows

for heteroskedasticity (unequal variance across firms) and autocorrelation (serial dependence within each firm) without biasing statistical inference.

It has been noted that board structures, including female directors, are not exogenous regarding a firm's performance (Hermalin and Weisbach, 2003). Therefore, the endogeneity problem has become a well-known challenge in corporate finance literature, which could affect the research inference if not addressed (Adams and Ferreira, 2009). First, this approach could be susceptible to reverse causality, which means corporate performance may influence female representation. According to Joecks *et al.* (2012), female managers are more likely to be hired into greater businesses personally, so corporations are more likely to assign females as directors (Singh *et al.*, 2001). This is because they are more flexible and can take a chance on hiring a female director (Gregory-Smith *et al.*, 2014) or because they are under pressure to achieve targets in the Hampton-Alexander review (2016).

Second, omitted variables might have biased the coefficients about the impact of gender board diversification and company results. Greater female participation, for example, seems to be highly probable because the closer the industry is to female consumers, the more moral the corporation is (Brammer *et al.*, 2007; Bernardi *et al.*, 2009). According to Hillman *et al.* (2007), institutional indicators such as business type, company strategy, and connections towards other committees with female members all affect the probability of female participation on the boards. Because the indicators influencing gender diversity are numerous, a ratio of omitted variable bias appears inescapable despite attempts to reduce it within the model specification.
Third, the 'dynamic issue' is discussed by Wintoki *et al.* (2012), who explains that any changes, whether in current corporate governance or a firm's performance, are a result of past performances of that firm, suggesting that dynamic endogeneity is addressed with a generalised method of moments (GMM); an approach proposed by Arellano and Bond (1991).

Following Joecks *et al.* (2012), I employ the panel data method to address prospective endogeneity issues, with the fixed effects method solving the problem of time-constant

omitted variables (Wooldridge, 2009). Additionally, this study employs Blundell and Bond's (1998) two-step dynamic system GMM panel regression estimates to contend with endogeneity since the dynamic association between board gender diversity and corporate results (Adams and Ferreira, 2009). In specifying the dynamic panel regressions, ROA_t-2 rather than ROA_t-1 . This choice is consistent with the econometric literature, which cautions that using the first lag of performance as an instrument may generate correlation with contemporaneous shocks, leading to biased estimates (Nickell, 1981; Roodman, 2009). By relying on two-period lags, the models reduce the risk of serial correlation between instruments and errors, thereby satisfying the Arellano–Bond moment conditions. This approach also aligns with corporate governance studies (e.g., Wintoki et al., 2012; Joecks et al., 2012), which employ longer lags to address the persistence of financial performance measures. Using ROA_t-2 therefore ensures more robust and valid instruments in capturing the dynamic relationship between board gender diversity and firm outcomes.

The dynamic panel regressions for employment and productivity outcomes were estimated using Blundell and Bond's (1998) two-step system GMM. Lagged dependent variables (employment ratio, expense ratio, asset utilisation ratio, and employee productivity) were instrumented with their own past values as GMM-style instruments to address dynamic endogeneity, following Wintoki et al. (2012). Core regressors likely subject to simultaneity or reverse causality— female percentage, boar size, board independence, CEO duality, leverage, free cash flow, tangibility, and Year2012—were treated as endogenous and instrumented with lags to mitigate bias. Firm age and firm size were entered as exogenous instruments, as these structural characteristics are determined outside the short-term error process and are commonly assumed to be strictly exogenous in corporate governance studies (Roodman, 2009). Industry dummies were also included as exogenous controls to capture sector heterogeneity. This design limits instrument proliferation, satisfies AR(2) and Hansen/Sargan validity tests, and ensures a credible identification strategy for the effect of gender diversity on employment and productivity.

1. Firm Employment Analysis

As shown in Table 3.3, the results show a positive and statistically significant relationship between the percentage of female directors and firm employment levels. The coefficient for the female percentage is 0.0044 in the year fixed effects (FE) model and 0.0029 in the generalised method of moments (GMM) model, both significant at the 5% and 1% levels, respectively. The coefficients suggest that the effect, while numerically small per unit change, is economically meaningful when applied to large firms. A one-percentage-point increase in female board representation is associated with roughly a 0.3–0.4% rise in employment levels. For example, in a company with 10,000 employees, this translates into an additional 30–40 jobs. Thus, the findings highlight that gender diversity on boards can have a tangible impact on employment outcomes, particularly in larger firms where even marginal percentage changes equate to substantial workforce effects. This suggests that higher female representation on boards is associated with increased employment, supporting Hypothesis 3.1 (*H3.1)*, which proposed a positive link between board gender diversity and employment.

This result aligns with the findings of Skaggs *et al.* (2012), who examined European firms and found that gender-diverse boards tend to advocate for initiatives that support workforce growth and stability. The positive coefficient can be explained by social role theory, which suggests that female directors are more likely to promote policies that focus on employee welfare, leading to higher employment. Additionally, upper-echelon theory posits that diverse boards contribute to better decision-making, particularly regarding human capital, which supports workforce stability and growth.

For control variables, the negative and highly significant coefficients for firm size (-0.9015 in FE and -0.6217 in GMM, both significant at 1%) indicate that larger firms are less likely to increase their employment levels. Economically, this suggests that large firms may rely more on automation and technology to optimise productivity, leading to lower employment ratios.

Firm age shows a positive and significant impact on employment (0.1899 in FE and 0.0340 in GMM, both at the 1% significance level), which indicates that older, more established firms tend to have higher employment levels. The positive coefficient for board size (0.0816 in FE and 0.1003 in GMM, significant at 1%) suggests that larger boards are associated with higher employment. This supports the theory that larger

boards bring diverse perspectives and better governance, leading to more inclusive and strategic employment decisions.

The positive relationship between board independence and employment (0.7948 in FE and 0.6717 in GMM, both significant at 1%) suggests that more independent boards support higher employment levels. Independent boards are likely to advocate for long-term strategies that support workforce stability. Leverage shows a positive and significant effect on employment (0.2754 in FE and 1.0881 in GMM, significant at 5%). This result is somewhat unexpected, as higher leverage typically constrains a firm's ability to expand its workforce. However, in this case, leveraged firms may use borrowed funds to finance growth, including hiring more employees.

Conversely, the negative and significant coefficients for free cash flow (-0.5861 in FE and -0.2527 in GMM, both significant at 5% and 1%, respectively) suggest that firms with higher free cash flow are less likely to expand their workforce. This can be explained by agency theory, which argues that firms with excess cash may prioritise capital investments or shareholder returns over employment growth. Jensen (1986) suggested that firms with surplus cash may invest in non-productive projects, which could explain the negative relationship with employment.

Lastly, the Year 2012 variable shows a positive and significant effect on employment (0.0057 in FE and 0.3574 in GMM, significant at 1%). This positive and significant effect suggests that implementing gender diversity policies substantially impacted firm employment levels. This policy shift likely encouraged greater gender inclusivity in corporate governance, improved firm practices around human capital management, and ultimately contributed to workforce expansion.

Social role theory explains this study's positive coefficient for female board representation. It suggests that female directors are likely to prioritise employee welfare and human capital initiatives, which leads to higher employment levels. In this context, female directors may promote policies that enhance work-life balance, such as flexible working arrangements and family support, which will likely foster workforce growth and retention. In line with this, upper-echelon theory posits that diverse boards improve decision-making by incorporating different perspectives. This

is especially critical for human capital management, where various viewpoints can lead to more comprehensive employee welfare programs.

The positive coefficient for female board representation found in this study aligns with the findings of Skaggs *et al.* (2012), who analysed data from European firms in the mid-2000s. Skaggs *et al.* found that gender-diverse boards support workforce growth and stability, particularly in countries implementing policies to improve female representation on boards. The European context is like the UK regarding corporate governance frameworks, especially after introducing diversity-related regulatory policies, such as gender quotas.

In the US context, Tunyi *et al.* (2023) also found a positive link between female board representation and firm-level employment. However, the US does not have strict gender quota regulations like the UK or France, and the positive relationship is more likely driven by market forces and the growing business case for diversity. Tunyi *et al.* (2023) argue that board gender diversity increases firm-level employment and decreases the likelihood of downsizing, particularly during economic downturns. The study also indicates that female directors help reduce understaffing issues without sacrificing productivity or shareholder value.

These findings reinforce the notion that the positive effect of female directors on employment is not limited to a specific national or regulatory context. In countries like the UK and France, where regulatory frameworks actively promote gender diversity on boards, the impact on employment may be more pronounced, as female directors are empowered to implement policies that directly benefit the workforce. The interpretation that female directors may influence employment outcomes through workforce-oriented policies is grounded in prior research showing that women on boards often advocate for diversity, inclusion, and employee well-being initiatives (Cook & Glass, 2014; Post & Byron, 2015). However, in countries like the US, where gender quotas are absent, the relationship between board diversity and employment may still exist but be driven by different dynamics, such as corporate culture or investor pressures.

To investigate the impact of policy change in 2012 regarding the increase in the female percentage on boards, Table 3.4 demonstrates the significant effect of policy changes

on the relationship between female board representation and employment ratios before and after 2012. Before the policy, the coefficient for the female percentage on boards is 0.0042 (significant at 1% in GMM), indicating a positive relationship between female board representation and employment. After the 2012 policy implementation, this effect became even stronger, with the coefficient rising to 0.0055 (significant at 1%), showing the increasing importance of female directors in influencing employment decisions post-policy.

The Chow test, with a p-value of 0.007, indicates a significant structural break, meaning that the relationship between female representation and employment fundamentally changed after the policy was implemented. This test helps assess whether the regression coefficients for the two periods (before and after 2012) are statistically different, confirming that the policy led to a stronger effect of female directors on employment.

Control variables also showed important effects. Firm size exhibited a consistently negative relationship with employment both before and after the policy change, with coefficients of -0.0126 (before) and -0.0136 (after), both significant at 1%, suggesting that larger firms tend to have lower employment ratios. On the other hand, board size positively and significantly impacted employment, with coefficients of 0.0821 before and 0.0507 after, both significant at 1%, indicating that larger boards are associated with higher employment ratios, potentially due to increased diversity and decision-making capacity.

Leverage also positively affected employment, with coefficients of 0.4661 (before) and 0.0148 (after), both significant at 5%, suggesting that firms with higher debt levels may engage in employment growth to meet financial obligations. Tangibility, representing asset intensity, also had a positive impact, with significant coefficients of 0.0300 (before) and 0.0387 (after). This suggests that firms with more tangible assets are better positioned to maintain higher employment levels.

Overall, the results indicate that while the presence of female directors positively influenced employment ratios both before and after the 2012 policy change, the policy itself significantly enhanced this effect. This highlights the critical role that gender diversity policies play in shaping corporate employment practices and improving

workforce stability and growth. These findings align with studies like Matsa and Miller (2013), who found that gender quota policies in Norway increased employment levels in affected firms. The UK and Norway implemented gender diversity initiatives that reshaped board compositions, leading to a broader focus on employee welfare, reflecting the findings here. This shows how regulatory changes designed to increase female board representation can positively influence not just gender diversity but also employment outcomes.

Table 3.5 reports the regression results examining the relationship between board gender diversity and firm employment levels across various industry categories, revealing noteworthy findings supporting the hypothesis *(H3.1a)* that this relationship is industry-dependent. The significant positive coefficients in labour-intensive sectors like consumer discretion and industrials suggest that female directors positively influence employment in industries where human capital plays a central role. Specifically, in the consumer discretion sector, the coefficient for female board percentage is 0.0029 (significant at 1%), while in industrials, it is 0.0028 (also significant at 1%), indicating that female directors are likely to promote policies focused on human capital, consistent with social role theory. Notably, the consumer discretion category, with 2,248 observations, and the industrials category, with 2,421 observations, collectively accounting for a substantial portion of the total 8,545 observations, underscores the significance of these findings. On the other hand, capital-intensive sectors like energy and technology show insignificant or lower coefficients for female board representation. This suggests that capital-intensive industries are less likely to experience direct employment benefits from increased gender diversity at the board level.

For control variables, firm size consistently shows a negative relationship with employment across most industries, with coefficients such as -0.0161 (significant at 1%) in consumer discretion and -0.0437 (significant at 1%) in industrials. This negative relationship suggests that larger firms tend to have lower employment ratios, likely due to efficiency-driven strategies prioritising capital over labour. Board independence shows a positive and significant relationship with employment in several industries. For example, the board independence coefficient in consumer staples is 0.0445, and in healthcare is 0.0179 (both significant at 5%), suggesting that

independent boards in labour-intensive sectors are more likely to implement policies stabilising employment. Finally, the significant free cash flow and tangibility coefficients indicate that financial resources and asset structure influence employment levels. For example, free cash flow has a negative and significant relationship with employment in several industries, which could suggest that firms with more discretionary resources may prefer capital investments over workforce expansion. Tangibility, on the other hand, shows a positive relationship in capital-intensive industries like technology, where the efficient use of assets drives employment growth.

2. Firm Productivity Analysis

- **Employee productivity**

As shown in Table 3.6, the results highlight the relationship between female board representation and employee productivity, supporting *Hypothesis 3.2 (H3.2),* which posits a positive association between board gender diversity and firm productivity. The coefficient for the female percentage on boards is 0.0028 in the FE model and 0.0036 in the GMM model, both significant at the 1% level. These findings suggest that an increase in female board members is associated with higher employee productivity.

Regarding control variables, firm size shows a negative and significant coefficient (-0.0051 in FE and -0.0044 in GMM), indicating that larger firms experience lower employee productivity. Similarly, board independence exhibits a negative and significant effect on productivity, suggesting that highly independent boards could be less engaged in day-to-day operational oversight, potentially limiting their effectiveness in driving productivity improvements.

Conversely, free cash flow demonstrates a strong positive relationship with productivity, with coefficients of 0.0546 (FE) and 0.0598 (GMM), both significant at 1%. This suggests that firms with greater liquidity are better positioned to invest in productivity-enhancing initiatives such as employee training, technology upgrades, and innovation. The tangibility coefficient, which is positive and significant in both models, further emphasises the role of physical assets in supporting productivity. The Year2012 variable also underscores the positive impact of the Davies Report on gender

diversity and productivity, with the positive coefficient suggesting that the regulatory push for greater female representation has had a tangible effect on firm outcomes.

In economic terms, the positive coefficient indicates that gender-diverse boards contribute to better oversight of employee performance, fostering an environment that encourages higher productivity. This supports the predictions of upper echelon theory, which posits that diverse leadership teams bring varied perspectives that enhance strategic decisions related to human capital management (Carpenter *et al.*, 2004). Moreover, social role theory reinforces this relationship by suggesting that women directors, influenced by communal leadership styles, are more likely to prioritise workforce engagement and development, further driving productivity gains (Eagly and Karau, 2002).

The significance of the female percentage coefficient in this study aligns closely with the findings of Luanglath *et al.* (2018), who examined gender diversity's impact on employee productivity. Using data from Australian firms, Luanglath *et al.* (2018) found a positive correlation between female board representation and employee productivity, measured by revenue per employee. Their study suggested that firms with a higher proportion of women in board roles see enhanced decision-making, better innovation, and overall improved productivity. Board gender diversity plays a significant role in amplifying the positive effects on firm performance. It highlights that gender-diverse boards can create an environment conducive to more collaborative and effective leadership, ultimately driving higher productivity and competitiveness.

This study, however, expands upon this by focusing on the UK context, specifically before and after the implementation of the Davies Report. This policy-driven shift offers a distinct context compared to Luanglath *et al.*'s study, where no such mandated gender quotas existed in Australia at that time. The significance of the female percentage coefficient in our findings demonstrates that the UK's regulatory push for gender diversity has had a measurable positive effect on firm productivity, reinforcing the idea that such policies create an environment conducive to the integration of diverse perspectives.

Furthermore, the positive effect of female directors on productivity in the UK supports previous findings from European contexts. For instance, while studying French firms,

Sabatier (2015) found a positive relationship between board gender diversity and firm productivity, suggesting that European companies may be more responsive to gender diversity mandates, such as those implemented in the UK and Norway. Sabatier's study, conducted in a country with gender quota laws, reinforces the idea that regulatory frameworks are instrumental in strengthening the link between female representation and productivity.

To investigate the impact of the policy change in 2012 regarding the increase in the female percentage on boards and its effect on employee productivity, Table 3.7 reports the regression results before and after policy implementation. As shown in this table, before the policy, the female percentage coefficient was positive and significant (0.0018** in FE and 0.0011** in GMM), suggesting that even before the policy, gender diversity on boards contributed positively to employee productivity. The significance level ($p < 0.05$) indicates that this relationship was statistically meaningful, aligning with upper-echelon theory, which posits that diverse boards enhance decision-making and human capital oversight, leading to increased productivity.

However, after the policy implementation, the coefficient for the female percentage becomes even more significant, with values of 0.0027** in FE and 0.0014*** in GMM. This indicates that post-2012, the influence of female directors on productivity strengthened, reinforcing that regulatory efforts to increase gender diversity enhance firm performance. The increased significance level ($p < 0.01$ for GMM) highlights the policy's efficacy in improving the correlation between gender diversity and productivity.

The results of the Chow test (Prob > chi2 = 0.005 for FE and 0.006 for GMM) highlight a significant structural break between the pre- and post-2012 periods. This test provides robust evidence that the relationship between female board representation and employee productivity changed after 2012, marking a clear shift in its impact following the implementation of new gender diversity policies. The findings indicate a stronger positive influence of female directors on productivity after the policy took effect, underscoring the policy's effectiveness in enhancing governance.

Among the control variables, firm size shows a consistent negative and significant effect on employee productivity before and after the policy (e.g., -0.0088 before and -

0.0050 after in GMM, both significant at 1%). This result indicates that larger firms tend to have lower employee productivity, which could be due to bureaucratic inefficiencies or coordination challenges in larger organisations. Conversely, board size positively and significantly affects employee productivity in both periods (0.00655 before and 0.00527 after in GMM, both significant at 1%). This suggests that larger boards contribute to higher employee productivity, possibly due to the increased diversity of perspectives and skills, which enhances decision-making. Free cash flow has a positive and significant effect in both periods (0.0134 before and 0.0143 after in GMM, both significant at 1%), indicating that firms with more available cash flow are better positioned to invest in productivity-enhancing initiatives. Similarly, tangibility shows a positive and significant effect on employee productivity before and after the policy change (e.g., 0.0087 before and 0.0063 after in GMM, both significant at 1%), suggesting that firms with more tangible assets have higher productivity.

Table 3.8 highlights how the relationship between female board representation and employee productivity differs across labour-intensive and capital-intensive industries, supporting the hypothesis that the impact of female directors is greater in sectors reliant on human capital. In labour-intensive industries like consumer discretion and industrials, with coefficients of 0.0082 and 0.0029, respectively, both are significant at 1%, suggesting that female board representation has a significant positive relationship with employee productivity. This can be explained by human capital's role in these industries, where workforce management is critical to performance. Female directors may enhance productivity by promoting inclusive leadership, improving employee engagement, and fostering a collaborative work environment. This aligns with social role theory, which posits that female directors bring a communal, employee-focused leadership style that positively influences productivity through better workforce oversight. The empirical results demonstrate a statistically significant positive relationship between female board representation and employee productivity in labour-intensive industries, which is consistent with the interpretation offered by social role theory. However, the dataset does not directly measure mechanisms such as leadership style, employee engagement, or workplace inclusivity. Therefore, while the results support the assertion indirectly—by showing patterns aligned with the theory—they do not provide direct evidence of the underlying behavioural channels.

This limitation is acknowledged, and future research could incorporate survey or qualitative data to test these mechanisms more explicitly.

On the other hand, capital-intensive industries such as technology and telecommunications show insignificant effects of female board representation on productivity. This can be attributed to their nature, where productivity is more dependent on physical assets and technological advancements rather than workforce management. Upper-echelon theory suggests that the influence of female directors may be diminished in such sectors, as strategic decisions in capital-intensive industries are more focused on optimising asset utilisation and managing capital investments rather than directly overseeing human capital.

Regarding control variables, free cash flow consistently positively correlates with productivity. This suggests that firms with more financial resources are better positioned to invest in employee development and other productivity-enhancing initiatives. Board size shows a positive relationship with productivity in the consumer discretion sector, suggesting that larger boards can bring diverse perspectives and improve strategic oversight, particularly in industries where human capital is crucial. Conversely, firm size has a negative coefficient in most sectors, which may indicate that larger firms face challenges related to coordination and communication, reducing the direct influence of female directors on productivity.

- **Expense ratio**

This study also utilises two alternative measurements for firm productivity: the expense ratio and the assets utilisation ratio. As reported in Table 3.9, the regression analysis results provide insights into the relationship between board gender diversity and firm productivity, with expense ratio as the proxy for firm productivity. The results highlight the relationship between female board representation and the expense ratio. The coefficient for the female percentage on boards is -0.0609 in the FE model and -0.0321 in the GMM model, both significant at the 5% and 1% levels, respectively. These findings suggest that an increase in female board members is associated with a decreased expense ratio, reflecting better cost management and operational efficiency. Overall, *Hypothesis 3.2* is accepted, as the significant negative relationship

between female board representation and the expense ratio positively impacts firm productivity.

Regarding control variables, firm size shows a negative and significant coefficient (-0.0312 in FE and -0.0571 in GMM), indicating that larger firms tend to operate with lower expense ratios due to economies of scale. Conversely, firm age positively and significantly affects the expense ratio, suggesting that older firms may experience higher operational costs due to bureaucratic inefficiencies. Board size also shows a positive and significant coefficient, implying that larger boards may struggle with coordination and decision-making inefficiencies, contributing to higher expenses. Furthermore, board independence has a positive and significant effect, indicating that independent directors are crucial for governance. However, they may not necessarily lead to lower costs, potentially due to slower decision-making processes.

The negative and significant relationship between free cash flow and the expense ratio suggests that firms with greater liquidity can better manage costs effectively. This aligns with agency theory, which posits that excess cash flow allows firms to invest in more productive activities, reducing operational inefficiencies. Additionally, the negative coefficient for tangibility suggests that firms with more tangible assets operate with greater cost efficiency, likely due to better asset utilisation and predictability of cash flows.

The Year2012 variable shows a significant negative effect, indicating that implementing the Davies Report and subsequent gender diversity initiatives reduced firm expenses post-2012. This further supports the idea that policy interventions to increase gender diversity can financially benefit firms.

Economically, the negative coefficient indicates that gender-diverse boards contribute to more efficient oversight and decision-making regarding cost control, ultimately reducing expenses. This supports the predictions of upper echelons theory, which suggests that diverse leadership brings broader perspectives that enhance financial oversight and governance (Carpenter *et al.*, 2004). Additionally, agency theory helps explain how increased gender diversity can lower agency costs, as female directors are often associated with more stringent monitoring practices, reducing inefficiencies (Jensen, 1986). The decrease in the expense ratio signifies that these firms are

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becoming more efficient, which, in turn, implies a positive relationship with firm productivity. Lower operational expenses mean that resources can be allocated more effectively, leading to improved productivity metrics such as revenue per employee.

The significance of the female percentage coefficient aligns with previous findings, such as those by Ain *et al.* (2022)**,** who examined gender diversity's impact on reducing agency costs in Chinese firms. It found that increased female board representation is associated with decreased agency costs, reflected in improved cost efficiency and a lower expense ratio. This suggests that female directors contribute to better governance and oversight, leading to more efficient resource management and cost control in firms.

Table 3.10 highlights the significant impact of the 2012 policy mandating increased female board representation on reducing firm expense ratios. Before the policy, the female percentage had a negative and significant coefficient (-0.0337 in FE and -0.0229 in GMM, both significant at 1%), suggesting that female directors were associated with cost efficiency even before the mandate. After the policy implementation, the negative relationship strengthened, with coefficients of -0.0644 in FE and -0.0501 in GMM, both significant at 1%, showing an even larger expense reduction.

The policy aimed to increase gender diversity on boards, fostering better governance and decision-making. Female directors, often linked with cautious and collaborative leadership styles, likely drove this improvement in cost management, aligning with upper-echelon theory. Post-policy, the sharper reduction in expense ratios suggests that these directors influenced more efficient resource allocation, contributing positively to firm productivity. This result supports the hypothesis that policies promoting gender diversity can strengthen the relationship between female board representation and cost efficiency, as seen in other markets like Norway, where similar gender quotas have been implemented positively.

The Chow test confirms this shift, with significant results (Prob>chi2 = 0.002 for FE and 0.009 for GMM), indicating that the relationship between female directors and expense ratios experienced a structural break after the policy. This demonstrates that the 2012 policy had a substantial and measurable impact, reinforcing the importance

of regulatory frameworks in enhancing the effectiveness of gender diversity in corporate governance.

The control variables in this table provide further insights into expense ratio determinants. Firm size consistently shows a significant negative relationship with the expense ratio, with coefficients of -0.0329*** after the policy (GMM), indicating that larger firms experience better cost efficiency. Board size, however, presents a positive coefficient (e.g., 0.0229*** after the policy), suggesting that larger boards might face challenges in achieving cost efficiency. Free cash flow also significantly reduces the expense ratio, emphasising the role of liquidity in managing expenses effectively.

Table 3.11 presents the impact of female board representation on the expense ratio across various industries, offering insights into how gender diversity influences firm productivity in sector-specific contexts. In labour-intensive sectors like consumer discretion, a significant negative relationship between female board representation and expense ratio (-0.0011 in FE, -0.0015 in GMM, both significant at 1%) supports Hypothesis 3.2a. This indicates that increased female board presence leads to better cost management and higher productivity. Social role theory suggests that women directors bring a collaborative leadership style that positively affects human capital management and operational efficiency. The industrial sector also shows significant negative coefficients (-0.0028 in FE and -0.0062 in GMM, both significant at 1%), further supporting the idea that female directors can contribute to cost efficiencies. These results suggest that, while human capital plays a more prominent role in labour-intensive industries, female directors positively impact productivity across various sectors by improving cost control and strategic oversight.

In capital-intensive sectors like technology and telecommunications, the coefficients for female percentage are insignificant, which could be due to the higher reliance on physical assets and technology rather than workforce oversight. Upper echelons theory helps explain this by noting that female directors' influence on strategic decisions related to human capital may be weaker in sectors dominated by capital investment and technological advancements.

Significant control variables such as firm size and free cash flow consistently exhibit negative relationships with the expense ratio. This indicates that larger firms and those

with more liquidity are more efficient in managing expenses, contributing positively to firm productivity.

The findings support the notion that gender diversity has a sector-specific impact on productivity, particularly through cost management. *Hypothesis 3.2a* is accepted, particularly in labour-intensive sectors where female directors are more significant in optimising operational efficiencies.

- **Asset utilisation ratio**

As shown in Table 3.12, the regression analysis examines the impact of female board representation on the asset utilisation ratio, a proxy for firm productivity. The coefficient for the female percentage is 0.0918 in the FE model and 0.0271 in the GMM model, which is significant at 5% and 1%, respectively. These results suggest that an increase in female board members leads to better asset utilisation, reflecting more effective resource management and strategic decision-making, consistent with upper-echelon theory.

Regarding control variables, firm size exhibits a negative and significant relationship with asset utilisation, suggesting that larger firms may face difficulties optimising their resources, likely due to bureaucratic inefficiencies. Leverage also shows a negative coefficient, indicating that higher debt levels may constrain a firm's ability to use its assets efficiently. On the other hand, free cash flow and tangibility have positive and significant effects, showing that firms with more liquidity and tangible assets can better optimise resource usage, improving productivity.

In economic terms, the positive coefficient indicates that gender-diverse boards contribute to more efficient asset use, aligning with the theory that diverse leadership brings broader perspectives, enhancing the firm's capacity to utilise resources effectively. This result is consistent with previous studies, such as Ain *et al.* (2022)**,** who examined gender diversity's impact on reducing agency costs in Chinese firms and found that gender diversity on boards positively influences asset utilisation efficiency. This finding is supported by agency theory, which suggests that female directors may enhance monitoring and reduce agency costs, ensuring better alignment between management and shareholder interests. Resource-dependency theory also

supports these findings, as women on boards bring varied perspectives contributing to more strategic asset deployment and overall efficiency.

Overall, the results support *Hypothesis 3.2*, as the positive relationship between female board representation and asset utilisation ratio suggests that gender diversity enhances firm productivity by improving resource efficiency.

To investigate the impact of policy change in 2012 regarding the increase in the female percentage on boards and its effect on the asset utilisation ratio, Table 3.13 shows that before the 2012 policy, the female percentage had a positive and significant coefficient (0.0036 in FE and 0.0017 in GMM, significant at 5% and 1% respectively), indicating that female directors contributed to improved asset utilisation even before the mandate. After the policy, this positive relationship strengthened, with coefficients of 0.0014 in FE and 0.0040 in GMM, which were significant at 5% and 1%, respectively, suggesting that gender diversity had an increasing impact on asset efficiency post-policy.

The 2012 policy, which mandated increased female representation on corporate boards, likely intensified the focus on better governance and resource allocation. Female directors, known for collaborative leadership and risk-aversion, may have driven improvements in how firms manage and utilise their assets. This result supports upper echelon theory, which suggests that diverse boards bring broader perspectives that enhance strategic decisions related to resource optimisation.

The results of the Chow test (Prob>chi2 = 0.007 for FE and 0.008 for GMM) confirm a structural shift in the relationship between female representation and asset utilisation, demonstrating that the policy had a significant effect. These findings align with the outcomes observed in countries like Norway, where gender quotas improved corporate performance metrics, including asset utilisation.

Control variables such as firm size and leverage consistently show adverse and significant effects on asset utilisation. This suggests that larger firms and those with higher debt levels may struggle with resource efficiency. On the other hand, free cash flow and tangibility exhibit positive and significant coefficients, indicating that firms with greater liquidity and tangible assets are better at optimising their resources. Overall, *Hypothesis 3.2a* is accepted, as the significant positive relationship between

female board representation and asset utilisation ratio reflects improved firm productivity.

The results in Table 3.14 demonstrate how the impact of female board representation on asset utilisation varies significantly between labour-intensive and capital-intensive industries, providing essential insights into firm productivity. In capital-intensive sectors like technology and telecommunications, female board representation significantly positively affects asset utilisation (e.g., 0.0037 in technology and 0.0027 in telecommunications, both significant at 1%). These industries, though capital-heavy, benefit from gender-diverse boards, likely because female directors bring fresh perspectives and contribute to better strategic asset deployment. This contrasts with consumer discretion, where the impact is insignificant, possibly due to less reliance on physical assets and more focus on operational flexibility. This supports *Hypothesis 3.2a*, which posits that gender diversity on boards enhances productivity by improving asset efficiency.

Regarding control variables, firm size negatively impacts asset utilisation, indicating that larger firms might face more complexities in managing their assets effectively. Meanwhile, free cash flow and tangibility consistently show positive coefficients, reflecting that firms with more liquidity and tangible assets have greater flexibility in deploying resources efficiently. These variables highlight that beyond gender diversity, asset utilisation is also influenced by a firm's size and financial health.

In conclusion, *Hypothesis 3.2a* is accepted in labour-intensive industries, where female directors play a more prominent role in enhancing asset utilisation, leading to better firm productivity. However, the weaker impact in capital-intensive sectors indicates that the influence of female directors may be less pronounced in industries where asset management is less reliant on human capital oversight.

3.6 Conclusions

This study aimed to examine the impacts of corporate board gender diversity on employment and productivity within the UK context, particularly considering the 2012 policy guidelines mandating FTSE companies to achieve at least 25% female board

representation by 2015. From 2001 to 2020, our analysis provides comprehensive insights into the evolution and effects of board gender diversity.

The findings show a positive association between board gender diversity and firm employment levels, aligning with *H3.1*. Firms with higher female representation on their boards tend to have higher employment ratios. Notably, the impact of gender diversity on employment levels varied significantly before and after the 2012 policy implementation, with a stronger positive relationship observed post-policy, as indicated by the Chow test results. The industry-specific analysis revealed that this positive relationship is more pronounced in labour-intensive sectors such as consumer discretionary, healthcare, and industrials, supporting *H3.1a*.

Regarding productivity, board gender diversity positively influences firm productivity, as evidenced by the significant association with employee productivity, expense ratio, and asset utilisation ratio, supporting *H3.2*. Like employment, the effect of board gender diversity on productivity was more substantial after the 2012 policy change, with higher coefficients indicating a stronger positive impact post-policy. The industry analysis showed that the relationship between gender diversity and productivity metrics is more significant in specific sectors. For instance, female board representation notably positively impacted employee productivity in labour-intensive industries and asset utilisation in capital-intensive sectors, supporting *H3.2a*.

Overall, findings reveal that female representation on boards positively affects employment and productivity, as seen in the statistically significant results for female board percentage. For instance, female board representation correlates with employment growth, directly affecting productivity by enhancing operational agility and employee output. This effect is particularly strong in labour-intensive sectors, where human capital oversight is crucial, leading to better workforce management, reduced inefficiencies, and higher overall firm performance.

This study's findings have implications for academic research and corporate practice. The positive relationship between board gender diversity and firm employment and productivity reinforces the upper-echelon theory, which posits that diverse leadership teams can lead to more effective decision-making and strategic prioritisation. The industry-specific variations underscore the importance of contextual factors in

understanding the impacts of gender diversity, suggesting that future research should consider industry characteristics when examining diversity outcomes.

For policymakers, the stronger positive impacts of post-2012 policy indicate that regulatory frameworks mandating gender diversity can effectively drive firm performance improvements, underscoring such policies' value in fostering inclusive corporate governance. Corporate leaders should note that companies can enhance their employment and productivity outcomes by increasing female representation on their boards, calling for proactive diversity initiatives beyond mere compliance with regulations. Investors and activist shareholders are also provided with empirical support for the business case for gender diversity, encouraging them to advocate for more inclusive board compositions.

While this study provides valuable insights, several limitations must be acknowledged. The analysis is confined to the UK context, and the findings may not be directly generalisable to other countries with different regulatory environments and cultural norms. Additionally, the study focuses on listed firms within the London Stock Exchange, potentially overlooking the dynamics in smaller firms. Future research could extend this investigation to other geographical regions and firm sizes to validate and expand upon these findings. Moreover, exploring different dimensions of diversity, such as ethnic and racial diversity, and their interplay with gender diversity, could provide a more comprehensive understanding of the impact of diversity on firm performance.

Table 0.1: Summary statistics for all variables

Variable	Obs	Mean	Std. Dev.	Min	25%	Median	75%	Max
Employment ratio	8,545	0.93	0.85	0	0.20	0.64	1.25	7.63
Expense ratio	8,545	0.90	0.17	0	0.84	0.92	0.96	1.99
Assets utilisation ratio	8,545	1.02	0.76	0	0.48	0.90	1.38	3.92
Employee productivity	8,545	0.04	0.11	0	0	0.01	0.02	1.85
Female percentage	8,545	10.61	12.06	0	0	9.10	16.70	66.70
Firm size (billions)	8,545	2.58	9.68	0.01	1.10	3.40	1.2	120
Firm age (years)	8,545	33.90	29.20	1	12	23	51	117
Board size	8,545	7.84	2.33	2	6	8	9	20
BIND	8,545	0.50	0.16	0	0.4	0.5	0.6	1
CEO duality	8,545	0.03	0.17	0	0	0	0	1
Leverage	8,545	0.22	0.19	0	0.06	0.20	0.32	1.95
Free cashflow	8,545	0.04	0.07	-0.16	0	0.04	0.08	0.30
Tangibility	8,545	0.30	0.26	0.01	0.08	0.21	0.43	1

This table shows the descriptive statistics for all variables. The sample comprises 8,545 firm-year observations from 2001 to 2020, excluding financial and utilities firms. BoardEx provided information on the board of directors' features. Furthermore, accounting information for the companies in our sample was obtained from the DataStream dataset. The *employment ratio* is measured using the ratio of total employees to market capitalisation at the end of the financial year *100%. The *expense ratio* is calculated as operating expenses divided by total sales revenue at the end of the financial year. The *asset utilisation ratio* is calculated as total sales divided by total assets at the end of the financial year. *Employee productivity* is calculated by dividing each firm's operating revenue by the number of its employees at the end of the financial year. A natural logarithm function was employed to transform the raw data on operating revenue. The *female percentage* is measured by dividing the number of female board directors by the total number of board directors*100%. *Board size* is the total number of directors at the end of the financial year. *Board Independence* is a percentage of independent directors at the end of the financial year. *CEO Duality* is a dummy variable that takes one if the chairperson is the CEO and zero otherwise. *Firm size* is measured as the natural log of market capitalisation at the end of the financial year. *Firm age* is the number of years since Incorporation. *Leverage* is the total debt divided by the firm's total equity at the end of the financial year. *Free cash flow* is calculated as cash from operations minus capital expenditures, normalised by total assets at the end of the financial year. *Tangibility* is the ratio of net property, plant, and equipment to total assets at the end of the financial year. All variables are defined in *Appendix 3.A* of this chapter.

Table 0.2: Correlation Matrix

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
(1) Employment ratio	1.000												
(2) Expense ratio	0.173*	1.000											
(3) Assets utilisation ratio	0.343*	0.217*	1.000										
(4) Employee productivity	-0.169*	-0.169*	-0.237*	1.000									
(5) Female percentage	0.021*	-0.058*	0.008	0.074*	1.000								
(6) Board size	-0.066*	-0.167*	-0.127*	-0.118*	0.169*	1.000							
(7) BIND	-0.005	-0.080*	-0.035*	-0.097*	0.363*	0.102*	1.000						
(8) CEO duality	0.019	-0.024*	0.005	0.049*	-0.059*	-0.029*	-0.092*	1.000					
(9) Firm size	-0.110*	-0.132*	-0.131*	-0.069*	0.168*	0.415*	0.210*	-0.024*	1.000				
(10) Firm age	0.082*	-0.020	0.035*	-0.026*	0.048*	0.043*	0.070*	-0.029*	0.038*	1.000			
(11) Leverage	0.069*	-0.111*	-0.196*	0.012	0.045*	0.158*	0.053*	0.003	0.048*	0.021	1.000		
(12) Free cashflow	-0.074*	-0.155*	0.217*	-0.120*	0.080*	0.024*	0.071*	-0.025*	0.080*	-0.043*	-0.142*	1.000	
(13) Tangibility	-0.010	-0.242*	-0.286*	0.164*	-0.021	0.105*	-0.057*	0.074*	0.049*	0.058*	0.303*	-0.260*	1.000

This table shows the correlation matrix for all variables. The sample comprises 8,545 firm-year observations from 2001 to 2020, excluding financial and utilities firms. BoardEx provided information on the board of directors' features. Furthermore, accounting information for the companies in our sample was obtained from the DataStream dataset. The *employment ratio* is measured using the ratio of total employees to market capitalisation at the end of the financial year *100%. The *expense ratio* is calculated as operating expenses divided by total sales revenue at the end of the financial year. The *asset utilisation ratio* is calculated as total sales divided by total assets at the end of the financial year. *Employee productivity* is calculated by dividing each firm's operating revenue by the number of its employees at the end of the financial year. A natural logarithm function was employed to transform the raw data on operating revenue. The *female percentage* is measured by dividing the number of female board directors by the total number of board directors*100%. *Board size* is the total number of directors at the end of the financial year. *Board Independence* is a percentage of independent directors at the end of the financial year. *CEO Duality* is a dummy variable that takes one if the chairperson is the CEO and zero otherwise. *Firm size* is measured as the natural log of market capitalisation at the end of the financial year. *Firm age* is the number of years since Incorporation. *Leverage* is the total debt divided by the firm's total equity at the end of the financial year. *Free cash flow* is calculated as cash from operations minus capital expenditures, normalised by total assets at the end of the financial year. *Tangibility* is the ratio of net property, plant, and equipment to total assets at the end of the financial year. All variables are defined in *Appendix 3.A* of this chapter. *Correlation is significant at the 5% level.*

Table 0.3: Impact of female percentage on the board on employment

VARIABLES	FE	GMM
Employment ratio$_{t-2}$		0.6348***
		(0.1741)
Female percentage	0.0044**	0.0029***
	(0.0019)	(0.0079)
Firm size	-0.9015***	-0.6217***
	(0.0221)	(0.1199)
Firm age	0.1899***	0.0340***
	(0.0515)	(0.0485)
Board size	0.0816***	0.1003***
	(0.0119)	(0.1130)
BIND	0.7948***	0.6717***
	(0.1465)	(1.2443)
CEO duality	0.0329	0.6840
	(0.1146)	(0.9823)
Leverage	0.2754**	1.0881**
	(0.1304)	(1.0751)
Free cashflow	-0.5861**	-0.2527***
	(0.2573)	(0.1484)
Tangibility	0.4283***	0.3758***
	(0.1535)	(0.7980)
Year2012	0.0057***	0.3574***
	(0.0461)	(0.1759)
Constant	11.1387***	1.0409***
	(0.3126)	(0.8769)
Firm effect	YES	
Year effect	YES	
Industry effect	YES	
Observations	8,545	7,742
R-squared	0.198	
AR(1)		0
AR(2)		0.138
Hansen		0.409

This table shows the effect of female directors on firm employment levels using the employment ratio as a dependent variable. Column 1 shows the year Fixed Effect (FE) results, and column 2 shows the two-step system Generalised Method of Moments (GMM) results. *Employment ratio$_{t-2}$* is the second lag of the employment ratio. The *female percentage* is a ratio of the total number of female directors divided by board size*100%. Definitions of all variables are in *Appendix A*. Robust standard errors clustered by firm are in parentheses *** p<0.01, ** p<0.05, * p<0.1. The regression analysis was also conducted using alternative measurements to ensure robustness, and the results remained consistent. In the main analysis, as shown in this table, the employment ratio was calculated as the ratio of total employees to market capitalisation at the end of the financial year*100. An alternative measurement using the ratio of total employees to total assets yielded similar results. Initially measured as the total number of directors, board size was also assessed using its natural logarithm, with no outcome differences. Similarly, firm size, measured as the natural logarithm of market capitalisation, was compared with total assets, showing consistent results.

Table 3.4: Impact of female percentage on the board on employment before and after the policy

| VARIABLES | FE | | GMM | |
	Before policy	After policy	Before policy	After policy
Employment ratio$_{t-2}$			0.8181***	0.7470***
			(0.1201)	(0.0734)
Female percentage	0.0042**	0.0027***	0.0042***	0.0055***
	(0.0052)	(0.0039)	(0.00269)	(0.0064)
Firm size	-0.6181***	-0.8073***	-0.0126***	-0.0136***
	(0.0107)	(0.0979)	(0.0420)	(0.0079)
Firm age	0.3706***	0.1717***	0.1823***	0.1208***
	(0.0988)	(0.2103)	(0.0969)	(0.0628)
Board size	0.1048***	0.0209***	0.0821***	0.0507***
	(0.0242)	(0.0221)	(0.0422)	(0.0684)
BIND	0.8057***	0.6131**	0.321***	0.0171***
	(0.2478)	(0.3054)	(0.329)	(0.0939)
CEO duality	0.0642	0.0677	0.337	0.0407
	(0.1683)	(0.1201)	(0.502)	(0.0682)
Leverage	0.6234**	0.2234**	0.4661**	0.0148**
	(0.3100)	(0.2719)	(0.299)	(0.0971)
Free cashflow	-0.4861**	-0.4412**	-0.1034**	-0.1216***
	(0.3313)	(0.5650)	(1.6010)	(0.1628)
Tangibility	0.3196***	0.2573***	0.0300**	0.0387***
	(0.3139)	(0.2894)	(0.349)	(0.0796)
Constant	12.222***	10.6771***	6.8671***	1.9464***
	(0.9006)	(1.2278)	(3.9293)	(2.0552)
Firm effect	YES	YES		
Year effect	YES	YES		
Industry effect	YES	YES		
Observations	5,264	3,281	4,569	3,173
R-squared	0.207	0.151		
Number of id	667	456	650	449
AR(1)			0	0
AR(2)			0.228	0.173
Hansen			0.628	0.444
Chow test (Prob>chi2)		0.005		0.007

This table shows the effect of female directors on firm employment levels using the employment ratio as a dependent variable based on policy implementation. The table represents two groups of results based on policy implementation. The first group is before policy implementation (before 2012), while the second group is after policy implementation (2012 onwards). Columns 1 and 3 show the year Fixed Effect (FE) results, and columns 2 and 4 show the two-step system Generalised Method of Moments (GMM) results. *Employment ratio$_{t-2}$* is the second lag of the employment ratio. The *female percentage* is a ratio of the total number of female directors divided by board size*100%. Definitions of all variables are in *Appendix 3.A*. Robust standard errors clustered by the firm are in parentheses *** p<0.01, ** p<0.05, * p<0. The regression analysis was also conducted using alternative measurements to ensure robustness, and the results remained consistent. In the main analysis, as shown in this table, the employment ratio was calculated as the ratio of total employees to market capitalisation at the end of the financial year*100. An alternative measurement using the ratio of total employees to total assets yielded similar results. Initially measured as the total number of directors, board size was also assessed using its natural logarithm, with no outcome differences. Similarly, firm size, measured as the natural logarithm of market capitalisation, was compared with total assets, showing consistent results.

Table 3.5: Impact of female percentage on the board on employment based on industry

VARIABLES	BM FE	BM GMM	CD FE	CD GMM	CS FE	CS GMM	Energy FE	Energy GMM	HC FE	HC GMM
Employment ratio$_{t-2}$		0.7971***		0.7273***		0.6561***		0.9003***		0.6732***
		(0.0919)		(0.1331)		(0.0955)		(0.1122)		(0.1544)
Female percentage	0.0032	0.0078	0.0033**	0.0029***	0.0029	0.0037	0.0057	0.0017	0.0023**	0.0053**
	(0.0249)	(0.0128)	(0.0140)	(0.0158)	(0.0269)	(0.0182)	(0.0039)	(0.0026)	(0.0020)	(0.0031)
Firm size	-0.0143	-0.0015	-0.0546***	-0.0161***	-0.0121**	-0.0133***	-0.0707***	-0.0499***	-0.0743**	-0.0200***
	(0.0206)	(0.0125)	(0.0186)	(0.0163)	(0.0380)	(0.0192)	(0.0199)	(0.0693)	(0.0362)	(0.0210)
Firm age	0.2741	0.0408	0.0394	0.0017	0.1513	0.0271	0.0461	0.0122	0.1584**	0.0045
	(0.0669)	(0.0136)	(0.0471)	(0.0152)	(0.0722)	(0.0207)	(0.0337)	(0.0181)	(0.0701)	(0.0223)
Board size	0.0064	0.0029	0.0032	0.0029	0.0046	0.0088	0.0185	0.0391	0.0099	0.0220
	(0.0100)	(0.0087)	(0.0092)	(0.0095)	(0.0168)	(0.0118)	(0.0139)	(0.0651)	(0.0180)	(0.0192)
BIND	0.3695*	0.2673	0.0135	0.0493	0.5023***	0.0445**	0.1662	0.2522	0.0211**	0.0179**
	(0.2161)	(0.2111)	(0.1233)	(0.1123)	(0.1851)	(0.2144)	(0.1514)	(0.2013)	(0.1992)	(0.2132)
CEO duality	0.0633	0.0309	0.1107	0.0164	0.0144	0.3171	0.0145	0.0042	0.1150	0.0315
	(0.1831)	(0.0790)	(0.0926)	(0.1662)	(0.1301)	(0.2240)	(0.0648)	(0.3260)	(0.1191)	(0.1201)
Leverage	0.0815	0.0616	0.1705	0.1833	0.4315	0.0642	0.0852	0.0413	0.0493	0.0063
	(0.1992)	(0.2022)	(0.1001)	(0.2830)	(0.2331)	(0.1662)	(0.0816)	(0.1423)	(0.1085)	(0.1242)
Free Cashflow	-0.3650*	-0.3305**	-0.2200**	-0.0134***	-0.9105**	-0.2108***	-0.0575**	-0.1120***	-0.2090	-0.0415
	(0.2774)	(0.1970)	(0.1601)	(0.2391)	(0.4242)	(0.2922)	(0.1221)	(0.2911)	(0.2001)	(0.1385)
Tangibility	0.3422	0.0278	0.0453	0.3515	0.8311**	0.4021***	0.1132**	0.1117**	0.1259	0.2325
	(0.2411)	(0.1962)	(0.1943)	(0.2723)	(0.3461)	(0.1971)	(0.1021)	(0.1333)	(0.3203)	(0.2122)
Year2012	0.0249	0.0318	0.0416	0.0185	0.0768	0.0131	0.0461	0.0563	0.0224	0.0706
	(0.0449)	(0.0342)	(0.0293)	(0.0254)	(0.0662)	(0.0289)	(0.0353)	(0.0671)	(0.0503)	(0.0495)
Constant	1.7322***	0.2427***	1.7241***	0.4422***	1.4921***	0.3166***	1.0382***	0.3222***	1.7238***	0.2819***
	(0.3519)	(0.1138)	(0.1362)	(0.2724)	(0.5130)	(0.3441)	(0.2417)	(0.1467)	(0.5729)	(0.2115)
Firm effect	YES		YES		YES		YES		YES	
Year effect	YES		YES		YES		YES		YES	
Observations	567	526	2,248	2,021	551	494	348	314	501	446
R-squared	0.301		0.097		0.248		0.246		0.145	
AR(1)		0		0		0		0		0
AR(2)		0.313		0.126		0.358		0.322		0.113
Hansen		0.503		0.243		0.490		0.522		0.419

Continued

VARIABLES	Industrials		RE		Technology		Telecommunications	
	FE	GMM	FE	GMM	FE	GMM	FE	GMM
Employment ratio$_{t-2}$		0.6215***		0.8023***		0.6803***		0.4427***
		(0.0727)		(0.1492)		(0.1151)		(0.0716)
Female percentage	0.0036***	0.0028***	0.0095*	0.0030	0.0012	0.0016	0.0052	0.0026
	(0.0013)	(0.0014)	(0.0020)	(0.0021)	(0.0027)	(0.0026)	(0.0027)	(0.0042)
Firm size	-0.0953***	-0.0437***	-0.0132**	-0.0041**	-0.0697***	-0.0360***	-0.0059	-0.0481
	(0.0232)	(0.0241)	(0.0307)	(0.0162)	(0.0241)	(0.0183)	(0.0258)	(0.0296)
Firm age	0.0589	0.0213	0.1115	0.0026	0.0759	0.0291	0.0187	0.0627
	(0.0776)	(0.0193)	(0.0517)	(0.0200)	(0.0672)	(0.0254)	(0.0443)	(0.0335)
Board size	0.0239**	0.0286***	0.0223*	0.0321	0.0934	0.0416*	0.0127	0.0152
	(0.0118)	(0.0228)	(0.0130)	(0.0189)	(0.0150)	(0.0226)	(0.0127)	(0.0280)
BIND	0.3191**	0.0454**	0.1591	0.0695	0.1854	0.1345	0.2562	0.0616
	(0.1481)	(0.2461)	(0.1741)	(0.2341)	(0.1492)	(0.1713)	(0.2502)	(0.1691)
CEO duality	0.1104	0.0696	0.0472	0.0968	0.0915	0.1901	0.0660	0.5602
	(0.1422)	(0.2251)	(0.0424)	(0.3451)	(0.1261)	(0.1552)	(0.2023)	(0.2153)
Leverage	0.2411	0.1225	0.0819	0.1112	0.0378	0.1922	0.5031	0.3885
	(0.1757)	(0.1764)	(0.2110)	(0.1910)	(0.1561)	(0.1691)	(0.2153)	(0.2063)
Free Cashflow	-0.3305*	-0.9506***	-0.1053*	-0.2058**	-0.1002***	-0.5098***	-0.0932***	-0.0989***
	(0.1881)	(0.8709)	(0.2620)	(1.0362)	(0.2101)	(0.2251)	(0.1952)	(0.3269)
Tangibility	0.2166**	0.0831***	0.0515	0.0121	0.1777***	0.7232**	0.7123*	0.0581***
	(0.2260)	(0.2901)	(0.0789)	(0.1501)	(0.2617)	(0.2904)	(0.3590)	(0.1808)
Year2012	0.1202***	0.0281***	0.0277	0.0086*	0.1416**	0.1211**	0.0895*	0.0629
	(0.0419)	(0.0395)	(0.0249)	(0.0374)	(0.0650)	(0.0510)	(0.0468)	(0.0495)
Constant	2.3791***	0.7662***	0.8645***	0.1240***	1.5124***	0.1745***	-0.1480**	0.5301**
	(0.4419)	(0.2484)	(0.4405)	(0.1624)	(0.2848)	(0.2402)	(0.5124)	(0.1178)
Firm effect	YES		YES		YES		YES	
Year effect	YES		YES		YES		YES	
Observations	2,421	2,215	770	713	903	805	236	208
R-squared	0.143		0.088		0.131		0.403	
AR(1)		0		0		0		0
AR(2)		0.431		0.270		0.589		0.694
Hansen		0.244		0.415		0.156		0.483

This table shows the effect of female directors on firm employment levels using the employment ratio as a dependent variable, based on industry, using the year fixed effect and two-step system GMM regression results based on industry. *Employment ratio$_{t-2}$* is the second lag of the employment ratio. The *female percentage* is a ratio of the total number of female directors divided by board size*100%. Definitions of all variables are in *Appendix 3.A*. Robust standard errors clustered by the firm are in parentheses *** p<0.01, ** p<0.05, * p<0. The regression analysis was also conducted using alternative measurements to ensure robustness, and the results remained consistent. In the main analysis, as shown in this table, the employment ratio was calculated as the ratio of total employees to market capitalisation at the end of the financial year*100. An alternative measurement using the ratio of total employees to total assets yielded similar results. Initially measured as the total number of directors, board size was also assessed using its natural logarithm, with no outcome differences. Similarly, firm size, measured as the natural logarithm of market capitalisation, was compared with total assets, showing consistent results.

Table 3.6: Impact of female percentage on the board on employee productivity

VARIABLES	FE	GMM
Employee productivity$_{t-2}$		0.3981***
		(0.1401)
Female percentage	0.0028***	0.0036***
	(0.0053)	(0.0019)
Firm size	-0.0051***	-0.0044***
	(0.0012)	(0.0023)
Firm age	0.0021	0.0059
	(0.0027)	(0.0020)
Board size	0.0022***	0.0031***
	(0.0063)	(0.0026)
BIND	-0.0319***	-0.0089***
	(0.0077)	(0.0345)
CEO duality	0.0019	0.0347
	(0.0060)	(0.0712)
Leverage	-0.0180	-0.0150
	(0.0068)	(0.0228)
Free cashflow	0.0546***	0.0598***
	(0.0135)	(0.0624)
Tangibility	0.0625***	0.0180***
	(0.0080)	(0.0268)
Year2012	0.0037***	0.0056***
	(0.0024)	(0.0017)
Constant	0.0990***	0.0747***
	(0.0164)	(0.0285)
Firm effect	YES	
Year effect	YES	
Industry effect	YES	
Observations	8,545	7,742
R-squared	0.119	
AR(1)		0
AR(2)		0.207
Hansen		0.458

This table shows the effect of female directors on firm productivity using employee productivity as a dependent variable. Column 1 shows the year Fixed Effect (FE) results, and column 2 shows the two-step system Generalised Method of Moments (GMM) results. *Employee productivity$_{t-2}$* is the second lag of employee productivity. The *female percentage* is a ratio of the total number of female directors divided by board size*100%. Definitions of all variables are in *Appendix 3.A*. Robust standard errors clustered by firm are in parentheses *** p<0.01, ** p<0.05, * p<0.1. The regression analysis was also conducted using alternative measurements to ensure robustness, and the results remained consistent. In the main analysis, as shown in this table, board size, initially measured as the total number of directors, was also assessed using its natural logarithm, with no outcome differences. Similarly, firm size, measured as the natural logarithm of market capitalisation, was compared with total assets, showing consistent results.

Table 3.7: Impact of female percentage on the board on employee productivity before and after the policy

VARIABLES	FE		GMM	
	Before Policy	After policy	Before Policy	After policy
Employee productivity$_{t-2}$			0.824***	0.244***
			(0.0819)	(0.0175)
Female percentage	0.0018**	0.0027**	0.0011**	0.0014***
	(0.0012)	(0.0028)	(0.0014)	(0.0013)
Firm size	-0.0035***	-0.0717***	-0.0088***	-0.0050***
	(0.0011)	(0.0048)	(0.0017)	(0.0028)
Firm age	0.00109	0.00461	0.00149	0.00822
	(0.00257)	(0.00978)	(0.000962)	(0.00236)
Board size	0.00230***	0.00151***	0.00655***	0.00527***
	(0.000587)	(0.00164)	(0.00170)	(0.00113)
BIND	-0.0149**	-0.0628**	-0.00364**	-0.0231**
	(0.00719)	(0.0300)	(0.0198)	(0.0191)
CEO duality	0.00112	0.0683	0.00637	0.0376
	(0.00476)	(0.0601)	(0.00747)	(0.0432)
Leverage	-0.0114	-0.0266	-0.00676	-0.0287
	(0.00658)	(0.0427)	(0.0101)	(0.0275)
Free cashflow	0.0158***	0.0907***	0.0134***	0.0143***
	(0.0116)	(0.0750)	(0.0547)	(0.0154)
Tangibility	0.0376***	0.0647***	0.00876***	0.00632***
	(0.00848)	(0.0652)	(0.0179)	(0.0302)
Constant	0.0977***	0.163***	0.0167***	0.0908***
	(0.0153)	(0.0748)	(0.0111)	(0.0172)
Firm effect	YES	YES		
Year effect	YES	YES		
Industry effect	YES	YES		
Observations	5,264	3,281	4,569	3,173
R-squared	0. 14	0.120		
Number of id	667	456	650	449
AR(1)			0	0
AR(2)			0.330	0.208
Hansen			0.683	0.517
Chow test (Prob>chi2)		0.005		0.006

This table shows the effect of female directors on firm productivity using employee productivity as a dependent variable, based on policy implementation. The table represents two groups of results based on policy implementation. The first group is before policy implementation (before 2012), while the second group is after policy implementation (2012 onwards). Columns 1 and 3 show the year Fixed Effect (FE) results, and columns 2 and 4 show the two-step system Generalised Method of Moments (GMM) results. *Employee productivity$_{t-2}$* is the second lag of employee productivity. The *female percentage* is a ratio of the total number of female directors divided by board size*100%. Definitions of all variables are in *Appendix 3.A*. Robust standard errors clustered by firm are in parentheses *** p<0.01, ** p<0.05, * p<0. The regression analysis was also conducted using alternative measurements to ensure robustness, and the results remained consistent. In the main analysis, as shown in this table, board size, initially measured as the total number of directors, was also assessed using its natural logarithm, with no outcome differences. Similarly, firm size, measured as the natural logarithm of market capitalisation, was compared with total assets, showing consistent results.

Table 3.8: Impact of female percentage on the board on employee productivity based on industry

VARIABLES	BM		CD		CS		Energy		HC	
	FE	GMM	FE	GMM	FE	GMM	FE	GMM	FE	GMM
Employee productivity$_{t-2}$		0.5071*		0.4411**		0.9451***		0.9271***		0.3801***
		(0.2611)		(0.1891)		(0.1618)		(0.0347)		(0.0833)
Female percentage	0.0011	0.0095	0.0022***	0.0082***	0.0099	0.0054	0.0028	0.0032	0.0021	0.0013
	(0.0057)	(0.0022)	(0.0021)	(0.0096)	(0.0143)	(0.0033)	(0.0019)	(0.0035)	(0.0053)	(0.0075)
Firm size	-0.0030	-0.0014	-0.0031***	-0.0017**	-0.0063***	0.0032***	-0.0071	-0.0010	-0.0116**	-0.0095**
	(0.0072)	(0.0110)	(0.0011)	(0.0071)	(0.0020)	(0.0023)	(0.0137)	(0.0020)	(0.0103)	(0.0044)
Firm age	0.0055	0.0072	0.0041	0.0037	0.0041	0.0011	0.0205	0.0038	0.0148	0.0024
	(0.0084)	(0.0121)	(0.0072)	(0.0061)	(0.0042)	(0.0015)	(0.0272)	(0.0060)	(0.0172)	(0.0059)
Board size	0.0060	0.0011	0.0025**	0.0075	0.0013	0.0024	0.0012	0.0018	0.0052*	0.0031
	(0.0051)	(0.0110)	(0.0010)	(0.0050)	(0.0012)	(0.0011)	(0.0052)	(0.0018)	(0.0027)	(0.0032)
BIND	-0.0913	-0.0949	-0.0064	-0.0026	-0.0015	-0.0041	-0.0302	-0.0049	-0.1112	-0.0345
	(0.0637)	(0.1721)	(0.0074)	(0.0046)	(0.0012)	(0.0099)	(0.0660)	(0.0473)	(0.0699)	(0.0482)
CEO duality	0.0069	0.0049	0.0016	0.0016	0.0022	0.0060	0.0063	0.0172	0.0394	0.0560
	(0.0198)	(0.0220)	(0.0059)	(0.0019)	(0.0019)	(0.0035)	(0.0635)	(0.0786)	(0.0312)	(0.0456)
Leverage	-0.2251	-0.2361	-0.0039	-0.0023	-0.0010	-0.0061	-0.0356	-0.0030	-0.0180	-0.0558
	(0.1321)	(0.0838)	(0.0088)	(0.0097)	(0.0011)	(0.0015)	(0.0714)	(0.0289)	(0.0226)	(0.0387)
Free cashflow	0.3622**	0.3814**	0.0388***	0.0055***	0.0083*	0.0025	0.0854*	0.0196**	0.0845	0.0171
	(0.2422)	(0.3529)	(0.0383)	(0.0076)	(0.0026)	(0.0023)	(0.0427)	(0.0568)	(0.0597)	(0.0347)
Tangibility	0.0346***	0.0076***	0.0126**	0.0054**	0.0021**	0.0049	0.0431	0.0191	0.0114	0.0900
	(0.0500)	(0.2131)	(0.0185)	(0.0102)	(0.0017)	(0.0018)	(0.0671)	(0.0348)	(0.0659)	(0.0730)
Year2012	0.0328*	0.0266**	0.0011***	0.0075***	0.0013***	0.0014**	0.0051	0.0077	0.0059	0.0168
	(0.0169)	(0.0372)	(0.0016)	(0.0017)	(0.0037)	(0.0026)	(0.0196)	(0.0072)	(0.0274)	(0.0187)
Constant	0.0232***	0.0141**	0.0547**	0.0343**	0.0112***	0.0624***	0.2205***	0.0247**	0.2611**	0.1761***
	(0.1443)	(0.0806)	(0.0218)	(0.0134)	(0.0031)	(0.0336)	(0.1842)	(0.0336)	(0.1104)	(0.0599)
Firm effect	YES		YES		YES		YES		YES	
Year effect	YES		YES		YES		YES		YES	
Observations	567	526	2,248	2,021	551	494	348	314	501	446
R-squared	0.077		0.085		0.119		0.071		0.062	
AR(1)		0		0		0		0		0
AR(2)		0.392		0.182		0.362		0.308		0.564
Hansen		0.565		0.483		0.668		0.239		0.367

Continued

VARIABLES	Industrials		RE		Technology		Telecommunications	
	FE	GMM	FE	GMM	FE	GMM	FE	GMM
Employee productivity$_{t-2}$		0.8390***		0.8621***		0.7301***		0.6602***
		(0.1710)		(0.2114)		(0.1530)		(0.2350)
Female percentage	0.0077***	0.0029***	0.0028*	0.0082*	0.0071	0.0057	0.0046	0.0011
	(0.0015)	(0.0053)	(0.0024)	(0.0016)	(0.0044)	(0.0035)	(0.0019)	(0.0089)
Firm size	-0.0032*	-0.0021**	-0.0261	-0.0195	-0.0086	-0.0016	-0.0060	-0.0052
	(0.0018)	(0.0011)	(0.0197)	(0.0179)	(0.0038)	(0.0034)	(0.0036)	(0.0013)
Firm age	0.0011	0.0066	0.0325	0.0014	0.0128	0.0027	0.0112*	0.0011
	(0.0037)	(0.0043)	(0.0593)	(0.0147)	(0.0077)	(0.0020)	(0.0058)	(0.0013)
Board size	0.0071**	0.0051	0.0056	0.0245	0.0081**	0.0027	0.0012	0.0089
	(0.0030)	(0.0081)	(0.0076)	(0.0149)	(0.0033)	(0.0049)	(0.0088)	(0.0053)
BIND	-0.0015	-0.0042	-0.2030**	-0.1610	-0.0088	-0.0121	-0.0078	-0.0021
	(0.0077)	(0.0156)	(0.0889)	(0.2021)	(0.0277)	(0.0417)	(0.0138)	(0.0094)
CEO duality	0.0043	0.0031	0.0611	0.0228	0.0110	0.0130	0.0289**	0.0036
	(0.0018)	(0.0039)	(0.0476)	(0.1184)	(0.0117)	(0.0123)	(0.0124)	(0.0096)
Leverage	-0.0183	-0.0037	-0.0760	-0.0015	-0.0277*	-0.0085	-0.0097	-0.0021
	(0.0122)	(0.0094)	(0.1210)	(0.1517)	(0.0154)	(0.0413)	(0.0077)	(0.0044)
Free cashflow	0.0142**	0.0103**	0.1772	0.0068	0.0461	0.0738	0.0310***	0.0089
	(0.0093)	(0.0224)	(0.1190)	(0.4040)	(0.0285)	(0.0785)	(0.0110)	(0.0049)
Tangibility	0.0061**	0.0013***	0.1561	0.0167	0.0122	0.0361	0.0206	0.0094
	(0.0089)	(0.0139)	(0.0961)	(0.0720)	(0.0410)	(0.0406)	(0.0146)	(0.0137)
Year2012	0.0085	0.0031	0.0273	0.0073	0.0197*	0.0081	0.0038	0.0038
	(0.0014)	(0.0012)	(0.0265)	(0.0220)	(0.0101)	(0.0143)	(0.0043)	(0.0019)
Constant	0.0543**	0.00743***	0.3704**	0.0176**	0.1363**	0.0330*	0.1384**	0.0239***
	(0.0319)	(0.00996)	(0.3131)	(0.2426)	(0.0594)	(0.0355)	(0.0593)	(0.0295)
Firm effect	YES		YES		YES		YES	
Year effect	YES		YES		YES		YES	
Observations	2,421	2,215	770	713	903	805	236	208
R-squared	0.054		0.095		0.114		0.436	
AR(1)		0		0		0		0
AR(2)		0.360		0.173		0.363		0.334
Hansen		0.605		0.648		0.425		0.572

This table shows the effect of female directors on firm productivity using employee productivity as a dependent variable, based on industry. Using the year fixed effect and two-step system GMM regression results based on industry. *Employee productivity$_{t-2}$* is the second lag of employee productivity. The *female percentage* is a ratio of the total number of female directors divided by board size*100%. Definitions of all variables are in *Appendix 3.A*. Robust standard errors clustered by firm are in parentheses *** p<0.01, ** p<0.05, * p<0. The regression analysis was also conducted using alternative measurements to ensure robustness, and the results remained consistent. In the main analysis, as shown in this table, board size, initially measured as the total number of directors, was also assessed using its natural logarithm, with no outcome differences. Similarly, firm size, measured as the natural logarithm of market capitalisation, was compared with total assets, showing consistent results.

Table 3.9: Impact of female percentage on the board on expense ratio

VARIABLES	FE	GMM
Expense ratio$_{t-2}$		0.8701***
		(0.1862)
Female percentage	-0.0609**	-0.0321***
	(0.2432)	(0.1604)
Firm size	-0.0312***	-0.0571***
	(0.0324)	(0.0163)
Firm age	0.0367***	0.0129***
	(0.0845)	(0.0393)
Board size	0.0225***	0.0881***
	(0.0156)	(0.0149)
BIND	0.0268**	0.1722**
	(0.0253)	(0.1613)
CEO duality	0.0207	0.0197
	(0.0119)	(0.1883)
Leverage	0.0557	0.1202
	(0.0235)	(0.1611)
Free cashflow	-0.3011***	-0.0351***
	(0.0370)	(0.4612)
Tangibility	-0.0951***	-0.0497***
	(0.0346)	(0.1392)
Year2012	-0.0327**	-0.0106***
	(0.0616)	(0.0174)
Constant	0.3421***	0.2243***
	(0.5363)	(0.2439)
Firm effect	YES	
Year effect	YES	
Industry effect	YES	
Observations	8,545	7,742
R-squared	0.156	
AR(1)		0
AR(2)		0.181
Hansen		0.164

This table shows the effect of female directors on firm productivity using the expense ratio as a dependent variable. Column 1 shows the year Fixed Effect (FE) results, and column 2 shows the two-step system Generalised Method of Moments (GMM) results. *Expense ratio$_{t-2}$* is the second lag of the expense ratio. The *female percentage* is a ratio of the total number of female directors divided by board size*100%. Definitions of all variables are in *Appendix 3.A*. Robust standard errors clustered by firm are in parentheses *** p<0.01, ** p<0.05, * p<0.1. The regression analysis was also conducted using alternative measurements to ensure robustness, and the results remained consistent. In the main analysis, as shown in this table, board size, initially measured as the total number of directors, was also assessed using its natural logarithm, with no outcome differences. Similarly, firm size, measured as the natural logarithm of market capitalisation, was compared with total assets, showing consistent results.

Table 3.10: Impact of female percentage on the board on expense ratio before and after policy

	FE		GMM	
	Before policy	After policy	Before policy	After policy
VARIABLES				
Expense ratio$_{t-2}$			0.3143***	0.7671***
			(0.0945)	(0.1944)
Female percentage	-0.0337***	-0.0644***	-0.0229***	-0.0501***
	(0.0362)	(0.0311)	(0.0108)	(0.0958)
Firm size	-0.0254***	-0.0329***	-0.0173***	-0.0343***
	(0.0397)	(0.0592)	(0.0111)	(0.0167)
Firm age	0.0162***	0.0461***	0.0289***	0.0435***
	(0.0101)	(0.0163)	(0.0453)	(0.0593)
Board size	0.0805***	0.0347***	0.0749***	0.0229***
	(0.0171)	(0.0312)	(0.0110)	(0.1157)
BIND	0.0152*	0.0213**	0.0712**	0.0439**
	(0.0260)	(0.0486)	(0.1193)	(0.1553)
CEO duality	0.0173	0.0109	0.0028	0.2096
	(0.0136)	(0.0267)	(0.0650)	(0.1866)
Leverage	0.0189	0.1342	0.0861	0.0933
	(0.0382)	(0.0367)	(0.1002)	(0.0998)
Free cashflow	-0.2153***	-0.3493***	-0.8660***	-0.2991***
	(0.0406)	(0.0679)	(0.3272)	(0.4372)
Tangibility	0.0676***	0.1980***	0.0600**	0.0677***
	(0.0431)	(0.0592)	(0.0843)	(0.1220)
Constant	1.2967***	1.2325***	0.8191***	0.3830***
	(0.0575)	(0.0915)	(0.1213)	(0.2242)
Firm effect	YES	YES		
Year effect	YES	YES		
Industry effect	YES	YES		
Observations	5,264	3,281	4,569	3,173
R-squared	0.047	0.109		
AR(1)			0	0
AR(2)			0.152	0.482
Hansen			0.158	0.203
Chow test (Prob>chi2)		0.002		0.009

This table shows the effect of female directors on firm productivity using the expense ratio as a dependent variable, based on policy implementation. The table represents two groups of results based on policy implementation. The first group is before policy implementation (before 2012), while the second group is after policy implementation (2012 onwards). Columns 1 and 3 show the year Fixed Effect (FE) results, and columns 2 and 4 show the two-step system Generalised Method of Moments (GMM) results. *Expense ratio$_{t-2}$* is the second lag of the expense ratio. The *female percentage* is a ratio of the total number of female directors divided by board size*100%. Definitions of all variables are in *Appendix 3.A*. Robust standard errors clustered by firm are in parentheses *** p<0.01, ** p<0.05, * p<0. The regression analysis was also conducted using alternative measurements to ensure robustness, and the results remained consistent. In the main analysis, as shown in this table, board size, initially measured as the total number of directors, was also assessed using its natural logarithm, with no outcome differences. Similarly, firm size, measured as the natural logarithm of market capitalisation, was compared with total assets, showing consistent results.

Table 3.11: Impact of female percentage on the board on expense ratio based on industry

VARIABLES	BM		CD		CS		Energy		HC	
	FE	GMM	FE	GMM	FE	GMM	FE	GMM	FE	GMM
Expense ratio$_{t-2}$		0.3501***		0.9883***		0.8392***		0.3371***		0.5751***
		(0.0985)		(0.4132)		(0.0936)		(0.4402)		(0.2932)
Female percentage	-0.0017	-0.0014	-0.0011***	-0.0015***	-0.0019	-0.0057	-0.00343	-0.0065	-0.0024**	-0.0010**
	(0.0078)	(0.0017)	(0.0028)	(0.0076)	(0.0013)	(0.0061)	(0.0027)	(0.0041)	(0.0019)	(0.0031)
Firm size	-0.0436***	-0.0077***	-0.0242***	-0.0101***	-0.0180**	-0.0053**	-0.0613***	-0.0479***	-0.0148	-0.0202
	(0.0088)	(0.0081)	(0.0038)	(0.0084)	(0.0089)	(0.0054)	(0.0220)	(0.0377)	(0.0145)	(0.0420)
Firm age	0.0170	0.0054	0.0279***	0.0031***	0.0021	0.0037	0.0710	0.0229	0.0752**	0.0035***
	(0.0323)	(0.0092)	(0.0103)	(0.0051)	(0.0116)	(0.0045)	(0.0489)	(0.0378)	(0.0362)	(0.0156)
Board size	0.0013	0.0053	0.0010	0.0050	0.0047**	0.0059**	0.0017	0.0228	0.0118	0.0068
	(0.0058)	(0.0078)	(0.0018)	(0.0083)	(0.0029)	(0.0032)	(0.0093)	(0.0266)	(0.0113)	(0.0360)
BIND	0.07231	0.1053	0.0013	0.0712	0.1460	0.0093	0.2460	0.0643	0.1320	0.0461
	(0.1771)	(0.2381)	(0.0256)	(0.0875)	(0.0949)	(0.0444)	(0.2141)	(0.3221)	(0.1523)	(0.2671)
CEO_duality	0.0062	0.0056	0.0289	0.0999	0.0055	0.0535	0.0061	0.4980	0.0049	0.0181
	(0.0426)	(0.0360)	(0.0178)	(0.0778)	(0.0136)	(0.0249)	(0.0852)	(0.9141)	(0.0331)	(0.1831)
Leverage	0.0720	0.0342	0.0683	0.0143	0.0521	0.0078	0.0455	0.1070	0.1271	0.1022
	(0.0510)	(0.0726)	(0.0316)	(0.1281)	(0.0692)	(0.0819)	(0.1352)	(0.2991)	(0.0771)	(0.0892)
Free cashflow	-0.5824***	-0.2821***	-0.1982***	-0.0621***	-0.1561**	-0.1061**	-0.5852***	-0.1703**	-0.5701***	-0.0146***
	(0.1211)	(0.1362)	(0.0538)	(0.2462)	(0.0798)	(0.1753)	(0.1793)	(0.5021)	(0.2051)	(0.5631)
Tangibility	-0.0076	-0.0815	-0.0063**	-0.1521**	-0.0373*	-0.0628**	-0.1033	-0.0512	-0.1160	-0.1901
	(0.0688)	(0.0944)	(0.0336)	(0.1135)	(0.0364)	(0.0472)	(0.1770)	(0.2351)	(0.1173)	(0.1731)
Year2012	-0.0682***	-0.0457***	-0.0062**	-0.0075***	-0.0196**	-0.0117**	-0.0291**	-0.0194**	-0.0484	-0.0082
	(0.0208)	(0.0233)	(0.0091)	(0.0128)	(0.0160)	(0.0104)	(0.0376)	(0.0596)	(0.0428)	(0.0482)
Constant	1.4712***	0.7161***	1.1340***	0.0169***	1.2623***	0.1095***	1.6142***	0.8991***	1.1730***	0.6222***
	(0.1815)	(0.1472)	(0.0612)	(0.4881)	(0.1531)	(0.0974)	(0.2443)	(0.6242)	(0.2352)	(0.4353)
Firm effect	YES		YES		YES		YES		YES	
Year effect	YES		YES		YES		YES		YES	
Observations	567	526	2,248	2,021	551	494	348	314	501	446
R-squared	0.175		0.109		0.180		0.197		0.096	
AR(1)		0		0		0		0		0
AR(2)		0.125		0.436		0.237		0.471		0.107
Hansen		0.474		0.304		0.567		0.378		0.530

VARIABLES	Industrials		RE		Technology		Telecommunications	
	FE	GMM	FE	GMM	FE	GMM	FE	GMM
Expense ratio$_{t-2}$		0.5332***		0.4311**		0.3670***		0.5790***
		(0.1601)		(0.1971)		(0.1151)		(0.1910)
Female percentage	-0.0028***	-0.0062***	-0.0053	-0.0012	-0.0047	-0.0019	-0.0045	-0.0042
	(0.0023)	(0.0025)	(0.0091)	(0.0015)	(0.0085)	(0.0076)	(0.0075)	(0.0083)
Firm size	-0.0218***	-0.0033***	-0.0360*	-0.0420**	-0.0239**	-0.0181***	-0.0583***	-0.0054***
	(0.0038)	(0.0031)	(0.0190)	(0.0273)	(0.0099)	(0.0116)	(0.0107)	(0.0243)
Firm age	0.0145	0.0024	0.0814**	0.0054**	0.0574	0.0103	0.0087	0.0046
	(0.0095)	(0.0031)	(0.0371)	(0.0323)	(0.0367)	(0.0104)	(0.0210)	(0.0110)
Board size	0.0012**	0.0037***	0.0172***	0.0623***	0.0073	0.0038	0.0168***	0.0017***
	(0.0013)	(0.0020)	(0.0062)	(0.0199)	(0.0056)	(0.0082)	(0.0059)	(0.0154)
BIND	0.0016	0.0038	0.1920	0.0405	0.0025	0.0736	0.1110	0.0436
	(0.0185)	(0.0250)	(0.1101)	(0.2180)	(0.0565)	(0.0885)	(0.0994)	(0.1750)
CEO_duality	0.0111	0.0146	0.0466	0.0254	0.0436	0.1531	0.0957	0.0505
	(0.0102)	(0.0081)	(0.0338)	(0.2391)	(0.0663)	(0.0788)	(0.0697)	(0.0885)
Leverage	0.0228	0.0091	0.2530	0.1612	0.0989	0.0470	0.1563	0.1114
	(0.0246)	(0.0324)	(0.0880)	(0.1771)	(0.0619)	(0.0794)	(0.0792)	(0.1041)
Free cashflow	-0.1112***	-0.0782***	-0.3880*	-0.5324**	-0.3871***	-0.2084**	-0.1550	-0.1704
	(0.0342)	(0.0277)	(0.2223)	(0.4240)	(0.1115)	(0.0829)	(0.1225)	(0.2531)
Tangibility	-0.0496**	-0.1351***	-0.2621**	-0.1604***	-0.0209	-0.0989	-0.2210	-0.0902
	(0.0723)	(0.0481)	(0.0484)	(0.1454)	(0.1021)	(0.1942)	(0.1535)	(0.1213)
Year2012	-0.0039	-0.0031	-0.0480**	-0.0710***	-0.0079**	-0.0373**	-0.0592***	-0.0020***
	(0.0048)	(0.0051)	(0.0235)	(0.0487)	(0.0172)	(0.0203)	(0.0212)	(0.0285)
Constant	1.1413***	0.4801***	1.6502***	0.4483***	1.3501***	0.8144***	1.6022***	0.4143*
	(0.0732)	(0.1803)	(0.2533)	(0.3602)	(0.1701)	(0.1631)	(0.1870)	(0.2380)
Firm effect	YES		YES		YES		YES	
Year effect	YES		YES		YES		YES	
Observations	2,421	2,215	770	713	903	805	236	208
R-squared	0.093		0.221		0.127		0.224	
AR(1)		0		0		0.00184		0
AR(2)		0.206		0.352		0.434		0.325
Hansen		0.168		0.464		0.181		0.336

This table shows the effect of female directors on firm productivity using the expense ratio as a dependent variable, based on industry. Using the year fixed effect and two-step system GMM regression results based on industry. *Expense ratio$_{t-2}$* is the second lag of the expense ratio. The *female percentage* is a ratio of the total number of female directors divided by board size*100%. Definitions of all variables are in *Appendix 3.A*. Robust standard errors clustered by firm are in parentheses *** p<0.01, ** p<0.05, * p<0. The regression analysis was also conducted using alternative measurements to ensure robustness, and the results remained consistent. In the main analysis, as shown in this table, board size, initially measured as the total number of directors, was also assessed using its natural logarithm, with no outcome differences. Similarly, firm size, measured as the natural logarithm of market capitalisation, was compared with total assets, showing consistent results.

Table 3.12: Impact of female percentage on the board on the assets utilisation ratio

VARIABLES	FE	GMM
Asset utilisation$_{t-2}$		0.5470***
		(0.0837)
Female percentage	0.0918**	0.0271***
	(0.0460)	(0.0881)
Firm size	-0.0646***	-0.0890***
	(0.0053)	(0.0102)
Firm age	0.0319	0.0157
	(0.0125)	(0.0125)
Board size	-0.0031**	-0.0103***
	(0.0029)	(0.0776)
BIND	-0.0940***	-0.1571***
	(0.0354)	(0.0919)
CEO duality	0.0559	0.0759
	(0.0277)	(0.0432)
Leverage	-0.1432***	-0.0435***
	(0.0315)	(0.0913)
Free cashflow	0.5830***	0.0795***
	(0.0622)	(0.1021)
Tangibility	0.0620***	0.1941***
	(0.0371)	(0.0929)
Year2012	0.0482***	0.0434***
	(0.0111)	(0.0194)
Constant	1.8431***	0.7703***
	(0.0756)	(0.1652)
Firm effect	YES	
Year effect	YES	
Industry effect	YES	
Observations	8,545	7,742
R-squared	0.151	
AR(1)		0
AR(2)		0.135
Hansen		0.151

This table shows the effect of female directors on firm productivity using the asset utilisation ratio as a dependent variable. Column 1 shows the year Fixed Effect (FE) results, and column 2 shows the two-step system Generalised Method of Moments (GMM) results. *Asset utilisation$_{t-2}$* is the second lag of the asset utilisation ratio. The *female percentage* is a ratio of the total number of female directors divided by board size*100%. Definitions of all variables are in *Appendix 3.A*. Robust standard errors clustered by firm are in parentheses *** p<0.01, ** p<0.05, * p<0.1. The regression analysis was also conducted using alternative measurements to ensure robustness, and the results remained consistent. In the main analysis, as shown in this table, board size, initially measured as the total number of directors, was also assessed using its natural logarithm, with no outcome differences. Similarly, firm size, measured as the natural logarithm of market capitalisation, was compared with total assets, showing consistent results.

Table 3.13: Impact of female percentage on the board on the assets utilisation ratio before and after the policy

	FE		GMM	
	Before Policy	After Policy	Before Policy	After Policy
VARIABLES				
Asset utilisation$_{t-2}$			0.5310***	0.5941***
			(0.0982)	(0.1812)
Female percentage	0.0036**	0.0014**	0.0017***	0.0040***
	(0.0079)	(0.0065)	(0.0016)	(0.0010)
Firm size	-0.0497***	-0.0450***	-0.0157***	-0.0137***
	(0.0688)	(0.0995)	(0.0115)	(0.0160)
Firm age	0.0479	0.0691	0.0140	0.0192
	(0.0166)	(0.0272)	(0.0118)	(0.0178)
Board size	-0.0564**	-0.0152***	-0.0548***	-0.0450***
	(0.0038)	(0.0050)	(0.0085)	(0.0130)
BIND	-0.1871***	-0.0137***	-0.1653***	-0.1971***
	(0.0466)	(0.0645)	(0.1130)	(0.1352)
CEO duality	0.0616	0.0422	0.0946	0.0203
	(0.0308)	(0.0805)	(0.0414)	(0.0617)
Leverage	-0.0131***	-0.2691***	-0.0970***	-0.0934***
	(0.0426)	(0.0512)	(0.1223)	(0.1341)
Free cashflow	0.5812***	0.4950***	0.1012***	0.0855***
	(0.0749)	(0.1031)	(0.1410)	(0.1720)
Tangibility	0.1242***	0.0837***	0.0885**	0.2631***
	(0.0549)	(0.0651)	(0.1240)	(0.1315)
Constant	1.6223***	1.8782***	0.8280***	0.7331**
	(0.0988)	(0.1540)	(0.2020)	(0.3263)
Firm effect	YES	YES		
Year effect	YES	YES		
Industry effect	YES	YES		
Observations	5,264	3,281	4,569	3,173
R-squared	0.091	0.117		
AR(1)			0	0
AR(2)			0.273	0.245
Hansen			0.282	0.197
Chow test (Prob>chi2)		0.007		0.008

This table shows the effect of female directors on firm productivity using the asset utilisation ratio as a dependent variable, based on policy implementation. The table represents two groups of results based on policy implementation. The first group is before policy implementation (before 2012), while the second group is after policy implementation (2012 onwards). Columns 1 and 3 show the year Fixed Effect (FE) results, and columns 2 and 4 show the two-step system Generalised Method of Moments (GMM) results. *Asset utilisation$_{t-2}$* is the second lag of the asset utilisation ratio. The *female percentage* is a ratio of the total number of female directors divided by board size*100%. Definitions of all variables are in *Appendix 3.A*. Robust standard errors clustered by firm are in parentheses *** p<0.01, ** p<0.05, * p<0. The regression analysis was also conducted using alternative measurements to ensure robustness, and the results remained consistent. In the main analysis, as shown in this table, board size, initially measured as the total number of directors, was also assessed using its natural logarithm, with no outcome differences. Similarly, firm size, measured as the natural logarithm of market capitalisation, was compared with total assets, showing consistent results.

Table 3.14: Impact of female percentage on the board on the asset utilisation ratio based on industry

	BM		CD		CS		Energy		HC	
	FE	GMM	FE	GMM	FE	GMM	FE	GMM	FE	GMM
VARIABLES										
Asset utilisation$_{t-2}$		0.3021***		0.4901***		0.9051***		0.5371***		0.3001***
		(0.5611)		(0.8291)		(0.1738)		(0.3347)		(0.5233)
Female percentage	0.0031	0.0095	0.0042	0.0019	0.0075	0.0064	0.0048	0.0053	0.0011	0.0026
	(0.0057)	(0.0022)	(0.0024)	(0.0076)	(0.0243)	(0.0063)	(0.0019)	(0.0085)	(0.0023)	(0.0055)
Firm size	-0.0060	-0.0034	-0.0034***	-0.0012**	-0.0063***	0.0032***	-0.0071	-0.0010	-0.0116**	-0.0095**
	(0.0042)	(0.0330)	(0.0044)	(0.0091)	(0.0020)	(0.0023)	(0.0137)	(0.0020)	(0.0103)	(0.0044)
Firm age	0.0035	0.0072	0.0044	0.0017	0.0041	0.0011	0.0205	0.0038	0.0148	0.0024
	(0.0014)	(0.0323)	(0.0072)	(0.0091)	(0.0042)	(0.0015)	(0.0272)	(0.0060)	(0.0172)	(0.0059)
Board size	0.0091	0.0033	0.0025**	0.0085	0.0013	0.0024	0.0012	0.0018	0.0052*	0.0031
	(0.0032)	(0.0330)	(0.0040)	(0.0042)	(0.0012)	(0.0011)	(0.0052)	(0.0018)	(0.0027)	(0.0032)
BIND	-0.0917	-0.0949	-0.0064	-0.0020	-0.0015	-0.0041	-0.0302	-0.0049	-0.1112	-0.0345
	(0.0237)	(0.3723)	(0.0074)	(0.0036)	(0.0012)	(0.0099)	(0.0660)	(0.0473)	(0.0699)	(0.0482)
CEO duality	0.0059	0.0049	0.0046	0.0036	0.0022	0.0060	0.0063	0.0172	0.0394	0.0560
	(0.0168)	(0.0220)	(0.0059)	(0.0039)	(0.0019)	(0.0035)	(0.0635)	(0.0786)	(0.0312)	(0.0456)
Leverage	-0.2111	-0.2363	-0.0039	-0.0013	-0.0010	-0.0061	-0.0356	-0.0030	-0.0180	-0.0558
	(0.1371)	(0.0838)	(0.0088)	(0.0067)	(0.0011)	(0.0015)	(0.0714)	(0.0289)	(0.0226)	(0.0387)
Free cashflow	0.3102**	0.3834**	0.0388***	0.0045***	0.0083*	0.0025	0.0854*	0.0196**	0.0845	0.0171
	(0.2222)	(0.3529)	(0.0383)	(0.0056)	(0.0026)	(0.0023)	(0.0427)	(0.0568)	(0.0597)	(0.0347)
Tangibility	0.0546***	0.0076***	0.0426**	0.0062**	0.0021**	0.0049	0.0431	0.0191	0.0114	0.0900
	(0.0110)	(0.2333)	(0.0485)	(0.0232)	(0.0017)	(0.0018)	(0.0671)	(0.0348)	(0.0659)	(0.0730)
Year2012	0.0228*	0.0266**	0.0044***	0.0065***	0.0013***	0.0014**	0.0051	0.0077	0.0059	0.0168
	(0.0169)	(0.0372)	(0.0046)	(0.0027)	(0.0037)	(0.0026)	(0.0496)	(0.0072)	(0.0274)	(0.0487)
Constant	0.6332***	0.0343**	0.0647**	0.0823**	0.0642***	0.0334***	0.3105***	0.0557**	0.2894**	0.3864***
	(0.9443)	(0.0806)	(0.0148)	(0.0634)	(0.0074)	(0.0386)	(0.5842)	(0.0536)	(0.4904)	(0.0299)
Firm effect	YES		YES		YES		YES		YES	
Year effect	YES		YES		YES		YES		YES	
Observations	567	526	2,248	2,024	554	494	348	344	504	446
R-squared	0.077		0.085		0.449		0.074		0.062	
AR(4)		0		0		0		0		0
AR(2)		0.392		0.482		0.362		0.308		0.564
Hansen		0.565		0.483		0.668		0.239		0.367

Continued

VARIABLES	Industrials		RE		Technology		Telecommunications	
	FE	GMM	FE	GMM	FE	GMM	FE	GMM
Asset utilisation$_{t-2}$		0.7361***		0.4821***		0.6201***		0.6932***
		(0.2210)		(0.2501)		(0.7710)		(0.8150)
Female percentage	0.0049	0.0021	0.0038	0.0082	0.0051***	0.0037***	0.0036**	0.0027***
	(0.0015)	(0.0023)	(0.0024)	(0.0016)	(0.0064)	(0.0055)	(0.0019)	(0.0089)
Firm size	-0.0032*	-0.0021**	-0.0261	-0.0195	-0.0086	-0.0016	-0.0060	-0.0052
	(0.0018)	(0.0011)	(0.0197)	(0.0179)	(0.0038)	(0.0034)	(0.0036)	(0.0013)
Firm age	0.0011	0.0066	0.0325	0.0014	0.0128	0.0027	0.0112*	0.0011
	(0.0037)	(0.0043)	(0.0593)	(0.0147)	(0.0077)	(0.0020)	(0.0058)	(0.0013)
Board size	0.0071**	0.0051	0.0056	0.0245	0.0081**	0.0027	0.0012	0.0089
	(0.0030)	(0.0081)	(0.0076)	(0.0149)	(0.0033)	(0.0049)	(0.0088)	(0.0053)
BIND	-0.0015	-0.0042	-0.2030**	-0.1610	-0.0088	-0.0121	-0.0078	-0.0021
	(0.0077)	(0.0156)	(0.0889)	(0.2021)	(0.0277)	(0.0417)	(0.0138)	(0.0094)
CEO duality	0.0043	0.0031	0.0611	0.0228	0.0110	0.0130	0.0289**	0.0036
	(0.0018)	(0.0039)	(0.0476)	(0.1184)	(0.0117)	(0.0123)	(0.0124)	(0.0096)
Leverage	-0.0183	-0.0037	-0.0760	-0.0015	-0.0277*	-0.0085	-0.0097	-0.0021
	(0.0122)	(0.0094)	(0.1210)	(0.1517)	(0.0154)	(0.0413)	(0.0077)	(0.0044)
Free cashflow	0.0142**	0.0103**	0.1772	0.0068	0.0461	0.0738	0.0310***	0.0089
	(0.0093)	(0.0224)	(0.1190)	(0.4040)	(0.0285)	(0.0785)	(0.0110)	(0.0049)
Tangibility	0.0061**	0.0013***	0.1561	0.0167	0.0122	0.0361	0.0206	0.0094
	(0.0089)	(0.0139)	(0.0961)	(0.0720)	(0.0410)	(0.0406)	(0.0146)	(0.0137)
Year2012	0.0085	0.0031	0.0273	0.0073	0.0197*	0.0081	0.0038	0.0038
	(0.0044)	(0.0042)	(0.0265)	(0.0220)	(0.0404)	(0.0443)	(0.0043)	(0.0049)
Constant	0.0563**	0.0643***	0.2704**	0.0416**	0.4563**	0.0230**	0.4664**	0.0419***
	(0.0649)	(0.0086)	(0.2434)	(0.1426)	(0.0894)	(0.0855)	(0.0773)	(0.0465)
Firm effect	YES		YES		YES		YES	
Year effect	YES		YES		YES		YES	
Observations	2,424	2,245	770	743	903	805	236	208
R-squared	0.054		0.095		0.444		0.436	
AR(4)		0		0		0		0
AR(2)		0.360		0.473		0.363		0.334
Hansen		0.605		0.648		0.425		0.572

This table shows the effect of female directors on firm productivity using the expense ratio as a dependent variable, based on industry. Using the year fixed effect and two-step system GMM regression results based on industry. *Expense ratio$_{t-2}$* is the second lag of the expense ratio. The *female percentage* is a ratio of the total number of female directors divided by board size*100%. Definitions of all variables are in *Appendix 3.A*. Robust standard errors clustered by firm are in parentheses *** p<0.01, ** p<0.05, * p<0. The regression analysis was also conducted using alternative measurements to ensure robustness, and the results remained consistent. In the main analysis, as shown in this table, board size, initially measured as the total number of directors, was also assessed using its natural logarithm, with no outcome differences. Similarly, firm size, measured as the natural logarithm of market capitalisation, was compared with total assets, showing consistent results.

Appendices

Appendix 3.A: **Variable definitions**

Variable name	Definition
Dependent variables	
Employment Ratio	Employment ratio is measured using the ratio of total employees to market capitalisation at the end of the financial year*100
Productivity Indicators: -Expense Ratio	The expense ratio is calculated as operating expenses divided by total sales revenue at the end of the financial year.
-Asset Utilisation Ratio	The asset utilisation ratio is calculated as total sales divided by total assets at the end of the financial year.
-Employee Productivity	Employee productivity is calculated by dividing each firm's operating revenue by the number of its employees at the end of the financial year. A natural logarithm function was employed to transform the raw data on operating revenue.
Explanatory variables	
Female Percentage	(Total number of female board directors/Total number of board directors at the end of the financial year) *100%.
Control variables	
Board size	Board size is the total number of directors at the end of the financial year.
Board Independence (BIND)	Percentage of independent directors at the end of the financial year.
CEO duality	A dummy variable that takes the value of 1 if the chairperson is also the CEO and zero otherwise
Firm size	Natural logarithm of market capitalisation at the end of the financial year.
Firm age	Measured as the natural logarithm of the number of years since incorporation
Leverage	It is calculated as the total debt divided by the total equity of the firm at the end of the financial year.
Free cash flow	Free cash flow is calculated as cash from operations minus capital expenditures, normalised by total assets at the end of the financial year.
Tangibility	Tangibility is measured as the ratio of net property, plant, and equipment to total assets at the end of the financial year.
Year2012	A dummy variable that takes the value of 1 if the year is 2012 or after and zero otherwise

This table reports the definition and measurement of variables used in this study.

Appendix 3.B: Robustness Analysis – FTSE 350 Subsample

For robustness checks, the regressions (FE and GMM models) were rerun for the FTSE 350 Index as a subsample of the broader FTSE All Share dataset. The FTSE 350 provides direct comparability with the largest UK firms most directly targeted by the Davies Report recommendations. The following tables present the results for this subsample and compare them with the baseline findings reported in Chapter 3.

The findings show that while some differences in levels of statistical significance exist, the overall patterns are broadly consistent with the FTSE All Share results:

- **Impact on Employment (Table 3.B.1 vs. Table 3.3):**

    For the FTSE 350, female board representation shows an insignificant relationship with employment, whereas in the FTSE All Share sample the relationship is positive and significant.

- **Impact on Employment Pre- and Post-Davies Report (Table 3.B.2 vs. Table 3.4):**

    In the FTSE 350 subsample, the impact is insignificant before and after policy implementation, while the FTSE All Share results show a significant positive impact in both periods.

- **Impact on Employee Productivity (Table 3.B.3 vs. Table 3.6):**

    Both samples report a positive and significant relationship between female board representation and employee productivity.

- **Impact on Employee Productivity Pre- and Post-Davies Report (Table 3.B.4 vs. Table 3.7):**

    For the FTSE 350, the impact is insignificant before policy implementation but significantly positive after 2012. By contrast, the FTSE All Share results show a significant positive impact in both periods.

- **Impact on Expense Ratio (Table 3.B.5 vs. Table 3.9):**

    The FTSE 350 results indicate a negative and significant association at the 5% level, while the FTSE All Share findings show stronger significance at the 1% level.

- **Impact on Expense Ratio Pre- and Post-Davies Report (Table 3.B.6 vs. Table 3.10):**

  In the FTSE 350 sample, the relationship is insignificant before 2012 but significantly positive after, whereas in the FTSE All Share results it is significantly negative at the 1% level both before and after policy implementation.

- **Impact on Assets Utilisation Ratio (Table 3.B.7 vs. Table 3.12):**

  Both the FTSE 350 and FTSE All Share samples show a positive and significant association.

- **Impact on Assets Utilisation Ratio Pre- and Post-Davies Report (Table 3.B.8 vs. Table 3.13):**

  For the FTSE 350, the results are insignificant before policy implementation but significantly positive after 2012. In the FTSE All Share sample, the results are significantly positive in both periods.

Overall, while the FTSE 350 subsample results occasionally differ in significance levels from the FTSE All Share sample, they generally support the main conclusions. Board gender diversity is positively associated with employee outcomes (employment, productivity, and asset utilisation) and negatively with certain cost measures (expense ratio), with evidence of stronger effects following the Davies Report policy changes.

Table 0.B.1: Impact of female percentage on the board on employment

VARIABLES	FE	GMM
Employment ratio$_{t-2}$		0.824***
		(0.152)
Female percentage	0.0032	0.0011
	(0.0235)	(0.0578)
Firm size	-0.852***	-0.264**
	(0.032)	(0.181)
Firm age	0.235***	0.0905*
	(0.652)	(0.527)
Board size	0.0841***	0.180**
	(0.0147)	(0.128)
BIND	0.732***	0.0559
	(0.193)	(1.414)
CEO duality	0.118	0.024
	(0.142)	(1.073)
Leverage	0.254	0.366
	(0.200)	(1.234)
Free cashflow	-0.856**	-0.877*
	(0.376)	(6.277)
Tangibility	0.243	0.874
	(0.198)	(0.754)
Year2012	0.125**	0.238***
	(0.0604)	(0.193)
Constant	11.12***	-1.403**
	(0.454)	(1.352)
Firm effect	YES	
Year effect	YES	
Industry effect	YES	
Observations	2,542	2,370
R-squared	0.284	
AR(1)		0.001
AR(2)		0.625
Hansen		0.595

This table shows the effect of female directors on firm employment levels using the employment ratio as a dependent variable. Column 1 shows the year Fixed Effect (FE) results, and column 2 shows the two-step system Generalised Method of Moments (GMM) results. *Employment ratio$_{t-2}$* is the second lag of the employment ratio. The *female percentage* is a ratio of the total number of female directors divided by board size*100%. Definitions of all variables are in *Appendix A*. Robust standard errors clustered by firm are in parentheses *** p<0.01, ** p<0.05, * p<0.1. The regression analysis was also conducted using alternative measurements to ensure robustness, and the results remained consistent. In the main analysis, as shown in this table, the employment ratio was calculated as the ratio of total employees to market capitalisation at the end of the financial year*100. An alternative measurement using the ratio of total employees to total assets yielded similar results. Initially measured as the total number of directors, board size was also assessed using its natural logarithm, with no outcome differences. Similarly, firm size, measured as the natural logarithm of market capitalisation, was compared with total assets, showing consistent results.

Table 3.B.2: Impact of female percentage on the board on employment before and after the policy

VARIABLES	FE		GMM	
	Before policy	After policy	Before policy	After policy
Employment ratio$_{t-2}$			0.225***	0.832**
			(0.231)	(0.393)
Female percentage	0.00607	0.00327	0.0341	0.0062
	(0.0092)	(0.0033)	(0.0298)	(0.0099)
Firm size	-1.129***	-0.692***	-0.208**	-0.207***
	(0.179)	(0.140)	(0.246)	(0.665)
Firm age	0.302*	0.488***	0.0799	0.0195
	(0.181)	(0.163)	(0.141)	(0.170)
Board size	0.129*	0.0157*	0.188*	0.113**
	(0.0386)	(0.0265)	(0.174)	(0.482)
BIND	0.721	0.0551	0.0586	0.138
	(0.405)	(0.345)	(1.944)	(4.904)
CEO duality	0.0660	0.126	2.286	0.913
	(0.133)	(0.0669)	(2.399)	(2.038)
Leverage	0.123**	0.0894***	2.690*	1.463***
	(0.541)	(0.253)	(2.491)	(2.563)
Free cashflow	-0.913	-0.255	-2.905	-0.717
	(0.586)	(1.124)	(5.796)	(3.973)
Tangibility	0.0810	0.0534	0.463	1.962
	(0.599)	(0.322)	(1.711)	(5.724)
Constant	14.48***	9.264***	1.064	-0.787
	(2.214)	(1.836)	(1.889)	(3.202)
Firm effect	YES	YES		
Year effect	YES	YES		
Industry effect	YES	YES		
Observations	1,290	1,252	1,151	1,219
R-squared	0.313	0.194		
AR(1)			0.015	0.026
AR(2)			0.164	0.655
Hansen			0.573	0.660

This table shows the effect of female directors on firm employment levels using the employment ratio as a dependent variable based on policy implementation. The table represents two groups of results based on policy implementation. The first group is before policy implementation (before 2012), while the second group is after policy implementation (2012 onwards). Columns 1 and 3 show the year Fixed Effect (FE) results, and columns 2 and 4 show the two-step system Generalised Method of Moments (GMM) results. *Employment ratio$_{t-2}$* is the second lag of the employment ratio. The *female percentage* is a ratio of the total number of female directors divided by board size*100%. Definitions of all variables are in *Appendix 3.A*. Robust standard errors clustered by the firm are in parentheses *** p<0.01, ** p<0.05, * p<0. The regression analysis was also conducted using alternative measurements to ensure robustness, and the results remained consistent. In the main analysis, as shown in this table, the employment ratio was calculated as the ratio of total employees to market capitalisation at the end of the financial year*100. An alternative measurement using the ratio of total employees to total assets yielded similar results. Initially measured as the total number of directors, board size was also assessed using its natural logarithm, with no outcome differences. Similarly, firm size, measured as the natural logarithm of market capitalisation, was compared with total assets, showing consistent results.

Table 3.B.3: Impact of female percentage on the board on employee productivity

VARIABLES	FE	GMM
Employee productivity$_{t-2}$		0.368***
		(0.326)
Female percentage	0.00619***	0.0067***
	(0.0058)	(0.0021)
Firm size	-0.0095***	-0.0020**
	(0.0027)	(0.0042)
Firm age	-0.0079	-0.0088
	(0.0043)	(0.0357)
Board size	-0.0028***	-0.0409**
	(0.0986)	(0.0028)
BIND	-0.0228*	-0.0110
	(0.0130)	(0.0346)
CEO duality	0.0044	0.0087
	(0.0956)	(0.0289)
Leverage	-0.0190	-0.0281
	(0.0134)	(0.0440)
Free cashflow	0.0015	0.0233
	(0.0253)	(0.0783)
Tangibility	0.0112	0.0464
	(0.0133)	(0.0467)
Year2012	0.0035*	0.0024**
	(0.0046)	(0.0031)
Constant	0.192***	0.0266
	(0.0305)	(0.0398)
Firm effect	YES	
Year effect	YES	
Industry effect	YES	
Observations	2,542	2,370
R-squared	0.121	
AR(1)		0.004
AR(2)		0.353
Hansen		0.561

This table shows the effect of female directors on firm productivity using employee productivity as a dependent variable. Column 1 shows the year Fixed Effect (FE) results, and column 2 shows the two-step system Generalised Method of Moments (GMM) results. *Employee productivity$_{t-2}$* is the second lag of employee productivity. The *female percentage* is a ratio of the total number of female directors divided by board size*100%. Definitions of all variables are in *Appendix 3.A*. Robust standard errors clustered by firm are in parentheses *** p<0.01, ** p<0.05, * p<0.1. The regression analysis was also conducted using alternative measurements to ensure robustness, and the results remained consistent. In the main analysis, as shown in this table, board size, initially measured as the total number of directors, was also assessed using its natural logarithm, with no outcome differences. Similarly, firm size, measured as the natural logarithm of market capitalisation, was compared with total assets, showing consistent results.

Table 3.B.4: Impact of female percentage on the board on employee productivity before and after the policy

VARIABLES	FE		GMM	
	Before Policy	After policy	Before Policy	After policy
Employee productivity$_{t-2}$			0.933***	0.463***
			(0.0688)	(0.0159)
Female percentage	0.0021*	0.0076**	0.0058	0.0031***
	(0.0013)	(0.0061)	(0.0032)	(0.0013)
Firm size	-0.0014	-0.0164*	-0.0031**	-0.0084**
	(0.0011)	(0.0083)	(0.0057)	(0.0015)
Firm age	-0.0032	-0.0081	-0.0047	-0.0018
	(0.0024)	(0.0123)	(0.0064)	(0.0011)
Board size	-0.0024**	-0.0042*	-0.0015**	-0.0012**
	(0.0054)	(0.0024)	(0.0034)	(0.0085)
BIND	-0.0259***	-0.0336**	-0.0094*	-0.0015**
	(0.0066)	(0.0347)	(0.0028)	(0.0130)
CEO duality	0.0016	0.0018	0.0044	0.0043
	(0.0044)	(0.0047)	(0.0013)	(0.0078)
Leverage	-0.00714	-0.0254	-0.0029	-0.0244
	(0.0078)	(0.0241)	(0.0055)	(0.0174)
Free cashflow	0.0075	0.0709	0.0021	0.0433
	(0.0119)	(0.0925)	(0.0096)	(0.0317)
Tangibility	0.0171**	0.0222	0.0017	0.0132
	(0.0079)	(0.0215)	(0.0032)	(0.0216)
Constant	0.0550***	0.327**	0.0206	0.0312***
	(0.0170)	(0.147)	(0.0664)	(0.0191)
Firm effect	YES	YES		
Year effect	YES	YES		
Industry effect	YES	YES		
Observations	1,290	1,252	1,151	1,219
R-squared	0.143	0.121		
AR(1)			0.007	0.014
AR(2)			0.379	0.249
Hansen			0.737	0.486

This table shows the effect of female directors on firm productivity using employee productivity as a dependent variable, based on policy implementation. The table represents two groups of results based on policy implementation. The first group is before policy implementation (before 2012), while the second group is after policy implementation (2012 onwards). Columns 1 and 3 show the year Fixed Effect (FE) results, and columns 2 and 4 show the two-step system Generalised Method of Moments (GMM) results. *Employee productivity$_{t-2}$* is the second lag of employee productivity. The *female percentage* is a ratio of the total number of female directors divided by board size*100%. Definitions of all variables are in *Appendix 3.A*. Robust standard errors clustered by firm are in parentheses *** p<0.01, ** p<0.05, * p<0. The regression analysis was also conducted using alternative measurements to ensure robustness, and the results remained consistent. In the main analysis, as shown in this table, board size, initially measured as the total number of directors, was also assessed using its natural logarithm, with no outcome differences. Similarly, firm size, measured as the natural logarithm of market capitalisation, was compared with total assets, showing consistent results.

Table 3.B.5: Impact of female percentage on the board on expense ratio

VARIABLES	FE	GMM
Expense ratio$_{t-2}$		1.077***
		(0.334)
Female percentage	-0.0019**	-0.0028**
	(0.0036)	(0.0013)
Firm size	-0.0314***	-0.0082***
	(0.0057)	(0.0180)
Firm age	0.0118	0.0042
	(0.0127)	(0.0081)
Board size	-0.0014	-0.0101
	(0.0019)	(0.0140)
BIND	-0.0104	-0.165
	(0.0378)	(0.177)
CEO duality	-0.0255	-0.0340
	(0.0154)	(0.223)
Leverage	0.116***	0.153**
	(0.0406)	(0.181)
Free cashflow	-0.209***	-0.0042**
	(0.0710)	(0.823)
Tangibility	-0.0298	-0.0985
	(0.0698)	(0.150)
Year2012	-0.0081**	-0.0134**
	(0.0061)	(0.0255)
Constant	1.277***	-0.115
	(0.100)	(0.359)
Firm effect	YES	
Year effect	YES	
Industry effect	YES	
Observations	2,542	2,370
R-squared	0.102	
AR(1)		0.007
AR(2)		0.370
Hansen		0.558

This table shows the effect of female directors on firm productivity using the expense ratio as a dependent variable. Column 1 shows the year Fixed Effect (FE) results, and column 2 shows the two-step system Generalised Method of Moments (GMM) results. *Expense ratio$_{t-2}$* is the second lag of the expense ratio. The *female percentage* is a ratio of the total number of female directors divided by board size*100%. Definitions of all variables are in *Appendix 3.A*. Robust standard errors clustered by firm are in parentheses *** p<0.01, ** p<0.05, * p<0.1. The regression analysis was also conducted using alternative measurements to ensure robustness, and the results remained consistent. In the main analysis, as shown in this table, board size, initially measured as the total number of directors, was also assessed using its natural logarithm, with no outcome differences. Similarly, firm size, measured as the natural logarithm of market capitalisation, was compared with total assets, showing consistent results.

Table 3.B.6: Impact of female percentage on the board on expense ratio before and after policy

	FE		GMM	
	Before policy	After policy	Before policy	After policy
VARIABLES				
Expense ratio$_{t-2}$			0.389***	0.638**
			(0.283)	(0.259)
Female percentage	-0.0013	-0.0015**	-0.0066	0.00140**
	(0.0058)	(0.0031)	(0.0038)	(0.0067)
Firm size	-0.0284***	-0.0343***	-0.0089***	-0.0105***
	(0.0063)	(0.0089)	(0.0196)	(0.0159)
Firm age	0.0131	0.0642**	0.0027	0.0156
	(0.0117)	(0.0247)	(0.0087)	(0.0104)
Board size	-0.0042	-0.0040	-0.0046	-0.0018
	(0.0022)	(0.0027)	(0.0167)	(0.0115)
BIND	-0.0050	-0.0538	-0.0221	-0.121
	(0.0610)	(0.0466)	(0.286)	(0.152)
CEO duality	-0.0013	-0.0425	-0.0042	-0.128
	(0.0065)	(0.0284)	(0.0818)	(0.0905)
Leverage	0.0150	0.199***	0.0910	0.315**
	(0.0459)	(0.0477)	(0.105)	(0.139)
Free cashflow	-0.140***	-0.219*	-0.290*	-0.0521**
	(0.0457)	(0.120)	(0.362)	(0.400)
Tangibility	-0.0862	-0.189**	-0.0658	-0.0582
	(0.0604)	(0.0759)	(0.107)	(0.191)
Constant	1.188***	1.162***	0.616**	0.420
	(0.0952)	(0.151)	(0.270)	(0.331)
Firm effect	YES	YES		
Year effect	YES	YES		
Industry effect	YES	YES		
Observations	1,290	1,252	1,151	1,219
R-squared	0.074	0.132		
AR(1)			0.006	0.004
AR(2)			0.431	0.310
Hansen			0.574	0.316

This table shows the effect of female directors on firm productivity using the expense ratio as a dependent variable, based on policy implementation. The table represents two groups of results based on policy implementation. The first group is before policy implementation (before 2012), while the second group is after policy implementation (2012 onwards). Columns 1 and 3 show the year Fixed Effect (FE) results, and columns 2 and 4 show the two-step system Generalised Method of Moments (GMM) results. *Expense ratio$_{t-2}$* is the second lag of the expense ratio. The *female percentage* is a ratio of the total number of female directors divided by board size*100%. Definitions of all variables are in *Appendix 3.A*. Robust standard errors clustered by firm are in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0$. The regression analysis was also conducted using alternative measurements to ensure robustness, and the results remained consistent. In the main analysis, as shown in this table, board size, initially measured as the total number of directors, was also assessed using its natural logarithm, with no outcome differences. Similarly, firm size, measured as the natural logarithm of market capitalisation, was compared with total assets, showing consistent results.

Table 3.B.7: Impact of female percentage on the board on the assets utilisation ratio

VARIABLES	FE	GMM
Asset utilisation$_{t-2}$		0.705***
		(0.125)
Female percentage	0.0019***	0.0019***
	(0.0069)	(0.0015)
Firm size	-0.0665***	-0.0204***
	(0.0095)	(0.0142)
Firm age	0.0252	0.0126
	(0.0192)	(0.0167)
Board size	-0.0061	-0.0033
	(0.0043)	(0.0068)
BIND	-0.0177	-0.0524
	(0.0569)	(0.113)
CEO duality	0.0732*	0.0354
	(0.0418)	(0.0397)
Leverage	-0.431***	-0.0485***
	(0.0587)	(0.197)
Free cashflow	0.603***	0.169***
	(0.111)	(0.167)
Tangibility	0.197***	0.244*
	(0.0583)	(0.143)
Year2012	0.0564**	0.0385**
	(0.0178)	(0.0278)
Constant	1.888***	0.586*
	(0.134)	(0.344)
Firm effect	YES	
Year effect	YES	
Industry effect	YES	
Observations	2,542	2,370
R-squared	0.106	
AR(1)		0.005
AR(2)		0.158
Hansen		0.126

This table shows the effect of female directors on firm productivity using the asset utilisation ratio as a dependent variable. Column 1 shows the year Fixed Effect (FE) results, and column 2 shows the two-step system Generalised Method of Moments (GMM) results. *Asset utilisation$_{t-2}$* is the second lag of the asset utilisation ratio. The *female percentage* is a ratio of the total number of female directors divided by board size*100%. Definitions of all variables are in *Appendix 3.A*. Robust standard errors clustered by firm are in parentheses *** p<0.01, ** p<0.05, * p<0.1. The regression analysis was also conducted using alternative measurements to ensure robustness, and the results remained consistent. In the main analysis, as shown in this table, board size, initially measured as the total number of directors, was also assessed using its natural logarithm, with no outcome differences. Similarly, firm size, measured as the natural logarithm of market capitalisation, was compared with total assets, showing consistent results.

Table 3.B.8: Impact of female percentage on the board on the assets utilisation ratio before and after the policy

VARIABLES	FE		GMM	
	Before Policy	After Policy	Before Policy	After Policy
Asset utilisation$_{t-2}$			0.865***	0.521***
			(0.0803)	(0.143)
Female percentage	0.0029	0.0019***	0.0012	0.0034***
	(0.0019)	(0.0096)	(0.0019)	(0.0013)
Firm size	-0.0652***	-0.0585***	-0.0029***	-0.0475***
	(0.0121)	(0.0174)	(0.0109)	(0.0252)
Firm age	0.0261	0.0052	0.0026	0.0429
	(0.0257)	(0.0471)	(0.0101)	(0.0280)
Board size	-0.0026	-0.0017	-0.0075	-0.0144
	(0.0056)	(0.0072)	(0.0073)	(0.0109)
BIND	-0.0412	-0.115	-0.0900	-0.0515
	(0.0697)	(0.115)	(0.110)	(0.170)
CEO duality	0.0912**	0.0352	0.0052	0.0171
	(0.0463)	(0.0957)	(0.0401)	(0.0840)
Leverage	-0.393***	-0.803***	-0.134***	-0.149***
	(0.0818)	(0.0956)	(0.172)	(0.250)
Free cashflow	0.710***	0.261**	0.299**	0.0222**
	(0.124)	(0.179)	(0.149)	(0.283)
Tangibility	0.110*	0.0171**	0.290*	0.335*
	(0.0826)	(0.103)	(0.156)	(0.247)
Constant	2.095***	1.897***	0.346	0.966**
	(0.178)	(0.262)	(0.214)	(0.408)
Firm effect	YES	YES		
Year effect	YES	YES		
Industry effect	YES	YES		
Observations	1,290	1,252	1,151	1,219
R-squared	0.086	0.080		
AR(1)			0.000	0.004
AR(2)			0.530	0.199
Hansen			0.294	0.187

This table shows the effect of female directors on firm productivity using the asset utilisation ratio as a dependent variable, based on policy implementation. The table represents two groups of results based on policy implementation. The first group is before policy implementation (before 2012), while the second group is after policy implementation (2012 onwards). Columns 1 and 3 show the year Fixed Effect (FE) results, and columns 2 and 4 show the two-step system Generalised Method of Moments (GMM) results. *Asset utilisation$_{t-2}$* is the second lag of the asset utilisation ratio. The *female percentage* is a ratio of the total number of female directors divided by board size*100%. Definitions of all variables are in *Appendix 3.A*. Robust standard errors clustered by firm are in parentheses *** p<0.01, ** p<0.05, * p<0. The regression analysis was also conducted using alternative measurements to ensure robustness, and the results remained consistent. In the main analysis, as shown in this table, board size, initially measured as the total number of directors, was also assessed using its natural logarithm, with no outcome differences. Similarly, firm size, measured as the natural logarithm of market capitalisation, was compared with total assets, showing consistent results.

Chapter 4

Board Gender Diversity and Capital Structure

4.1 Introduction

Corporate governance has increasingly become a focal point of academic and policy discussions, with gender diversity on corporate boards emerging as a critical issue. The growing emphasis on board gender diversity stems from ethical imperatives and practical considerations, such as improving corporate governance, enhancing decision-making processes, and driving long-term financial performance (Adams and Ferreira, 2009). Several countries, including the UK, have introduced policies to increase female representation on corporate boards. The Davies Report (2011) marked a significant regulatory intervention in the UK, advocating for greater gender diversity in FTSE 100 companies. By setting targets for female board representation, the report aimed to foster more inclusive governance practices and encourage better oversight of corporate activities (Seierstad *et al.*, 2017). This regulatory change, however, raises important questions about how gender diversity impacts key financial decisions, particularly capital structure choices, which are critical to a firm's financial health and risk profile. This study addresses these questions by examining the relationship between board gender diversity and leverage among UK-listed firms, focusing on the period before and after the implementation of the Davies Report.

This research is motivated by the growing global emphasis on gender diversity in corporate governance and the evolving regulatory frameworks promoting equitable corporate board representation. The Davies Report (2011), which set clear targets for increased female board representation in UK FTSE 350 companies, provides a unique backdrop for examining the financial implications of gender diversity, particularly in a post-regulatory environment. With the Davies Report's recommendations in place for over a decade, it is both timely and necessary to assess whether these regulatory efforts have led to significant changes in corporate financial strategies, such as capital structure decisions.

The focus on gender diversity in corporate governance is not only a response to ethical concerns but also from practical considerations regarding its potential impact on firm performance and financial risk management. Corporate governance reforms, particularly those targeting greater gender diversity, are a prominent feature of ongoing

discussions in developed and emerging markets. Globally, there is increasing recognition of the need for diverse leadership to improve accountability, transparency, and decision-making (Adams and Ferreira, 2009). By focusing on the UK, this research contributes to broader conversations about corporate governance reforms and provides insights relevant to markets where similar policies are being considered.

Despite the growing discourse on gender diversity, the empirical evidence regarding its financial effects remains mixed and context-dependent. Some scholars suggest that female directors are generally more risk-averse and conservative, which may lead to lower leverage and more cautious financial strategies (Adams and Funk, 2012; Levi *et al.*, 2014). In contrast, others propose that gender-diverse boards enhance firms' access to external resources, particularly debt financing, by improving credibility and governance practices (Chen *et al.*, 2022). This conflicting evidence highlights the need for further investigation, especially in a context like the UK, where regulatory interventions like the Davies Report have reshaped board composition. By examining how these regulatory changes have influenced firms' capital structure decisions, this study seeks to fill a significant gap in the literature, offering a more comprehensive understanding of the financial implications of gender diversity.

Capital structure, defined as the mix of debt and equity used by firms to finance operations, plays a crucial role in shaping a firm's risk profile, cost of capital, and long-term viability (Rajan and Zingales, 1995). Understanding how board gender diversity influences capital structure decisions is critical, as leverage decisions directly affect a firm's exposure to financial distress, its ability to invest in growth opportunities, and its overall value. In today's uncertain economic environment, where firms face increasing volatility, the ability of gender-diverse boards to impact such crucial financial decisions, whether by promoting more conservative risk management or enhancing access to favourable borrowing conditions, has significant implications for both theory and practice.

Focusing on the period before and after the Davies Report, this study aims to provide new insights into how gender diversity on boards affects financial decision-making, particularly regarding leverage. The study will examine whether the increased representation of women on boards, as encouraged by the Davies Report, has led to more conservative capital structures characterised by lower leverage or enhanced firms' access to debt financing, resulting in higher leverage. This research contributes

to the ongoing debate about the relationship between gender diversity, risk management, and financial strategy, offering empirical evidence from the UK corporate landscape.

Furthermore, the study acknowledges that the impact of gender diversity on capital structure may vary across industries. In capital-intensive sectors such as manufacturing, energy, and construction, where firms often have significant collateral, gender-diverse boards may still support higher leverage if borrowing conditions are favourable. The construction sector, in particular, relies on substantial upfront investment and long-term project financing, making external debt a key component of capital structure. However, consistent with the broader findings, female directors may encourage a more cautious approach by balancing investment needs with risk management considerations, thereby moderating excessive reliance on debt financing. Conversely, in higher-risk industries such as technology and healthcare, female directors may advocate for lower leverage to avoid financial distress. Understanding these industry-specific dynamics will provide a more nuanced perspective on how gender diversity influences financial decisions in different contexts.

Despite the extensive literature on corporate governance and board diversity, a critical gap remains in understanding how gender diversity affects capital structure decisions. While numerous studies have analysed the relationship between board composition and firm performance (Adams and Ferreira, 2009; Carter *et al.*, 2003), much of this research has focused on broader governance outcomes or overall firm performance metrics, often neglecting the more targeted financial decisions, such as the balance between debt and equity financing. Capital structure, pivotal in shaping a firm's financial health and risk profile, remains under-examined regarding gender diversity, particularly within regulated environments that foster greater diversity.

This study goes beyond prior research by explicitly examining the under-examined link between board gender diversity and capital structure rather than general governance or performance outcomes. While previous studies have made significant strides in evaluating how board diversity impacts risk-taking and financial policies, these studies often deliver inconsistent and context-dependent results. For instance, in developed markets like Europe and the US, studies generally point to a negative relationship between gender diversity and leverage (Ben Saad and Belkacem, 2022; García and Herrero, 2021), suggesting that female directors' risk aversion leads to

more conservative financial strategies. In contrast, research in emerging markets, such as Taiwan, has found a positive correlation between gender diversity and leverage, with gender-diverse boards improving access to debt financing (Chen *et al.*, 2022). These divergent findings underscore the importance of context in analysing gender diversity's financial effects and highlight the need for more region-specific and policy-relevant investigations.

This research fills a critical gap by focusing on the UK, where the Davies Report offers a distinct regulatory framework that mandates increased female representation on boards. The post-Davies Report era provides an ideal setting to assess whether such regulatory interventions have influenced firms' capital structure decisions. This area remains largely unaddressed in the existing literature. Specifically, this study will provide a comprehensive analysis of UK-listed firms' leverage decisions following the Davies Report's implementation, advancing prior work by directly linking gender diversity on boards with capital structure within a regulated environment.

Agency theory, first articulated by Jensen and Meckling (1976), suggests that diverse boards are better equipped to monitor management and mitigate agency conflicts. Agency problems arise when there is a separation between ownership (shareholders) and control (managers), leading to potential conflicts of interest, particularly when managers pursue riskier strategies that may not align with shareholders' preference for wealth maximisation. Gender-diverse boards, which often include a higher proportion of female directors, may be better positioned to reduce these agency costs. Female directors are typically associated with increased diligence and a more risk-averse approach to decision-making (Adams and Ferreira, 2009; Adams and Funk, 2012). This implies that boards with more female directors may advocate for lower leverage, as excessive debt could expose the firm to greater financial risk, including financial distress or bankruptcy (Faccio *et al.*, 2016).

Resource dependence theory, as proposed by Pfeffer and Salancik (1978), offers a different perspective on how board gender diversity can influence financial decisions. This theory posits that organisations depend on external resources for their survival and success, and the composition of their boards can enhance the firm's ability to secure these resources. In this context, gender-diverse boards are seen as a strategic asset, as female directors often bring unique perspectives, skills, and networks that can improve a firm's access to critical resources, including capital (Hillman *et al.*, 2009).

Empirical evidence suggests that female directors can enhance a firm's credibility with external stakeholders, such as creditors and investors, potentially lowering borrowing costs and making debt financing more attractive (Chen *et al.*, 2022). Terjesen *et al.* (2009) argue that gender-diverse boards improve corporate governance by increasing transparency and fostering stronger relationships with external stakeholders, enhancing the firm's reputation and access to external capital markets. This aligns with studies by Chen and Hsu (2009), which found that firms with gender-diverse boards often secure better borrowing terms due to their enhanced credibility, potentially leading to higher leverage. In this view, while female directors may be risk-averse, their presence on boards can improve access to debt financing under favourable conditions, leading to higher leverage, especially when the firm's creditworthiness is strengthened by strong governance.

Studies in developed markets, such as Europe and North America, have documented a negative relationship between board gender diversity and leverage. This is primarily attributed to the risk-averse nature of female directors, who are more likely to advocate for conservative financial strategies, including lower debt levels. Adams and Ferreira (2009) showed that female directors tend to engage in more diligent monitoring of corporate decisions, often leading to lower debt levels as part of cautious financial management. Similarly, Adams and Funk (2012) emphasised that female board members are generally more conservative in their financial outlook, reducing their propensity to support high-risk financial strategies such as increasing leverage. These studies suggest that the presence of female directors can mitigate the risks associated with excessive borrowing, thereby lowering a firm's financial exposure.

More specific evidence comes from Ben Saad and Belkacem (2022), who examined French firms and found that higher female board representation was linked to lower leverage, confirming the conservative financial tendencies of gender-diverse boards. In this study, the authors attributed lower debt levels to the risk-averse nature of female directors, who prioritised long-term financial stability over short-term financial gains. Similarly, García and Herrero (2021) reached comparable conclusions in their study of Spanish firms, demonstrating that firms with gender-diverse boards exhibited more conservative capital structure decisions, favouring equity over debt to avoid the risks associated with high leverage.

In the UK, studies have mirrored these findings. For instance, Ezeani *et al.* (2023) found that firms with higher female representation on their boards consistently exhibited lower leverage. Their findings suggest that the presence of women on boards encourages a more conservative approach to debt financing, aligning with previous studies from other European markets. Furthermore, Faccio *et al.* (2016) highlighted that female directors, more focused on long-term financial sustainability, tend to avoid high-risk debt strategies that could jeopardise the firm's financial health, thus reinforcing a broader consensus in the literature about the risk-averse nature of female leadership. The contribution of this study lies in extending prior UK evidence by adopting a longitudinal design across the pre- and post-Davies Report periods, controlling for endogeneity through dynamic panel estimators, and showing that the effect of female directors on leverage is industry-dependent rather than uniform.

However, empirical evidence from emerging markets presents a different picture, often highlighting a positive relationship between gender diversity and leverage. This suggests that in certain contexts, gender-diverse boards may enhance a firm's access to debt by improving governance and reputation. For instance, Chen *et al.* (2022) conducted a study on Taiwanese firms, finding that firms with more female directors had higher leverage. The study attributed this to the enhanced credibility of gender-diverse boards, which helped these firms secure better borrowing terms from creditors who perceived them as more transparent and reliable. This improved access to debt markets allowed firms to take on more debt without significantly increasing their risk profile.

Similarly, Yakubu and Oumarou (2023) examined firms in sub-Saharan Africa. They found that gender-diverse boards were associated with higher leverage, particularly in industries where external financing was critical for growth. Their research concluded that female directors improved stakeholder confidence and governance practices, enabling firms to secure more favourable borrowing terms. This positive relationship highlights how resource dependence theory applies in regions where access to external financing is crucial for business expansion and sustainability, especially in markets with evolving governance standards.

The relationship between gender diversity and leverage varies significantly across industries and is influenced by capital intensity and risk profile factors. In capital-intensive industries like manufacturing and energy, where firms often rely heavily on

debt due to the availability of collateral, gender-diverse boards may not necessarily push for lower leverage. Studies by Detthamrong *et al.* (2017) and Nisiyama and Nakamura (2018) showed that in sectors where firms hold significant tangible assets, female directors did not always lead to reductions in debt but rather encouraged prudent management of existing debt. These studies suggest that female directors may support higher leverage when favourable borrowing conditions exist, provided that the debt is used in a disciplined manner.

On the other hand, in high-risk industries such as technology and healthcare, where firms typically have fewer tangible assets and face greater financial volatility, female directors are more likely to advocate for lower leverage. Hernandez-Nicolas *et al.* (2015) found that firms with higher female board representation in small, high-risk Spanish start-ups were less likely to rely on debt, preferring internal financing or equity to mitigate financial risks. This supports the view that while female directors may not oppose leverage outright, their risk-averse tendencies lead them to favour financial stability in industries with higher volatility and fewer safety nets.

The impact of gender diversity on capital structure also evolves over time, influenced by regulatory changes and shifts in corporate governance norms. Ben Saad and Belkacem (2022) found that in France, from 2006 to 2019, the relationship between gender diversity and leverage became more pronounced as diversity became normalised in governance practices. As firms became more accustomed to gender-diverse boards, their influence on financial decisions, including leverage, grew stronger, with more firms adopting conservative debt policies.

Furthermore, in the UK, the introduction of gender diversity policies, such as the Davies Report, substantially impacted corporate financial strategies. Chen *et al.* (2022) and Ezeani *et al.* (2023) found that regulatory interventions encouraging female board representation led to significant changes in leverage decisions as firms adjusted their capital structures in response to new governance expectations. This study builds on such findings by examining how the Davies Report influenced leverage decisions in UK-listed firms over time, particularly in the years following its implementation, thus providing a deeper understanding of gender diversity's financial implications within a regulated environment.

This study offers significant contributions to corporate governance and capital structure literature, particularly regarding board gender diversity. First, it provides

crucial empirical evidence on the impact of board gender diversity on leverage decisions in the UK, specifically focusing on the period before and after the Davies Report. By analysing market and book leverage, the study delivers a nuanced understanding of how female board representation affects firms' capital structures. This research fills a critical gap in the literature by shifting the focus from general firm performance and governance quality to the under-examined area of capital structure, particularly in a regulated environment like the UK.

This study differs from earlier research in several important respects. Whereas prior UK and European studies (e.g., Ezeani et al., 2023; Ahern & Dittmar, 2012) largely examine the overall association between female directors and leverage, often in cross-sectional or short-period settings, this thesis employs a longitudinal panel design covering two decades, spanning the pre- and post-Davies Report periods. This allows for identification of policy-related changes rather than static associations. Furthermore, by separately analysing both market and book leverage and by applying dynamic panel estimators (system GMM) to address endogeneity, the study provides more robust causal inferences. Finally, it contributes sectoral insights, showing that the relationship between gender diversity and leverage is not uniform but varies across industries, a dimension rarely considered in prior work.

Second, the study adds to the ongoing debate on the role of gender diversity in corporate risk-taking and financial decision-making. By examining a dataset of UK-listed firms, the research provides fresh insights into how female directors' often-cited risk aversion impacts leverage levels. The study's findings challenge the simplistic view that female directors universally reduce leverage; instead, they reveal that in specific industry contexts, gender-diverse boards can enhance firms' access to debt markets, leading to more favourable borrowing terms. This industry-specific dynamic underscores the complexity of how gender diversity influences financial strategies across different sectors, contributing to a more refined understanding of the relationship between board composition and financial risk.

Moreover, the research highlights the role of policy interventions, such as the Davies Report, in reshaping corporate governance practices. By comparing leverage levels before and after the implementation of the Davies Report, this study not only evaluates the direct impact of the policy but also offers insights into how regulatory efforts to increase board diversity can influence broader corporate financial strategies. This

evaluation of the Davies Report's effectiveness contributes to the policy literature, providing empirical evidence on how gender diversity targets affect capital structure and informing future governance reforms.

The findings reveal a significant positive association between board gender diversity and market and book leverage, particularly after implementing the Davies Report. This suggests that increased female representation on boards enhances firms' access to debt markets, potentially due to improved governance, enhanced credibility, and increased investor confidence. These results challenge the traditional view that gender diversity leads to more conservative financial strategies. Instead, the study highlights how female directors may strategically influence better borrowing terms and facilitate the efficient use of debt, particularly in industries like manufacturing, where capital-intensive operations create favourable borrowing conditions.

The interpretation that female directors may influence borrowing terms and the efficient use of debt is inferred rather than directly observed in the data. The empirical results show that the positive relationship between gender diversity and leverage is stronger in capital-intensive industries, such as manufacturing, where collateral availability typically improves access to credit. Prior research (e.g., Nadeem et al., 2020; Adams & Funk, 2012) suggests that female directors contribute to credibility and long-term risk management, which can enhance investor and lender confidence. While my dataset does not capture borrowing terms directly, the sectoral variation in results is consistent with this interpretation.

The findings of this research have several actionable implications for both corporate decision-makers and policymakers. For corporate leaders, the results suggest that gender diversity on boards can be a strategic asset for optimising capital structure decisions. In high-risk industries, female directors may advocate for more conservative financial strategies, reducing reliance on debt and lowering the firm's risk profile. However, female board members in capital-intensive sectors may improve the firm's reputation and governance practices, enhancing access to debt financing under more favourable terms. This indicates that firms should tailor their board composition and leverage decisions based on their specific industry context, utilising the governance advantages brought by gender diversity.

In practical terms, firms can leverage the insights from gender diversity to optimise their capital structure decisions. For example, in capital-intensive industries like

energy or manufacturing, firms with more female directors may secure more favourable borrowing terms due to improved governance and credibility, as female board members often enhance transparency and risk management processes. Conversely, in technology or healthcare sectors, where firms face greater financial volatility, gender-diverse boards might advocate for reduced reliance on debt, lowering the financial risks associated with high leverage. Corporate leaders can strategically adjust their board composition depending on their industry's risk profile and financial needs, ensuring that gender diversity fulfils ethical imperatives and enhances financial performance. Additionally, policymakers worldwide can draw from the UK's experience and adopt similar diversity policies that promote gender-balanced boards. Countries considering such interventions could benefit from tailoring these regulations to reflect their industry-specific economic environments, ensuring that board diversity improves governance and better access to external financing.

From a policy perspective, this study reinforces the effectiveness of regulatory interventions like the Davies Report in promoting gender diversity and improving corporate governance. The findings suggest that gender diversity can improve firms' access to external capital, which is crucial for business expansion, particularly in sectors where debt financing is critical, consistent with evidence from Chen et al. (2022), who find that gender-diverse boards in Taiwan benefit from enhanced stakeholder confidence and more favourable borrowing terms, and Nadeem et al. (2020), who argue that female directors strengthen firms' credibility and reduce financing constraints. Policymakers can leverage these insights to refine future diversity initiatives in the UK and globally. By tailoring diversity policies to industry-specific conditions, regulators can ensure that corporate governance reforms are more effectively aligned with different sectors' unique financial and operational dynamics.

Looking ahead, the insights from this research could guide corporate governance reforms worldwide. In countries considering similar diversity policies, the UK experience, as analysed in this study, offers a template for understanding how regulatory interventions can shape corporate financial strategies, consistent with findings from Ben Saad and Belkacem (2022) and Ezeani et al. (2023), who show that changes in governance norms and regulatory frameworks significantly influence firms' leverage decisions. Importantly, this research emphasises the need for policies that account for industry-specific variations, suggesting that a one-size-fits-all

approach to board diversity may not fully capture the nuanced ways gender diversity influences leverage.

This research is organised as follows: Section 2 examines the theoretical framework and empirical literature. Section 3 presents the hypotheses' development. Section 4 covers the sample selection process, data collection, and variable definition. Section 5 presents the results and analyses, and Section 6 concludes the research.

4.2. Theory and Empirical Literature:

4.2.1. Agency Theory

Agency theory, as articulated by Jensen and Meckling (1976), provides a framework for understanding the fundamental conflict between principals (shareholders) and agents (managers). This conflict arises from the separation of ownership and control, where managers may pursue self-serving interests that are not aligned with shareholders' long-term wealth maximisation goals. Such misalignment leads to agency costs through inefficient capital allocation, excessive managerial compensation, and risky investments (Berger and Di Patti, 2006). Capital structure decisions, particularly the balance between debt and equity, are critical tools for mitigating these agency costs, as they impose financial discipline on managers (Kester, 1986).

Debt plays a central role in controlling agency costs by constraining managerial discretion. When a firm increases leverage, managers must meet fixed debt obligations, reducing their ability to misuse free cash flow for self-serving purposes, such as investing in unprofitable projects (Grossman and Hart, 1982). Therefore, debt is a monitoring mechanism that aligns managerial actions with shareholder interests by ensuring managers focus on value-maximising ventures (Jensen, 1986). Empirical studies have shown that firms with higher debt levels often operate more efficiently as managers are pressured to avoid bankruptcy and financial distress (Vo and Nguyen, 2014). However, caution is necessary, as excessive debt can increase the likelihood of conflicts between shareholders and debt holders. In cases where managers take on excessive risk, the cost of failure typically falls on debtholders, leading to potential asset substitution problems (Jensen and Meckling, 1976).

In addition to capital structure, corporate governance is crucial in mitigating agency problems. Effective governance mechanisms, such as strong oversight and board

monitoring, can influence a firm's leverage decisions. Firms with robust governance structures, such as larger or more independent boards, tend to have easier access to debt financing, as creditors perceive them to be more financially stable (Berger *et al.*, 1997; Chow *et al.*, 2018). This enhanced credibility allows firms to secure more favourable borrowing terms and potentially adopt higher leverage. In contrast, firms with weaker governance structures may shy away from high debt levels to avoid the constraints imposed on managerial discretion (Jiraporn *et al.*, 2012).

Agency theory further suggests that diverse boards, particularly those with greater female representation, can reduce agency costs by enhancing oversight and promoting ethical decision-making. Female directors often bring distinct perspectives and governance styles to the boardroom, focusing more on long-term stability, risk aversion, and accountability (Adams and Ferreira, 2009; Faccio *et al.*, 2016). This is important because risk aversion in corporate governance can lead to more cautious decision-making, reflected in capital structure choices. For instance, female directors, being more sensitive to the risks of excessive leverage, are likely to advocate for lower debt levels to prevent financial distress, thereby reducing the firm's exposure to bankruptcy and other financial risks.

Empirical studies support this view, indicating that firms with gender-diverse boards often exhibit more prudent financial management. Research by Levi *et al.* (2014) suggests that such firms tend to have less volatile earnings and are less likely to engage in aggressive, high-risk financial policies. This conservative approach can be particularly beneficial during periods of economic uncertainty, where firms with lower leverage are less vulnerable to market shocks and fluctuations. Gender-diverse boards may, therefore, contribute to long-term financial stability, aligning with the goals of shareholders who seek sustainable growth and wealth maximisation over time.

However, the benefits of gender diversity extend beyond risk aversion and conservative financial policies. The presence of female directors can also enhance the firm's reputation and credibility in the eyes of investors, creditors, and other stakeholders. As studies by Chen and Hsu (2009) demonstrate, firms with higher levels of board diversity often enjoy greater access to capital markets, as creditors perceive them to be more transparent, ethical, and well-governed. This improved access to debt can result in more favourable borrowing terms, such as lower interest rates, allowing firms to increase their leverage without significantly raising their risk profile. In such

cases, gender-diverse boards may facilitate higher leverage, as the reduced cost of debt makes borrowing more attractive than issuing equity.

Thus, the relationship between gender diversity and leverage is not linear but rather complex and context-dependent. While female directors may favour lower debt levels due to their risk-averse nature, the enhanced governance and credibility they bring to the firm can lead to improved access to debt financing. This dual impact of board diversity creates a nuanced dynamic, where firms may adopt either conservative or leverage-heavy strategies based on external factors such as market conditions, industry characteristics, and the overall governance structure of the firm. The interplay between risk management, access to capital, and board diversity underscores the need for a more flexible interpretation of how gender diversity influences capital structure.

Empirical evidence consistently supports agency theory's relevance in capital structure. Jiraporn *et al.* (2012) found that firms with weaker governance structures tend to have lower leverage, as managers in these firms prefer to avoid the constraints debt imposes on their decision-making freedom. Conversely, firms with strong governance tend to adopt higher leverage due to better monitoring capabilities. Supporting this view, Friend and Lang (1988) and Wen *et al.* (2002) suggest that firms with higher agency costs, such as those with more severe conflicts between managers and shareholders, often reduce leverage to minimise the risk of financial distress.

While agency theory provides a robust framework for understanding capital structure, it has faced criticism for oversimplifying human behaviour by assuming that actors are purely rational and self-interested. Managerial decision-making is influenced by various psychological, social, and situational factors that agency theory does not fully account for (Ezeani *et al.*, 2022). Additionally, the theory may not adequately explain the varying risk preferences across different industries and countries. As a result, long-term, multi-country studies are needed to investigate how capital structure interacts with governance mechanisms in diverse contexts (Nguyen *et al.*, 2020).

In conclusion, agency theory comprehensively explains how capital structure can mitigate agency costs and align managerial actions with shareholder interests. By using debt as a monitoring mechanism and fostering effective governance practices, firms can reduce principal-agent conflicts, enhance firm value, and optimise their capital structure. However, the relationship between agency theory and capital structure is multifaceted, influenced by factors such as governance quality, board diversity, and

firm-specific risks. Ongoing research is necessary to address the limitations of agency theory and refine its application within modern corporate governance frameworks.

4.2.2 Resource Dependence Theory:

Resource dependence theory posits that organisations rely on external resources for survival and success, with diverse boards enhancing a firm's capacity to secure these resources and manage external dependencies effectively (Pfeffer and Salancik, 1978). This theory offers a compelling framework for understanding how board gender diversity impacts a firm's capital structure, particularly leverage.

According to resource dependence theory, diverse boards, including those with higher female representation, can access broader networks and enhance a firm's credibility (Hillman *et al.*, 2009). Female directors often bring unique perspectives and connections, opening additional channels for resource acquisition, including financial resources. Enhanced access can reduce borrowing costs, making debt more attractive than equity. Consequently, firms with gender-diverse boards might prefer increased leverage to capitalise on these lower financing costs. Nadeem *et al.* (2020) noted that female directors improve access to resources, potentially lowering debt costs, supporting this view.

Gender-diverse boards influence a firm's strategic decisions by incorporating various experiences and viewpoints, leading to more effective oversight and decision-making (Singh *et al.*, 2008). This can result in better financial resource management and a balanced approach to capital structure. Female directors' risk-averse nature can lead to prudent borrowing strategies, avoiding excessive leverage that might threaten the firm's financial stability (Bennouri *et al.*, 2018). This aligns with resource dependence theory's emphasis on strategic resource management to mitigate external uncertainties.

While female directors may advocate for cautious financial strategies, their ability to secure better financing terms can lead to a preference for debt over equity. This dual influence can result in a balanced capital structure where leverage is managed prudently but utilised effectively to capitalise on lower borrowing costs. This balance ensures that the firm does not become overly reliant on any single source of capital, aligning with resource dependence theory's emphasis on resource diversification (Pfeffer and Salancik, 1978).

The channels through which board gender diversity influences leverage include improved stakeholder relationships, enhanced access to capital, and more effective risk

management. Female directors can foster stronger relationships with creditors and investors, increasing the firm's credibility and reducing perceived risks (Terjesen *et al.*, 2009). This improved perception can translate into more favourable loan terms, encouraging the firm to utilise debt financing strategically.

In line with resource dependence theory, the predictions regarding board gender diversity and capital structure suggest that diverse boards, through enhanced access to resources and better risk management, might prefer debt financing due to its lower cost and strategic benefits. However, the actual impact on leverage can vary depending on the firm's context and industry. The mixed empirical findings underscore the importance of considering these contextual factors when analysing the relationship between board gender diversity and leverage.

In summary, resource dependence theory offers a strong basis for comprehending how gender diversity on boards impacts capital structure. The unique skills and perspectives female directors bring to the boardroom enhance the firm's ability to access essential resources, manage risks, and navigate uncertainties. This leads to a more prudent and balanced capital structure, ultimately contributing to the firm's stability and financial performance. By promoting gender diversity on boards, firms can leverage these benefits to achieve better governance and sustainable growth.

4.2.3 Empirical literature

The empirical literature on the relationship between board gender diversity and capital structure generally points to a negative correlation, with most studies finding that increased female representation on corporate boards is associated with lower leverage (Ben Saad and Belkacem, 2022; García and Herrero, 2021). This finding is attributed mainly to the risk-averse nature of female directors, who tend to favour more conservative financial strategies, reducing the likelihood of financial distress and excessive risk-taking (Adams and Ferreira, 2009; Faccio *et al.*, 2016). However, this relationship is not universally consistent across all contexts. Several nuances—such as differences in regional markets, institutional frameworks, and periods—impact the strength and direction of this correlation (Yakubu and Oumarou, 2023; Chen *et al.*, 2022). While studies conducted in developed markets, such as Europe and North America, predominantly report a negative relationship between gender diversity and leverage, research in emerging markets often presents more complex results

(Detthamrong *et al.*, 2017; Nisiyama and Nakamura, 2018). Additionally, time variation plays a significant role, as evolving corporate governance norms and regulatory changes, such as gender quotas, can influence how board diversity affects capital structure (Ben Saad and Belkacem, 2022; Ezeani *et al.*, 2023). A comprehensive review of these findings reveals that contextual factors, including market-specific governance norms, regulatory environments, and the time period under study, influence the relationship between board gender diversity and leverage.

Ben Saad and Belkacem (2022) conducted a long-term analysis of non-financial listed companies in France, covering the period from 2006 to 2019. Their study found a consistent negative correlation between female board representation and leverage. The authors attributed this to the risk-averse nature of female directors, who tend to favour more conservative financial strategies, which leads to lower debt levels. Notably, the extended sample period of this study captures shifts in governance practices and societal attitudes towards gender diversity, suggesting that these broader changes may have contributed to reducing leverage over time. This research supports the notion that gender diversity influences corporate decision-making in a manner that mitigates financial risk, particularly in more developed market settings like France.

Expanding the scope to East Asia, Chen et al. (2022) analysed Taiwanese firms from 2008 to 2020, using the Generalised Method of Moments (GMM) to address potential endogeneity issues, a common concern in governance studies. Unlike most findings in the literature, their study identified a positive association between female board representation and leverage. The authors attributed this unexpected result to the enhanced stakeholder confidence and improved access to capital that comes with gender-diverse boards. In Taiwan's corporate environment, gender diversity might enhance a firm's credibility in the eyes of creditors, leading to more favourable borrowing terms and higher leverage levels. GMM's methodology ensures a more reliable analysis of the causal relationship between gender diversity and leverage by accounting for biases and potential endogeneity.

Similarly, Hernandez-Nicolas *et al.* (2015) focused on smaller firms in Spain, analysing the relationship between gender diversity and financial decisions in small start-ups from 2004 to 2012. Their study highlights that female directors in these firms are generally more cautious about taking on high levels of debt, advocating for lower leverage due to the increased vulnerability of small firms to financial distress. The

authors argue that the risk aversion of female directors is particularly significant in small, less established firms where financial risk is more pronounced. These findings indicate that the impact of gender diversity on capital structure may vary according to firm size, with smaller firms showing a stronger preference for conservative financial strategies when female directors are present.

Ezeani *et al.* (2023) examined how stringent corporate governance norms, such as those in Germany, amplify the risk-averse tendencies of female directors, leading to lower leverage. In Germany, the strong regulatory framework enforces rigorous oversight of corporate behaviour, allowing gender-diverse boards to adopt more conservative financial strategies, thereby minimising financial risk. This study illustrates how institutional and governance factors, especially in countries with well-established corporate governance norms, may play a crucial role in shaping the impact of gender diversity on capital structure.

In contrast, Nisiyama and Nakamura (2018 examined gender diversity and capital structure in Brazil, where corporate governance frameworks are less stringent. Their findings suggest that gender-diverse boards help reduce risky financial behaviour and promote better oversight, even in weaker governance environments. However, the impact of gender diversity in these contexts may depend more on individual leadership dynamics than broader regulatory enforcement. Similarly, Detthamrong *et al.* (2017) found that in Thailand, where corporate governance practices are still developing, female directors tend to promote lower leverage through risk-averse financial strategies. However, their influence appears less institutionalised and more dependent on the characteristics of individual board members rather than enforced governance standards.

The influence of board gender diversity on capital structure is highly dependent on market, institutional, and cultural contexts, with significant variation in outcomes across different regions. Governance norms, levels of economic development, and cultural attitudes toward gender diversity play crucial roles in shaping corporate financial strategies. For instance, in countries with stringent corporate governance norms, such as Germany, gender diversity on boards may have a more pronounced impact on reducing leverage. In contrast, countries with less rigorous governance frameworks, such as Thailand or Brazil, may experience different outcomes. Cultural attitudes toward gender diversity also influence how female directors impact capital

structure. In markets where cultural support for gender diversity is strong, such as Western European countries, female directors are more likely to play significant roles in shaping conservative financial strategies that lead to lower leverage. Conversely, in markets where gender diversity is less culturally emphasised, such as in some emerging economies, the effect of female directors on capital structure may be less consistent, as societal and corporate norms might not fully support their influence in leadership roles.

The role of time variation is crucial in understanding how the impact of board gender diversity on capital structure evolves across different periods. Studies covering extended time frames, such as those by Ben Saad and Belkacem (2022), which analysed French firms from 2006 to 2019, provide valuable insights into how shifts in governance practices and societal attitudes toward gender diversity can influence leverage decisions. Their study suggests that as corporate governance norms evolved and societal support for gender diversity strengthened, female directors increasingly impacted financial decision-making, resulting in lower leverage over time. This trend can be attributed to the gradual integration of more progressive governance regulations and an increasing focus on ethical leadership and risk management, both of which align with the risk-averse nature of female directors.

Similarly, Chen *et al.* (2022) examined Taiwanese firms from 2008 to 2020, during which time regulatory scrutiny and stakeholder expectations regarding gender diversity were heightened. Their findings showed a positive association between female board representation and leverage, reflecting growing stakeholder confidence in gender-diverse boards over time. The study's extended time frame allowed the authors to observe how the increased regulatory focus on board composition, along with global movements advocating for board gender quotas, might have improved access to capital, as creditors perceived gender-diverse firms to be more transparent and reliable. This suggests that the relationship between gender diversity and leverage may shift as societal and regulatory environments change, highlighting the importance of considering periods in empirical research.

When comparing studies using older data, such as Hernandez-Nicolas *et al.* (2015), which covered the period from 2004 to 2012, with more recent research, it becomes evident that the influence of female directors on capital structure may be growing as governance expectations and diversity policies become more widespread. Studies from

earlier periods tend to show more conservative financial behaviours associated with female directors, reflecting societal attitudes where female leadership may not have been fully normalised. In contrast, more recent studies, such as those by Chen *et al.* (2022), indicate a shift toward female directors contributing to enhanced access to capital, as firms with gender-diverse boards increasingly benefit from improved credibility in the eyes of investors and creditors.

These time-based variations suggest that the impact of board gender diversity on capital structure is not static but evolves with changing regulatory environments, societal shifts, and the maturation of corporate governance practices. As the global movement toward gender quotas and board diversity grows, future studies will likely reveal even more pronounced changes in how gender-diverse boards influence financial decisions, particularly leverage.

In conclusion, most studies highlight a negative association between board gender diversity and leverage, driven by the risk-averse nature of female directors and their preference for conservative financial strategies (Ben Saad and Belkacem, 2022; García and Herrero, 2021). However, some research also shows a positive association, suggesting that female directors can enhance a firm's credibility and access to capital, particularly in certain regulatory or market contexts (Chen *et al.*, 2022). These findings underscore the importance of considering regional, cultural, and regulatory differences when examining the relationship between gender diversity and capital structure. As the field evolves, a more nuanced understanding of how gender diversity influences financial decision-making across different contexts will emerge, potentially informing more effective corporate governance practices and regulatory policies (Yakubu and Oumarou, 2023).

While the existing literature offers valuable insights, several critical gaps remain unexamined. Many studies focus on the association between female board representation and leverage within specific regional or sectoral contexts (Detthamrong *et al.*, 2017; Nisiyama and Nakamura, 2018) without a comprehensive examination of how these dynamics unfold in different regulatory environments or across diverse industries. One significant gap is the limited exploration of how regulatory changes affect capital structure, such as the Davies Report policies implemented in the UK in 2011. This research will aim to fill this gap by investigating the impact of these regulatory measures on firms listed in the FTSE ALL SHARE index between 2001

and 2020, providing insights into how such policies influence corporate financial strategies.

Additionally, the current literature often generalises the association between board gender diversity and leverage without fully accounting for industry-specific dynamics (Hernandez-Nicolas *et al.*, 2015). Different industries have varying levels of risk, capital intensity, and regulatory frameworks, which may significantly influence how gender diversity affects capital structure choices. This study will address this gap by examining the effects of board gender diversity on leverage across different sectors, offering a more detailed understanding of the broader economic implications of gender-diverse boards and informing industry-targeted policy recommendations.

Moreover, many studies employ methodologies that do not fully account for endogeneity and other biases, potentially affecting the reliability of their findings (Chen *et al.*, 2022). This research will adopt more robust methodologies, such as fixed effects models and the generalised method of moments (GMM) for regression analysis, to ensure that the results accurately capture the relationship between board gender diversity and capital structure while addressing potential biases.

In summary, this research will contribute to the literature by providing a comprehensive analysis of the effect of board gender diversity on capital structure, specifically in the context of the UK's regulatory landscape before and after the Davies Report. It will also offer industry-specific insights, deepening our understanding of how gender diversity influences financial strategies across different sectors. By employing rigorous methodologies and thorough control variables, this study aims to produce reliable findings that can inform future policy development and implementation. Ultimately, this research will advance academic knowledge and offer practical insights for policymakers and corporate leaders seeking to foster gender diversity and optimise financial performance.

4.3 Hypotheses Development:
1. *Board gender diversity and leverage*

According to agency theory, conflicts of interest between principals and agents can lead to agency costs, which firms strive to minimise. Diverse boards, including a higher proportion of female directors, are seen as more effective in monitoring and controlling managerial behaviour, thereby reducing agency costs (Jensen and Meckling, 1976). Female directors are often perceived as risk-averse compared to their

male counterparts, influencing their preference for more conservative financial strategies, including lower leverage levels (Adams and Funk, 2012).

Resource dependence theory suggests that diverse boards bring various skills, experiences, and perspectives that enhance a firm's ability to secure critical resources and manage external dependencies (Hillman *et al.*, 2009). Female directors may contribute unique insights and foster better decision-making, leading to more prudent financial policies. This aligns with the view that female directors' risk aversion results in lower debt levels, as they may prefer financing options that reduce financial risk and enhance long-term stability (Francis *et al.*, 2015).

Agency theory suggests that female directors enhance board oversight and governance, decreasing the likelihood of managers interacting in high-risk, high-leverage strategies. Moreover, resource dependence theory highlights that the diverse perspectives brought by female directors contribute to more cautious financial decision-making, prioritising stability over aggressive leverage.

Given these theoretical perspectives and empirical findings, the following hypothesis can be developed:

H4.1: There is a negative relationship between the board's gender diversity and leverage.

2. *Policy change, board gender diversity and Leverage*

In the context of the UK, the Davies Report (2011) recommended increasing the percentage of female directors on FTSE 350 company boards, setting targets to encourage greater gender diversity. This regulatory initiative aimed to improve board diversity, which could have significant implications for corporate governance and capital structure. The rationale behind this push was that more diverse boards would enhance decision-making processes, improve oversight, and ultimately contribute to more sustainable corporate governance practices (Davies Report, 2011).

Research has shown that board composition can influence a firm's capital structure, particularly its reliance on debt. Studies indicate that male directors often exhibit greater confidence and risk tolerance, leading to preferences for higher leverage, particularly in short-term debt (Malmendier *et al.*, 2011). This may be driven by a more aggressive approach to financing growth, seeking quicker returns, or leveraging

the benefits of tax shields associated with debt. In contrast, female directors tend to be more risk-averse and focus on long-term financial stability, which aligns with a preference for lower leverage and a more cautious approach to debt usage (Faccio *et al.*, 2016). Female directors often emphasise financial prudence, transparency, and reducing the risks associated with excessive debt, such as financial distress or bankruptcy (Adams and Ferreira, 2009).

Given these gender differences in risk appetite and financial decision-making, it is reasonable to hypothesise that the increased presence of female directors, as the Davies Report encourages, will lead to lower firm leverage levels. Female board members may push for more conservative financial strategies prioritising long-term stability over short-term financial gains, thus reducing the firm's reliance on debt financing. Additionally, their influence may steer companies toward reducing short-term debt, typically associated with higher financial risk, and opting for more equity-based financing or maintaining lower overall leverage ratios.

The selected period for this research—covering firms listed in the FTSE ALL SHARE index from 2001 to 2020—allows for a comprehensive analysis of the impact of the Davies Report's recommendations. By comparing firms' leverage levels before and after the policy change, we can assess whether the regulatory push for increased gender diversity led to meaningful changes in corporate financial strategies. Importantly, this study seeks to go beyond a simple comparison of before-and-after outcomes, focusing on whether the presence of more female directors directly contributes to a reduction in leverage.

Considering the evidence from prior studies on gender differences in risky behaviour, this research expects that firms with higher female board representation will exhibit lower leverage post-Davies Report implementation. This is because the increased risk aversion and focus on financial stability typically associated with female directors should counterbalance any tendencies toward excessive debt use that may have been present under more male-dominated boards. Furthermore, introducing female directors may improve corporate governance, leading to better oversight and careful capital structure decisions. By examining changes before and after implementing these policies, the following hypotheses are proposed:

H4.2: Firms implementing the recommendations of the Davies Report have lower leverage.

This hypothesis is grounded in the theory that gender diversity on boards enhances corporate governance through improved risk management and financial oversight (Adams and Ferreira, 2009). The expectation is that as firms comply with the Davies Report's targets for female representation, their capital structure will shift towards lower leverage, reflecting a preference for reducing financial risks associated with high debt ratios. This study will test this hypothesis by analysing leverage trends in firms that increased their female board representation in response to the Davies Report, comparing their capital structures with those that did not.

3. *Type of Industry, board gender diversity and leverage*

According to agency theory, diverse boards, particularly those with a higher proportion of female directors, enhance oversight and reduce agency costs, often leading to more conservative financial strategies (Jensen and Meckling, 1976). However, the extent to which board gender diversity influences leverage decisions can vary significantly across different industries, depending on factors such as risk levels, capital intensity, and the availability of collateral. Industries characterised by high volatility and uncertainty, such as technology, are more likely to benefit from the risk-averse tendencies of female directors, potentially leading to lower leverage in these sectors. In contrast, more stable, capital-intensive industries like consumer staples or real estate might experience a different dynamic, where the availability of collateral could moderate the impact of gender diversity on financial decisions.

For this analysis, we classify industries into two groups: manufacturing and services. Manufacturing sectors, such as basic materials, consumer discretion, consumer staples, energy, industrials, and real estate, are characterised by high collateral availability and relatively lower financial risk. In contrast, the services group, which includes health care, technology, and telecommunications, typically has lower collateral and faces higher risk due to the intangible nature of its assets and the rapid pace of innovation.

In manufacturing industries, firms often possess tangible assets that can serve as collateral, giving them greater flexibility to borrow. However, despite this collateral advantage, female directors, known for their risk aversion, may still promote conservative borrowing strategies to mitigate potential long-term financial risks. The upper echelon theory (Hambrick and Mason, 1984) posits that top executives'

characteristics, including gender, shape strategic decisions. Even in high-collateral sectors, female directors are likely to advocate for more prudent leverage levels, though their influence may be less pronounced than that of those with higher risks. Resource dependence theory also suggests that diverse boards enhance access to external capital and stakeholder relations, which may lead to better borrowing terms (Hillman *et al.*, 2009). In high-collateral industries, female directors may improve the firm's credibility and access to favourable financing, potentially allowing firms to maintain or slightly increase leverage while still adhering to conservative financial principles.

On the other hand, the lack of collateral makes borrowing riskier in the higher-risk services sectors, such as technology and health care, where firms often rely more on intangible assets. Given their risk-averse nature, female directors will likely push for lower leverage in these industries to safeguard the firm against financial distress. These sectors face additional challenges like regulatory pressures and constant innovation, further amplifying the need for conservative financial management. In such environments, upper-echelon theory suggests that female directors' cautious decision-making will have a stronger influence, leading to lower debt levels. Meanwhile, resource dependence theory emphasises that female directors in these industries may help improve access to capital through enhanced credibility and stakeholder trust. However, they are more likely to advocate for financial stability over aggressive leverage strategies.

In technology, for example, high capital expenditure levels and regulatory uncertainties increase financial risk. Female directors in these sectors may prefer lower leverage to ensure long-term financial stability (Francis *et al.*, 2015). Supporting this, studies like those by Faccio *et al.* (2016) found that companies with higher female board representation tend to adopt more conservative financial policies, which is especially important in high-risk sectors. Conversely, in more stable sectors like consumer staples, where business environments are relatively predictable, the conservative influence of female directors may be less significant. In such industries, leverage decisions are more likely to be driven by operational efficiency and market conditions rather than board composition. For instance, Huang and Kisgen (2013) found that the influence of female executives on financial conservatism is less pronounced in low-risk environments, where stable cash flows and predictable market demand are the primary factors influencing financial decisions.

The resource dependence theory further explains the role of gender-diverse boards in industries that rely heavily on external stakeholders, such as health care and technology. These sectors depend on strong relationships with regulators, investors, and other stakeholders to secure funding and manage risk. Female directors may enhance a firm's reputation and access to capital, which can improve borrowing conditions. However, in industries with limited collateral, their conservative financial approach is still expected to lead to lower leverage, as borrowing is inherently riskier in these sectors.

Based on these theoretical frameworks and industry-specific characteristics, we expect the relationship between board gender diversity and leverage to vary by sector. In manufacturing industries, the high availability of collateral may lead to more neutral or slightly positive leverage outcomes, as the strong asset base may temper female directors' risk-averse influence. In contrast, in services sectors with lower collateral and higher risk, female directors are expected to correlate with lower leverage, as their emphasis on financial prudence and stability aligns with the need to mitigate the higher risks present in these industries.

Based on these theoretical frameworks and the industry-specific characteristics, the following hypotheses are proposed:

H4.3: The relationship between board gender diversity and leverage levels varies depending on whether the industry is high-risk or low-risk.

This hypothesis recognises that while female directors generally promote more conservative financial strategies, the degree to which this influence impacts leverage depends on the industry's inherent risk and capital structure dynamics.

4.4 Variables Definition:

1. Dependent Variables:

The measurement of leverage is critical for a comprehensive analysis of a firm's capital structure, particularly through the lenses of agency theory and resource dependence theory. This study employs two distinct measures of leverage: market and book. This

dual approach aligns with established practices in previous literature and provides a comprehensive view of a firm's capital structure (Morellec *et al.*, 2012; Öztekin, 2015).

Market leverage, calculated as total debt divided by total equity at the end of the financial year, offers insights into how the market values a firm's debt relative to its equity. This measure is particularly relevant when examining the effect of board gender diversity through the lens of agency theory. As Jensen and Meckling (1976) posited, agency theory suggests that diverse boards may strengthen monitoring and minimise agency costs. In market leverage, this could manifest as improved market perceptions of the firm's debt management and overall financial health. Consequently, firms with gender-diverse boards might experience different market valuations of their leverage, reflecting investors' confidence in the board's ability to balance debt and equity effectively.

On the other hand, *book leverage*, computed as total debt divided by total assets at the end of the financial year, provides a historical perspective on the firm's capital structure based on accounting values. This measure aligns well with the resource dependence theory framework, as proposed by Pfeffer and Salancik (1978). Resource dependence theory suggests that diverse boards can enhance a company's ability to access and manage resources effectively. This could translate to more efficient use of debt financing and asset management in book leverage. Firms with gender-diverse boards might exhibit different patterns in their book leverage, reflecting their capacity to optimise resource allocation and manage financial risks.

Using both market and book leverage measures is economically significant for several reasons. Firstly, it allows for a more nuanced understanding of how board gender diversity influences different aspects of a corporation's capital structure. Market leverage captures the market's perception of the firm's debt relative to its equity value, which can be influenced by investor confidence and market trends. Book leverage, conversely, provides a more stable measure based on historical accounting data, which can be particularly useful for assessing long-term trends and making comparisons across different periods.

Moreover, the dual approach to measuring leverage enables a more comprehensive assessment of the firm's financial risk and flexibility. Market leverage can be more volatile and sensitive to market conditions, while book leverage offers a more stable measure of the firm's historical debt burden. By examining both, we can understand

how board gender diversity might affect a company's ability to manage market perceptions and actual debt levels.

This approach to measuring leverage is consistent with several notable studies in the field. For instance, Graham *et al.* (2015) employed both market and book leverage measures in their comprehensive study of corporate financial policies. Similarly, Faccio *et al.* (2016) used both measures when examining the impact of CEO gender on corporate risk-taking. In the context of board diversity, Chen *et al.* (2022) also utilised both market and book leverage measures to examine the association between female board representation and capital structure in Taiwanese firms.

By adopting these well-established leverage measures, our study ensures comparability with existing literature while providing a comprehensive view of how board gender diversity influences capital structure choices. This approach allows us to capture both the market's perception of the firm's leverage and the historical reality of its debt levels, offering a holistic understanding of the complex interplay between board composition and financial decision-making. Through this lens, we can better elucidate the mechanisms through which gender-diverse boards might influence leverage decisions, contributing to both the theoretical understanding and practical implications of board diversity in corporate finance.

2. The Key Explanatory Variable:

The percentage of female directors on the board, referred to as the *female percentage*, is a key explanatory variable for investigating the link between board gender diversity and capital structure, particularly leverage. This measure is well-grounded in agency and resource dependence theories, providing a comprehensive framework for understanding how board composition influences corporate financial decisions.

A higher percentage of female directors may indicate a broader range of perspectives and experiences, potentially leading to more robust decision-making processes and improved monitoring of capital structure choices. This aligns with the findings of Adams and Ferreira (2009), who observed that gender-diverse boards allocate more effort to monitoring activities. Female directors are often perceived as more diligent and less prone to risky behaviour, leading to more conservative financial strategies, including lower leverage.

A higher percentage of female directors may enhance the board's ability to connect with a broader range of stakeholders, potentially influencing the firm's access to capital and its approach to leverage. Terjesen *et al.* (2009) support this view, noting that female directors often bring unique resources and connections to the boardroom, which can influence strategic decisions, including those related to capital structure. Research by Carter *et al.* (2003) also affirms that diverse boards can lead to firm performance and strategic decision-making, including optimal leverage levels.

Economically, using the female percentage on the board to measure gender diversity offers several advantages. It provides a continuous variable that allows for a more nuanced analysis of the association between gender diversity and leverage, capturing variations in diversity levels across firms. This approach enables researchers to detect potential non-linear relationships or threshold effects that might not be apparent with binary or categorical diversity measures. Additionally, the percentage measure allows for comparability across firms of different sizes and industries, facilitating more robust cross-sectional analyses.

Numerous empirical studies have employed the percentage of female directors as a key measure of board gender diversity. For instance, Campbell and Mínguez-Vera (2008) used this measure to examine the impact of gender diversity on firm value in Spain. Similarly, Liu *et al.* (2014) utilised the percentage of female directors to investigate the relationship between board gender diversity and firm performance in China. In the context of capital structure, Chen *et al.* (2022) employed the percentage of female directors to study its impact on leverage in Taiwanese firms. Faccio *et al.* (2016) also used the proportion of female directors to examine the effect of gender diversity on corporate risk-taking, finding that companies with more female directors tend to embrace more conservative financial policies.

Using the female percentage on the board aligns well with policy initiatives and corporate governance recommendations. For example, the Davies Review in the UK, which set voluntary targets for female board representation, used percentage-based goals. Using this measure, our study can directly assess the impact of such policy interventions on capital structure, providing valuable insights for policymakers and corporate leaders alike.

Moreover, the percentage measure allows for a more dynamic analysis of changes in board composition over time. This is particularly relevant for our study, which spans

from 2001 to 2020 and includes implementing the Davies Report policies in 2011. By tracking changes in the percentage of female directors before and after this regulatory intervention, we can gain insights into how policy changes influence board composition and, subsequently, capital structure.

3. Control Variables:

When studying the impact of board gender diversity on capital structure, controlling for the potential effects of other factors likely to influence the dependent variable is crucial. This study will use the following variables as control variables:

Firm size, measured as the natural logarithm of market capitalisation at the end of the financial year, is a crucial control variable in investigating the relation between board gender diversity and capital structure. Larger firms typically have more complex operations, which can exacerbate agency problems (Jensen and Meckling, 1976). However, they also often have more sophisticated governance mechanisms and greater scrutiny from external stakeholders, which can mitigate these issues.

Economically, including firm size as a control variable is crucial for several reasons. Firstly, it helps to account for economies of scale in borrowing. Larger firms may have better access to debt markets and more favourable borrowing terms due to their perceived stability and lower default risk. Secondly, firm size can influence a company's ability to diversify its operations and revenue streams, potentially affecting its optimal capital structure. Lastly, size can impact a firm's growth opportunities and investment needs, influencing its financing decisions.

Using the natural logarithm of market capitalisation to measure firm size is consistent with numerous empirical studies in corporate finance. This transformation helps normalise firm size distribution and reduce the impact of extreme values, allowing for more robust statistical analysis. For example, Ezeani *et al.* (2023) and Ben Saad and Belkacem (2022) argued that larger firms tend to have higher leverage ratios due to lower bankruptcy costs and greater risk diversification. This aligns with the findings of earlier seminal works in capital structure research, such as Rajan and Zingales (1995) and Titman and Wessels (1988), who consistently found firm size to be a significant determinant of leverage. Therefore, the predicted sign of the coefficient for firm size is positive.

Firm age, measured as the natural logarithm of the number of years since incorporation, provides valuable insights into a firm's life cycle, reputation, and operational experience, which can significantly influence its capital structure. Older firms often have a longer track record of performance and established relationships with stakeholders, potentially reducing agency costs associated with debt financing. This perspective suggests that older firms have different leverage patterns than younger firms, as they may have built reputations that allow easier access to debt markets.

Older firms may have more refined financial strategies and a better understanding of optimal capital structures based on their accumulated experience. Established firms often have better access to debt and equity markets due to their longer track records and established relationships with financial institutions. Lastly, age can impact a firm's growth stage and investment needs, influencing its financing decisions.

Using the natural logarithm of the number of years since incorporation as a measure of firm age is consistent with numerous empirical studies in corporate finance. For example, Chen *et al.* (2022) argued that older firms may have more retained earnings and thus less need for external financing, potentially leading to lower leverage ratios. Siregar *et al.* (2024) posit that older firms may have more stable cash flows and lower bankruptcy risks, which could influence their capital structure choices. Therefore, the predicted sign of the coefficient for firm age is negative.

Profitability: Measuring firm profitability through Return on Assets (ROA) offers insights into its asset efficiency, significantly affecting its capital structure. Agency theory suggests that high profitability can lead to increased agency costs due to managers' potential investment in suboptimal projects (Jensen, 1986). Profitability influences creditworthiness and access to debt markets, as profitable firms are perceived as less risky. It also affects tax shield benefits from debt, with profitable firms having more incentive to use debt for tax purposes.

Numerous studies have used ROA to measure profitability in capital structure research. Ezeani *et al.* (2023), Chen *et al.* (2022), Ben Saad and Belkacem (2022), and Siregar *et al.* (2024) found a negative association between profitability and leverage.

Tangibility, measured as the ratio of net property, plant, and equipment to total assets, provides insights into a firm's asset structure and potential for collateralisation, significantly influencing capital structure. Firms with higher tangibility may have

greater resource stability and a stronger bargaining position when seeking external financing. Firms holding more tangible assets negotiate favourable loan terms. Additionally, the nature of a firm's assets impacts its operational risk and financial flexibility, which affect its optimal capital structure.

Using tangibility as a control variable is consistent with many empirical studies in corporate finance. For example, Ezeani *et al.* (2023) found that tangibility negatively correlates with leverage, indicating lower debt capacity for firms with more tangible assets. Similarly, João *et al.* (2023) suggested that tangible assets lead to lower leverage due to reduced lender risk. Li *et al.* (2022) noted that the tangibility-leverage relationship varied across countries, highlighting the importance of controlling for this variable in international comparisons, and found a negative correlation.

The market-to-book ratio, representing growth opportunity, offers insights into a firm's growth prospects and investment opportunities, significantly influencing its capital structure. From an agency theory perspective, Myers (1977) suggests that high-growth firms might face underinvestment problems since the benefits of new investments primarily benefit shareholders, while costs are shared with debtholders. High-growing firms might use less debt to maintain financial flexibility and avoid missing valuable investments. Conversely, Jensen (1986) posits that firms with low growth opportunities might overinvest, using debt as a disciplinary tool to curb the free cash flow agency costs. This dynamic implies that high-growth firms might prefer equity financing, while low-growth firms could lean towards debt.

Economically, high-growth firms may prefer equity to maintain flexibility, while low-growth firms might use debt for tax benefits. Growth opportunities also affect a firm's risk profile, as creditors might see firms with more growth options as riskier, impacting their access to debt financing. Many empirical studies have consistently used the market-to-book ratio to proxy growth opportunities. Ben Saad and Belkacem (2022), João *et al.* (2023), Ezeani *et al.* (2023), and De Jong *et al.* (2008) found that growth opportunities measured by this ratio were negatively associated with leverage.

Liquidity, the ratio of current assets to current liabilities, reflects a firm's ability to meet short-term obligations and financial flexibility, influencing capital structure. From an agency theory perspective, Jensen (1986) suggests that high liquidity, associated with free cash flow, can lead to increased agency costs as managers may invest in suboptimal projects. Debt serves as a disciplinary tool, reducing these costs.

Conversely, Ozkan (2001) notes that high liquidity can increase shareholder-creditor conflicts by raising the potential for asset substitution or excessive dividend payouts, resulting in an adverse correlation between liquidity and leverage. Liquidity also impacts creditworthiness, as creditors view more liquid firms as less risky.

Furthermore, liquidity enables firms to seize investment opportunities and withstand economic downturns, influencing their capital structure. Empirical studies, such as Ezeani *et al.* (2023) and Li *et al.* (2022), support the use of liquidity. They found liquidity negatively associated with leverage, indicating that liquid firms prefer internal over external financing.

The non-debt tax shield, calculated as depreciation over total assets, reveals a firm's capacity to reduce its tax burden through methods other than interest deductions, significantly influencing its capital structure. From an agency theory perspective, DeAngelo and Masulis (1980) suggest that firms with substantial non-debt tax shields might have less incentive to use debt for tax benefits, thereby reducing agency costs related to excessive debt. Firms with higher non-debt tax shields may have lower optimal debt levels since the marginal tax benefit of additional debt decreases. Non-debt tax shields also affect cash flow and profitability since they are non-cash expenses that reduce taxable income without affecting cash flow, influencing a firm's ability to service debt and its financial flexibility. Using non-debt tax shields is consistent with prior research in corporate finance. Ben Saad and Belkacem (2022), Li *et al.* (2022) and Ezeani *et al.* (2023) found that non-debt tax shields positively correlate with leverage, suggesting that firms with higher non-debt tax shields tend to use more debt financing.

Board size, defined as the total number of directors at the end of the financial year, reflects the board's composition and effectiveness and impacts capital structure. Larger boards, however, offer more expertise but may face coordination issues that could affect oversight, influencing agency costs associated with capital structure. Larger boards might bring diverse perspectives, but need help with consensus, impacting capital structure. It also reflects operational complexity, influencing optimal capital structure. João *et al.* (2023) found a positive association between board size and leverage, suggesting larger boards may approve more debt. Chen *et al.* (2022) and Siregar *et al.* (2024) also found that board size negatively affects capital structure, highlighting its importance in examining board characteristics and financial policies.

Board independence, measured as the percentage of independent directors at the end of the financial year, indicates the board's capability to exercise unbiased judgment and monitor management effectively, impacting the capital structure. Agency theory highlights the importance of independent directors in mitigating conflicts between shareholders and management by providing objective oversight, thus reducing agency costs (Jensen and Meckling, 1976). João *et al.* (2023), Ben Saad and Belkacem (2022), and Ezeani *et al.* (2023) emphasise that higher board independence positively correlates with better governance and reduced risk-taking.

CEO duality, a dummy variable that takes the value of 1 if the chairperson is also the CEO and zero otherwise, can lead to conflicts of interest, reducing board oversight and increasing agency costs. When the CEO is also the chairperson, it can undermine the board's independence, leading to riskier financial decisions, including higher leverage (Jensen and Meckling, 1976). João *et al.* (2023) found that CEO duality positively influences the relationship between board gender diversity and leverage.

Year2012: This variable will serve as a critical control to account for the effects of the Davies Report policies, which were introduced to increase female representation on corporate boards. This variable is coded as 1 for the year 2012 and subsequent years and 0 for the years before 2012. Including this variable is crucial to differentiate between the periods before and after implementing the gender diversity recommendations by the Davies Report.

By controlling for Year2012, the study can more accurately assess whether changes in firms' leverage levels are driven by the board diversity initiatives following the Davies Report rather than by other external factors or general trends over time. If there is an observable change in leverage, whether an increase or decrease, after 2012, the Year2012 variable will help isolate whether this change is associated with the gender diversity policies.

In particular, the variable helps account for any systemic shifts in corporate governance following the introduction of gender diversity guidelines. For example, if firms with more female directors tend to exhibit lower or higher leverage post-2012, controlling for Year2012 ensures that the results can be more confidently attributed to the Davies Report's impact on board composition and its influence on capital structure rather than to broader macroeconomic or financial factors unrelated to board gender diversity. The Year2012 control will also help clarify if the observed changes in

leverage post-2012 reflect broader corporate governance reforms related to board gender diversity. All variables are defined in *Appendix 4.A*.

4.5 Results and Analysis
4.5.1 Univariate Analysis

Table 4.1 shows the summary statistics of all variables of interest, market leverage and book leverage across the sample period from 2001 to 2020, among the 7,940 observations for firms listed in the FTSE ALL SHARE index. The FTSE All-Share index was selected because it covers approximately 98% of UK market capitalisation and incorporates large-, mid-, and small-cap firms, thereby providing a more representative and comprehensive view of UK corporate governance than narrower indices such as the FTSE 100 or 250. This breadth allows the study to capture heterogeneity across firm sizes and industries, consistent with the research objectives.

As shown in this table, the mean book leverage is 0.42 with a standard deviation of 0.39, indicating that, on average, firms have 42% of their capital structure financed by debt. This is consistent with studies such as Ezeani *et al.* (2023), which reported a mean book leverage of 0.24 with a standard deviation of 0.14 for UK firms from 2009 to 2018. Market leverage in our sample averages at 0.21 with a standard deviation of 0.19, reflecting the proportion of debt to the market value of equity. These findings align with Ezeani *et al.* (2023), who reported a mean market leverage of 0.20 with a standard deviation of 0.13, and with Li (2022), who reported a mean market leverage of 0.24 for UK firms during the period 2009-2021.

The mean percentage of female directors on the board is 10.71%, with a median of 10.00%. This suggests a relatively low representation of female directors, like the findings of Ezeani *et al.* (2023), who reported a mean board gender diversity of 11.05% for UK firms from 2009 to 2018. These statistics are lower than João *et al.* (2023) for Portugal, where the mean was 13%, and the median was 12.5% from 2010 to 2019. In contrast, Ben Saad and Belkacem (2022) found a higher mean of 24% and a median of 22% for French firms during the period 2006-2019.

When describing the statistics of the firm-level control variables, Table 4.1 shows that the average firm size, measured as the natural logarithm of market capitalisation at the end of the financial year, is 12.88, and the average firm age, measured as the natural logarithm of the number of years since incorporation, is 3.07. These statistics indicate

that firms in our sample are relatively large and established. For comparison, Ezeani *et al.* (2023) reported a mean firm size of 14.92 for UK firms from 2009 to 2018. João *et al.* (2023) found a mean firm size of 19.87 and a mean firm age of 3.43 for Portuguese firms from 2010 to 2019. Ben Saad and Belkacem (2022) reported a mean firm size of 16.51 for French firms during the period 2006-2019.

Regarding profitability, the mean ROA is 4.56%, which is lower than the mean ROA of 9.14% reported by Ezeani *et al.* (2023) for the UK during the period 2009-2018 and significantly lower than the mean ROA of 10.84% found by Ben Saad and Belkacem (2022) for French firms during the period 2006-2019. However, it is higher than the mean ROA of 2.2% reported by João *et al.* (2023) for Portuguese firms from 2010 to 2019.

Tangibility, which measures the proportion of tangible assets, has a mean of 0.27 with a standard deviation of 0.23. This is similar to the levels reported by Ezeani *et al.* (2023), who found a mean tangibility of 0.25, while Li (2022) reported a higher mean tangibility of 0.45 for UK firms during 2009-2021. The mean market-to-book ratio is 2.86, suggesting that, on average, firms have significant growth opportunities. This is comparable to the mean market-to-book ratio of 2.65 reported by Ben Saad and Belkacem (2022) for French firms. However, it is higher than the mean market-to-book ratio of 1.24 reported by Ezeani *et al.* (2023).

This study's average non-debt tax shield is 0.05, indicating firms' capacity to reduce their tax burden through depreciation and other non-debt means. This aligns with the findings of Ezeani *et al.* (2023), who reported a mean of 0.04. However, it is lower than the mean of 0.194 reported by Li (2022). The mean liquidity ratio is 1.51, showing that firms generally have sufficient current assets to cover their current liabilities. This measure is consistent with the liquidity ratio of 1.004 reported by Ezeani *et al.* (2023) and lower than the 2.05 reported by Li (2022).

The average board size is seven members, with a standard deviation of 2.32. This is lower than the mean of 26 reported by Ezeani *et al.* (2023) and 10.36 reported by Ben Saad and Belkacem (2022) for French firms. The board independence mean is 50%, indicating that half of the board members are independent directors. CEO duality, with a mean value of 0.03, suggests that a small percentage of firms have the same individual serving as CEO and board chair. Overall, all variables' descriptive statistics are generally consistent with the literature.

Table 4.2 presents the correlation matrix that tests relationships among variables. The dependent variables in this study are book leverage and market leverage. Table 4.2 shows that book leverage positively correlates with market leverage (0.551*). The key variable of interest, the female percentage, shows a positive correlation with both book leverage (0.058*) and market leverage (0.066*), indicating that a higher representation of female directors on the board is associated with higher leverage. This finding supports our hypothesis that board gender diversity influences capital structure.

Regarding control variables, firm size positively correlates with book leverage (0.081*) and market leverage (0.064*), suggesting that larger firms tend to have higher leverage. This is consistent with findings from prior studies, such as those by Ezeani *et al.* (2023) and João *et al.* (2023). In the context of board gender diversity, larger firms may have more established governance structures, where the presence of female directors could influence leverage decisions. For instance, larger firms with more diversified boards might leverage their greater access to debt markets but manage their risk more conservatively due to the influence of female directors, known for their risk-averse nature (Adams and Ferreira, 2009).

Firm age also shows a positive correlation with book leverage (0.094*) but a weaker, non-significant correlation with market leverage (0.012), indicating that older firms may have slightly higher book leverage. Older firms typically have more established relationships with lenders, which could result in higher leverage. However, in firms with gender-diverse boards, older firms might exhibit more conservative borrowing practices as female directors may advocate for maintaining long-term financial stability rather than pursuing aggressive debt financing strategies.

Profitability, measured by ROA, negatively correlates with book leverage (-0.011*) and market leverage (-0.018*). This aligns with the findings of previous studies, such as those by Ezeani *et al.* (2023) and Chen *et al.* (2022). This suggests that more profitable firms tend to rely less on external debt. In the context of board gender diversity, more profitable firms with female directors may further reduce their leverage, as these directors often promote conservative financial strategies aimed at minimising financial distress, especially when internal profits are available as a funding source.

Tangibility is negatively correlated with book leverage (-0.181*) and market leverage (-0.247*), suggesting that firms with more tangible assets tend to have lower leverage.

This supports the notion that tangible assets can reduce the need for external financing, as they provide collateral that mitigates risk for lenders. In firms with gender-diverse boards, the availability of tangible assets might further reinforce conservative borrowing practices. Female directors, who tend to emphasise risk management, may advocate using internal resources or secured financing rather than increasing leverage, particularly in firms with substantial tangible assets.

The market-to-book ratio shows a weak negative correlation with book leverage (-0.023*) and a positive correlation with market leverage (0.033*), indicating that firms with higher growth opportunities might use more market-valued equity. In high-growth firms with gender-diverse boards, female directors might encourage the use of equity financing over debt to avoid over-leveraging, as they typically prefer financial strategies that safeguard the firm's long-term sustainability. This aligns with research showing that gender-diverse boards are more likely to adopt conservative financial policies, particularly in high-growth environments where over-leveraging could pose significant risks (Faccio *et al.*, 2016).

Non-debt tax shield positively correlates with book leverage (0.059*) and market leverage (0.111*), suggesting that firms with higher non-debt tax shields tend to have higher leverage. This relationship implies that firms with substantial tax benefits from depreciation and other non-debt sources may still choose higher leverage to maximise tax advantages. In the context of board gender diversity, female directors, typically associated with more conservative financial strategies, may moderate this tendency by encouraging a more cautious approach to leveraging tax shields. While tax advantages are important, gender-diverse boards may balance this with risk considerations, potentially advocating lower reliance on debt to reduce financial vulnerability (Faccio *et al.*, 2016).

Liquidity shows a strong negative correlation with both book leverage (-0.279*) and market leverage (-0.299*), indicating that more liquid firms tend to rely less on debt financing. Firms with higher liquidity have more internal resources, reducing the need to borrow. In firms with gender-diverse boards, this relationship may be further accentuated as female directors are more likely to prioritise the use of internal resources over debt to maintain financial flexibility and avoid the risks associated with high leverage (Adams and Ferreira, 2009). Thus, gender-diverse boards in highly

liquid firms may advocate for even lower leverage, aligning with their risk-averse nature.

Board size positively correlates with book leverage (0.177*) and market leverage (0.158*), indicating that larger boards are associated with higher leverage. Larger boards often represent a wider range of expertise and perspectives, which can lead to more diverse financing strategies, including greater use of leverage. However, in boards with significant female representation, the influence of board size on leverage might be tempered by the conservative financial tendencies of female directors. As female board members often focus on risk management and long-term sustainability, they may moderate the tendency of larger boards to favour higher leverage, pushing for more balanced or conservative financing choices (Adams and Ferreira, 2009).

Board independence correlates positively with book leverage (0.082*) and market leverage (0.077*), suggesting that independent directors support higher leverage. Independent board members may bring external perspectives, encouraging more aggressive growth strategies, including using debt. In gender-diverse boards, the interaction between independence and gender diversity might lead to a more cautious approach to leverage. While independent directors might push for greater leverage to finance expansion, female directors could advocate for more measured debt usage, balancing growth with financial stability (Francis *et al.*, 2015).

CEO duality shows a weak and non-significant correlation with both book leverage (0.015) and market leverage (0.012), suggesting that the role of CEO duality in influencing leverage might be minimal. However, in firms with gender-diverse boards, the presence of female directors could enhance the board's oversight, potentially reducing any negative effects of CEO duality on corporate governance. While CEO duality may not significantly impact leverage on its own, the presence of female directors may strengthen governance structures and contribute to more prudent financial decisions overall, including leverage choices (Chen *et al.*, 2022).

The correlation matrix indicates significant relationships among the variables at the 5% level, providing a foundation for further analysis. The provided statistics suggest no high correlations among the variables, implying no multicollinearity issues. Variance Inflation Factor (VIF) tests will be performed after each regression to double-check for multicollinearity, ensuring the robustness of the multivariate analysis (Neter, 1985; Ryan, 1997).

Discussing Table 4.2 in detail provides three key benefits. First, it offers an initial descriptive insight into the direction and strength of relationships among variables, setting expectations for later regression analysis. Second, it allows for the identification of potential multicollinearity issues—by examining whether any independent variables are highly correlated—before moving to multivariate models. Third, linking the bivariate correlations to theoretical expectations (e.g., risk aversion, resource dependence) provides an interpretive bridge between theory and empirical results. While the multivariate regressions ultimately provide the stronger causal evidence, the correlation analysis adds value by contextualising the data, highlighting preliminary patterns, and demonstrating robustness in the research design.

Overall, the provided correlation matrix presents only the individual association between variables. The association between dependent variables and the variables of interest might differ when applying multivariate analysis.

4.5.2 Multivariate Analysis
1. Main Analysis (Board Gender Diversity and Market Leverage)
Before conducting the multivariate analysis, the methods used for its empirical tests are explained. All models are estimated using year-fixed effects regressions on a large, unbalanced panel dataset comprising 7,940 observations for the listed firms in the London Stock Exchange from 2001 to 2020. The unbalanced form of the dataset is because the data covers a lengthy period where new firms frequently enter the database or might be delisted, acquired, or merged during this time. If a balanced panel data analysis is conducted, the sample would be reduced to an undesirable size (Hillier, 2011); therefore, including firms that ceased to exist using unbalanced panel data analysis is appropriate for this work.

The methodological approaches employed across previous studies, including fixed effects models, structural equation modelling, and GMM, are crucial in addressing potential biases and endogeneity issues, thereby enhancing the reliability of the findings. For instance, the use of panel data analysis by Ben Saad and Belkacem (2022) and García and Herrero (2021) and the application of GMM by Hordofa (2023) and Adusei and Obeng (2019) reinforce the robustness of their conclusions. These sophisticated methodologies provide valuable insights into the dynamics between board gender diversity and leverage, accounting for the complex nature of corporate

governance and financial decision-making. In specifying the dynamic panel regressions, ROA_t-2 rather than ROA_t-1 . This choice is consistent with the econometric literature, which cautions that using the first lag of performance as an instrument may generate correlation with contemporaneous shocks, leading to biased estimates (Nickell, 1981; Roodman, 2009). By relying on two-period lags, the models reduce the risk of serial correlation between instruments and errors, thereby satisfying the Arellano–Bond moment conditions. This approach also aligns with corporate governance studies (e.g., Wintoki et al., 2012; Joecks et al., 2012), which employ longer lags to address the persistence of financial performance measures. Using ROA_t-2 therefore ensures more robust and valid instruments in capturing the dynamic relationship between board gender diversity and firm outcomes.

The dynamic panel regressions for capital structure (market and book leverage) were estimated using Blundell and Bond's (1998) two-step system GMM. Lagged dependent variables (market leverage and book leverage) were instrumented with their own past values at t–2 to address dynamic endogeneity, following Wintoki et al. (2012). Core regressors prone to simultaneity and reverse causality—female percentage, board size, board independence, CEO duality, ROA, market to book ratio, tangibility, non debt tax shield, liquidity, and Year2012—were treated as endogenous and instrumented with their lags, ensuring that the instruments are correlated with the regressors but uncorrelated with contemporaneous error terms (Roodman, 2009). Firm age and firm size were included as strictly exogenous instruments, since they represent structural firm characteristics unlikely to be affected by short-term shocks in leverage. This approach controls for omitted variables and simultaneity bias, limits instrument proliferation, and satisfies standard validity checks (Arellano–Bond AR(2), Hansen/Sargan tests), thereby providing credible identification of the relationship between gender diversity and leverage.

Table 4.3 presents the results from the regression analysis examining the impact of the percentage of female directors on market leverage, using the year fixed effect (FE) model and the generalised method of moments (GMM) model. The coefficients for the female percentage variable are positive and significant at the 1% level in both models. Specifically, the FE model reports a coefficient of 0.0193 (significant at 1%), while the GMM model reports a coefficient of 0.0176 (significant at 1%). These results indicate that an increase in the percentage of female directors on the board is associated with higher market leverage, suggesting that firms with more female board members

tend to use more debt financing. This may initially seem contrary to the commonly cited view that female directors are more risk-averse and prefer conservative financial strategies. However, it is possible that female directors, while risk-averse, may also improve the firm's reputation, credibility, and governance practices, making it easier for the firm to access debt under favourable terms. This enhanced access to debt markets could lead to higher leverage, as creditors view firms with diverse and well-governed boards as lower risk (Chen and Hsu, 2009). Therefore, the null hypothesis (*H4.1*) predicting a negative relationship between board gender diversity and leverage is rejected.

Firm size shows a positive and significant relationship with market leverage, with coefficients of 0.0207 (significant at 1%) in the FE model and 0.0102 (significant at 1%) in the GMM model. This suggests that larger firms have higher leverage due to their greater capacity to secure debt financing. Conversely, firm age exhibits a negative and significant relationship with leverage, with coefficients of -0.0218 (significant at 5%) in the FE model and -0.0113 (significant at 1%) in the GMM model. This implies that older firms, which may have more established reputations and less need for external financing, tend to have lower leverage.

The return on assets (ROA) variable is negatively and significantly related to market leverage, with coefficients of -0.0853 (significant at 1%) in the FE model and -0.0363 (significant at 1%) in the GMM model. This indicates that more profitable firms prefer lower leverage, aligning with the view that they can rely more on internal financing. The market-to-book ratio, reflecting growth opportunities, shows a positive and significant relationship with leverage, with coefficients of 0.0860 (significant at 5%) in the FE model and 0.00120 (significant at 5%) in the GMM model, suggesting that firms with higher growth prospects are more likely to use debt financing.

Liquidity is negatively and significantly related to leverage, with coefficients of -0.0229 (significant at 1%) in the FE model and -0.00244 (significant at 1%) in the GMM model. This suggests that firms with higher liquidity prefer to rely on internal resources rather than external debt. The Year2012 dummy variable, which captures the effect of the Davies Report policies, is positive and significant in both models, with coefficients of 0.00666 (significant at 5%) in the FE model and 0.00904 (significant at 1%) in the GMM model. This indicates a general increase in leverage post-2012,

possibly due to the enhanced credibility and access to debt financing resulting from improved board gender diversity.

The results show that board gender diversity positively influences leverage, particularly after implementing policies promoting female board representation. This finding contrasts with prior studies that reported a negative relationship between board gender diversity and leverage, such as Ben Saad and Belkacem (2022). However, it aligns with the findings of Chen *et al.* (2022) and Yakubu and Oumarou (2023), who observed a positive relationship. The differences in findings can be attributed to variations in regional contexts, sample periods, and methodological approaches.

Economically, female board representation's positive and significant impact on leverage suggests that female directors enhance the firm's credibility and improve access to debt financing. This enhanced access may lead firms to prefer debt over equity, particularly when borrowing conditions are favourable. Additionally, the significant effects of firm size, age, profitability, growth opportunities, and liquidity on leverage align with existing literature, reinforcing the robustness of these findings. In conclusion, the results support the hypothesis that board gender diversity positively influences leverage, particularly after implementing the Davies Report policies.

- **Impact of Policy Change on Board Gender Diversity and Market Leverage**

To test Hypothesis *H4.2*, which posits that firms implementing the recommendations of the Davies Report have lower leverage, the following analysis examines the relationship between board gender diversity and market leverage before and after the policy change. Table 4.4 presents the impact of policy change on the relationship between board gender diversity and market leverage. It splits the sample into periods before and after the implementation of the Davies Report. Before the implementation of the Davies Report, there was no statistically significant relationship between the percentage of female directors and market leverage in either the year fixed effects (FE) or generalised method of moments (GMM) models. This suggests that, before the policy intervention, board gender diversity did not have a meaningful impact on market leverage.

In contrast, after implementing the Davies Report, the relationship between female board representation and market leverage becomes significantly positive in both models, with coefficients of 0.00117 (significant at 1%) in FE and 0.00120 (significant

at 1%) in GMM. This significant positive relationship indicates that post-policy implementation, an increase in the percentage of female directors is associated with higher market leverage. This suggests that the regulatory push to enhance board diversity has led to a notable shift in capital structure, with firms more likely to increase leverage as female representation on the board grows.

The coefficient for firm size remains positive and significant across both periods, indicating that larger firms consistently tend to have higher leverage. Before the policy change, the coefficients were 0.0177 (significant at 1%) in the FE model and 0.00776 (significant at 1%) in the GMM model. After the policy change, these coefficients increase to 0.0273 (significant at 1%) and 0.00716 (significant at 1%), respectively. This consistent positive relationship underscores the importance of firm size as a determinant of leverage.

Firm age, return on assets (ROA), market-to-book ratio, and liquidity exhibit significant leverage relationships, with notable changes before and after the policy implementation. Before the policy change, firm age shows a negative but insignificant relationship with leverage. However, post-policy, the coefficients become significantly negative in the FE model, with a value of -0.0389 (significant at 10%) and -0.000626 (significant at 1%) in the GMM model. This indicates that older firms reduce leverage more significantly after the policy change, likely due to their established credit histories and potentially less reliance on debt financing as female board representation increases.

ROA consistently demonstrates a negative and significant relationship with leverage in both periods. Before the policy, the coefficients are -0.000629 (significant at 5%) in the FE model and -0.000237 (significant at 5%) in the GMM model. After the policy, these coefficients become more negative, at -0.00148 (significant at 1%) and -0.000673 (significant at 5%), respectively. This suggests that more profitable firms prefer lower leverage, aligning with the theory that profitable firms rely more on internal financing than external debt.

The market-to-book ratio, reflecting growth opportunities, shows a shift in significance pre- and post-policy implementation. Before the policy change, the relationship was positive but insignificant. After the policy, the relationship becomes significantly positive, with coefficients of 0.0177 (significant at 5%) in the FE model and 0.000318 (significant at 5%) in the GMM model. This indicates that firms with

higher growth opportunities are more likely to use debt financing following the policy implementation.

Liquidity consistently shows a negative relationship with leverage. Before the policy change, the coefficients were -0.0226 (significant at 1%) in the FE model and -0.00223 (insignificant) in the GMM model. Post-policy, the coefficients are -0.0149 (significant at 5%) in the FE model and -0.00148 (insignificant) in the GMM model, suggesting that firms with higher liquidity prefer to rely on internal resources rather than external debt.

Similar policy-driven initiatives to promote gender diversity on corporate boards have been implemented in other countries, with varying results regarding their impact on capital structure. These initiatives share the common goal of improving corporate governance by increasing the representation of women on boards. Still, each country's unique regulatory, economic, and cultural contexts influence their outcomes, particularly regarding leverage.

For example, France introduced a gender quota law in 2011 mandating that women hold at least 40% of board seats in large publicly traded companies. The rationale behind this law was to enhance corporate governance by promoting diversity of thought and leadership styles, which, in turn, would lead to better decision-making and oversight. Studies by Ben Saad and Belkacem (2022) found that implementing this gender quota law contributed to more conservative financial strategies within French firms, particularly by reducing leverage. The authors suggest that the increased presence of female directors, generally more risk-averse and cautious about debt levels, has reduced firms' reliance on debt financing. The regulatory change encouraged firms to adopt lower leverage levels, as female directors pushed for more prudent financial strategies, focusing on long-term stability rather than short-term gains. This finding aligns with the broader literature that associates female directors with more conservative financial management and lower financial risk (Faccio *et al.*, 2016).

To further analyse these findings, Hypothesis (*H4.2*) posited that firms implementing the recommendations of the Davies Report have lower leverage. The results from the subsample analysis provide evidence of this variation. Before the policy change, there was no statistically significant relationship between board gender diversity and market

leverage in either model, suggesting that gender diversity on boards did not significantly impact leverage levels during that period.

However, after the Davies Report's implementation, the relationship between female board representation and market leverage became significantly positive in both models, with coefficients of 0.00117 (significant at 1%) in the FE model and 0.00120 (significant at 1%) in the GMM model. This indicates that following the introduction of the Davies Report's recommendations, firms with higher female board representation were more likely to exhibit increased leverage levels.

Comparing the subsample results with the full sample analysis, a similar trend emerges. In the full sample, covering the entire period from 2001 to 2020, the relationship between female board representation and leverage was also positive and significant, with larger coefficients of 0.0193 in the FE model and 0.0176 in the GMM model. This suggests that board gender diversity positively impacted leverage, but this effect became more pronounced after the regulatory intervention, as seen in the subsample results.

The results indicate that the Davies Report likely amplified the influence of female board representation on capital structure decisions, leading to higher leverage post-policy. This finding mirrors studies such as Chen *et al.* (2022) and Yakubu and Oumarou (2023), which suggest that female board members can enhance a firm's credibility and governance practices, making it easier to access debt financing. Consequently, these firms might have been more inclined to take on debt under favourable terms, thus explaining the increase in leverage.

In summary, the evidence does not support Hypothesis (*H4.2*), as the results show that leverage levels increased, contrary to the expectation of lower leverage following the Davies Report's recommendations. The significant positive relationship observed post-policy suggests that the regulatory push for greater board gender diversity influenced firms to adjust their capital structures, resulting in a tendency toward higher leverage in the years following the policy implementation. Therefore, Hypothesis (*H4.2*) is rejected, as the results indicate that the relationship between board gender diversity and leverage levels varied after the Davies Report's implementation, but in the opposite direction than anticipated.

- **Industry-Specific Impact of Board Gender Diversity on Market Leverage**

Hypothesis 4.3 *(H4.3),* which posits that the relationship between board gender diversity and leverage levels varies depending on whether the industry is high-risk or low-risk, was tested by splitting the sample into manufacturing and services groups. The sample was divided into manufacturing and services to capture broad differences in capital intensity and risk profiles while preserving sufficient observations for reliable estimation. Table 4.5 presents the regression analysis results, providing evidence that the impact of board gender diversity on leverage is indeed industry-specific.

In the manufacturing group, the coefficient for the percentage of female directors is positive and significant in the FE with a coefficient of 0.00107 (significant at 1%) and the GMM model with a coefficient of 0.000973 (significant at 1%). These results suggest that in manufacturing industries—characterised by high collateral and relatively lower financial risk— an increase in female board representation is associated with higher market leverage. This may reflect the enhanced credibility and improved borrowing terms that female directors can bring to these firms, aligning with the resource dependence theory (Hillman *et al.*, 2009). The models control for asset tangibility, which is widely used in the capital structure literature as a proxy for collateral value (Rajan & Zingales, 1995; Frank & Goyal, 2009). Tangible assets, such as property, plant, and equipment, are those most likely to be pledged as collateral, so including tangibility in the regressions helps capture this effect.

The positive relationship indicates that female directors, while generally risk-averse, may still advocate for debt financing when the availability of collateral mitigates financial risk. Thus, in capital-intensive industries such as consumer staples, energy, and industrials, female directors may allow firms to take advantage of favourable borrowing conditions without undermining financial stability.

The significant positive relationship in the manufacturing group supports the view that female directors may enhance the firm's reputation and access to debt financing by strengthening governance credibility and signalling a commitment to diversity and ethical oversight. Prior research shows that lenders and investors often view gender-diverse boards as less prone to excessive risk-taking and more transparent (Adams & Ferreira, 2009; Nadeem et al., 2020). This perception reduces information asymmetry and improves stakeholder confidence, which in turn can translate into more favourable borrowing terms and greater access to external capital.

Economically, this finding suggests that while female directors are cautious in high-risk environments, they may still see strategic value in leveraging debt when the firm's tangible assets provide a secure basis for borrowing. This is consistent with the upper echelon theory (Hambrick and Mason, 1984), which highlights how the characteristics of boards, such as gender, shape strategic decisions like capital structure.

In contrast, the services group shows no significant impact of board gender diversity on leverage. The coefficients for the female percentage variable are positive but insignificant in both models. This suggests that in services sectors—characterised by higher risk and limited collateral—the presence of female directors does not meaningfully influence leverage decisions. These results align with expectations from agency theory and the risk-averse nature of female directors (Adams and Ferreira, 2009), as directors in higher-risk, low-collateral industries like healthcare and technology are likely to avoid increasing leverage. In these sectors, female directors may prioritise financial stability and caution. Still, their ability to impact leverage may be constrained by the lack of tangible assets and the inherently risky nature of these industries.

Additionally, several control variables show significant relationships with leverage across both groups. Firm size positively and significantly affects leverage in the manufacturing group, with coefficients of 0.0229 (significant at 1%) in the FE model and 0.0119 (significant at 1%) in the GMM model. Larger firms have a greater capacity to secure debt financing, particularly in industries with high collateral, which supports the view that firm size is a key determinant of leverage (Ben Saad and Belkacem, 2022). Conversely, firm age exhibits a negative and significant relationship with leverage, indicating that older firms tend to rely less on external financing, as they may have accumulated internal resources or prefer equity financing due to their established reputations (Huang and Kisgen, 2013).

ROA shows a consistent negative and significant relationship with leverage across both groups, with coefficients of -0.00120 (significant at 1%) in the FE model for manufacturing and -0.000316 (significant at 1%) for services. This aligns with the notion that more profitable firms prefer lower leverage, relying on internal funds to finance operations (Chen *et al.*, 2022). Liquidity is also negatively and significantly related to leverage in both groups, suggesting that firms with higher liquidity use their internal resources rather than debt financing.

In summary, the results support *Hypothesis 4.3*, indicating that the impact of board gender diversity on leverage varies by industry. In the manufacturing group, female directors are associated with higher leverage, likely due to the availability of collateral and favourable borrowing conditions. In contrast, female directors in the higher-risk, low-collateral services group do not significantly influence leverage decisions, reflecting their more conservative approach to financial management in riskier environments. These findings underscore the importance of considering industry characteristics when assessing the relationship between board gender diversity and capital structure. Therefore, Hypothesis (*H4.3*) is accepted, as the results confirm that the relationship between board gender diversity and leverage levels varies depending on the industry's risk profile and capital intensity.

2. Alternative Analysis (Board Gender Diversity and Book Leverage)

The study also examined the impact of board gender diversity on leverage using book leverage as an alternative dependent variable. Table 4.6 presents the results of the regression analysis examining the effect of female percentage on board gender diversity and book leverage. Consistent with the findings from market leverage analysis, the coefficients for the female percentage variable are positive and significant at the 1% level in both the FE and GMM models. Specifically, the FE model reports a coefficient of 0.0509 (significant at 1%), while the GMM model reports a coefficient of 0.00199 (significant at 1%). These results indicate that an increase in the percentage of female directors is associated with higher book leverage. Similar to the market leverage results, this finding suggests that firms with more female directors tend to employ more debt financing. Therefore, the null hypothesis (*H4.1*) predicting a negative relationship between board gender diversity and leverage is rejected.

While this result may seem counterintuitive given the widely-held view that female directors are more risk-averse and prefer conservative financial strategies, it aligns with the idea that female directors might improve the firm's reputation and governance practices, thereby enhancing access to favourable borrowing terms. This improved access to debt markets could lead to higher leverage as creditors perceive firms with gender-diverse boards as more stable and lower risk (Chen and Hsu, 2009). Therefore, just as in the case of market leverage, the null hypothesis predicting a negative relationship between board gender diversity and leverage is rejected.

Firm size also shows a significant positive relationship with book leverage, with coefficients of 0.00157 (significant at 5%) in the FE model and 0.0299 (significant at 1%) in the GMM model. This aligns with the idea that larger firms have better access to debt financing due to their more extensive asset bases and stronger credit profiles. In contrast, firm age does not show a significant relationship with book leverage, indicating that older firms may not significantly differ from younger firms in their use of debt.

As ROA measures, profitability shows a negative and significant relationship with book leverage, with coefficients of -0.0551 (significant at 1%) in the FE model and -0.000547 (significant at 1%) in the GMM model. This suggests that more profitable firms prefer lower leverage, likely due to their ability to finance investments using retained earnings rather than debt, which mirrors the findings for market leverage.

Similarly, liquidity is negatively and significantly associated with book leverage, with coefficients of -0.0673 (significant at 1%) in the FE model and -0.0130 (significant at 1%) in the GMM model. This suggests that more liquid firms prefer to rely on internal resources rather than debt, reinforcing the view that higher liquidity reduces the need for external financing.

The Year2012 dummy variable, which captures the impact of the Davies Report policies, is positive and significant in both models, with coefficients of 0.0445 (significant at 1%) in the FE model and 0.0475 (significant at 1%) in the GMM model. This indicates that leverage generally increased post-2012, likely due to enhanced credibility and better access to debt financing after implementing policies promoting gender diversity on corporate boards. This is consistent with the market leverage results, where introducing gender diversity policies significantly increased leverage.

In conclusion, the results for book leverage are mainly consistent with those for market leverage. Both analyses show that board gender diversity is associated with higher leverage, suggesting that female directors, while generally risk-averse, may enhance firms' access to favourable borrowing conditions. This is consistent with the findings of Chen *et al.* (2022) and Yakubu and Oumarou (2023), who observed similar positive relationships. Additionally, significant control variables such as firm size, profitability, and liquidity align with existing literature, reinforcing the robustness of these findings.

- **Impact of Policy Change on Board Gender Diversity and Book Leverage**

The results for the impact of board gender diversity on book leverage following the policy change, as presented in Table 4.7, align with the main findings for market leverage shown in Table 4.4. This does not support *H4.2,* which posits that firms implementing the recommendations of the Davies Report have lower leverage.

Before the policy implementation, the coefficients for the percentage of female directors on book leverage were positive but not statistically significant, indicating no meaningful relationship between gender diversity on boards and book leverage during this period. However, after the policy change, the relationship between female board representation and book leverage becomes statistically significant. The FE model reports a coefficient of 0.00280 (significant at 1%), while the GMM model shows a coefficient of 0.00313 (significant at 1%). This indicates that after the Davies Report's implementation, firms with a higher percentage of female directors tended to increase their reliance on debt, as reflected in higher book leverage. This result is consistent with the findings for market leverage. It suggests that while generally considered risk-averse, female board members can enhance the firm's reputation and credibility, facilitating better access to debt markets under favourable borrowing conditions (Chen and Hsu, 2009).

Firm size continues to show a positive and significant relationship with book leverage before and after the policy change. Before the policy, the FE model reported a coefficient of 0.000726 (significant at 5%), and the GMM model reported 0.0365 (significant at 1%). After the policy, the impact of firm size on leverage strengthens, with coefficients increasing to 0.00766 (significant at 1%) in the FE model and 0.0208 (significant at 1%) in the GMM model. This suggests that larger firms, with greater access to collateral and financial stability, can secure more debt.

Firm age also demonstrates a significant negative relationship with book leverage, with older firms reducing their leverage before and after the policy. The FE model shows a coefficient of -0.00570 (significant at 1%) before the policy and -0.0223 (significant at 1%) after the policy. This suggests that older firms are less dependent on external financing, particularly as they become more established and reduce their reliance on debt.

As measured by ROA, profitability continues to exhibit a negative and significant relationship with book leverage across both periods. Before the policy, the FE model reports a coefficient of -0.00224 (significant at 1%), and this negative relationship

persists after the policy, with a coefficient of -0.00188 (significant at 1%). This indicates that more profitable firms prefer lower leverage, as they can rely on internal financing rather than debt.

Liquidity consistently shows a negative relationship with leverage. Before the policy change, the FE model reports a significant coefficient of -0.0426 (significant at 1%), indicating that firms with higher liquidity tend to use less debt. After the policy, liquidity remains negatively associated with leverage, with a coefficient of -0.0225 (significant at 5%) in the FE model, reinforcing that more liquid firms prefer internal resources over debt financing.

Overall, the findings for book leverage are consistent with those of market leverage, confirming that the relationship between board gender diversity and leverage levels became significantly positive after the Davies Report's implementation. This suggests that firms with higher female board representation tend to increase their use of debt, likely due to improved access to favourable borrowing terms. Therefore, Hypothesis *(H4.2)* is rejected, as the results indicate that the relationship between board gender diversity and leverage levels varied after the Davies Report's implementation, but in the opposite direction than anticipated.

- **Industry-Specific Impact of Board Gender Diversity on Book Leverage**

As presented in Table 4.8, the results for the impact of board gender diversity on book leverage across industries generally support the main findings for market leverage shown in Table 4.5. In the manufacturing group, the percentage of female directors shows a positive and significant relationship with book leverage. The FE model reports a coefficient of 0.00199 (significant at 1%), and the GMM model reports a coefficient of 0.00273 (significant at 1%). This result suggests that female directors continue to enhance the firm's ability to secure debt financing in capital-intensive manufacturing industries, such as consumer discretion, energy, and industrials. The positive relationship aligns with resource dependence theory (Hillman *et al.*, 2009), which posits that gender-diverse boards can improve a firm's credibility and access to external resources, such as capital, enabling higher leverage. This finding supports the idea that female directors, while risk-averse, can strategically advocate for debt financing in environments where collateral mitigates the associated financial risks.

In contrast, the services group shows no significant relationship between the percentage of female directors and book leverage, similar to the results for market leverage. The coefficients for the female percentage variable are positive but insignificant in both the FE and GMM models. This suggests that female directors may prioritise financial stability and avoid increasing leverage in high-risk, low-collateral industries such as healthcare and technology. The risk-averse nature of female directors (Adams and Ferreira, 2009) in these sectors may lead them to limit debt financing due to the inherent risks and lack of tangible assets to secure borrowing.

Firm size shows a positive and significant relationship with book leverage across both industry groups. In the manufacturing group, the FE model reports a coefficient of 0.00342 (significant at 1%), and the GMM model reports 0.0322 (significant at 1%). In the services group, the FE model reports 0.0184 (significant at 5%), and the GMM model reports 0.0107 (significant at 1%). This consistent positive relationship indicates that larger firms, irrespective of industry, can better secure debt financing due to their greater financial stability and capacity to offer collateral.

On the other hand, firm age exhibits a significant negative relationship with book leverage in both the manufacturing and services groups. This suggests that older firms, which may have accumulated internal resources over time, tend to rely less on debt. In the manufacturing group, the FE model shows a coefficient of -0.0182 (significant at 5%), and the GMM model reports -0.00651 (significant at 1%). In the services group, the FE model reports -0.0285 (significant at 5%), and the GMM model reports -0.00539 (significant at 5%).

ROA is negatively and significantly related to book leverage across both industry groups, reinforcing that more profitable firms prefer internal financing over debt. In the manufacturing group, the FE model shows a coefficient of -0.00246 (significant at 1%), and the GMM model reports -0.00110 (significant at 1%). In the services group, the FE model reports -0.00150 (significant at 5%), and the GMM model reports -0.00259 (significant at 1%).

Liquidity consistently shows a negative and significant relationship with book leverage in both groups. Firms with higher liquidity rely less on external debt and prefer to use internal resources. In the manufacturing group, the FE model reports a coefficient of -0.0430 (significant at 1%), and the GMM model reports -0.0115

(significant at 1%). In the services group, the FE model reports -0.0447 (significant at 1%), and the GMM model reports -0.0157 (significant at 5%).

The Year2012 variable, which captures the effect of the Davies Report, is positive and significant in the manufacturing group, indicating that firms in this sector increased their book leverage following the implementation of the gender diversity policies. The FE model reports a coefficient of 0.0583 (significant at 1%), and the GMM model reports 0.0550 (significant at 1%). In the services group, the Year2012 variable is significant only in the GMM model, with a coefficient of 0.0282 (significant at 5%), suggesting a more limited effect of the policy on book leverage in these higher-risk industries.

In conclusion, the results for book leverage are consistent with those for market leverage, particularly in the manufacturing group, where female directors are associated with higher leverage levels due to the availability of collateral and favourable borrowing conditions. In the services group, the absence of significant results for female directors further reinforces that board gender diversity has a more limited impact on leverage in high-risk, low-collateral industries. Therefore, Hypothesis (*H4.3*) is accepted, as the results confirm that the relationship between board gender diversity and leverage levels varies depending on the industry's risk profile and capital intensity.

4.6 Conclusions

The relationship between board gender diversity and corporate capital structure has garnered increasing attention in recent years. This study contributes new insights, by showing that, unlike much prior evidence, board gender diversity in the UK is linked to higher leverage after the Davies Report, with effects varying by industry and confirmed through robust econometric tests. Drawing from a comprehensive dataset of firms listed on the London Stock Exchange from 2001 to 2020, the study examines the impact of female board representation on firms' leverage before and after the Davies Report and across different industries.

The findings reveal a significant and positive association between board gender diversity and market and book leverage, particularly after the Davies Report's implementation. This suggests that increased female representation on boards enhances firms' access to debt markets, potentially due to improved governance,

enhanced credibility, and increased investor confidence. These results challenge the traditional view that gender diversity leads to more conservative financial strategies, suggesting instead that female directors may strategically use their influence to secure better borrowing terms and facilitate the use of debt more efficiently. The evidence comes from the significant positive association between female board representation and both market and book leverage after the Davies Report, indicating that gender-diverse boards are linked to greater use of debt financing. While the dataset does not directly capture borrowing terms, this interpretation is consistent with prior studies showing that gender diversity improves governance credibility and lender confidence (Nadeem et al., 2020; Chen et al., 2022). Consequently, Hypothesis (*H4.1)*, which predicted a negative relationship between board gender diversity and leverage, is rejected.

The regulatory intervention of the Davies Report played a crucial role in this shift. Before its implementation, the relationship between female board representation and leverage was insignificant, implying a limited influence of gender diversity on leverage decisions. However, post-policy, the relationship became significantly positive, demonstrating the effectiveness of the Davies Report in promoting gender diversity and altering firms' capital structure strategies. This finding does not support Hypothesis (*H4.2)*, which posited that firms implementing the recommendations of the Davies Report have lower leverage.

The results also indicate significant industry-specific variations in how board gender diversity affects leverage. In the manufacturing sector, characterised by capital-intensive operations and access to collateral, the relationship between board gender diversity and leverage is positive and significant, suggesting that female directors in these industries may advocate for debt financing under favourable borrowing conditions. This aligns with the findings of Hillman *et al.* (2009), who emphasised the role of diverse boards in improving access to external resources. On the other hand, in service industries—particularly those with higher risk and lower collateral—the relationship between board gender diversity and leverage is insignificant, indicating that female directors may adopt more conservative financial strategies in these contexts. These findings affirm Hypothesis (*H4.3*), which proposed that the relationship between board gender diversity and leverage would vary across industries based on risk profiles and capital intensity.

These findings are largely consistent with previous literature, though with some variations. For example, the positive relationship between gender diversity and leverage in the manufacturing sector aligns with studies such as Chen *et al.* (2022) and Yakubu and Oumarou (2023), which found that gender-diverse boards can improve a firm's credibility and access to capital. However, this study's results differ from those of Ben Saad and Belkacem (2022), who reported a negative relationship between board gender diversity and leverage in French firms, highlighting the importance of regional and regulatory context. The lack of significant results in high-risk service sectors is consistent with prior studies like Adams and Ferreira (2009), which suggested that female directors tend to adopt more risk-averse financial strategies.

These findings underscore the potential advantages of promoting gender diversity on boards for corporate decision-makers. Female directors can enhance governance practices and improve access to debt financing, offering firms a strategic advantage in managing their capital structure. For policymakers, the results of this study highlight the positive effects of regulatory interventions such as the Davies Report in fostering gender diversity and encouraging balanced financial strategies.

Despite these contributions, the study has limitations. The focus on the UK and the specific regulatory context of the Davies Report may limit the generalisability of these findings to other regions or policy environments. Future research could expand geographically and investigate how similar policies in different countries influence the relationship between board gender diversity and leverage. Additionally, exploring other dimensions of diversity, such as ethnicity or age, could provide a more comprehensive understanding of how diverse boards influence financial strategies.

In conclusion, this research advances the understanding of how board gender diversity influences capital structure decisions, particularly following regulatory interventions like the Davies Report. The significant and positive influence of female board representation on leverage decisions underscores the value of diversity in corporate governance, contributing to the broader discourse on the benefits of inclusivity and diversity within corporate governance frameworks.

Table 4.1: Summary statistics for all variables

Variable	Obs	Mean	Std. Dev.	Min	25%	Median	75%	Max
Book leverage	7,940	0.42	0.39	0	0.10	0.41	0.60	1.75
Market leverage	7,940	0.21	0.19	0	0.05	0.18	0.31	1.95
Female percentage	7,940	10.71	12.12	0	0	10.00	18.20	66.70
Firm size (billions)	7,940	2.70	10.00	0.01	1.10	3.30	1.20	120
Firm size (log)	7,940	12.88	1.78	9.21	11.61	12.72	14	18.60
Firm age (years)	7,940	33.38	29.12	1	11	22	49	117
Firm age (log)	7,940	3.07	1.02	0	2.40	3.09	3.89	4.76
ROA	7,940	4.56	12.07	-58.97	1.72	5.76	9.85	69.85
Tangibility	7,940	0.27	0.23	0.01	0.08	0.21	0.39	0.98
Market to Book	7,940	2.86	2.55	0	1.32	1.96	3.40	16.96
Non-debt tax shield	7,940	0.05	0.03	0	0.03	0.04	0.06	0.19
Liquidity	7,940	1.51	0.90	0.01	0.94	1.32	1.78	5.49
Board size	7,940	7.80	2.32	2	6	7	9	20
Board Independence	7,940	0.50	0.16	0	0.40	0.50	0.62	1
CEO duality	7,940	0.03	0.16	0	0	0	0	1

This table shows the descriptive statistics for all variables. The sample comprises 7,940 firm-year observations from 2001 to 2020, excluding financial and utilities firms. BoardEx provided information on the board of directors' features. Furthermore, accounting information for the companies in our sample was obtained from the DataStream dataset. The *book leverage* is calculated as the total debt divided by the firm's total assets at the end of the financial year. The *market leverage* is calculated as the total debt divided by the firm's total equity at the end of the financial year. The *female percentage* is measured by dividing the number of female board directors by the total number of board directors*100%. *Board size* is the total number of directors at the end of the financial year. *Board Independence* is a percentage of independent directors at the end of the financial year. *CEO Duality* is a dummy variable that takes one if the chairperson is the CEO and zero otherwise. *Firm size* is measured as the natural log of market capitalisation at the end of the financial year. *Firm age* is the number of years since Incorporation. *ROA* is calculated by dividing the firm's annual net income by the average total assets during a financial year. *Tangibility* is the ratio of net property, plant, and equipment to total assets at the end of the financial year. *Market-to-Book* is calculated as the market capitalisation divided by the firm's total equity at the end of the financial year. *Liquidity* is calculated as the firm's total current assets divided by its total current liabilities at the end of the financial year. *Non-debt tax shield* is calculated as depreciation divided by the firm's total assets at the end of the financial year. All variables are defined in *Appendix 4.A* of this chapter.

Table 4.2: Correlation Matrix

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
(1) Book leverage	1.000												
(2) Market leverage	0.551*	1.000											
(3) Female percentage	0.058*	0.066*	1.000										
(4) Firm size	0.081*	0.064*	0.168*	1.000									
(5) Firm age	0.094*	0.012	0.052*	0.039*	1.000								
(6) ROA	-0.011*	-0.018*	0.055*	0.086*	0.048*	1.000							
(7) Tangibility	-0.181*	-0.247*	-0.009	0.076*	0.039*	0.036*	1.000						
(8) Market to Book	-0.023*	0.033*	0.054*	0.094*	-0.083*	0.163*	-0.126*	1.000					
(9) Non-debt tax shield	0.059*	0.111*	-0.022*	-0.016	-0.050*	-0.099*	0.265*	0.029*	1.000				
(10) Liquidity	-0.299*	-0.279*	-0.067*	-0.088*	0.016	0.037*	-0.165*	-0.051*	-0.153*	1.000			
(11) Board size	0.177*	0.158*	0.167*	0.429*	0.041*	0.103*	0.093*	0.064*	-0.066*	-0.126*	1.000		
(12) Board Independence	0.082*	0.077*	0.363*	0.213*	0.080*	0.033*	-0.038*	0.020	-0.022*	-0.044*	0.108*	1.000	
(13) CEO duality	0.015	0.012	-0.043*	-0.021	-0.046*	-0.009	0.036*	0.002	0.063*	-0.015	-0.018	-0.079*	1.000

This table shows the correlation matrix for all variables. The sample comprises 7,940 firm-year observations from 2001 to 2020, excluding financial and utilities firms. BoardEx provided information on the board of directors' features. Furthermore, accounting information for the companies in our sample was obtained from the DataStream dataset. The *book leverage* is calculated as the total debt divided by the firm's total assets at the end of the financial year. The *market leverage* is calculated as the total debt divided by the firm's total equity at the end of the financial year. The *female percentage* is measured by dividing the number of female board directors by the total number of board directors*100%. *Board size* is the total number of directors at the end of the financial year. *Board Independence* is a percentage of independent directors at the end of the financial year. *CEO Duality* is a dummy variable that takes one if the chairperson is the CEO and zero otherwise. *Firm size* is measured as the natural log of market capitalisation at the end of the financial year. *Firm age* is the number of years since Incorporation. *ROA* is calculated by dividing the firm's annual net income by the average total assets during a financial year. *Tangibility* is the ratio of net property, plant, and equipment to total assets at the end of the financial year. *Market-to-Book* is calculated as the market capitalisation divided by the firm's total equity at the end of the financial year. *Liquidity* is calculated as the firm's total current assets divided by its total current liabilities at the end of the financial year. *Non-debt tax shield* is calculated as depreciation divided by the firm's total assets at the end of the financial year. All variables are defined in *Appendix 4.A* of this chapter. **Correlation is significant at the 5% level.*

Table 4.3: Impact of female percentage on the board on market leverage

VARIABLES	FE	GMM
Market leverage$_{t-2}$		0.908***
		(0.0491)
Female percentage	0.0193***	0.0176***
	(0.0132)	(0.0129)
Firm size	0.0207***	0.0102***
	(0.00442)	(0.00316)
Firm age	-0.0218**	-0.0113***
	(0.00968)	(0.00184)
Board size	0.00235	0.00344
	(0.00221)	(0.00229)
Board independence	0.0128	0.0381
	(0.0262)	(0.0350)
CEO duality	0.0151	0.00778
	(0.0175)	(0.0177)
ROA	-0.0853***	-0.0363***
	(0.000284)	(0.000283)
Market-to-Book	0.0860**	0.00120**
	(0.0402)	(0.00152)
Tangibility	-0.00198	-0.1081
	(0.00151)	(0.0457)
Non-debt tax shield	0.341*	0.0205
	(0.175)	(0.178)
Liquidity	-0.0229***	-0.00244***
	(0.00412)	(0.00338)
Year2012	0.00666**	0.00904***
	(0.00726)	(0.00537)
Constant	0.371***	-0.0494***
	(0.0609)	(0.0188)
Firm effect	YES	
Year effect	YES	
Industry effect	YES	
Observations	7,940	7,179
R-squared	0.165	
AR(1)		0
AR(2)		0.508
Hansen		0.125

This table shows the effect of female directors on leverage using the market leverage as a dependent variable. Column 1 shows the year Fixed Effect (FE) results, and column 2 shows the two-step system Generalised Method of Moments (GMM) results. *Market leverage$_{t-2}$* is the second lag of market leverage. The *female percentage* is a ratio of the total number of female directors divided by board size*100%. Definitions of all variables are in *Appendix 4.A*. Robust standard errors clustered by firm are in parentheses *** p<0.01, ** p<0.05, * p<0.1. The regression analysis was also conducted using alternative measurements to ensure robustness, and the results remained consistent. In the main analysis, as shown in this table, the board size, initially measured as the total number of directors, was also assessed using its natural logarithm, with no outcome differences. Similarly, firm size, measured as the natural logarithm of market capitalisation, was compared with total assets, showing consistent results.

Table 4.4: Impact of female percentage on the board on market leverage before and after policy

VARIABLES	Before Policy		After Policy	
	FE	GMM	FE	GMM
Market Leverage$_{t-2}$		0.813***		1.070***
		(0.0605)		(0.0754)
Female percentage	0.00766	0.00347	0.00117***	0.00120***
	(0.000415)	(0.000521)	(0.000330)	(0.000383)
Firm size	0.0177***	0.00776***	0.0273***	0.00716***
	(0.00499)	(0.00364)	(0.00786)	(0.00482)
Firm age	-0.00786	-0.000868	-0.0389*	-0.000626***
	(0.0107)	(0.00198)	(0.0204)	(0.00310)
Board size	0.00124	0.00115	0.000674	0.00730
	(0.00264)	(0.00309)	(0.00292)	(0.00371)
Board independence	-0.0122	-0.0331	0.0266	0.0297
	(0.0314)	(0.0424)	(0.0378)	(0.0506)
CEO duality	0.00732	0.0228	0.0676	0.0337
	(0.0192)	(0.0195)	(0.0521)	(0.0253)
ROA	-0.000629**	-0.000237**	-0.00148***	-0.000673**
	(0.000324)	(0.000307)	(0.000431)	(0.000412)
Market-to-Book	0.0595	0.000324	0.0177**	0.000318**
	(0.0402)	(0.00159)	(0.0725)	(0.00208)
Tangibility	-0.00155	-0.00380	- 0.00174	-0.1512
	(0.00171)	(0.0511)	(0.00200)	(0.0663)
Non-debt tax shield	-0.0300	-0.0104	0.884***	0.458
	(0.201)	(0.194)	(0.230)	(0.296)
Liquidity	-0.0226***	-0.00223	-0.0149**	-0.00148
	(0.00378)	(0.00463)	(0.00640)	(0.00453)
Constant	0.417***	-0.0567**	0.366***	-0.0630**
	(0.0730)	(0.0233)	(0.115)	(0.0305)
Firm effect	YES		YES	
Year effect	YES		YES	
Industry effect	YES		YES	
Observations	4,911	4,257	3,029	2,922
R-squared	0.039		0.146	
AR(1)		0.00		0.00
AR(2)		0.309		0.537
Hansen		0.1193		0.1333

This table shows the effect of female directors on leverage using market leverage as a dependent variable based on policy implementation. The table represents two groups of results based on policy implementation. The first group is before policy implementation (before 2012), while the second group is after policy implementation (2012 onwards). Columns 1 and 3 show the year Fixed Effect (FE) results, and columns 2 and 4 show the two-step system Generalised Method of Moments (GMM) results. Market Leverage$_{t-2}$ is the second lag of market leverage. The female percentage is a ratio of the total number of female directors divided by board size*100%. Definitions of all variables are in *Appendix 4.A*. Robust standard errors clustered by the firm are in parentheses *** p<0.01, ** p<0.05, * p<0. The regression analysis was also conducted using alternative measurements to ensure robustness, and the results remained consistent. In the main analysis, as shown in this table, the board size, initially measured as the total number of directors, was also assessed using its natural logarithm, with no outcome differences. Similarly, firm size, measured as the natural logarithm of market capitalisation, was compared with total assets, showing consistent results.

Table 4.5: Impact of board gender diversity on market leverage based on industry

VARIABLES	Manufacturing Group		Services Group	
	FE	GMM	FE	GMM
Market leverage$_{t-2}$		0.813***		0.985***
		(0.0505)		(0.0868)
Female percentage	0.00107***	0.000973***	0.000422	0.000351
	(0.000327)	(0.000376)	(0.000593)	(0.000463)
Firm size	0.0229***	0.0119***	0.0130	0.00133
	(0.00514)	(0.00386)	(0.00924)	(0.00534)
Firm age	-0.0160**	-0.00266**	-0.0363*	-0.00187**
	(0.0108)	(0.00280)	(0.0219)	(0.00447)
Board size	0.00304	0.00261	0.000961	0.00161
	(0.00234)	(0.00272)	(0.00563)	(0.00470)
Board independence	0.0277	0.0538	0.0314	0.0706
	(0.0287)	(0.0420)	(0.0646)	(0.0475)
CEO duality	0.0254	0.0105	0.00390	0.0795
	(0.0178)	(0.0166)	(0.0400)	(0.0476)
ROA	-0.00120***	-0.000474***	-0.000316**	-0.000815***
	(0.000375)	(0.000392)	(0.000370)	(0.000305)
Market-to-Book	0.00259*	0.000442**	0.000683**	0.000632**
	(0.00177)	(0.00204)	(0.00285)	(0.00136)
Tangibility	-0.0496	-0.122	-0.256	-0.161
	(0.0418)	(0.0538)	(0.118)	(0.0909)
Non-debt tax shield	0.392*	0.0920	0.273	0.0189
	(0.206)	(0.214)	(0.312)	(0.282)
Liquidity	-0.0229***	-0.00596**	-0.0216***	-0.00523***
	(0.00529)	(0.00474)	(0.00581)	(0.00421)
Year2012	0.0128	0.00649	0.0153	0.00593
	(0.00841)	(0.00647)	(0.0119)	(0.0106)
Constant	0.425***	-0.0389***	0.213**	-0.0204***
	(0.0677)	(0.0252)	(0.133)	(0.0341)
Firm effect	YES		YES	
Year effect	YES		YES	
Observations	6,312	5,732	1,628	1,447
R-squared	0.095		0.108	
AR(1)		0.00		0.00
AR(2)		0.704		0.470
Hansen		0.251		0.602

This table shows the effect of female directors on leverage using market leverage as a dependent variable based on industry group. The table represents two groups of results based on industry. The first group is the manufacturing group, which includes basic materials, consumer discretion, consumer staples, energy, industrial, and real estate, while the second group is the services group, which includes healthcare, technology, and telecommunications. Columns 1 and 3 show the year Fixed Effect (FE) results, and columns 2 and 4 show the two-step system Generalised Method of Moments (GMM) results. *Market leverage$_{t-2}$* is the second lag of market leverage. The *female percentage* is a ratio of the total number of female directors divided by board size*100%. Definitions of all variables are in *Appendix 4.A*. Robust standard errors clustered by the firm are in parentheses *** p<0.01, ** p<0.05, * p<0. The regression analysis was also conducted using alternative measurements to ensure robustness, and the results remained consistent. In the main analysis, as shown in this table, the board size, initially measured as the total number of directors, was also assessed using its natural logarithm, with no outcome differences. Similarly, firm size, measured as the natural logarithm of market capitalisation, was compared with total assets, showing consistent results.

Table 4.6: Impact of female percentage on the board on book leverage

VARIABLES	FE	GMM
Book leverage$_{t-2}$		0.476***
		(0.0359)
Female percentage	0.0509***	0.00199***
	(0.0160)	(0.000838)
Firm size	0.00157**	0.0299***
	(0.000610)	(0.00815)
Firm age	-0.00118	-0.00927
	(0.00867)	(0.00668)
Board size	0.0243	0.00582
	(0.0203)	(0.00673)
Board independence	0.00342	0.0427
	(0.00425)	(0.0766)
CEO duality	0.00561	0.0197
	(0.0508)	(0.0432)
ROA	-0.0551***	-0.000547***
	(0.0421)	(0.000525)
Market-to-Book	0.00212***	0.000264***
	(0.000449)	(0.00368)
Tangibility	-0.125	-0.0117
	(0.0692)	(0.103)
Non-debt tax shield	0.00236	0.231
	(0.00265)	(0.314)
Liquidity	-0.0673***	-0.0130***
	(0.278)	(0.00733)
Year2012	0.0445***	0.0475***
	(0.00706)	(0.0168)
Constant	0.350***	-0.0961***
	(0.114)	(0.0609)
Firm effect	YES	
Year effect	YES	
Industry effect	YES	
Observations	7,940	7,179
R-squared	0.122	
AR(1)		0.00
AR(2)		0.1897
Hansen		0.138

This table shows the effect of female directors on leverage using the book leverage as a dependent variable. Column 1 shows the year Fixed Effect (FE) results, and column 2 shows the two-step system Generalised Method of Moments (GMM) results. B*ook leverage$_{t-2}$* is the second lag of book leverage. The *female percentage* is a ratio of the total number of female directors divided by board size*100%. Definitions of all variables are in *Appendix 4.A*. Robust standard errors clustered by firm are in parentheses *** p<0.01, ** p<0.05, * p<0.1. The regression analysis was also conducted using alternative measurements to ensure robustness, and the results remained consistent. In the main analysis, as shown in this table, the board size, initially measured as the total number of directors, was also assessed using its natural logarithm, with no outcome differences. Similarly, firm size, measured as the natural logarithm of market capitalisation, was compared with total assets, showing consistent results.

Table 4.7: Impact of female percentage on the board on book leverage before and after policy

VARIABLES	Before Policy		After Policy	
	FE	GMM	FE	GMM
Book leverage$_{t-2}$		0.419***		0.548***
		(0.0418)		(0.0519)
Female percentage	0.000802	0.00219	0.00280***	0.00313***
	(0.000983)	(0.00176)	(0.000746)	(0.000973)
Firm size	0.000726**	0.0365***	0.00766***	0.0208***
	(0.00935)	(0.0105)	(0.0153)	(0.0110)
Firm age	-0.00570***	-0.0163***	-0.0223***	-0.00436**
	(0.0208)	(0.00839)	(0.0453)	(0.00764)
Board size	0.00679	0.00446	0.00148	0.00120
	(0.00526)	(0.00888)	(0.00574)	(0.00981)
Board independence	0.0358	0.103	0.0964	0.110
	(0.0586)	(0.104)	(0.0708)	(0.109)
CEO duality	0.0620	0.0453	0.123	0.129
	(0.0411)	(0.0401)	(0.0677)	(0.0964)
ROA	-0.00224***	-0.00368***	-0.00188***	-0.00197***
	(0.000457)	(0.000606)	(0.000768)	(0.000890)
Market-to-Book	0.0266	0.00148	0.242***	0.00244***
	(0.0811)	(0.00418)	(0.118)	(0.00522)
Tangibility	-0.00555	-0.0385	-0.00507	-0.0500
	(0.00329)	(0.139)	(0.00338)	(0.121)
Non-debt tax shield	-0.542	-0.0274	0.254	0.466
	(0.304)	(0.407)	(0.531)	(0.511)
Liquidity	-0.0426***	-0.0130	-0.0225**	-0.0151**
	(0.00807)	(0.0106)	(0.00962)	(0.0107)
Constant	0.443***	-0.141*	0.319	-0.00464**
	(0.135)	(0.0756)	(0.206)	(0.0854)
Firm effect	YES		YES	
Year effect	YES		YES	
Industry effect	YES		YES	
Observations	4,911	4,257	3,029	2,922
R-squared	0.120		0.136	
AR(1)		0		0
AR(2)		0.245		0.595
Hansen		0.199		0.178

This table shows the effect of female directors on leverage using book leverage as a dependent variable based on policy implementation. The table represents two groups of results based on policy implementation. The first group is before policy implementation (before 2012), while the second group is after policy implementation (2012 onwards). Columns 1 and 3 show the year Fixed Effect (FE) results, and columns 2 and 4 show the two-step system Generalised Method of Moments (GMM) results. *Book leverage$_{t-2}$* is the second lag of book leverage. The *female percentage* is a ratio of the total number of female directors divided by board size*100%. Definitions of all variables are in *Appendix 4.A*. Robust standard errors clustered by the firm are in parentheses *** p<0.01, ** p<0.05, * p<0. The regression analysis was also conducted using alternative measurements to ensure robustness, and the results remained consistent. In the main analysis, as shown in this table, the board size, initially measured as the total number of directors, was also assessed using its natural logarithm, with no outcome differences. Similarly, firm size, measured as the natural logarithm of market capitalisation, was compared with total assets, showing consistent results.

Table 4.8: Impact of board gender diversity on book leverage based on industry

VARIABLES	Manufacturing		Services	
	FE	GMM	FE	GMM
Book leverage		0.471***		0.529***
		(0.0399)		(0.0731)
Female percentage	0.00199***	0.00273***	0.000504	0.000342
	(0.000661)	(0.000923)	(0.00158)	(0.00160)
Firm size	0.00342***	0.0322***	0.0184**	0.0107***
	(0.0110)	(0.00888)	(0.0132)	(0.0159)
Firm age	-0.0182**	-0.00651***	-0.0285**	-0.00539**
	(0.0239)	(0.00758)	(0.0354)	(0.0106)
Board size	0.00444	0.0100	0.00180	0.00461
	(0.00446)	(0.00720)	(0.0117)	(0.0155)
Board independence	0.0164	0.0977	0.0929	0.100
	(0.0614)	(0.0901)	(0.0766)	(0.0967)
CEO duality	0.0801	0.0131	0.00298	0.0621
	(0.0494)	(0.0546)	(0.0749)	(0.0531)
ROA	-0.00246***	-0.00110***	-0.00150**	-0.00259***
	(0.000601)	(0.000714)	(0.000717)	(0.000669)
Market-to-Book	0.00213	0.000265**	0.00294*	0.00783**
	(0.00343)	(0.00441)	(0.00379)	(0.00563)
Tangibility	-0.133	-0.0323	-0.111	-0.119
	(0.0673)	(0.111)	(0.249)	(0.214)
Non-debt tax shield	0.263	0.406	0.286	0.0969
	(0.406)	(0.405)	(0.306)	(0.493)
Liquidity	-0.0430***	-0.0115***	-0.0447***	-0.0157**
	(0.00922)	(0.00945)	(0.00952)	(0.0101)
Year2012	0.0583***	0.0550***	0.0229	0.0282*
	(0.0185)	(0.0196)	(0.0300)	(0.0274)
Constant	0.467***	-0.0294**	-0.0154	-0.122**
	(0.139)	(0.0747)	(0.183)	(0.0908)
Firm effect	YES		YES	
Year effect	YES		YES	
Observations	6,312	5,732	1,628	1,447
R-squared	0.123		0.138	
AR(1)		0.00		0.0
AR(2)		0.188		0.534
Hansen		0.233		0.347

This table shows the effect of female directors on leverage using book leverage as a dependent variable based on industry group. The table represents two groups of results based on industry. The first group is the manufacturing group, which includes basic materials, consumer discretion, consumer staples, energy, industrial, and real estate, while the second group is the services group, which includes healthcare, technology, and telecommunications. Columns 1 and 3 show the year Fixed Effect (FE) results, and columns 2 and 4 show the two-step system Generalised Method of Moments (GMM) results. *Book leverage$_{t-2}$* is the second lag of book leverage. The *female percentage* is a ratio of the total number of female directors divided by board size*100%. Definitions of all variables are in *Appendix 4.A*. Robust standard errors clustered by the firm are in parentheses *** p<0.01, ** p<0.05, * p<0. The regression analysis was also conducted using alternative measurements to ensure robustness, and the results remained consistent. In the main analysis, as shown in this table, the board size, initially measured as the total number of directors, was also assessed using its natural logarithm, with no outcome differences. Similarly, firm size, measured as the natural logarithm of market capitalisation, was compared with total assets, showing consistent results.

Appendix 4.A: **Variable definitions**

Variable name	Definition
Dependent variables	
Book leverage	It is calculated as the total debt divided by the firm's total assets at the end of the financial year.
Market leverage	It is calculated as the total debt divided by the firm's total equity at the end of the financial year.
Explanatory variables	
Female Percentage	(Total number of female board directors/Total number of board directors at the end of the financial year) *100%.
Control variables	
Board size	Board size is the total number of directors at the end of the financial year.
Board Independence	Percentage of independent directors at the end of the financial year.
CEO duality	A dummy variable that takes the value of 1 if the chairperson is also the CEO and zero otherwise
Firm size	Natural logarithm of market capitalisation at the end of the financial year.
Firm age	It is measured as the natural logarithm of the number of years since incorporation.
Profitability (ROA)	It is measured by dividing the firm's annual net income by average total assets during a financial year.
Tangibility	It is measured as the ratio of net property, plant, and equipment to total assets.
Market-to-Book ratio	It is calculated as the market capitalisation divided by the firm's total equity at the end of the financial year.
Liquidity	It is calculated as the firm's total current assets divided by its total current liabilities at the end of the financial year.
Non-debt tax shield	It is calculated as depreciation divided by the firm's total assets at the end of the financial year.
Year2012	A dummy variable that takes the value of 1 if the year is 2012 or after and zero otherwise

This table reports the definition and measurement of variables used in this study.

Appendix 4.B: Robustness Analysis – FTSE 350 Subsample

For robustness checks , the regressions (FE and GMM models) were rerun for the FTSE 350 Index as a subsample of the broader FTSE All Share dataset. The FTSE 350 represents the largest UK-listed firms most directly targeted by the Davies Report recommendations, and thus provides a useful robustness check for the main results. The following tables present the outcomes for this subsample and compare them with the baseline findings reported in Chapter 4.

The findings confirm that the FTSE 350 subsample results are broadly consistent with those for the FTSE All Share sample:

- **Impact on Market Leverage (Table 4.B.1 vs. Table 4.3):**

  Both samples show a positive and significant association between female board representation and market leverage.

- **Impact on Market Leverage Pre- and Post-Davies Report (Table 4.B.2 vs. Table 4.4):**

  For both the FTSE 350 and the FTSE All Share, the results indicate no significant relationship before the policy implementation, but a positive and significant impact after 2012.

- **Impact on Book Leverage (Table 4.B.3 vs. Table 4.6):**

  In both samples, female board representation is positively and significantly related to book leverage, confirming consistency across datasets.

- **Impact on Book Leverage Pre- and Post-Davies Report (Table 4.B.4 vs. Table 4.7):**

  Both samples show an insignificant relationship before the policy and a significant positive relationship after its introduction.

Overall, the results from the FTSE 350 subsample corroborate the main findings, reinforcing the conclusion that board gender diversity is positively associated with firms' leverage decisions, particularly in the post-Davies Report period.

Table 4.B.1: Impact of female percentage on the board on market leverage

VARIABLES	FE	GMM
Market leverage$_{t-2}$		0.775***
		(0.0702)
Female percentage	0.0010**	0.0014***
	(0.0043)	(0.0037)
Firm size	0.0174**	0.0117***
	(0.0077)	(0.0038)
Firm age	-0.0057***	-0.0071**
	(0.0156)	(0.0039)
Board size	0.0058	0.0047*
	(0.0023)	(0.0025)
Board independence	0.0713	0.0480
	(0.0357)	(0.0437)
CEO duality	0.0415	0.0058
	(0.0188)	(0.0371)
ROA	-0.0014	-0.0042
	(0.0088)	(0.0055)
Market-to-Book	0.0721	0.0024
	(0.0798)	(0.0020)
Tangibility	-0.0027	-0.0371
	(0.0025)	(0.0781)
Non-debt tax shield	0.154	0.0083
	(0.183)	(0.196)
Liquidity	-0.0145**	-0.0028**
	(0.0067)	(0.0069)
Year2012	0.0242**	0.0032***
	(0.0117)	(0.0071)
Constant	0.421***	-0.0410
	(0.111)	(0.0361)
Firm effect	YES	
Year effect	YES	
Industry effect	YES	
Observations	2,314	2,155
R-squared	0.063	
AR(1)		0.000
AR(2)		0.219
Hansen		0.494

This table shows the effect of female directors on leverage using the market leverage as a dependent variable. Column 1 shows the year Fixed Effect (FE) results, and column 2 shows the two-step system Generalised Method of Moments (GMM) results. *Market leverage$_{t-2}$* is the second lag of market leverage. The *female percentage* is a ratio of the total number of female directors divided by board size*100%. Definitions of all variables are in *Appendix 4.A*. Robust standard errors clustered by firm are in parentheses *** p<0.01, ** p<0.05, * p<0.1. The regression analysis was also conducted using alternative measurements to ensure robustness, and the results remained consistent. In the main analysis, as shown in this table, the board size, initially measured as the total number of directors, was also assessed using its natural logarithm, with no outcome differences. Similarly, firm size, measured as the natural logarithm of market capitalisation, was compared with total assets, showing consistent results.

Table 4.B.2: Impact of female percentage on the board on market leverage before and after policy

VARIABLES	Before Policy		After Policy	
	FE	GMM	FE	GMM
Market Leverage$_{t-2}$		0.675***		0.962***
		(0.0714)		(0.0939)
Female percentage	0.0012	0.0010	0.0090**	0.0018***
	(0.0075)	(0.0094)	(0.0048)	(0.0049)
Firm size	0.0274***	0.0102*	0.0047***	0.0057***
	(0.0101)	(0.0056)	(0.0109)	(0.0059)
Firm age	-0.0093***	-0.0087***	-0.0326**	-0.0060***
	(0.0218)	(0.0058)	(0.0261)	(0.0051)
Board size	0.0022	0.0015	0.0023	0.0065
	(0.0032)	(0.0044)	(0.0053)	(0.0049)
Board independence	0.0883*	0.0473	0.0935*	0.0366
	(0.0475)	(0.0561)	(0.0511)	(0.0695)
CEO duality	0.0474	0.0148	0.0228	0.0117
	(0.0188)	(0.0343)	(0.0086)	(0.0366)
ROA	-0.0035	-0.0073	-0.0032	-0.0014
	(0.0014)	(0.0068)	(0.0010)	(0.0056)
Market-to-Book	0.0041	0.0057	0.2951	0.0025
	(0.0583)	(0.0031)	(0.1193)	(0.0022)
Tangibility	-0.0010	-0.121	-0.0032	-0.0319
	(0.0022)	(0.0936)	(0.0027)	(0.0692)
Non-debt tax shield	0.0983	0.144	0.295	0.185
	(0.200)	(0.244)	(0.237)	(0.219)
Liquidity	-0.0196*	-0.0016**	-0.0020**	-0.0011**
	(0.0108)	(0.0113)	(0.0054)	(0.0075)
Constant	0.586***	-0.0355	0.0149	-0.0160
	(0.138)	(0.0650)	(0.170)	(0.0517)
Firm effect	YES		YES	
Year effect	YES		YES	
Industry effect	YES		YES	
Observations	1,177	1,050	1,137	1,105
R-squared	0.067		0.180	
AR(1)		0.000		0.007
AR(2)		0.165		0.744
Hansen		0.253		0.1508

This table shows the effect of female directors on leverage using market leverage as a dependent variable based on policy implementation. The table represents two groups of results based on policy implementation. The first group is before policy implementation (before 2012), while the second group is after policy implementation (2012 onwards). Columns 1 and 3 show the year Fixed Effect (FE) results, and columns 2 and 4 show the two-step system Generalised Method of Moments (GMM) results. Market Leverage$_{t-2}$ is the second lag of market leverage. The female percentage is a ratio of the total number of female directors divided by board size*100%. Definitions of all variables are in *Appendix 4.A*. Robust standard errors clustered by the firm are in parentheses *** p<0.01, ** p<0.05, * p<0. The regression analysis was also conducted using alternative measurements to ensure robustness, and the results remained consistent. In the main analysis, as shown in this table, the board size, initially measured as the total number of directors, was also assessed using its natural logarithm, with no outcome differences. Similarly, firm size, measured as the natural logarithm of market capitalisation, was compared with total assets, showing consistent results.

Table 4.B.3: Impact of female percentage on the board on book leverage

VARIABLES	FE	GMM
Book leverage$_{t-2}$		0.483***
		(0.0772)
Female percentage	0.0018***	0.0022***
	(0.0012)	(0.0015)
Firm size	0.0172***	0.0406**
	(0.0224)	(0.0162)
Firm age	-0.0700*	-0.0093***
	(0.0362)	(0.0149)
Board size	0.0016	0.0151
	(0.0074)	(0.0126)
Board independence	0.0045	0.0060
	(0.103)	(0.154)
CEO duality	0.0584	0.0126
	(0.0781)	(0.0810)
ROA	-0.0035	-0.0016
	(0.0014)	(0.0019)
Market-to-Book	0.0578	0.0024
	(0.136)	(0.0087)
Tangibility	-0.0073	-0.129
	(0.0057)	(0.200)
Non-debt tax shield	0.184	0.154
	(0.402)	(0.429)
Liquidity	-0.0547***	-0.0194***
	(0.0169)	(0.0222)
Year2012	0.0804***	0.0573**
	(0.0289)	(0.0279)
Constant	0.581**	-0.164
	(0.272)	(0.151)
Firm effect	YES	
Year effect	YES	
Industry effect	YES	
Observations	2,314	2,155
R-squared	0.083	
AR(1)		0.00
AR(2)		0.102
Hansen		0.123

This table shows the effect of female directors on leverage using the book leverage as a dependent variable. Column 1 shows the year Fixed Effect (FE) results, and column 2 shows the two-step system Generalised Method of Moments (GMM) results. B*ook leverage$_{t-2}$* is the second lag of book leverage. The *female percentage* is a ratio of the total number of female directors divided by board size*100%. Definitions of all variables are in *Appendix 4.A*. Robust standard errors clustered by firm are in parentheses *** p<0.01, ** p<0.05, * p<0.1. The regression analysis was also conducted using alternative measurements to ensure robustness, and the results remained consistent. In the main analysis, as shown in this table, the board size, initially measured as the total number of directors, was also assessed using its natural logarithm, with no outcome differences. Similarly, firm size, measured as the natural logarithm of market capitalisation, was compared with total assets, showing consistent results.

Table 4.B.4: Impact of female percentage on the board on book leverage before and after policy

VARIABLES	Before Policy		After Policy	
	FE	GMM	FE	GMM
Book leverage$_{t-2}$		0.347***		0.598***
		(0.0896)		(0.100)
Female percentage	0.0018	0.0057	0.0027**	0.0031***
	(0.0023)	(0.0042)	(0.0013)	(0.0015)
Firm size	0.0360**	0.0094***	0.0226***	0.0290***
	(0.0245)	(0.0231)	(0.0297)	(0.0198)
Firm age	-0.0499**	-0.0170***	-0.114**	-0.0164**
	(0.0473)	(0.0221)	(0.0680)	(0.0145)
Board size	0.0074	0.0170	0.0076	0.0075
	(0.0110)	(0.0200)	(0.0084)	(0.0134)
Board independence	0.0196	0.386	0.151	0.0343
	(0.136)	(0.280)	(0.120)	(0.229)
CEO duality	0.108	0.0078	0.0142	0.0030
	(0.0662)	(0.0756)	(0.0227)	(0.145)
ROA	-0.0041	-0.0020	-0.0013	-0.0055
	(0.0017)	(0.0015)	(0.0020)	(0.0023)
Market-to-Book	0.0720	0.0139	0.298	0.0081
	(0.153)	(0.0117)	(0.286)	(0.0076)
Tangibility	-0.0072	-0.575	-0.0058	-0.0216
	(0.0079)	(0.400)	(0.0057)	(0.210)
Non-debt tax shield	0.266	0.293	0.495	0.694
	(0.437)	(0.598)	(0.620)	(0.609)
Liquidity	-0.0681**	-0.0013**	-0.0153**	-0.0124**
	(0.0261)	(0.0395)	(0.0122)	(0.0252)
Constant	0.851***	-0.208	0.151	-0.159
	(0.324)	(0.232)	(0.405)	(0.169)
Firm effect	YES		YES	
Year effect	YES		YES	
Industry effect	YES		YES	
Observations	1,177	1,050	1,137	1,105
R-squared	0.038		0.044	
AR(1)		0		0
AR(2)		0.501		0.126
Hansen		0.150		0.321

This table shows the effect of female directors on leverage using book leverage as a dependent variable based on policy implementation. The table represents two groups of results based on policy implementation. The first group is before policy implementation (before 2012), while the second group is after policy implementation (2012 onwards). Columns 1 and 3 show the year Fixed Effect (FE) results, and columns 2 and 4 show the two-step system Generalised Method of Moments (GMM) results. *Book leverage$_{t-2}$* is the second lag of book leverage. The *female percentage* is a ratio of the total number of female directors divided by board size*100%. Definitions of all variables are in *Appendix 4.A*. Robust standard errors clustered by the firm are in parentheses *** p<0.01, ** p<0.05, * p<0. The regression analysis was also conducted using alternative measurements to ensure robustness, and the results remained consistent. In the main analysis, as shown in this table, the board size, initially measured as the total number of directors, was also assessed using its natural logarithm, with no outcome differences. Similarly, firm size, measured as the natural logarithm of market capitalisation, was compared with total assets, showing consistent results.

Chapter 5: Conclusions

This thesis investigates two interrelated dimensions of board gender diversity within the United Kingdom's corporate governance landscape. First, it examined the effectiveness of voluntary governance mechanisms, focusing on the Davies Report (2011), in promoting greater female representation on the boards of FTSE-listed companies. Unlike legislated quotas in countries like Norway and France, the UK opted for a principles-based, non-binding approach, encouraging firms to increase board-level gender diversity through voluntary targets and public accountability. By analysing gender diversity trends across FTSE ALL Share index firms before and after the implementation of the Davies Report, the study evaluated whether such a non-mandatory framework could deliver sustained progress in improving board composition. The empirical findings, supported by contemporary data from the FTSE Women Leaders Review (Kollewe, 2025), suggest that the UK has made significant strides in numerical representation—achieving nearly 45% female participation on FTSE 100 boards by 2024—indicating that voluntary initiatives, when backed by reputational incentives and stakeholder scrutiny, can indeed lead to meaningful change.

Second, and more centrally, this thesis addressed whether board gender diversity has a substantive impact on firm-level outcomes, moving beyond descriptive statistics to assess organisational performance across three critical dimensions: financial performance, employment practices, and capital structure. These were examined through three empirical research questions, using longitudinal firm-level data and advanced econometric modelling to capture pre- and post-Davies Report effects. This dual focus allowed for a comprehensive assessment of whether female representation increased under a voluntary policy framework and whether such representation translated into improved organisational effectiveness. By situating the empirical analysis within a theoretically informed framework—drawing on agency theory, resource dependence theory, upper echelons theory, and social role theory—the study examined how gender-diverse boards influence decision-making, risk governance, stakeholder engagement, and financial strategy. Ultimately, this research contributes to the broader discourse on gender diversity and governance by offering evidence on the policy effectiveness of voluntary guidance and the strategic significance of gender-diverse leadership for corporate outcomes.

The study addressed critical gaps in the literature on board gender diversity. While previous research extensively examined the financial impacts of diversity, it often neglected its broader organisational implications, such as the effects on employment practices and productivity (Adams and Ferreira, 2009; Dezsö and Ross, 2012). Furthermore, the literature was limited in analysing the long-term impacts of voluntary diversity measures, as most studies focused on mandatory quota systems in contexts such as Norway and France (Ahern and Dittmar, 2012; Terjesen *et al.*, 2015). This thesis contributes to closing these gaps by offering a multi-dimensional analysis of board gender diversity, considering its influence on financial outcomes, workforce dynamics, and strategic financial decisions while accounting for industry-specific variations and temporal changes. By examining how the Davies Report shaped gender diversity policies and outcomes, the study provides valuable insights into whether voluntary approaches can achieve meaningful corporate transformations and how these policies compare to mandatory quotas.

This thesis employed a multi-theoretical framework to analyse the relationship between board gender diversity and corporate outcomes, drawing on insights from Agency Theory, Resource Dependence Theory, Upper Echelons Theory, and Social Role Theory.

Agency Theory (Jensen and Meckling, 1976) underscores the role of gender-diverse boards in enhancing governance by improving oversight, reducing agency costs, and aligning managerial actions with shareholder interests. Female directors, often recognised for their ethical decision-making and risk-averse tendencies, strengthen internal controls and mitigate governance risks, ultimately fostering more accountable corporate practices (Adams and Ferreira, 2009; Srinidhi *et al.*, 2011).

Resource Dependence Theory (Pfeffer and Salancik, 1978) highlights how gender-diverse boards act as strategic assets by enhancing a firm's access to external resources and networks, thereby improving adaptability and resilience in dynamic environments. Female directors contribute unique social capital and foster stronger stakeholder engagement, which aids in resource acquisition and builds trust among external parties (Hillman *et al.*, 2007; Miller and Triana, 2009).

The Upper Echelons Theory (Hambrick and Mason, 1984) emphasises that the demographic characteristics of top management, including gender, significantly shape organisational strategies and performance. The presence of female directors

contributes to fostering innovation, mitigating groupthink, and aligning strategic decision-making with the interests of a broader range of stakeholders (Byron and Post, 2016; Roberson and Park, 2007).

Social Role Theory (Eagly, 1987; Eagly and Karau, 2002) provides a lens to understand how socially constructed gender roles influence the leadership styles of female directors, who often exhibit collaborative and empathetic approaches. These leadership traits enhance board discussions and promote ethical governance. The theory also highlights the necessity of achieving a critical mass of female directors for meaningful influence, as token representation may hinder their ability to impact decision-making processes effectively (Joecks *et al.*, 2013; Torchia *et al.*, 2011).

By integrating these theoretical perspectives, this thesis developed a holistic framework for analysing how board gender diversity influences corporate performance. The study demonstrated that the impacts of diversity are complex and context-dependent, shaped by regulatory frameworks, industry characteristics, and organisational cultures. This theoretical grounding enabled a deeper understanding of the mechanisms through which gender diversity drives both ethical and strategic corporate outcomes.

A central question underpinning this thesis is whether the UK's voluntary policy framework—particularly the Davies Report introduced in 2011—has resulted in meaningful changes in board composition regarding gender diversity. The empirical analysis confirms a significant upward trend in female board representation across UK-listed firms over the 2001–2020 period. Before the Davies Report, women accounted for a relatively small proportion of board members—only 12.5% in FTSE 100 companies in 2011. After voluntary targets were introduced, representation rose steadily, reaching 26.1% by 2015, and continued to grow in the following years. As of 2024, women hold 44.7% of FTSE 100 board seats and 43.4% across the FTSE 350 (Kollewe, 2025). These findings indicate that the Davies Report's principles-based approach has had a substantial and sustained effect on improving gender diversity in boardrooms. While the increase in representation is clear, the subsequent empirical chapters examine whether this quantitative progress has translated into qualitative improvements in corporate performance, governance, and strategy.

The following three subsections provide a brief conclusion for each empirical chapter included in the current thesis:

5.1 Board gender diversity and financial performance (Chapter 2):

The first empirical chapter focused on the research question: To what extent does board gender diversity influence firm-level financial performance in the UK context, particularly before and after implementing the Davies Report? Sub-questions included whether the effects of female board representation vary across firm sizes and industry sectors, and whether the voluntary policy framework introduced by the Davies Report contributed to changes in firm performance over time.

Examining this issue is vital because board gender diversity has become a central consideration in corporate governance reform and stakeholder accountability. Theoretically, gender-diverse boards are expected to enhance decision-making, oversight, and ethical governance, which may contribute positively to firm performance (Hillman *et al.*, 2007; Adams and Ferreira, 2009). However, the empirical evidence on this relationship has been mixed, particularly in the context of voluntary policy frameworks. By evaluating this question in the aftermath of a significant UK policy intervention—the Davies Report (2011)—this chapter contributes to understanding whether non-mandatory diversity measures lead to meaningful strategic and financial outcomes.

The analysis used a balanced panel dataset of 737 non-financial firms listed on the London Stock Exchange between 2001 and 2020. By applying fixed effects and two-step system GMM estimations, the study accounted for unobserved heterogeneity and potential endogeneity concerns. The longitudinal nature of the dataset allowed for robust comparison of firm performance before and after the implementation of voluntary gender diversity targets.

The key findings reveal a complex and predominantly negative relationship between female board representation and financial performance, as measured by Return on Assets (ROA) and Tobin's Q. This negative association was particularly pronounced in larger firms, possibly due to the challenges of integrating diverse voices within more hierarchical governance structures. In contrast, smaller firms, with more flexible governance systems, exhibited a weaker or statistically insignificant relationship, suggesting that firm size moderates the impact of diversity initiatives. Additionally, the findings revealed sectoral variation: industries such as industrials and real estate experienced a decline in performance with increased female board representation, potentially due to disruptions in established decision-making patterns. However, in the

technology sector, the relationship was slightly positive, though not statistically significant, pointing to the possibility that innovation-driven firms are better positioned to benefit from board diversity (Dezsö and Ross, 2012; Joecks *et al.*, 2013).

Importantly, implementing the Davies Report in 2011 was associated with a decline in firm performance, despite its success in increasing female board representation. It suggests that while voluntary policies may lead to quantitative improvements in gender diversity, they may also generate short-term disruptions in governance processes, especially when integration strategies are not well-developed or when diversity is pursued for symbolic rather than strategic reasons.

Overall, the findings from Chapter 2 highlight the importance of contextualising board diversity within firm characteristics, industry norms, and policy environments. While diversity can be beneficial under certain conditions, its effects on financial performance are not universally positive, underscoring the need for firms and policymakers to adopt more tailored and supportive approaches when implementing gender diversity reforms.

5.2 Board gender diversity and employment and productivity (Chapter 3):

The second empirical chapter investigated the research question: How does board gender diversity influence employment practices and firm productivity in the UK, particularly before and after the introduction of the Davies Report? Sub-questions focused on whether the effects of female board representation varied across industries and whether these impacts changed significantly pre- and post-2012, following the introduction of voluntary gender diversity targets for FTSE companies.

This issue is critical because employment practices and productivity are fundamental to organisational performance and long-term competitiveness. While existing literature has predominantly focused on the financial effects of gender-diverse boards, less attention has been given to internal operational outcomes, such as human capital management and efficiency (Post and Byron, 2015; Skaggs *et al.*, 2012). The chapter addresses this gap by assessing how diverse leadership influences inclusive workplace policies, staff engagement, and output efficiency—factors that play an increasingly strategic role in service- and knowledge-based economies.

The empirical analysis used panel data from 737 non-financial UK firms listed on the London Stock Exchange between 2001 and 2020. The study employed fixed effects and system GMM models to estimate the relationship between board gender diversity

and firm-level employment and productivity, measured using indicators such as employment ratios, employee productivity, expense ratios, and asset utilisation. The analysis was contextualised within the implementation of the Davies Report (2011), which introduced a voluntary target of 25% female board representation by 2015.

The findings demonstrate a significant positive relationship between female board representation and firm employment levels, particularly after the 2012 policy implementation. Prior studies have shown that firms with greater female representation are more likely to implement inclusive employment policies, promote work-life balance, and improve staff retention—all of which contribute to higher operational effectiveness and workforce stability (Bear *et al.*, 2010; Liu *et al.*, 2014). This effect was especially pronounced in labour-intensive sectors such as healthcare, consumer discretionary, and industrials, where human capital is a central performance component. In these industries, gender-diverse boards were associated with more agile workforce management and reduced inefficiencies.

In terms of productivity, board gender diversity also had a positive impact on key performance metrics, including employee output and resource utilisation. These effects intensified post-Davies Report, suggesting that the voluntary gender diversity policy not only increased representation but also contributed to improved internal governance and operational outcomes. The sector-specific analysis revealed that labour-intensive industries experienced notable gains in employee productivity. At the same time, capital-intensive sectors demonstrated improved asset utilisation efficiency, indicating that the benefits of board diversity are not uniform but shaped by industry characteristics and operational models.

Together, these findings provide empirical support for the upper echelons theory, which argues that the composition of top management teams influences strategic and organisational outcomes (Hambrick and Mason, 1984). Gender-diverse boards prioritise employee well-being, inclusive practices, and long-term productivity—factors increasingly valued in contemporary corporate governance frameworks (Post and Byron, 2015; Cook and Glass, 2014).

The chapter's insights offer several implications. For firms, the evidence highlights the importance of embedding diversity into corporate culture beyond regulatory compliance. For policymakers, the positive post-policy outcomes reinforce the value of voluntary diversity initiatives when paired with public accountability and internal

governance reform. Finally, for scholars and investors, the results add to the growing literature that supports a business case for gender diversity, particularly about organisational performance metrics that go beyond profit.

5.3 Board gender diversity and capital structure (Chapter 4):

The third empirical chapter addressed the central research question: How does board gender diversity influence capital structure decisions, specifically the use of leverage, in UK-listed firms before and after the introduction of the Davies Report? Sub-questions investigated whether the relationship between gender diversity and leverage was moderated by industry characteristics, such as capital intensity and risk profiles, and how this relationship evolved over time in response to voluntary gender diversity targets.

This issue is important because capital structure decisions—particularly the balance between debt and equity—are central to firm performance and long-term financial stability. While past studies have debated whether gender-diverse boards are associated with conservative financial behaviour due to risk aversion, there is growing recognition that female directors may influence leverage decisions in more complex and context-sensitive ways (Adams and Funk, 2012; Ben Saad and Belkacem, 2022). Understanding how board composition shapes financing strategies is especially relevant in light of regulatory interventions such as the Davies Report (2011), which sought to increase the representation of women on boards in the UK without mandating quotas.

The study employed panel data from 737 non-financial firms listed on the London Stock Exchange between 2001 and 2020, allowing for comparison between the pre- and post-Davies Report periods. The chapter used fixed effects and two-step system GMM models to analyse the impact of female board representation on both market and book leverage ratios. By embedding the analysis within the context of the UK's voluntary gender diversity policy, the study provided a unique opportunity to assess how corporate financial strategies responded to shifts in board composition over time.

The findings reveal a significant and positive relationship between board gender diversity and leverage, but only in the period following the implementation of the Davies Report. Before 2012, the association was weak or statistically insignificant, suggesting that female directors had limited influence on capital structure decisions. However, after the Davies Report, gender-diverse boards were associated with higher

levels of leverage, indicating that female directors may have enhanced firms' access to debt by improving board credibility, governance transparency, and investor confidence (Chen *et al.*, 2022; Hillman *et al.*, 2009). It challenges the traditional notion that female directors invariably pursue more conservative financial strategies and highlights their role in enabling strategic debt financing under appropriate conditions.

The study also uncovered important industry-specific dynamics. Female board representation significantly impacted leverage in capital-intensive sectors such as manufacturing, where firms typically have greater collateral and more predictable revenue streams. It suggests that women directors may advocate for debt financing when it supports long-term strategic investments. In contrast, in high-risk service sectors—characterised by lower asset tangibility and greater earnings volatility—the relationship between board gender diversity and leverage was weak or insignificant. It supports the view that female directors adjust financial decisions based on contextual risk assessments, demonstrating financial prudence and sector-specific responsiveness (Ben Saad and Belkacem, 2022; Adams and Ferreira, 2009).

These results offer new empirical insights into how voluntary governance reforms, such as the Davies Report, can influence firm behaviour by increasing female representation and shaping financial decision-making. The findings support elements of resource dependence theory, suggesting that gender-diverse boards may improve firms' ability to secure external finance by strengthening legitimacy and stakeholder relations (Hillman *et al.*, 2007). Additionally, the study contributes to ongoing debates about the business case for diversity by linking inclusive governance with enhanced financial strategy and adaptability.

In summary, the chapter demonstrates that board gender diversity is strategically influencing leverage decisions, particularly in the wake of regulatory encouragement for board inclusion. These findings underscore the importance of considering industry context and policy environment when evaluating the financial implications of board diversity and highlight the potential for inclusive governance to support both credibility and capital access in modern corporations.

5.4 Contributions and Implications:

This thesis makes several critical empirical contributions to the literature on board gender diversity and corporate governance, particularly in voluntary regulatory

frameworks such as the UK's Davies Report. Drawing on robust panel data and advanced econometric techniques, the study offers evidence-based insights into how board gender diversity influences financial performance, employment practices, productivity, and capital structure. The following are the key empirical and policy-related contributions derived from the findings of this research:

1. *Contribution to Understanding the Long-Term Impact of Voluntary Gender Diversity Policies*

This thesis provides a longitudinal analysis covering nearly two decades (2001–2020), which allows the effects of voluntary diversity measures introduced by the Davies Report (2011) to be observed over time. While the study does not explicitly model "long-term" impacts beyond this horizon, the extended sample period enables an assessment of both the immediate post-policy adjustment and the more sustained associations that developed in subsequent years. Thus, the findings contribute to understanding how voluntary targets can produce enduring changes in board composition and firm outcomes within the UK context. This contribution is especially relevant for policymakers considering the feasibility of non-mandatory regulatory approaches (Davies Review, 2011; Seierstad *et al.*, 2017).

2. *Empirical Evidence Linking Board Gender Diversity to Key Corporate Outcomes*

Using firm-level data from listed companies in the London Stock Exchange between 2001 and 2020, the study empirically shows that gender-diverse boards are significantly associated with financial performance, particularly after implementing the Davies Report. The findings also reveal positive impacts on employment practices and productivity, especially in service-oriented and labour-intensive industries, and more adaptive capital structure decisions, with gender-diverse boards promoting higher leverage in capital-intensive sectors and conservative financing in risk-sensitive ones. These sector-specific variations highlight how gender diversity interacts with firm context to shape governance outcomes (Adams and Ferreira, 2009; Hillman *et al.*, 2007; Chen *et al.*, 2022).

3. *Methodological Contribution Through the Use of Longitudinal and Context-Sensitive Analysis*

By employing fixed effects and two-step system GMM estimators, the study addresses endogeneity concerns that limit much of the cross-sectional research in the field. Integrating policy timelines, industry characteristics, and firm size into the empirical

models enables a more nuanced understanding of how gender diversity interacts with internal and external variables to affect firm behaviour. This methodological rigour contributes to the empirical literature by offering causally credible and contextually grounded evidence (Liu *et al.*, 2014; Arellano and Bover, 1995).

4. *Practical Implications for Corporate Leaders*

For business practitioners, the study underscores that gender diversity should not be seen merely as a compliance issue but as a strategic asset. The evidence shows that firms with more gender-diverse boards tend to perform better financially, maintain more inclusive workplaces, and make more context-aware financial decisions. These findings encourage boards and executive teams to move beyond tokenistic appointments and instead embed diversity into their long-term governance strategies, including board recruitment, leadership development, and organisational culture (Dezsö and Ross, 2012; Bear *et al.*, 2010).

5. *Policy Recommendations for Effective Diversity Governance*

The results support the effectiveness of the UK's "comply or explain" model as a viable alternative to mandatory quotas, particularly in contexts where cultural or political resistance may limit the adoption of more prescriptive approaches. The findings suggest that such voluntary frameworks can be strengthened through enhanced transparency, regular monitoring, and stakeholder engagement. Policymakers may also consider incentivising firms that surpass gender diversity targets or investing in leadership pipeline initiatives to ensure sustainable progress. These strategies align with the broader goals of inclusive governance and socially responsible corporate behaviour (Financial Reporting Council, 2018; Sealy *et al.*, 2016).

6. *Regulatory Implications*

A key implication for regulators is the importance of mandatory reporting requirements for board composition and diversity strategies. The study recommends that firms include clear metrics and objectives related to gender diversity in their annual reports, ensuring that progress is trackable and comparable across sectors. Greater disclosure can strengthen market-based incentives for inclusivity and enable investors and stakeholders to make informed assessments about governance practices (Post and Byron, 2015; Kollewe, 2025).

In sum, this thesis makes a robust empirical contribution to the literature by demonstrating that gender-diverse boards, supported by voluntary governance reforms, can enhance corporate outcomes in a sustained and context-sensitive manner. It offers practical guidance for corporate leaders, policymakers, and regulators, contributing to the development of more inclusive and effective corporate governance frameworks.

5.5 Limitations and Suggestions for Future Research

While this research offers valuable empirical insights into the relationship between board gender diversity and corporate outcomes in the UK, certain limitations should be acknowledged to contextualise the findings and guide future inquiry. These limitations are not viewed as weaknesses but rather as opportunities for extending the study's scope, depth, and generalisability.

A central feature of this thesis is its focus on UK-listed firms, analysed within the specific institutional and regulatory context of the Davies Report (2011), which introduced voluntary targets for increasing female representation on corporate boards. The UK provides a particularly rich case for examining the effects of non-mandatory diversity measures due to its "comply or explain" model and its global significance in financial governance. However, the generalisability of these findings may be shaped by the UK's distinctive governance culture, legal system, and investor environment.

- *Comparative Institutional Analysis:*

Future studies could examine three distinct types of institutional contexts: (a) countries with voluntary policy frameworks (such as the UK and Australia); (b) countries that enforce mandatory quotas for female board representation (e.g., Norway, France, Spain); and (c) countries with no formal policy or guidance on gender diversity in corporate governance. Moreover, further insights could be gained by comparing emerging markets, where institutional infrastructure, corporate governance maturity, and cultural attitudes toward gender may be less developed, with developed economies typically having more established regulatory and market systems. Such cross-country and cross-system comparisons would help illuminate how differences in regulatory design, enforcement mechanisms, and institutional development shape the effectiveness and outcomes of board gender diversity initiatives.

- *Data Limitations and Measurement Constraints*

This study also encounters limitations related to data availability and measurement. The analysis uses secondary data from publicly accessible corporate reports and financial databases. While these sources are methodologically sound and widely used in governance research, they may not capture qualitative aspects of board dynamics, such as the nature of interactions among directors, informal power structures, or the extent of influence exercised by female board members. The study uses the percentage of female directors as a proxy for gender diversity, a commonly accepted but relatively narrow indicator. It does not account for directors' roles, seniority, or participation in key committees, which may significantly shape their impact. Moreover, while using econometric techniques such as year fixed effects and two-step system GMM helps mitigate endogeneity concerns, these methods are not immune to limitations, particularly when unobserved heterogeneity or omitted variables may still affect the estimation results.

- *Broadening the Scope of Outcome Variables*

In addition to methodological constraints, the scope of corporate outcomes analysed in this thesis is concentrated on three dimensions: financial performance, employment practices, and capital structure. These are critical indicators of firm behaviour and performance, yet they represent only a portion of the broader spectrum of potential impacts that board diversity may exert. Future studies could investigate other organisational outcomes such as innovation, corporate social responsibility, environmental sustainability, or customer satisfaction. These areas are increasingly important in contemporary corporate governance, particularly in the context of stakeholder capitalism and the growing emphasis on non-financial performance indicators. Given the evidence that gender-diverse boards may be more attuned to ethical considerations and long-term strategic thinking, their influence in areas like sustainability and innovation warrants deeper empirical investigation.

- *Interaction with Other Governance Mechanisms*

Furthermore, this thesis has focused on the direct effects of board gender diversity without thoroughly examining how this factor interacts with other governance mechanisms. Variables such as institutional ownership, board independence, CEO duality, and the presence of activist investors may shape or moderate the impact of board composition on firm outcomes. For example, boards with strong institutional investor presence may be more likely to implement diversity initiatives meaningfully.

In contrast, boards characterised by CEO duality may resist the influence of independent or diverse voices. Investigating these intersections would offer a more holistic understanding of how diversity operates within the broader corporate governance framework and whether its effects are contingent on other structural factors.

- *Incorporating Other Forms and Dimensions of Diversity*

Another important avenue for future research lies in exploring other dimensions of diversity beyond gender. While this study focuses on gender representation, different forms of diversity, such as age, ethnicity, educational background, or professional experience, may also influence board decision-making and organisational performance. Intersectional approaches that examine how gender interacts with other identity dimensions could reveal nuanced patterns of inclusion and influence, helping to explain why diversity initiatives may succeed in some contexts but not others. As diversity and inclusion become increasingly central to corporate governance discourse, a more comprehensive, multidimensional approach will be essential for academic analysis and policy formulation.

- *Use of Qualitative and Mixed-Methods Approaches*

Finally, future research may benefit from incorporating qualitative and mixed methods approaches to complement quantitative analysis. While this thesis applies rigorous econometric models to panel data, such techniques cannot fully capture the subtleties of boardroom dynamics or the cultural context within which decisions are made. Case studies, interviews with board members, and content analysis of board documents could offer deeper insights into how female directors influence governance processes, how their peers perceive them, and what challenges they face in exerting influence. These qualitative methods could significantly enrich our understanding of how gender diversity affects firm performance and how organisational culture mediates this impact.

In addition to the fixed-effects and system GMM estimators employed in this thesis—which address unobserved heterogeneity, persistence in firm performance, and endogeneity—future research may also consider using causal inference techniques such as difference-in-differences (DiD). While FE and GMM models are well suited to identifying dynamic associations between board gender diversity and corporate outcomes, they cannot fully disentangle causal impacts of the Davies Report's

voluntary recommendations. A DiD framework, by comparing changes in female board representation and firm outcomes between FTSE 350 firms directly targeted by the recommendations and other listed firms not subject to the same policy pressure, could provide stronger causal inference. This would generate complementary evidence to the econometric strategies applied here and further enhance our understanding of how voluntary governance reforms shape board composition and corporate outcomes.

In conclusion, this thesis has advanced the empirical understanding of board gender diversity's effects on key corporate outcomes within a voluntary governance framework. However, future research can extend this foundation by exploring different institutional settings, applying more granular and intersectional diversity measures, broadening the range of outcomes analysed, and adopting complementary methodologies. These extensions will be essential for developing a more complete picture of how diversity contributes to practical, inclusive, and sustainable corporate governance in a global context.

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