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CEO Gender and Firm Performance: Asymmetric Effects of Different Gender CEO Successions

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Abstract

It has been a subject of great debate amongst researchers in sociology, management, and corporate finance how much influence corporate executives can exert over organizational outcomes, and whether their personal values and attributes, such as gender, are reflected in the decisions they make, as proposed by the Upper Echelons Theory (Hambrick & Mason, 1984). As more legislation is introduced to increase the representation of women in leadership roles, Chief Executive Officer (CEO) turnover, particularly gendered transitions, continues to gain relevance and so it is crucial to understand the impact of these dynamics in corporations.

This dissertation aims to analyze the impact on firm performance of changes in CEO gender in the United States from 2000 to 2022. The study distinguishes between male-to-female and female-to-male transitions to examine and compare the outcomes of both events. To better isolate the causal effect, a Difference-in-Differences approach was employed, complemented by a matching procedure, with firms in which CEO gender remained unchanged during the same period serving as the control group.

The results show a positive, consistent, and statistically significant effect of the CEO transition from a man to a woman on firm performance, particularly in previously underperforming firms, whereas the reverse transition had no statistically significant impact. Overall, the results demonstrate that outcomes are asymmetric and depend on the direction of succession.

Keywords: corporate finance, firm performance, CEO succession, gender.

JEL-Codes: G30, G34, J16, M14, M41.

Resumo

Um dos debates centrais da sociologia, gestão, e finanças empresariais consiste em compreender até que ponto os executivos de uma empresa conseguem influenciar resultados organizacionais, nomeadamente, se os seus valores e atributos pessoais, como o género, se refletem nas decisões tomadas, conforme proposto pela Teoria dos Escalões Superiores (Hambrick & Mason, 1984). À medida que, por um lado, surge mais legislação com o intuito de aumentar a representatividade das mulheres em cargos de liderança; e, por outro, a rotatividade no cargo de *Chief Executive Officer* (CEO), particularmente entre géneros, se tem tornado mais relevante, torna-se crucial compreender o impacto destas dinâmicas nas empresas.

Esta dissertação tem como objetivo analisar transições de CEO com mudança no género, nos Estados Unidos, entre 2000 e 2022, e o seu impacto na performance das empresas. Este estudo distingue entre transições de homem para mulher e de mulher para homem, para melhor captar e comparar o impacto de ambos os eventos. Para isolar o efeito causal, foi implementada a abordagem diferença-em-diferenças, complementada por um procedimento de *matching*, recorrendo a empresas em que o género de CEO se manteve estável durante o mesmo período temporal como grupo de controlo.

Os resultados evidenciam um efeito positivo, consistente e estatisticamente significativo das transições de CEO de homem para mulher na performance da empresa, particularmente em empresas com desempenho abaixo da mediana pré-transição, enquanto que a transição inversa não apresenta qualquer impacto estatisticamente significativo. De forma geral, os resultados indicam que os efeitos são assimétricos e dependem do tipo da transição.

Palavras-chave: finanças empresariais, performance da empresa, sucessão de CEO, género.

Classificação JEL: G30, G34, J16, M14, M41.

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1. Introduction

Gender inequality endures as a long-standing, structural issue in society, with the World Economic Forum (2025) stating that it will take 123 years to successfully achieve full gender parity.

In the corporate domain, this gap is reinforced by gender-based stereotypes and discrimination (Heilman et al., 2024), and it translates into weakened economic resilience, lower levels of productivity and innovation, and underutilized talent. Despite the growing share of women in the labor market, which now represents around 41% of the overall workforce, their underrepresentation in leadership positions remains a concern, merely holding 28% of top-level management roles in 2025, which represents an increase lower than 3 p.p. since 2015. In the United States (U.S.), while the share of women in leadership positions increased, this was followed by a decline in estimated earned income (World Economic Forum, 2025). On aggregate, women tend to earn less than men in nearly all occupations and are more likely to be in lower-paying jobs, with 60% of roles in the very lowest-paying bracket belonging to women in the U.S. (Madgavkar et al., 2025).

That said, female representation in the corporate world remains an essential debate, particularly for policymakers, as more guidelines, such as recommended or legally binding gender quotas, continue to emerge. In 2024, the European Union (EU) introduced legislation (EU Directive 2022/2381) that requires all European-listed companies' boards to have, by the end of 2026, 33% of overall board seats and 40% of non-executive positions belonging to the underrepresented sex (European Union, 2022).

However, despite the efforts to bring women into leadership positions, those who reach these roles tend to face higher scrutiny from investors and a harsher judgement from the board of directors (Francis et al., 2021; Gupta et al., 2018b), resulting in turnover that is more sensitive to performance fluctuations (Ma, 2022), shorter tenures (MacLellan, 2024) and eventual replacement by men (Danziger, 2024).

The prominence of these dynamics in recent years and the increase in overall Chief Executive Officer (CEO) turnover (Danziger, 2024) emphasizes the need to understand the consequences of gendered transitions. As female representation in these positions grows, so do the possibilities for future research, making empirical work in the field vital.

Despite it being generally agreed upon that the impact of a woman will differ from that of a man, the literature is still divisive on the differences both genders drive in the top management of organizations (Eagly & Johannesen-Schmidt, 2001). If one accepts the possibility that managers can influence organizational outcomes, and that this impact will be a reflection of their own personal attributes (Hambrick & Mason, 1984; Papadakis & Barwise, 2002), it is plausible to assume that different genders will yield differing results, as gender is not a mere biological trait, but rather carries its own set of expectations and biases which help shape individual experiences and values (Broverman et al., 1972; Heilman, 2012; Heilman et al., 2024; Ridgeway, 1997).

Hence, given the differences documented in the managerial style of men and women, even if lacking consensus (Adams & Funk, 2011; Faccio et al., 2016; Huang & Kisgen, 2013; Levi et al., 2014), it can be expected that a gender change in CEO will lead to a switch in leadership style (Zhang & Qu, 2016), yielding distinct impacts on firm outcomes. Moreover, it is crucial to consider the dynamics inherent to succession, since different-gender transitions can yield distinct outcomes compared to same-gender ones, even between successions in which the succeeding gender remains the same (Zhang & Qu, 2016).

The purpose of this dissertation is to analyze different-gender CEO transitions (i.e., male-to-female and female-to-male) to examine whether these gendered transitions affect firm performance and whether their effects are symmetric or vary according to the direction of the succession.

This study aims to address the lack of consensus in the literature on the impact of women's leadership as CEOs and to shed light on what happens after a woman leaves the role and is succeeded by a man, thereby combining two core topics in financial literature: CEO succession and gender in corporate finance. Moreover, it differs from prior research and expands upon it by analyzing female-to-male successions, a previously understudied angle.

Following the introduction, the structure of this dissertation is organized as follows. The second chapter presents a review of the relevant literature, resulting in the research questions and subsequent hypotheses presented in the third chapter. The fourth chapter presents a detailed overview of the methodology, sample collection and data pre-processing, followed by the fifth chapter, which discusses the research results, robustness checks and extensions to the original analysis. To conclude, the last chapter puts forward the main conclusions.

2. Literature Review

2.1. Managerial Discretion

> "If we want to understand why organizations do the things they do, or why they perform the way they do, we must consider the biases and dispositions of their most powerful actors – their top executives" (Hambrick, 2007).

It has been a topic of great debate amongst researchers to what extent, and under which conditions, executives can influence organizational outcomes (Crossland & Hambrick, 2011). Agency theory was a pioneer in recognizing that the separation between ownership and control creates leeway in managerial action (Jensen & Meckling, 1976). Afterwards, the concept of managerial discretion was proposed: the degree of freedom managers have to choose among strategic alternatives that are acceptable to different stakeholders (Crossland & Hambrick, 2011).

A manager's leeway may, however, be limited and dependent on contextual and structural factors, such as size of the firm, ownership structure, the company's resources, and the broader context, namely the formal institutions and social norms present (Crossland & Hambrick, 2011; Papadakis & Barwise, 2002). Agency theory, particularly, focuses on how governance mechanisms and contracts can constrain managers to best align their interests with shareholders' (Jensen & Meckling, 1976).

Notwithstanding, one of the most crucial implications of managerial discretion is the extent to which executives can influence strategic decision-making and firm performance (Crossland & Hambrick, 2011; Papadakis & Barwise, 2002).

Lieberson and O'Connor's (1972) seminal paper aimed to measure how much a leader could influence an organization, recognizing that this effect would not only be a reflection of their own distinctive qualities, but also of internal structures and external factors which could constrain the manager.

The Upper Echelons Theory, developed by Hambrick and Mason (1984), suggests that strategic decision-making and performance in organizations will be partially dictated by managerial demographic characteristics, their values and experiences. Similarly, the "strategic choice" perspective in decision-making contends that a decision-making process will naturally reflect the individual's idiosyncrasies and biases (Papadakis & Barwise, 2002).

Consequently, the higher a manager's leeway, the more pronounced will be the impact of their distinctive and personal characteristics on firm outcomes (Crossland & Hambrick, 2011; Hambrick, 2007).

2.1.1. The Role of CEOs

> "Given that so many persons are involved in managing a company, why is it that it is often assumed that the CEO has greater impact than other leaders in the company on strategic actions and performance?" (Hutzschenreuter et al., 2012).

CEOs are not the sole managers of a firm: they are part of a management team, with whom they share their power and responsibilities (Hutzschenreuter et al., 2012), and are overseen by a board of directors. Nonetheless, literature has overall recognized CEOs as the principal leaders and individuals responsible for a corporation, its strategy and performance (Hutzschenreuter et al., 2012), and empirical research suggests that, particularly in the U.S., CEOs have been experiencing increased influence, while the significance of contextual factors has declined over time (Quigley & Hambrick, 2015), an effect supported by strong nationalist values of individualism (Hambrick, 2007).

On the one hand, this effect has been partially blamed on a "romanticization" of leadership, in which society is naively positing increased credit and blame on CEOs, which results in a heightened fixation on their figure (Quigley & Hambrick, 2015). On the other hand, it can also be attributed to an actual increase in their power and managerial discretion: their position at the top of the organizational chart confers them the authority to lead strategic decision-making, and the symbolism associated can help them shape organizational behavior (Hambrick, 2007; Hutzschenreuter et al., 2012; Quigley & Hambrick, 2015). Over the last few decades, CEOs have benefited from progressively higher compensation compared to other executives and greater media and press attention, being bestowed upon them more freedom and control within the firm (Quigley & Hambrick, 2015).

These two explanations, however, are not mutually exclusive, but rather symbiotic, operating in a vicious cycle to provide greater significance to CEOs: "increased romanticization may have engendered greater managerial influence, and greater CEO influence almost surely engendered more romanticization" (Quigley & Hambrick, 2015).

2.2. Women in the Corporate World

> "Advances toward gender equality in workforce participation and the easing of the rigid representation of women and men in long-established gender roles should be accompanied by a change in stereotypic beliefs. Yet, gender stereotypic beliefs have changed less than societal changes would suggest" (Heilman et al., 2024).

As women's representation in the corporate world steadily increases, a growing body of literature seeks to understand and assess the conditions women and men face in the workplace.

Earlier works on the topic date back to the 1970s. Broverman et al.'s (1972) research on sex stereotypes concluded that masculine characteristics are more positively valued and desired, compared to feminine ones, with women being perceived as less competent, independent, objective, and logical. These standards were not only widely accepted by society but also reinforced by women themselves under societal pressure to conform. Gender stereotypes can be divided into two categories: descriptive, which aim to describe what women are like, and prescriptive, which aim to dictate what women should be like (Heilman, 2012).

These preconceived ideas about gender can translate into discriminatory behaviors, and stereotypes have been pointed out as the root through which discrimination emerges in the workplace (Bobbitt-Zeher, 2011; Heilman et al., 2024). For instance, descriptive stereotypes create negative performance expectations due to a perceived poor fit between women's characteristics and the attributes necessary for a successful performance; while prescriptive ones introduce disapproval and penalties when normative standards are violated (Heilman, 2012).

Indeed, gender discrimination has been found in a variety of forms when it comes to employment, namely in hiring practices, promotions, performance evaluations and earnings (Bobbitt-Zeher, 2011). For instance, Blau and Ferber (1987) have empirically reported racial and gender discrimination in the labor market, measured by pay gap, after productivity characteristics were controlled for. Shareholders have been found to further cement this pay gap, particularly towards non-CEO female executives (Canil et al., 2019).

Yet, discrimination is not merely rooted in individual and cultural beliefs; it is also institutionalized in organizational structures and procedures. Bobbitt-Zeher (2011) points towards a discretionary policy use in the workplace, stating that organizational guidelines,

even if appearing gender-neutral, contribute to women's discrimination, as they are more often reinforced in ways that disadvantage women in relation to men.

Despite the profound changes witnessed in society over the last decades and strides towards gender parity, stereotypes remain present: a 2014 controlled experiment showed that male CEOs were more highly associated by participants with the traits of "dominance, leadership [and] powerfulness", while female CEOs ranked higher in "supportiveness, compassion [and] warmth" (Pillemer et al., 2014). Moreover, while societal roles have become less strict over time, segregation and clustering in industries persist, and gender hierarchy tends to reassert itself in the new structures created (Heilman et al., 2024; Ridgeway, 1997).

2.2.1. Gender in Corporate Leadership

> "Analysis of the situation that women and men face as leaders provides a rationale for expecting differences and similarities [in leadership style]" (Eagly & Johannesen-Schmidt, 2001).

Due to the central role of corporate managers, the literature has given much attention to the determinants and consequences of CEO succession, with overall evidence pointing to transitions driven by the board of directors' performance monitoring to replace underperforming managers (Huson et al., 2004). However, evidence regarding the repercussions of CEO replacement is mixed: on the one hand, to the extent that the successor CEO will improve management, firm value should increase after the announcement; on the other hand, if investors were unaware of the outgoing CEO's poor performance, value can decrease as a result (Huson et al., 2004).

CEO successions are often viewed under two perspectives: disruption or adaptation. The former suggests that this process imposes costs on organizations, resulting in a short-term decline in performance; while the latter argues that the effects will take longer to manifest, thus only impacting performance in the long-term (Schepker et al., 2017).

Under the theory that CEO successions are inherently disruptive, any feature that enhances such disruption, such as the attribute gap between former and current CEOs, will negatively impact firm performance (Zhang & Qu, 2016). Zhang and Qu (2016) found evidence that different-gender successions, while not differentiating between male-to-female and female-to-male transitions, tend to have a greater negative impact on firm performance compared to same-gender ones. This study offers a new view on why gender inequality still persists and

is more amplified in leadership positions: organizations, in wanting to avoid disruption, prefer to stick to the *status quo*, leading to continuous appointments of male CEOs. Similarly, Tao and Zhang (2026) found that companies tend to favor candidates who are culturally more similar to the outgoing CEO, in order to preserve continuity.

Zajac and Westphal (1996) have also shown that boards of directors tend to choose succeeding CEOs who are more demographically similar to them. This favoritism has been attributed, on the one hand, to intra-group bias, in which members of a group grant preferential treatment to others they perceive as more similar and compatible, according to the Social Identity Theory (Tajfel & Turner, 1979); on the other hand, to an attempt in exerting greater interpersonal influence on the successor and, thus, on the organization (Zajac & Westphal, 1996). Likewise, Cook and Glass (2013a) found that gender diversity on boards increases a woman's likelihood of being promoted to leadership positions. This tendency, however, is concerning when combined with Field et al.'s (2020) evidence that women are less likely to reach board positions, even when possessing higher qualifications.

Overall, a woman's likelihood of being promoted to executive positions remains lower than that of a man, even after controlling for job-relevant attributes such as age, education, and employment background (Xu, 2024). Given this, multiple theories have been proposed to explain the specific barriers women face in attaining leadership roles.

Among the first is the "glass ceiling" theory, which refers to an invisible barrier that impedes women's attainment of top management roles, regardless of qualifications. This concept is not merely another term for gender discrimination; rather it captures the tendency for inequality to intensify at higher levels of the organizational hierarchy, with gender gaps widening progressively (Cotter et al., 2001).

Building on the glass ceiling framework, and particularly driven by the lack of women CEOs, Oakley (2000) divided the barriers which prevented women and minorities from accessing senior management positions into corporate policies and behavioral explanations. Corporate policies, which encompass development, promotion and compensation, refer to institutionalized practices that confer objective barriers to women's achievement of leadership positions, such as improper training in their earlier carrier or the lack of affirmative action programs. Behavioral explanations, on the other hand, take into account the cultural and power dynamics at play, aiming to not only explain why such positions are not as easily

accessible to women, but also why women may not be as drawn to leadership roles or feel uncomfortable once they have attained them.

Furthermore, in the Role Congruity Theory of prejudice toward female leaders, Eagly and Karau (2002) state that there is a prejudice against women in leadership roles which stems from a perceived incongruity, or incompatibility, between the attributes of a woman and the requirements of a leadership role. According to the authors, this can lead to women being seen as less qualified than men for leadership positions, and assessing the behavior that aligns with leadership expectations more negatively when it is performed by women.

Following the aforementioned "glass ceiling" theory, the "glass cliff" theory has also surged, which posits that women are more likely to reach the top management of organizations in fragile financial positions, thus becoming overrepresented in precarious leadership roles, which are associated with greater risk of failure (Ryan & Haslam, 2007). Moreover, even amidst a crisis, women's traits for leadership positions only become desirable when the manager is required to either manage people, take responsibility for poor performance, or remain in the background (Ryan et al., 2011). The glass cliff effect has found empirical support, with a study by Cook and Glass (2013b) showing that occupational minorities, which are defined as white women or people of color, are more likely to be promoted CEOs of firms experiencing short, medium or long-term performance declines. However, more recent research has reached inconclusive results regarding this topic (Li et al., 2025).

When women do reach leadership roles, other challenges arise. In particular, their success when succeeding a man may depend partly on the attributes of their predecessors. Male predecessors can facilitate, or not, women's transition into management positions, by fostering a gender-inclusive environment and mitigating stereotypes and expectations, or failing to do so (Dwivedi et al., 2018).

Additionally, women face challenges in the way they are regarded by different stakeholders. For instance, when firm performance declines under the leadership of women, they are generally regarded more negatively compared to their male counterparts, particularly by the board of directors: not only is women's turnover more sensitive to changes in performance (Ma, 2022), but the empirically validated "savior effect" suggests that they are also more likely to be subsequently replaced by white men (Cook & Glass, 2013b).

Regarding market and investors' perception, women CEO appointments have been found to suffer negative abnormal reactions (Lee & James, 2007). However, a more recent study by Brinkhuis and Scholtens (2018) has found no significant differences in reactions attributable to gender, with the authors contending that this lack of relationship is due to female CEOs becoming less unique over time.

With regards to institutional investors, while they are more likely to target female CEOs when a firm is underperforming (Francis et al., 2021; Gupta et al., 2018a), institutional ownership, particularly by the "Big Three"[1], has been associated with the appointment of female CEOs, with these transitions being positively valued by the market (Song, 2023).

2.3. Gender Differences in Management

> "Managers and other leaders occupy roles defined by their specific position in a hierarchy but also simultaneously function under the constraints of their gender roles" (Eagly & Johannesen-Schmidt, 2001).

While there is a general consensus that women face more difficulties in attaining management positions, there is no such consensus on the differences between the behavior of women and men once those positions are attained (Eagly & Johannesen-Schmidt, 2001).

Given the theories previously explored, namely regarding managerial discretion and the Upper Echelons Theory, women and men in leadership positions will not only exert influence over organizational outcomes, but these impacts might differ due to the different stereotypes, contexts and expectations they face, which help shape their values, preferences and experiences (Hambrick & Mason, 1984; Papadakis & Barwise, 2002). Hence, as more women assume leadership roles, both in executive and non-executive board positions, the literature has also aimed to uncover differences in the managerial styles of men and women.

Adams and Funk (2011), focusing on Sweden, aimed to assess the differences between male and female directors across various dimensions, such as power, risk and benevolence, controlling for the differences found in the Swedish population as a whole, to understand whether women take on traditionally more "masculine" attributes in order to break the glass ceiling. If that is so, one would expect gender differences to disappear in leadership roles; however, the authors find differences to persist.

[1] The three dominant asset managers in the U.S.: State Street, BlackRock, and Vanguard.

A widely studied topic in how management styles differ concerns a perceived higher risk aversion among women, with them often being less trusted than men to make risky corporate decisions and viewed as more conservative investors (Schubert et al., 1999). For instance, given the difficulties women have in securing leadership roles and the greater risk of unemployment they face, they might prefer to undertake less risky decisions to preserve their careers (Faccio et al., 2016). This perception has gathered great empirical support.

Levi et al. (2014) attempted to understand, particularly, whether women exhibit less corporate overconfidence, that is, whether men tend to overestimate their own managerial skills and take on a more optimistic view of the future compared to women. Focusing on mergers and acquisitions, which have historically been linked to overconfidence due to overestimation of merger gains, the authors found that women undertake fewer acquisitions and offer lower bid premiums, both of which are consistent with lower overconfidence and higher risk aversion.

Similarly, Huang and Kisgen (2013) uncovered evidence of lower acquisitiveness among women and further suggested that they are more likely to exercise stock options early and issue less debt than their male counterparts, all of which are signs of lower overconfidence.

In fact, the association between a firm's debt levels and gender leadership as a sign of risk aversion has been greatly explored in the literature. The presence of women in both the top management team and the board of directors has been linked to lower leverage, a fact commonly attributed to reduced corporate risk-taking (Faccio et al., 2016; García & Herrero, 2021; Huang et al., 2023; Schopohl et al., 2021).

However, the findings regarding its structure differ: García and Herrero (2021) found that a higher level of board gender diversity is associated with debt with lower maturities; meanwhile, Huang et al. (2023) found that women in CEO roles issue debt with higher maturities. Nonetheless, both studies suggest that these firms exhibit improved financial health, with a lower likelihood of bankruptcy (García & Herrero, 2021) and greater debt capacity (Huang et al., 2023).

Other evidence, aside from financial leverage, supporting the thesis of lower corporate risk-taking in women includes: lower earnings volatility and a higher survival rate in firms led by women (Faccio et al., 2016); lower market-based idiosyncratic risk in companies with either female CEOs or Chief Financial Officers (CFOs) (Peltomäki et al., 2021); and decrease in

the level of firm risk (a measure taking into account volatility in returns, operational leverage and financial leverage) of troubled companies when the CEO role transitions from a man to a woman (Rigolini et al., 2021).

Notwithstanding, this relation is not clear-cut, and other studies have found conflicting results. The aforementioned study by Adams and Funk (2011) found that women were slightly more risk-loving than men, while other papers have found no evidence that female CEOs (Farag & Mallin, 2018) or gender-diverse boards (Sila et al., 2016) affect risk aversion.

More recently, literature has also focused on the gender differences in the Environmental, Social and Governance domain. Overall, women are generally associated with increased social performance (Post & Byron, 2016) and sustainability reporting (Buallay et al., 2022). Sandretto et al. (2025) provided a more in-depth analysis, suggesting that, while women are associated with greater overall sustainability performance, women in management positions are only positively associated with the "Social" pillar, and gender diversity amongst directors is only correlated with the "Governance" pillar.

All in all, given that differences in management style between genders do seem to exist, even if lacking consensus, it is essential to understand to what extent these differences can lead to variations in firm performance. For instance, women's decreased corporate risk-taking has been found to produce disruptions and inefficiencies in capital allocation (Faccio et al., 2016), however, it has also been identified as a mediator to explain improvements in firm performance (Bernile et al., 2018; Jeong & Harrison, 2017).

Empirical studies on the impact of women on firm performance have mostly focused on the influence of board gender diversity, with some finding a positive relationship (Brahma et al., 2020; Campbell & Mínguez-Vera, 2007; Liu et al., 2014), and others a negative one (Adams & Ferreira, 2009). Bennouri et al. (2018) found mixed results: while women on boards of directors lead to enhanced accounting performance, their impact on market-based performance is negative.

Similarly, a meta-analysis by Jeong and Harrison (2017), which focused on women in management and CEO roles, found that the presence of women in the top management team is positively, albeit weakly, associated with better long-term financial performance but negatively associated with short-term market returns.

A meta-analysis by Post and Byron (2015) helps reconcile these contradictory results by illustrating how the context in which women exercise this role can affect the outcome. The study suggests that the relationship between women and accounting performance is more positive in countries with greater shareholder protection, as these strengthen corporate governance and make boards more likely to consider the unique attributes that female directors bring. Meanwhile, the relationship with market-based performance is stronger in countries with greater gender parity, as women in these countries are more likely to make greater contributions, exercise greater influence, and enjoy greater legitimacy within the board.

Likewise, Dezsö and Ross (2012) developed a theoretical framework to explain under which circumstances women in the top management team can improve firm performance, and empirically demonstrated that such improvement is conditional on innovation being a part of the firm's strategy.

Lastly, there are very few studies focusing specifically on the impact CEO succession considering gender dynamics on firm performance, aside from the forecited studies by Zhang and Qu (2016), which found gender-changing successions to have a more negative impact on performance when compared to same-gender ones and to contribute to lower successor tenure; and Rigolini et al. (2021), which found a decrease in firm risk with male-to-female transitions.

Aside from these, Wu et al.'s (2024) recent research aimed to understand how environmental dynamism and gender parity may affect the impact of each type of gendered transition. In particular, the authors demonstrated that female-to-male transitions exert a greater impact over strategic change, which is, in turn, associated with enhanced firm performance, when the environment is more dynamic, as these are more receptive to rapid changes and risk-taking approaches, practices which are more consistent with male CEOs and their decision-making style. The opposite is true for stable environments, where male-to-female successions yielded greater impact.

3. Research Questions

CEOs can greatly influence strategic decision-making and firm performance (Crossland & Hambrick, 2011; Quigley & Hambrick, 2015), with their personal attributes and experiences often shaping the choices they make (Hambrick & Mason, 1984; Papadakis & Barwise, 2002).

Women and men face widely different contexts and expectations in the workplace, particularly in management positions (Bobbitt-Zeher, 2011; Cook & Glass, 2013a; Heilman, 2012; Heilman et al., 2024; Ridgeway, 1997). Consequently, this can result in the adoption of different managerial styles by each (Adams & Funk, 2011; Faccio et al., 2016; Huang & Kisgen, 2013; Levi et al., 2014), which will inevitably result in differences in firm performance (Bennouri et al., 2018; Jeong & Harrison, 2017; Post & Byron, 2015).

Moreover, the dynamics inherent to the succession process and the context in which successions occur have been found to affect subsequent success (Dwivedi et al., 2018; Wu et al., 2024; Zhang & Qu, 2016). The circumstances under which men and women are step into the role can differ (Cook & Glass, 2013b; Ryan & Haslam, 2007), justifying the analysis of both transitions separately.

Given this, the following research question and hypotheses were formulated:

Research Question 1. Does a change in CEO gender affect firm performance relative to firms in which gender remains unchanged?

> *Hypothesis 1*. A change in CEO gender affects firm performance relative to firms in which gender remains unchanged.
>
> *Hypothesis 1.a)* A change in CEO from a man to a woman affects firm performance relative to firms in which the CEO remains male.
>
> *Hypothesis 1.b)* A change in CEO from a woman to a man affects firm performance relative to firms in which the CEO remains female.

4. Methodology

4.1. Econometric Approach

To analyze the impact that a gender-changing CEO succession will yield on performance, two analyses were conducted, focused on male-to-female and female-to-male transitions, respectively. For this, an event-study Difference-in-Differences (DiD) methodology was employed, complemented by a matching procedure between the treated and control groups to ensure comparability and enhance the robustness of the results.

DiD is an econometric technique which estimates causal effects in non-experimental settings (Roth et al., 2023), and event-studies generalize DiD by allowing for the treatment to be received at different points in time. They are often adopted when treatment is not randomized, but there is sufficient data to analyze the units' trajectories before and after the treatment (Borusyak et al., 2024), which is the case when studying CEO transitions.

To implement the DiD methodology, two fundamental elements must be defined: the time periods to be considered before and after the treatment; the treatment and control groups, with the former exposed to the treatment and the latter remaining stable throughout the analysis (Roth et al., 2023).

With respect to the definition of the time periods, following previous CEO succession studies (Huson et al., 2004), a time window around the succession event was built. Hence, for each transition and its respective control group, data covering the two years preceding the succession, the year the new CEO took over, and the two subsequent years was collected. This time window balances the need to test pre-treatment trends with the objective of maximizing the available sample of gender-changing transitions.

With respect to the definition of treatment and control groups, the research adapted Faccio et al.'s (2016) design[2], controlling for male-to-female transitions by including firms that experienced no change in CEO gender and were thus managed exclusively by male CEOs over the same period. This framework, which focuses solely on male-to-female transitions, is extended by symmetrically analyzing female-to-male transitions, with firms managed solely by women as a control group.

[2] In Faccio et al.'s (2016) paper, "firms experiencing a transition from male to female CEOs […] are matched with a control group of firms that are run by male CEOs during the entire sample period." However, the authors did not have enough control firms to perform the symmetrical analysis, since their approach relies on a long panel, rather than a stacked panel.

To construct the treatment group, and given that each firm-year record will correspond to a given CEO gender, a male-to-female (female-to-male) transition was considered if, relative to a given gender-transition, these firms were managed by men (women) during the two years prior and subsequently managed by women (men). The respective control firms for male-to-female (female-to-male) transitions were those that were managed by men (women) throughout all five years. Table 1 explains the construction of each group and relative time periods.

Table 1: Construction of the Groups and Relative Time Periods

Table 1 presents how each treated and control group was constructed according to the CEO gender observed at each relative time period.

Time	CEO Gender			
	Male-to-Female		Female-to-Male	
	Treatment	Control	Treatment	Control
t = -2	Male	Male	Female	Female
t = -1	Male	Male	Female	Female
t = + 1	Female	Male	Male	Female
t = + 2	Female	Male	Male	Female
t = + 3	Female	Male	Male	Female

For purposes of the following study, the transition year will be considered the first year in which the new gender took over, i.e., the third year within the five-year time window (t=+1).

With this, the following baseline model specification, which analyses performance for firm *i* at time *t*, was implemented for the DiD estimation:

$$Performance_{i,t} = \alpha + \beta_1 \times Transition_i + \beta_2 \times Post_t + \beta_3 \times Transition_i \times Post_t + \beta_4 \times X_{i,t} + \varepsilon_{i,t}$$

In the model, the variable *Transition* is a dummy variable that denotes whether the firm experienced a gender transition, taking the value 1 if the observation belongs to the treatment group and 0 otherwise. Likewise, the variable *Post* is also a dummy variable, which equals 1 if the observation belongs to the three years post-treatment (t=+1, t=+2, t=+3) and 0 otherwise (t=-2, t=-1). With this, the coefficient associated with the interaction term between these two variables (β_3) captures the effect we aim to analyze: the variation in the performance of firms which experienced a gender change in CEO (in relation to firms which did not) in the years following that transition (relative to the years prior).

The vector X corresponds to a set of control variables, which are likely to influence performance, and will be thoroughly explored in the next sub-chapter. Finally, the error term ($\varepsilon_{i,t}$) accounts for any unobserved factors that may influence a company's performance.

The DiD approach was complemented and strengthened through matching between treated and control groups: matching allows us to, from a large number control units, produce a smaller control group, in which the distribution of covariates is similar to that of the treated group (Rosenbaum & Rubin, 1983), thus ensuring comparability between groups.

In our setting, matching also helped mitigate issues of sample selection bias, since treatment is not random – firms undergoing a succession may differ systematically from those who don't, and matching helps ensure that these pre-transition differences are partially accounted for before the regression (Faccio et al., 2016).

Moreover, in a DiD analysis, matching can aid in ensuring that the resulting sample does not violate the "parallel trends" assumption, a core premise of the DiD methodology. This assumption states that the average outcome among treated and control populations would have followed parallel trends in the absence of treatment (Roth et al., 2023). Balancing the baseline measures between groups does not necessarily guarantee the non-violation; however, parallel trends are more likely to be violated when there is severe imbalance, since the outcome is dependent on covariates other than treatment (e.g. firms with systematically higher levels of debt may naturally follow different performance patterns from other firms, regardless of undergoing a gender change in CEO) (Baker et al., 2026).

4.2. Variables

4.2.1. Dependent Variable

Following other studies regarding firm performance, *return on assets* (ROA) was chosen as the primary measure for the dependent variable (Adams & Ferreira, 2009; Brahma et al., 2020; Campbell & Mínguez-Vera, 2007; Zhang & Qu, 2016).

Generally, operating income is preferred over earnings as a baseline performance measure, since it provides a cleaner view of productivity, and is unaffected by extraordinary items, changes in capital structure (given that those changes leave the firm's operations unchanged), tax considerations, or minority interests. The choice of assets to scale this measure aligns with the goal of comparing the productivity of operating assets across firms, and, although

operating assets are not directly reported, the book value of total assets serves as the closest accounting proxy (Barber & Lyon, 1996). Thus, ROA is calculated as earnings before interest and taxes (EBIT) divided by the total book value of assets at fiscal-year-end.

4.2.2. Control Variables

Financial Controls

Firstly, firm *size* is widely regarded as a determinant of firm performance (Campbell & Mínguez-Vera, 2007; Levi et al., 2014). On the one hand, this effect can be negative, as size can represent organizational costs due to inefficiencies and sub-optimal diversification (Hansen & Wernerfelt, 1989). On the other hand, larger firms may have better access to capital markets and benefit from economies of scale, particularly in capital-intensive industries (Lenz, 1981). Size is measured as the logarithm of total assets.

Under agency theory, capital structure, namely firm *leverage*, can also affect firm value, by acting as a disciplinary mechanism: higher leverage reduces agency costs, by better aligning the interests of managers and shareholders, since it commits the firm to payments that reduce the amount of cash flow available for managers to engage in the transfer of "firm resources to their own, personal benefit" (Jensen & Meckling, 1976). Empirically, the level of a company's indebtedness is a typical control in firm performance regressions (Campbell & Mínguez-Vera, 2007; Levi et al., 2014), and is, thus, included in this study, as the ratio of long-term debt to total assets.

Investment also plays a central role in performance, by increasing shareholder value through positive net present value projects, as well as in the growth of the economy as a whole (Weston, 1961). However, driven by opportunistic incentives, as explained by agency theory, and understated risk perceptions, managers can also engage in overinvestment, which can be detrimental to long-term performance (Eisenmann, 2006). To capture long-term investment, and under the view that investment incorporates both replacement and expansion (Jorgenson, 1963), this study relies on capital expenditures, divided by total sales.

CEO Controls

CEO transitions imply changes in CEO characteristics other than gender. To the extent that these can affect the outcome, firm performance, the analysis must also control for them (Faccio et al., 2016).

CEO's age can affect the CEO's risk-taking propensity and job performance (Belenzon et al., 2019; Bhabra & Zhang, 2016; Serfling, 2014). Career concerns change throughout life, and, while younger CEO's have been generally associated with enhanced drive and enthusiasm, which results in higher corporate investment levels and lower risk aversion, older CEOs have been found to be more opportunistic, with a greater focus on the short-term personal impact of their decisions. Nonetheless, older CEOs benefit from more experience and more comprehensive professional networks (Bhabra & Zhang, 2016). Following Faccio et al. (2016) and Schopohl et al. (2021), the CEO's age is included, in its logarithmic form.

Furthermore, the *CEO's compensation mix*, more particularly the level of variable and equity-linked compensation, is also considered. Jensen and Meckling (1976) acknowledge the role that compensation structures have in providing appropriate incentives for the management to act on behalf of shareholders and the maximization of their welfare, which can, in turn, impact the way managers conduct themselves and encourage specific behaviors (Hambrick, 2007). Compensation structure is measured as the ratio of all variable and equity-linked compensation to total compensation.

Board Controls

The present study also includes board control variables. Governance arrangements, namely *board size* (i.e., the number of directors), are known to affect monitoring effectiveness (Yermack, 1996) and, thus, firm performance (Adams & Ferreira, 2009; Jensen & Meckling, 1976; Liu et al., 2014).

Likewise, the proportion of female directors present is also shown to impact accounting performance (Adams & Ferreira, 2009; Bennouri et al., 2018; Brahma et al., 2020; Campbell & Mínguez-Vera, 2007; Liu et al., 2014). Moreover, Schopohl et al. (2021) found evidence supporting that board gender diversity can affect the degree of influence female executives can exert over the firm. As such, *board gender diversity* is also included, as measured by the Shannon Index, where P_i represents the share of each gender in the board of directors:

$$Shannon\ Index = -\sum_{i=1}^{n} P_i \times \ln(P_i)$$

This index ranges from 0 to 0.69, where 0 indicates no board diversity and 0.69 indicates that the board is equally comprised of men and women (Campbell & Mínguez-Vera, 2007).

Furthermore, within corporate governance and relating to the CEO and their power within the organization, *CEO duality* is also considered. CEO duality refers to when a single person holds both the CEO and Chairman positions within a firm, which, under agency theory, is believed to lead to greater insider control and weaker board oversight and monitoring, thereby promoting entrenchment (Yu, 2022). However, from a resource dependency theory, duality can be beneficial under unique industry circumstances, namely, high complexity or resource scarcity, in which a "strong" CEO is needed (Yu, 2022). CEO duality is included as a dummy, taking the value of 1 when the CEO also holds the Chairman position.

Ownership Controls

Lastly, following previous research (Bennouri et al., 2018; Liu et al., 2014), ownership characteristics are also considered. Returning to agency theory, if managers and shareholders both act with the objective of value maximization, then the shareholder base would not matter (Caselli et al., 2023; Jensen & Meckling, 1976). However, managers can be self-interested (Jensen & Meckling, 1976) and different shareholders face different incentives, investment horizons, and constraints, all of which help shape the companies' governance mechanisms (Caselli et al., 2023).

Thus, scholars argue that *institutional ownership* can aid in reducing agency costs, given these investors' greater ability, resources, and incentives to monitor managers' behavior (Schnatterly et al., 2008). Institutional ownership is measured as the sum of 13F[3] holdings

Likewise, *ownership concentration* can yield a similar impact: due to economies of scale, smaller investors may face fewer incentives and higher costs to engage in monitoring activities, and hence monitoring may be heightened with larger block-holders (Caselli et al., 2023; Schnatterly et al., 2008). Ownership concentration is determined using the Herfindahl-Hirschman Index, where S_i represents each investor's ownership stake.

$$Herfindahl - Hirschman\ Index = \sum_{i=1}^{n} S_i^2$$

[3] 13F is a Securities and Exchange Commission's (SEC) form filed by larger institutional investors regarding their securities' holdings.

4.3. Data and Sample

This study on CEO successions focuses on U.S. firms, particularly transitions spanning 2000 to 2022. The choice of geographical region was guided by data availability and empirical findings that CEO impact is heightened and has been further increasing in the U.S. (Quigley & Hambrick, 2015). The choice of period was likewise influenced by data availability, particularly the scarcity of women CEOs prior to the turn of the century.

First, all CEO firm-year records were retrieved from ExecuComp. The platform reports executive data from S&P 1,500 firms, including CEO identification and gender, on a fiscal-year basis, where the CEO for each fiscal year is defined as the individual who held office for the majority of that fiscal year. This fiscal year alignment ensures that other firm-level data is correctly attributed to the appropriate CEO. For the collection process, alongside the CEO's identification for the given year, the dates when the person entered and left the CEO position, when available, were used as sanity checks.

Hence, all CEO records, and respective gender, spanning 1998 to 2024 (covering transitions from 2000 to 2022 and their respective time windows) were collected, yielding a total of 53,951 firm-year records, merely 3.94% of which corresponded to female CEOs.

The Financial and Real Estate sectors were excluded based on the two-digit Global Industry Classification Standard (GICS) codes (40 and 60, respectively), which aligns with previous literature (Campbell & Mínguez-Vera, 2007; Huang & Kisgen, 2013), as well as firms for which the industry group was unavailable. 43,571 CEO-firm-year records remained.

Gendered transitions that occurred between 2000 and 2022 were then isolated and filtered to include only those in which the predecessors' gender did not change in the two years prior, and the successors' gender did not change in the two years subsequent to the transition year. This led to 245 transitions, of which 159 are male-to-female, and 86 are female-to-male.

Afterward, the possible control companies were retrieved: for each transition year, the firms which were managed by CEOs of the same gender between the two years prior and subsequent to each transition year (entire time window) were identified. This procedure led to 28,669 control observations (firm-transition year matches), of which 27,951 belonged to the male-to-female and the remaining 718 to the female-to-male sample. These observations do not correspond to unique companies, since the same firm may serve as a control in multiple transition years if it satisfies the criteria in each corresponding window.

For the identified transitions and control firms, the data needed to compute the financial variables[4] was retrieved from CompuStat for the time window of each observation and one year prior to construct lagged variables. Units with missing data for any of the retrieved years were dropped, representing 688 (3 of which transitions) and 41 (4 of which transitions) units in the full male-to-female and female-to-male samples, respectively. Table 2 shows the distribution of transitions and control firms across the period considered.

Table 2: Distribution Over Time of Treated and Control Units

Table 2 presents the distribution of treated and control observations found between 2000 and 2022, according to the type of transition (male-to-female or female-to-male) under analysis. Treated observations correspond to gendered transitions occurring at each transition year and that follow the criteria established; and controls to firms managed solely by one gender over the specified time window for each transition year.

Transition Year	Time Window	Male-to-Female		Female-to-Male	
		Treatment	Control	Treatment	Control
2000	1998 - 2002	5	1,027	2	9
2001	1999 - 2003	6	1,128	2	7
2002	2000 - 2004	5	1,163	1	12
2003	2001 - 2005	4	1,106	2	14
2004	2002 - 2006	2	1,070	1	14
2005	2003 - 2007	4	1,069	1	16
2006	2004 - 2008	5	1,069	4	13
2007	2005 - 2009	7	1,079	2	18
2008	2006 - 2010	4	1,159	3	25
2009	2007 - 2011	4	1,442	2	32
2010	2008 - 2012	8	1,395	2	32
2011	2009 - 2013	6	1,369	3	32
2012	2010 - 2014	14	1,342	5	31
2013	2011 - 2015	8	1,311	4	34
2014	2012 - 2016	5	1,259	5	43
2015	2013 - 2017	2	1,253	2	43
2016	2014 - 2018	10	1,220	4	45
2017	2015 - 2019	6	1,187	4	39
2018	2016 - 2020	7	1,138	4	40
2019	2017 - 2021	11	1,115	7	40
2020	2018 - 2022	10	1,106	10	44
2021	2019 - 2023	10	1,141	5	45
2022	2020 - 2024	13	1,118	7	51
	Total	156	27,266	82	681

The other control variables, given the very wide universe of companies identified and the frequent need to manually impute data, were collected only post-matching and were not used in the matching procedure.

[4] Total Assets, EBIT, Long-Term Debt, Capital Expenditures and Sales, to compute ROA, Size, Leverage and Investment.

CEO controls, both age and compensation structure, were retrieved from ExecuComp. Board data, namely the ratio of male directors and board size, was collected mainly through BoardEx. The existence of CEO duality was inferred from the title the executive held as reported by ExecuComp. Lastly, ownership data was collected through the LSEG 13F holdings database. A summary of all variables collected and the corresponding databases is provided in Appendix A.

Since structured executive, board and ownership data is scarce, particularly for older records, when either variable was not available, we resorted to the company's SEC Filings, namely the form 10-K (annual report) and DEF14A (definitive proxy statement). In order to classify the board members' gender, only two categories were considered, men and women, and gender was inferred from the use of gendered pronouns and titles, as no indication was found that pointed to a self-identification deviating from this binary norm.

4.4. Matching Procedure

Matching is a preprocessing statistical technique, which aims to balance the distribution of covariates between treated and control groups, by identifying the overlap between the groups to avoid heavy extrapolation and reduce the bias in the estimation of treatment effects (Stuart, 2010). While matching and regression analyses should not be seen in conflict, but rather as complementary, the primary benefit of matching is that it greatly reduces model dependence (King et al., 2011; Stuart, 2010). In essence, it is a "method for creating a valid counterfactual (i.e., comparison group) in the absence of randomization" (Kainz et al., 2017).

The first decision in a matching procedure is the method to use. Doing so requires a bias-variance trade-off between sample size and the subsequent balancing of covariates between groups: while stricter matching methods guarantee greater balancing of confounders, they do so at the expense of reduced sample size, which increases the variance of the treatment estimates (King et al., 2011). To decide on a matching specification, as many matching solutions as possible should be tested, and the one that yields the best balance should be adopted. Once a particular satisfactory matching solution is reached, the matching method that produced it becomes irrelevant (King et al., 2011).

The chosen method presented in this research relies on a hybrid approach combining both Propensity Score Matching (PSM) and Multivariate Distance Matching (MDM). While both methods are based on optimizing the distance of pre-treatment covariates between

observations, the way each method computes such distance varies (King et al., 2011; Stuart, 2010). PSM measures the closeness between two observations based on the conditional probability of receiving treatment, given observed pre-treatment covariates (Rosenbaum & Rubin, 1983; Stuart, 2010) while MDM is based on the Mahalanobis distance, a metric which measures the distance between two observations taking into account the specified covariates and their correlation (King et al., 2011; Stuart, 2010).

Given that different distance measures can be combined (Stuart, 2010), propensity scores estimated via logit helped narrow the sample by trimming extreme values outside the common support. Being off common support refers to when a control or treatment observation has no close matches, rendering it inappropriate as a point of comparison (Stuart, 2010). Thus, this condition guarantees that treated and control units must exist in similar regions of the covariate space. Afterwards, MDM was conducted on the reduced sample, taking the propensity score, along with other covariates, into account to compute the distance between observations.

Given the advice set forth by King et al. (2011), to corroborate the choice of this matching procedure, the results obtained when using other matching specifications, namely solely PSM and MDM, can be found in Appendix B.

The second step is defining the covariates to include in the matching procedure. However, the literature lacks consensus on this. Overall, some studies indicate benefits to including the covariates that are either associated with treatment exposure or the outcome (Stuart, 2010), while others argue that, for instance, PSM delivers its most unbiased results when the model solely includes covariates related to the outcome but independent of treatment assignment (Austin, 2011).

Moreover, while including too many variables can amplify bias from inappropriate ones, small subsets may not be sufficient to balance all confounders (Kainz et al., 2017). This trade-off is of particular importance in small samples, as standard matching practices may not be optimal: in these situations, it may not be feasible to include too many covariates, and those related to the outcome should be prioritized (Brookhart et al., 2006).

Given this, from the control variables described in Chapter 4.2, firms were matched based solely on the subset of financial covariates (ROA, size, leverage and investment) observed in

the first year of the time window (t=-2)[5], thus prior to any transition. This choice avoids overloading the matching procedure while ensuring the variables have a strong theoretical link to the outcome under study (ROA). Moreover, pre-transition ROA is included, since pre-treatment measures of the outcome are essential in reducing bias (Kainz et al., 2017).

The descriptive statistics for these covariates across treated and control units in both samples, in the first year of the time window, are presented in Table 3.

Table 3: Descriptive Statistics of Key Variables for the First Pre-Treatment Period

Table 3 presents the descriptive statistics – number of observations, mean, standard deviation, minimum value, and maximum value – for the variables included in the matching procedure, reported at t=-2. ROA is calculated as earnings before interest and taxes divided by total assets; Size is calculated as a natural logarithm of total assets (in millions); Leverage is calculated as long-term debt (due in more than 1 year) divided by total assets; and Investment is calculated as capital expenditures divided by total sales.

	Obs.	Mean	Std. Dev.	Min.	Max.
Male-to-Female					
Transition = 1					
ROA	156	0.086	0.098	-0.425	0.392
Size	156	7.995	1.783	4.126	12.312
Leverage	156	0.240	0.219	0.000	1.421
Investment	156	0.077	0.130	0.000	1.233
Transition = 0					
ROA	27,266	0.080	0.169	-12.382	1.795
Size	27,266	7.554	1.699	-0.320	13.590
Leverage	27,266	0.224	0.230	0.000	6.901
Investment	27,266	0.097	0.524	-0.603	57.278
Female-to-Male					
Transition = 1					
ROA	82	0.091	0.094	-0.125	0.418
Size	82	7.914	1.815	4.874	11.723
Leverage	82	0.262	0.249	0.000	1.215
Investment	82	0.083	0.167	0.000	1.333
Transition = 0					
ROA	681	0.087	0.119	-0.993	0.622
Size	681	7.497	1.898	2.895	12.178
Leverage	681	0.197	0.195	0.000	1.397
Investment	681	0.091	0.345	0.000	8.337

Across both samples, we can observe that, on average, firms which would undertake a gendered transition in two years' time (*Transition* = 1) present a higher performance, are larger in size, have higher levels of indebtedness and undertake fewer investments, relative to those in which the gender would remain unchanged for the subsequent years (*Transition* = 0).

[5] All subsequent balancing diagnostics (bias, variance ratios and kernel density plots) are reported to this period.

These systematic pre-treatment differences can bias the intended DiD estimation and results, thereby supporting the use of a matching procedure to improve comparability. Given this, the matching begun with the estimation of a logit model, for each sample, whose results can be found in Table 4.

Table 4: Logit Regression Results

Table 4 presents the results for the logit regressions, which estimate the likelihood of undergoing a gendered transition. Results are reported for both male-to-female and female-to-male samples. The dependent variable takes the value 1 if the firm belongs to the treated group and 0 otherwise. The variables included are size, leverage, investment and ROA. Industry controls, based on the 4-digit GICS codes, and year controls are included. Statistical significance is indicated by * at the 10% level, ** at the 5% level, and *** at the 1% level. Standard errors are reported in parentheses. The log-likelihood and Pseudo R^2 are also presented.

	Male-to-Female	**Female-to-Male**
Dependent Variable	**Transition (1)**	**Transition (2)**
ROA	-0.219	-1.262
	(0.443)	(1.328)
Size	0.116**	0.111
	(0.053)	(0.083)
Leverage	-0.224	1.534**
	(0.415)	(0.716)
Investment	-0.116	-0.140
	(0.535)	(0.530)
Industry controls	Yes	Yes
Year controls	Yes	Yes
N	27,422	717[6]
Pseudo R^2	0.0556	0.0692
Log Likelihood	-908.428	-237.291

In the estimated regressions, only size in the male-to-female sample and leverage in the female-to-male sample are statistically significant predictors of the likelihood of undergoing a gendered transition, both at the 5% significance level. However, the statistical significance of the parameters and the quality of the estimated model are not of concern when conducting a matching procedure; rather, the balancing of covariates post-matching (Stuart, 2010) is the subsequent focus.

This model and estimated propensity scores allow matching to be restricted to observations within the common support, thus trimming outlier observations that lack close matches[7]. On the reduced samples, firms were matched through MDM on all covariates, including the propensity score, using one-to-one nearest neighbor matching, without replacement, and

[6] Controls from industries not present in treatment group (46 observations) are automatically dropped, due industry controls.
[7] 1157 (46) control observations were dropped in the male-to-female (female-to-male) sample.

exact matching on the transition year was enforced. This ensures that each treated observation was matched to a single control observation of the same year, and that each control was used only once as a match. In order to preserve sample size, no further restrictions, such as calipers, were imposed.

This yielded 156 and 82 matched observations for the male-to-female and female-to-male samples respectively. Detailed insights into the quality of the matches for all covariates and the overall sample are provided in Tables 5 and 6.

Table 5: Covariate Balancing Diagnostics Post-Matching

Table 5 presents covariate-balancing diagnostics for both samples. U refers to the unmatched sample and M to the matched sample. Bias is defined as the standardized mean differences in each covariate between the treated and control groups. The t-test tests whether the differences between groups are statistically significant. The last column reports the ratio of variances between the treated and control groups for each covariate. * denotes when the variance ratios exceed the 2.5th and 97.5th percentiles of the F-distribution.

Variable		Mean		% bias	% reduction |bias|	t-test		V(T)/ V(C)
		Treated	Control			t	p > |t|	
Male-to-Female								
ROA	U	0.086	0.080	4.4	96.0	0.45	0.655	0.34*
	M	0.086	0.087	-0.2		-0.02	0.982	1.12
Size	U	7.995	7.554	25.3	91.2	3.23	0.001	1.10
	M	7.995	7.956	2.3		0.19	0.848	1.01
Leverage	U	0.240	0.224	7.5	96.9	0.91	0.361	0.91
	M	0.240	0.240	0.2		0.02	0.983	1.07
Investment	U	0.077	0.097	-5.4	58.8	-0.49	0.625	0.06*
	M	0.077	0.068	2.2		0.61	0.541	1.33
Female-to-Male								
ROA	U	0.091	0.087	3.9	63.0	0.31	0.760	0.63*
	M	0.091	0.093	-1.4		-0.12	0.905	1.89*
Size	U	7.914	7.497	22.5	79.7	1.89	0.059	0.91
	M	7.914	7.830	4.6		0.30	0.763	1.04
Leverage	U	0.262	0.197	28.7	39.8	2.72	0.007	1.62*
	M	0.262	0.223	17.3		1.10	0.274	1.57*
Investment	U	0.083	0.091	-3.1	48.9	-0.22	0.829	0.23*
	M	0.083	0.078	1.6		0.18	0.859	1.40

Overall, across both samples and all covariates, bias was significantly reduced, by more than 50% in six of the eight covariates. Moreover, only one standardized mean difference is over 5% (17.3%), which is still considerably lower than the recommended 25% (Stuart, 2010). Furthermore, all t-tests confirm that there are no statistically significant differences between groups for each covariate.

The variance ratios also improve from the unmatched to the matched sample, with values closer to 1 (Stuart, 2010). Solely the ROA and leverage variance ratios in the female-to-male sample present slightly concerning values post-matching.

Table 6: Overall Balancing Diagnostics Post-Matching

Table 6 presents the overall balancing diagnostics in both samples, including the mean and median bias.

	Sample	Mean Bias	Median Bias
Male-to-Female	Unmatched	10.6	6.4
	Matched	1.2	1.2
Female-to-Male	Unmatched	14.5	13.2
	Matched	6.2	3.1

Table 6 further confirms that both mean and median bias for these covariates was significantly reduced through the matching procedure.

Regarding industry, although it was not used directly in the MDM procedure, including these controls in the propensity scores and the subsequent common support restriction ensures that treated and control observations are comparable with respect to industry. Nonetheless, it is also still important to assess the distribution of categorical variables across samples post-matching (Austin, 2009). Since the standardized mean differences also constitute an acceptable diagnostic metric for categorical variables as well (Austin, 2009; Stuart, 2010), the average bias across industries in both samples is also presented.

Table 7: Industry Bias Post-Matching

Table 7 presents the industry balancing diagnostic in both samples.

	Sample	Mean Industry Bias
Male-to-Female	Unmatched	11.0
	Matched	3.5
Female-to-Male	Unmatched	9.3
	Matched	5.4

Additionally, graphical diagnostics can help us assess the overlap in covariates between the treated and control groups and the overall balancing post-matching. In particular, the kernel density plots in Figures 1 and 2 illustrate the distributions of the continuous covariates across groups before and after matching and further corroborate the greater similarity between the treated and control groups post-matching.

Figure 1: Kernel Density Plots of Covariates in the Male-to-Female Sample

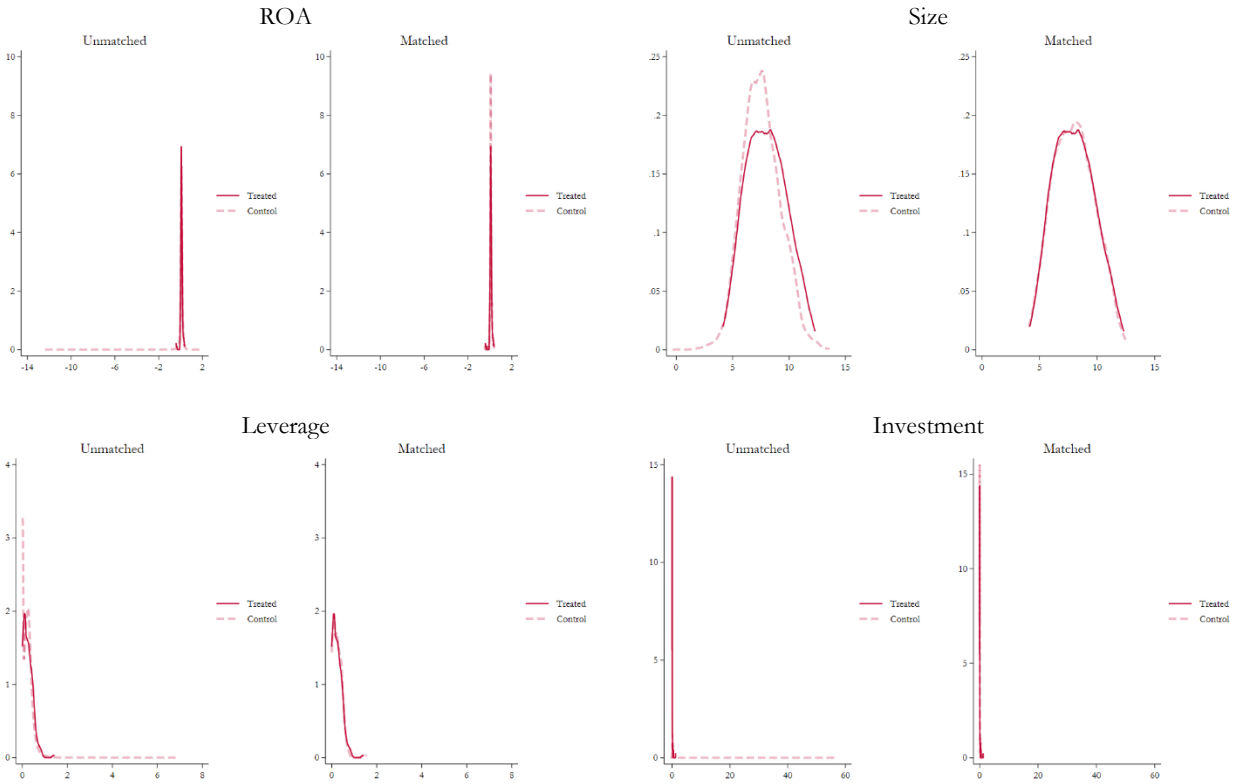
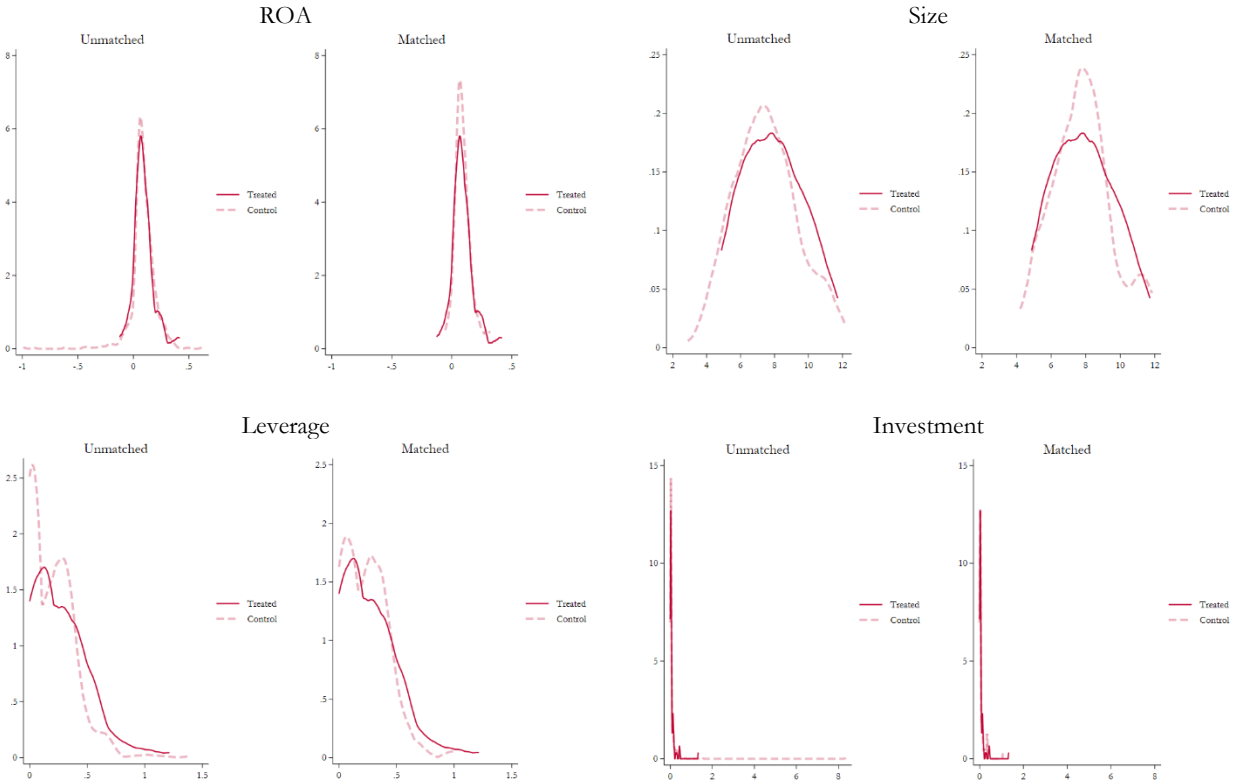


Figure 2: Kernel Density Plots of Covariates in the Female-to-Male Sample



To conclude, Table 8 provides the descriptive statistics for the first pre-treatment period of the matched sample (t=-2). Comparing the values below with the ones reported in Table 3, it can be assessed that these statistics are now considerably more similar across groups within each sample.

Table 8: Descriptive Statistics of Key Variables for the First Pre-Treatment Period Post-Matching

Table 8 presents the descriptive statistics – number of observations, mean, standard deviation, minimum value, and maximum value – for the post-matching samples, reported at t=-2. ROA is calculated as earnings before interest and taxes divided by total assets; Size is calculated as a natural logarithm of total assets (in millions); Leverage is calculated as long-term debt (due in more than 1 year) divided by total assets; and Investment is calculated as capital expenditures divided by total sales.

	Obs.	Mean	Std. Dev.	Min.	Max.
Male-to-Female					
Transition = 1					
ROA	156	0.086	0.098	-0.425	0.392
Size	156	7.995	1.783	4.126	12.312
Leverage	156	0.240	0.219	0.000	1.421
Investment	156	0.077	0.130	0.000	1.233
Transition = 0					
ROA	156	0.087	0.093	-0.488	0.415
Size	156	7.956	1.774	4.065	12.463
Leverage	156	0.240	0.212	0.000	1.552
Investment	156	0.068	0.113	0.002	1.075
Female-to-Male					
Transition = 1					
ROA	82	0.091	0.094	-0.125	0.418
Size	82	7.914	1.815	4.874	11.723
Leverage	82	0.262	0.249	0.000	1.215
Investment	82	0.083	0.167	0.000	1.333
Transition = 0					
ROA	82	0.093	0.069	-0.053	0.316
Size	82	7.830	1.783	4.219	11.834
Leverage	82	0.223	0.198	0.000	1.020
Investment	82	0.078	0.141	0.000	1.068

4.5. Final Samples

The descriptive statistics for all covariates in the final samples across the entire time window are presented in Table 9. In addition to the variables considered in the matching procedure, all other controls described in Chapter 4.2 are also included.

Table 9: Descriptive Statistics of the Final Samples

Table 9 presents the descriptive statistics – number of observations, mean, standard deviation, minimum value and maximum value – for all key variables in the final samples, across the entire time window. ROA, Size, Investment and Leverage are as defined previously; CEO's age is the natural logarithm of CEO's age; CEO Compensation Mix is the ratio of the CEO's variable and equity-linked compensation to total compensation; Board Size is the number of directors; Board Gender Diversity is calculated through the Shannon Index; CEO duality is a dummy variable taking the value of 1 when the CEO also occupies the role of Chairman of the Board and 0 otherwise; Institutional Ownership[8] is the sum of all institutional shareholders' holdings; Ownership Concentration is measured through the Herfindahl-Hirschman Index.

	Obs.	Mean	Std. Dev.	Min.	Max.
Male-to-Female					
ROA	1,560	0.082	0.109	-1.987	0.424
Size	1,560	8.064	1.775	3.356	12.518
Leverage	1,560	0.255	0.211	0.000	1.709
Investment	1,560	0.073	0.127	0.000	1.714
CEO's Age	1,560	4.026	0.126	3.584	4.564
CEO Compensation Mix	1,560	0.738	0.219	0.000	1.000
Board Size	1,560	9.660	2.167	2	17
Board Gender Diversity	1,560	0.476	0.205	0.000	0.693
CEO Duality	1,560	0.410	0.492	0	1
Institutional Ownership	1,560	0.693	0.300	0.000	1.000
Ownership Concentration	1,560	0.083	0.134	0.016	1.000
Female-to-Male					
ROA	820	0.078	0.113	-1.205	0.467
Size	820	7.968	1.803	3.780	12.041
Leverage	820	0.265	0.253	0.000	2.680
Investment	820	0.078	0.148	0.000	1.425
CEO's Age	820	3.999	0.118	3.526	4.331
CEO Compensation Mix	820	0.752	0.218	0.000	1.000
Board Size	820	9.471	2.225	4	18
Board Gender Diversity	820	0.545	0.154	0.000	0.693
CEO Duality	820	0.388	0.488	0	1
Institutional Ownership	820	0.725	0.283	0.000	1.000
Ownership Concentration	820	0.087	0.123	0.018	1.000

Lastly, since not all variables were used in the matching specification, it is important to assess the overall balance of the sample, across all covariates. Table 9 presents the mean and median bias for all eleven covariates, in both samples across treated and control groups, for the first year of the time window (t=-2).

[8] Institutional ownership reported in 13F filings occasionally exceeds 100%, a common phenomenon attributed to high short interest (since short selling data is not accounted for in these holdings), but also data errors (e.g. incorrect adjustment factors, measurement errors, double counting). Since ownership above 100% cannot be observed (Gompers & Metrick, 2001), these values were reset to 100%.

Table 10: Overall Bias for All Regression Covariates

Table 10 presents the overall bias for all regression covariates (ROA, Size, Leverage, Investment, CEO's Age, CEO Compensation Mix, Board Size, Board Gender Diversity, Institutional Ownership and Ownership Concentration), as measured in the first period of the time window (t=-2).

Sample	Mean Bias	Median Bias
Male-to-Female	12.2	5.0
Female-to-Male	13.6	10.3

Despite increasing, overall bias remains under the recommended cut-off of 25%. Furthermore, it is important to note that, as stated before, matching methods and regression adjustments work in a complementary manner, ensuring a "double robustness": while matching reduces model dependence of treatment estimations, the regression helps mitigate any small remaining imbalance in covariates between groups (Stuart, 2010).

5. Results and Discussion

5.1. Simple Difference-in-Differences

The DiD approach was implemented after matching the treated and control groups, and Table 11 reports results from various regressions derived from the original baseline specifications for both samples. All regressions were estimated through Ordinary Least Squares (OLS), with industry- and year-fixed effects. The coefficients and robust standard errors, clustered at the firm level, are reported, along with the mean Variance Inflation Factor (VIF) statistic, to ensure the absence of multicollinearity (the Pearson correlation matrix can be found in Appendix C). The regressions were computed using different sets of control variables to assess the consistency of results with different control combinations: aside from the financial controls, regressions (3) and (6) only account for the CEO controls; regressions (4) and (7) add the board controls to the previous; and regressions (5) and (8) add the ownership controls, thus comprising the full control set.

Regarding the male-to-female transitions, across all corresponding regressions (3-5), the coefficient of interest is positive and statistically significant at the 5% level, indicating that the CEO transition from a man to a woman, on average, led to an increase in firms' financial performance, as measured by ROA, of 2.0 to 2.3 p.p. *ceteris paribus*.

Furthermore, all VIF statistics are well below the recommended cut-off of 5, indicating that multicollinearity is not a concern in the estimated regressions.

These positive results suggest that a gender-changing succession can lead to a change in leadership style (Zhang & Qu, 2016) that is beneficial to the firm: i.e., women may bring a different managerial approach and organizational shift that the firms were in need of. For instance, reduced risk-taking policies, commonly attributed to women, have been proved to contribute to enhanced firm performance (Bernile et al., 2018; Jeong & Harrison, 2017).

The same approach was applied to the female-to-male sample (regressions 6-8). However, within this sample, the conclusions are substantially different: across all corresponding regressions, the coefficient of interest is statistically insignificant and indistinguishable from 0, suggesting that the CEO transition from a woman to a man did not affect firms' financial performance.

Table 11: Simple Difference-in-Differences Results

Table 11 reports the results from DiD regressions estimated via OLS, with ROA as the dependent variable, for both samples. The variable of interest is the interaction between the variables Transition and Post. Transition is a dummy variable that indicates whether the firm experienced a gender transition, taking the value 1 if the observation belongs to the treatment group and 0 otherwise. The variable Post is also a dummy variable, which equals 1 if the observation belongs to the years post-treatment, and 0 otherwise. The regressions use different sets of control variables, with industry and year fixed effects. Standard errors, reported in parentheses, are robust to firm-level clustering. Statistical significance is indicated by * at the 10% level, ** at the 5% level, and *** at the 1% level. The adjusted R^2 and Mean VIF are also presented.

	Male-to-Female			**Female-to-Male**		
Dependent Variable	**ROA**	**ROA**	**ROA**	**ROA**	**ROA**	**ROA**
	(3)	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Post	0.004	-0.004	-0.004	-0.010	-0.008	-0.008
	(0.006)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Transition	-0.006	-0.008	-0.006	-0.006	-0.006	-0.005
	(0.010)	(0.008)	(0.009)	(0.012)	(0.011)	(0.011)
Transition x Post	0.020**	0.022**	0.023**	-0.006	0.000	0.000
	(0.009)	(0.009)	(0.010)	(0.013)	(0.016)	(0.016)
Financial Controls						
Size $_t$	0.007	0.005	0.004	0.011*	0.007	0.007
	(0.006)	(0.007)	(0.006)	(0.006)	(0.006)	(0.006)
Leverage $_t$	-0.038	-0.039	-0.026	0.009	0.013	0.014
	(0.041)	(0.039)	(0.036)	(0.059)	(0.057)	(0.057)
Investment $_t$	-0.064**	-0.055**	-0.066***	-0.130***	-0.126***	-0.125***
	(0.026)	(0.025)	(0.024)	(0.038)	(0.039)	(0.039)
CEO Controls						
CEO's Age $_t$	0.074**	0.062*	0.061	-0.090*	-0.063	-0.068
	(0.036)	(0.038)	(0.038)	(0.049)	(0.056)	(0.057)
CEO Compensation Mix $_t$	0.101***	0.098***	0.088***	0.128***	0.114**	0.105**
	(0.027)	(0.027)	(0.029)	(0.048)	(0.051)	(0.049)
Board Controls						
Board Size $_t$		0.003	0.003		0.004	0.004
		(0.003)	(0.003)		(0.003)	(0.003)
Board Gender Diversity $_t$		0.003	-0.012		0.113*	0.099
		(0.039)	(0.035)		(0.064)	(0.064)
CEO Duality $_t$		0.013*	0.014*		-0.013	-0.011
		(0.008)	(0.008)		(0.014)	(0.014)
Ownership Controls						
Institutional Ownership $_t$			0.039*			0.004
			(0.020)			(0.027)
Ownership Concentration $_t$			-0.039			-0.063
			(0.032)			(0.066)
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes
Year controls	Yes	Yes	Yes	Yes	Yes	Yes
N	1,560	1,560	1,560	820	820	820
Adjusted R^2	0.190	0.192	0.206	0.228	0.246	0.248
Mean VIF	1.80	1.82	1.76	1.82	1.85	1.80

These findings, on the one hand, can be attributed to the fact that firms, and society to a broader extent, are historically accustomed to male leadership. Thereby, this lack of significant impact may reflect the lower organizational disruption associated with these transitions, since literature suggests that the impact of a succession depends on the degree to which the transition causes disruption within the company (Zhang & Qu, 2016).

However, on the other hand, these results are also consistent with a legacy effect of female leadership: organizational changes and improvements introduced by women persist beyond their tenure, and, thereby, their subsequent replacement with male successors does not instantly reverse them. This pattern is aligned with male successors validating, rather than overturning, the managerial practices established by female leaders.

Taken together, the asymmetry in results also provides valuable insights. Firstly, it suggests that results are driven by the gender-change itself and not merely the CEO succession, since, if the latter was the case, then one would expect similar results across both types of transitions. This is also consistent with the evidence that contextual effects matter in CEO succession, as not every transition will yield the same impact, partially due to predecessor's characteristics and their interaction with the successor (Dwivedi et al., 2018; Zhang & Qu, 2016).

Overall, these results only partially support the first hypothesis, that a change in CEO gender affects firm performance relative to firms in which gender remains unchanged: while they are fully consistent with hypothesis 1.a), which refers to male-to-female transitions, they provide no support to hypothesis 1.b).

Following prior literature on firm performance (Adams & Ferreira, 2009; Carter et al., 2010; Dezsö & Ross, 2012), each specification was estimated with the one-period lag of ROA. The inclusion of this variable intends to account for persistence in firm performance over time.

Furthermore, some control variables used may raise concerns of endogeneity: while the presented theoretical framework holds that, for instance, board characteristics will impact firm performance, it can also be stated that better performance can lead to improved governance practices, due to societal pressure, greater need for legitimacy, or more available resources (Adams & Ferreira, 2009; Dezsö & Ross, 2012). If that is the case, controlling for past performance can help mitigate concerns about reserve causality (Dezsö & Ross, 2012).

The results are reported in Table 12, and the magnitudes and levels of statistical significance of the coefficients of interest remain consistent across specifications, leading to the same conclusions: a CEO transition from a man to a woman led to an increase in firms' financial performance, *ceteris paribus*, while a transition from a woman to a man yielded no statistically significant effect.

Table 12: Difference-in-Differences Results with Lagged ROA

Table 12 reports the results from DiD regressions estimated via OLS, with ROA as the dependent variable, for both samples, and the one-period lag of ROA as one of the explanatory variables. The variable of interest is the interaction between the variables Transition and Post. The regressions use different sets of control variables, with industry- and year-fixed effects. Standard errors, reported in parentheses, are robust to firm-level clustering. Statistical significance is indicated by * at the 10% level, ** at the 5% level, and *** at the 1% level. The adjusted R^2 and Mean VIF are also presented.

	Male-to-Female			**Female-to-Male**		
Dependent Variable	**ROA**	**ROA**	**ROA**	**ROA**	**ROA**	**ROA**
	(9)	**(10)**	**(11)**	**(12)**	**(13)**	**(14)**
Post	-0.002	-0.003	-0.003	-0.005	-0.005	-0.005
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Transition	-0.008	-0.009	-0.009*	-0.007	-0.007	-0.007
	(0.005)	(0.004)	(0.004)	(0.007)	(0.006)	(0.006)
Transition x Post	0.016**	0.016**	0.016**	0.005	0.007	0.007
	(0.007)	(0.007)	(0.007)	(0.009)	(0.011)	(0.011)
Financial Controls						
Size $_t$	0.003	0.002	0.002	0.001	0.003	0.003
	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.003)
Leverage $_t$	-0.031	-0.031	-0.033	0.002	0.003	0.003
	(0.022)	(0.021)	(0.022)	(0.023)	(0.023)	(0.023)
Investment $_t$	-0.021	-0.020	-0.021	-0.057**	-0.061***	-0.060***
	(0.016)	(0.015)	(0.015)	(0.023)	(0.022)	(0.021)
CEO Controls						
CEO's Age $_t$	0.011	0.008	0.009	-0.019	-0.012	-0.013
	(0.017)	(0.018)	(0.017)	(0.028)	(0.032)	(0.032)
CEO Compensation Mix $_t$	0.033**	0.032*	0.032*	0.083***	0.084***	0.081***
	(0.016)	(0.016)	(0.017)	(0.030)	(0.029)	(0.027)
Board Controls						
Board Size $_t$		0.000	0.000		-0.002	-0.002
		(0.001)	(0.001)		(0.001)	(0.001)
Board Gender Diversity $_t$		0.005	0.006		0.025	0.019
		(0.014)	(0.014)		(0.036)	(0.033)
CEO Duality $_t$		0.005*	0.005*		-0.006	-0.005
		(0.003)	(0.003)		(0.005)	(0.005)
Ownership Controls						
Institutional Ownership $_t$			0.009			-0.005
			(0.008)			(0.013)
Ownership Concentration $_t$			0.023			-0.031
			(0.017)			(0.050)
ROA $_{t-1}$	0.855***	0.853***	0.854***	0.731***	0.729***	0.727***
	(0.058)	(0.059)	(0.059)	(0.085)	(0.092)	(0.094)
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes
Year controls	Yes	Yes	Yes	Yes	Yes	Yes
N	1,560	1,560	1,560	820	820	820
Adjusted R^2	0.651	0.651	0.651	0.604	0.604	0.604
Mean VIF	1.72	1.76	1.71	1.76	1.80	1.76

Nonetheless, to further address these concerns and reduce other potential endogeneity issues, namely simultaneity, the regressions were also estimated with all controls lagged by one year. While lagged ROA was previously readily available for the full panel, extending the lag structure for all governance and ownership variables would be substantially more costly; thus, this approach mechanically reduced the usable sample by one period. Notwithstanding, the DiD method remains feasible, as the time window spanned two pre-transition periods. The results for these regressions are reported in Table 13.

Table 13: Difference-in-Differences Results with Lagged Controls

Table 13 reports the results from DiD regressions estimated via OLS, with ROA as the dependent variable, for both samples. All controls variables are lagged by one period. The variable of interest is the interaction between the variables Transition and Post. The regressions use different sets of control variables, with industry- and year-fixed effects. Standard errors, reported in parentheses, are robust to firm-level clustering. Statistical significance is indicated by * at the 10% level, ** at the 5% level, and *** at the 1% level. The adjusted R^2 and Mean VIF are also presented.

	Male-to-Female			**Female-to-Male**		
Dependent Variable	**ROA (15)**	**ROA (16)**	**ROA (17)**	**ROA (18)**	**ROA (19)**	**ROA (20)**
Post	-0.003	-0.003	-0.003	-0.007	-0.005	-0.005
	(0.006)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Transition	-0.006	-0.008	-0.006	-0.020	-0.022	-0.024
	(0.011)	(0.010)	(0.010)	(0.014)	(0.014)	(0.014)
Transition x Post	0.016*	0.016*	0.019*	0.005	0.014	0.015
	(0.009)	(0.010)	(0.011)	(0.012)	(0.015)	(0.015)
Financial Controls						
Size $_{t-1}$	0.006	0.002	0.002	0.013*	0.008	0.007
	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Leverage $_{t-1}$	-0.001	-0.002	0.020	0.051	0.057	0.062
	(0.032)	(0.030)	(0.024)	(0.055)	(0.051)	(0.050)
Investment $_{t-1}$	-0.076**	-0.065**	-0.077***	-0.108***	-0.106***	-0.105***
	(0.030)	(0.029)	(0.030)	(0.037)	(0.036)	(0.036)
CEO Controls						
CEO's Age $_{t-1}$	0.074**	0.064*	0.059	-0.057	-0.026	-0.027
	(0.034)	(0.035)	(0.036)	(0.055)	(0.067)	(0.064)
CEO Compensation Mix $_{t-1}$	0.085***	0.081***	0.069**	0.110**	0.097**	0.093**
	(0.025)	(0.025)	(0.029)	(0.044)	(0.044)	(0.046)
Board Controls						
Board Size $_{t-1}$		0.004	0.004		0.005	0.005
		(0.003)	(0.003)		(0.004)	(0.004)
Board Gender Diversity $_{t-1}$		0.006	-0.016		0.124**	0.113*
		(0.043)	(0.035)		(0.059)	(0.060)
CEO Duality $_{t-1}$		0.011	0.012*		-0.017	-0.017
		(0.008)	(0.008)		(0.016)	(0.015)
Ownership Controls						
Institutional Ownership $_{t-1}$			0.034*			-0.031
			(0.018)			(0.027)
Ownership Concentration $_{t-1}$			-0.098			-0.088
			(0.077)			(0.085)
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes
Year controls	Yes	Yes	Yes	Yes	Yes	Yes
N	1,248	1,248	1,248	656	656	656
Adjusted R^2	0.165	0.168	0.191	0.223	0.243	0.247
Mean VIF	2.14	2.06	1.96	2.19	2.12	2.03

In the male-to-female sample, the coefficients of interest are consistent with the previous regressions and statistically significant, albeit at the 10% level. Likewise, in the female-to-male sample, the results remain statistically insignificant.

5.2. Dynamic Difference-in-Differences

Contrary to a simple DiD, which estimates a single treatment effect, a dynamic approach allows the treatment effects to change nonparametrically over time. For the baseline period, we consider the one immediately prior to treatment (t=-1), which constitutes the most common procedure in the literature (Sun & Abraham, 2021). Furthermore, implementing a dynamic DiD also allows us to statistically test the parallel trends assumption. While, due to its counterfactual nature, the hypothesis is untestable, pre-treatment trends are usually analyzed to ensure there is no prior violation (Roth et al., 2023).

Similar to the approach adopted by Matsa and Miller (2013), by including a pre-treatment period and its interaction with the treatment variable in the regression, and analyzing both the resulting coefficient and its statistical significance, the parallel trends assumption can be plausibly tested, conditional on other covariates. It is important to note that this differs from the traditional unconditional assumption, however, in certain economic settings, it can be more plausible: when, in the absence of treatment, the outcome depends on other specific covariates, conditional parallel trends become more credible, as ignoring these covariate specific trends can lead to relevant biases (Callaway & Sant'Anna, 2021). If the pre-treatment parallel trends hold, then statistically significant post-treatment coefficients can be interpreted as the causal effects of the gendered transition.

The results for these regressions are presented in Table 14. As we can infer from the reported results, the *Transition x Pre* coefficient is statistically insignificant in both regressions, and small in magnitude, which supports the existence parallel trends pre-transition.

Table 14: Dynamic Difference-in-Differences Results

Table 14 reports the results from the dynamic DiD regressions estimated via OLS, with ROA as the dependent variable, for both samples. The variable of interest is the interaction between the variable Transition and each one of the variables corresponding to the years post-transition – First Year, Second Year and Third Year. These are dummy variables which equal 1 if the observation belongs to the first- (t=+1), second- (t=+2), or third-year (t=+3) post-treatment, respectively, and 0 otherwise. Variable Pre is also a dummy variable, which equals 1 if the observation belongs to the first year of the sample (t=-2), and 0 otherwise. The regressions are estimated with industry- and year-fixed effects. Standard errors, reported in parentheses, are robust to firm-level clustering. Statistical significance is indicated by * at the 10% level, ** at the 5% level, and *** at the 1% level. The adjusted R^2 and Mean VIF are also presented.

	Male-to-Female	Female-to-Male
Dependent Variable	**ROA (21)**	**ROA (22)**
Pre (t=-2)	-0.001	0.007
	(0.004)	(0.005)
First Year (t=+1)	-0.005	-0.009
	(0.004)	(0.007)
Second Year (t=+2)	0.003	-0.010
	(0.005)	(0.008)
Third Year (t=+3)	-0.013	0.007
	(0.012)	(0.011)
Transition	-0.011	-0.010
	(0.010)	(0.013)
Transition x Pre (t=-2)	0.011	0.011
	(0.007)	(0.011)
Transition x First Year (t=+1)	0.032***	0.018
	(0.010)	(0.016)
Transition x Second Year (t=+2)	0.020*	-0.001
	(0.011)	(0.018)
Transition x Third Year (t=+3)	0.035**	0.000
	(0.014)	(0.018)
Financial Controls		
Size $_t$	0.004	0.007
	(0.006)	(0.006)
Leverage $_t$	-0.026	0.015
	(0.036)	(0.057)
Investment $_t$	-0.066***	-0.124*
	(0.024)	(0.039)
CEO Controls		
CEO's Age $_t$	0.062	-0.070
	(0.038)	(0.057)
CEO Compensation Mix $_t$	0.089***	0.106**
	(0.029)	(0.049)
Board Controls		
Board Size $_t$	0.003	0.004
	(0.003)	(0.003)
Board Gender Diversity $_t$	-0.011	0.097
	(0.036)	(0.065)
CEO Duality $_t$	0.014*	-0.011
	(0.008)	(0.014)
Ownership Controls		
Institutional Ownership $_t$	0.039*	0.004
	(0.020)	(0.027)
Ownership Concentration $_t$	-0.039	-0.060
	(0.033)	(0.067)
Industry controls	Yes	Yes
Year controls	Yes	Yes
N	1,560	820
Adjusted R^2	0.205	0.247
Mean VIF	2.49	2.52

Regarding treatment effects, in the male-to-female sample, we conclude that firms experiencing a gendered transition present higher performance relative to the baseline period (t=-1) in all post-transition years. However, since the effect is not cumulative, this suggests that the impact happens on the first year. Moreover, while the marginal effect from the first (3.2 p.p.) to the second year (2.0 p.p.) is negative, gains rebound in the third year (3.5 p.p.), suggesting that the impact felt in the first year is long-lived, since it endures over time.

Consistent with previous results, for the female-to-male sample, the transition yields no significant impact in any of the years under analysis.

5.3. Robustness Checks

5.3.1 Alternative Matching Specifications

Given the wide universe of control firms, alternative matching specifications were conducted to demonstrate that the results are not dependent on the chosen matching method. Both the PSM and MDM methods presented in Appendix B were applied, and, given that 1:1 matching can discard many potentially good matches (Stuart, 2010) , two-nearest-neighbors matching based on the hybrid approach adopted previously was also conducted.

Indeed, when there are many control units, it is possible to obtain multiple good matches for each treated unit. However, similarly to when choosing the matching method, this decision also involves a bias-variance trade-off: increasing the number of matches will naturally increase bias since the 2nd closest match will always be further away from the treated unit than its 1st closest match; but the resulting larger sample size can decrease the variance of estimates (Stuart, 2010).

Moreover, in the case of the two-nearest-neighbors approach, matching with replacement was allowed, since this choice can, in turn, help reduce bias by enabling controls that are similar to many treated individuals to be used more than once (Stuart, 2010). For such, the weights of the control units were adjusted in the subsequent regressions, to account for how many times each control served as a match.

The results are reported in Table 15, with regressions (23) and (26) corresponding to the one-nearest-neighbor PSM, regressions (24) and (27) to the one-nearest-neighbor MDM, and (25) and (28) to the two-nearest-neighbors hybrid matching. Both the PSM and the hybrid matching rely on the previously estimated logit model (Table 4).

Table 15: Difference-in-Differences Results for Different Matching Specifications

Table 15 reports the results from DiD regressions estimated via OLS, with ROA as the dependent variable, for both samples. The variable of interest is the interaction between the variables Transition and Post. The regressions use different matching specifications: regressions (23) and (26) use one-to-one PSM based on the previous logit model, regressions (24) and (27) use one-to-one MDM, and regressions (25) and (28) use the same hybrid approach as the baseline regressions, but with two-nearest-neighbor algorithm. All regressions are estimated with industry- and year-fixed effects. Standard errors, reported in parentheses, are robust to firm-level clustering. Statistical significance is indicated by * at the 10% level, ** at the 5% level, and *** at the 1% level. The adjusted R^2 and Mean VIF are also presented.

	Male-to-Female			**Female-to-Male**		
	PSM	MDM	1:2 Hybrid	PSM	MDM	1:2 Hybrid
Dependent Variable	**ROA (23)**	**ROA (24)**	**ROA (25)**	**ROA (26)**	**ROA (27)**	**ROA (28)**
Post	-0.002	-0.005	-0.002	0.002	0.006	-0.004
	(0.005)	(0.007)	(0.004)	(0.008)	(0.008)	(0.006)
Transition	-0.009	-0.012	-0.008	-0.008	-0.003	-0.001
	(0.010)	(0.011)	(0.008)	(0.015)	(0.012)	(0.011)
Transition x Post	0.015*	0.020*	0.018**	-0.003	-0.014	-0.005
	(0.008)	(0.010)	(0.008)	(0.015)	(0.017)	(0.014)
Financial Controls						
Size $_t$	-0.000	0.006	0.006	0.002	0.007	0.009
	(0.004)	(0.007)	(0.005)	(0.007)	(0.007)	(0.007)
Leverage $_t$	0.011	-0.028	-0.015	0.037	0.019	-0.004
	(0.033)	(0.038)	(0.032)	(0.074)	(0.056)	(0.066)
Investment $_t$	-0.041	-0.070**	-0.071***	-0.057	-0.101*	-0.115**
	(0.028)	(0.028)	(0.022)	(0.040)	(0.052)	(0.045)
CEO Controls						
CEO's Age $_t$	0.031	0.021	0.065**	-0.010	-0.093	-0.052
	(0.037)	(0.042)	(0.033)	(0.074)	(0.056)	(0.056)
CEO Compensation Mix $_t$	0.091***	0.059**	0.071***	0.136**	0.112**	0.115***
	(0.020)	(0.027)	(0.021)	(0.056)	(0.051)	(0.044)
Board Controls						
Board Size $_t$	0.005**	0.003	0.002	0.003	0.002	0.002
	(0.002)	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)
Board Gender Diversity $_t$	0.003	0.006	-0.004	0.111	0.068	0.094
	(0.023)	(0.032)	(0.026)	(0.070)	(0.070)	(0.064)
CEO Duality $_t$	0.010	0.017**	0.006	-0.001	0.001	-0.012
	(0.007)	(0.009)	(0.006)	(0.013)	(0.014)	(0.013)
Ownership Controls						
Institutional Ownership $_t$	0.020	0.029	0.032**	0.014	0.005	0.003
	(0.016)	(0.026)	(0.015)	(0.031)	(0.027)	(0.026)
Ownership Concentration $_t$	-0.038	-0.036	-0.028	-0.004	-0.079	-0.032
	(0.024)	(0.028)	(0.027)	(0.045)	(0.064)	(0.043)
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes
Year controls	Yes	Yes	Yes	Yes	Yes	Yes
N	1,560	1,560	2,325	820	820	1,075
Adjusted R^2	0.210	0.160	0.188	0.209	0.208	0.268
Mean VIF	1.77	1.74	1.74	1.81	1.78	1.83

In the male-to-female sample, across all specifications, the *Transition x Post* coefficient remains statistically and economically significant, at a 5% level in the two-nearest-neighbor hybrid matching, and at a 10% level otherwise. In the female-to-male sample, as before, the coefficients are statistically insignificant.

5.3.2. Alternative Dependent Variables

The present study relies on ROA as the firm's performance measure; however, ROA has drawbacks, namely its sensitivity to earnings manipulation and its reliance on total assets, which are recorded at historic cost and include non-operating assets (Barber & Lyon, 1996).

To overcome the first problem, we re-estimated the model using *cash-flow ROA*, since cash-based measures are less sensitive to earnings manipulation than accrual-based measures of performance (Barber & Lyon, 1996). Cash-flow ROA was measured as operating cash flow[9] divided by total assets. To address the latter issues, we also used *return on sales* (ROS), defined as EBIT divided by total sales. Sales, unlike total assets, are recorded in current dollars and may be a better match for scaling EBIT, since variations in assets can reflect changes unrelated to profitability or productivity (Barber & Lyon, 1996).

The results in Table 16 remain consistent with previous conclusions: the CEO transition from a man to a woman led, on average, to an increase in firms' financial performance, when measured by cash-flow ROA (5% significance level) or ROS (10% significance level), *ceteris paribus*; the opposite transition shows no statistically significant effect.

[9] Net cash flow from operating activities, as reported in the cash flow statement, and retrieved through the CompuStat database.

Table 16: Difference-in-Differences Results for Alternative Performance Measures

Table 16 reports the results from DiD regressions estimated via OLS, for both samples. The dependent variable is cash-flow ROA (CF ROA) in regressions (29) and (31), and return on sales (ROS) in regressions (30) and (32). The variable of interest is the interaction between the variables Transition and Post. All regressions rely on the original matching specification. All regressions are estimated with industry- and year-fixed effects. Standard errors, reported in parentheses, are robust to firm-level clustering. Statistical significance is indicated by * at the 10% level, ** at the 5% level, and *** at the 1% level. The adjusted R^2 and Mean VIF are also presented.

	Male-to-Female		**Female-to-Male**	
Dependent Variable	**CF ROA (29)**	**ROS (30)**	**CF ROA (31)**	**ROS (32)**
Post	-0.003	-0.019	-0.007	-0.001
	(0.005)	(0.026)	(0.007)	(0.021)
Transition	0.003	-0.010	-0.011	-0.051
	(0.007)	(0.017)	(0.011)	(0.032)
Transition x Post	0.018**	0.044*	0.002	-0.012
	(0.008)	(0.023)	(0.014)	(0.054)
Financial Controls				
Size $_t$	0.001	0.038	0.004	0.036
	(0.005)	(0.024)	(0.006)	(0.025)
Leverage $_t$	-0.062***	-0.106	-0.062	-0.077
	(0.024)	(0.132)	(0.047)	(0.170)
Investment $_t$	0.011	0.015	-0.056	-0.315*
	(0.019)	(0.056)	(0.048)	(0.180)
CEO Controls				
CEO's Age $_t$	0.036	0.084	-0.063	-0.006
	(0.032)	(0.079)	(0.049)	(0.108)
CEO Compensation Mix $_t$	0.066***	0.012	0.097**	0.355*
	(0.022)	(0.081)	(0.046)	(0.210)
Board Controls				
Board Size $_t$	0.002	-0.007	0.001	0.004
	(0.002)	(0.008)	(0.003)	(0.011)
Board Gender Diversity $_t$	0.006	0.075	0.073	-0.074
	(0.026)	(0.094)	(0.047)	(0.137)
CEO Duality $_t$	0.016***	0.017	-0.005	-0.017
	(0.006)	(0.020)	(0.012)	(0.033)
Ownership Controls				
Institutional Ownership $_t$	0.021	0.094	0.020	0.149
	(0.014)	(0.074)	(0.026)	(0.130)
Ownership Concentration $_t$	-0.044	-0.044	-0.070	0.094
	(0.030)	(0.057)	(0.058)	(0.285)
Industry controls	Yes	Yes	Yes	Yes
Year controls	Yes	Yes	Yes	Yes
N	1,560	1,560	820	820
Adjusted R^2	0.211	0.113	0.268	0.189
Mean VIF	1.76	1.76	1.80	1.80

5.3.3. Possible Gender Contaminations

Since the CEO's gender in a given year is determined by the CEO who held the office for most of the year, there can be years in which both genders are present in the CEO's office. To address concerns of contamination across the sample, the baseline regression was also estimated without the observations corresponding to those years (Table 17).

Table 17: Difference-in-Differences Results for the Reduced Sample

Table 17 reports the results from DiD regressions estimated via OLS, with ROA as the dependent variable, for both samples. Each sample was reduced to exclude years in which both genders are present in the CEO office. The variable of interest is the interaction between the variables Transition and Post. All regressions are estimated with industry- and year-fixed effects. Standard errors, reported in parentheses, are robust to firm-level clustering. Statistical significance is indicated by * at the 10% level, ** at the 5% level, and *** at the 1% level. The adjusted R^2 and Mean VIF are also presented.

	Male-to-Female	**Female-to-Male**
Dependent Variable	**ROA**	**ROA**
	(33)	**(34)**
Post	-0.005	-0.008
	(0.007)	(0.008)
Transition	-0.003	-0.004
	(0.009)	(0.011)
Transition x Post	0.019*	-0.003
	(0.010)	(0.020)
Financial Controls		
Size $_t$	0.005	0.010
	(0.007)	(0.006)
Leverage $_t$	-0.029	0.006
	(0.037)	(0.060)
Investment $_t$	-0.075***	-0.128***
	(0.022)	(0.044)
CEO Controls		
CEO's Age $_t$	0.048	-0.067
	(0.037)	(0.062)
CEO Compensation Mix $_t$	0.093***	0.113*
	(0.032)	(0.061)
Board Controls		
Board Size $_t$	0.001	0.001
	(0.003)	(0.003)
Board Gender Diversity $_t$	-0.011	0.084
	(0.035)	(0.074)
CEO Duality $_t$	0.016*	-0.013
	(0.008)	(0.014)
Ownership Controls		
Institutional Ownership $_t$	0.041*	0.002
	(0.022)	(0.028)
Ownership Concentration $_t$	-0.057	-0.068
	(0.035)	(0.065)
Industry controls	Yes	Yes
Year controls	Yes	Yes
N	1,398	719
Adjusted R^2	0.207	0.245
Mean VIF	1.75	1.81

The observation corresponding to the year in which the actual CEO transition occurred across all treated units was dropped. Moreover, given the nature of the data, this situation can also, occur sporadically in the first or last year of the time window for any given unit, whether treated or control. Those observations were also dropped. In the male-to-female sample, of the original 1,560 observations, 6 were dropped in addition to the 156 transitions. In the female-to-male sample, from the original 820 observations, besides the 82 transitions, 19 additional observations were dropped.

The results remain consistent, being statistically significant, at the 10% level, for the male-to-female sample, and insignificant for the female-to-male sample.

5.4. Impact of Pre-Transition Performance

Across all specifications considered, the male-to-female transitions yielded a positive impact on firm performance, but it is important to consider whether such impact is concentrated in specific contexts. A natural hypothesis is that female CEOs may be especially effective at turning around underperforming firms, or conversely, that they may add more value in well-performing firms with more resources and organizational slack to implement change. Understanding these circumstances provides insight into the mechanisms through which female leadership affects firm performance. Moreover, it may be that any type of transition will yield a positive impact when the firm is underperforming prior to succession.

To understand these contextual effects, transition firms in each sample were split based on their median ROA observed in t=-2 (8.1% and 7.9% in the male-to-female and female-to-male samples, respectively). The respective controls for each observation were kept. As this sample split can naturally affect the balance of the covariates, the descriptive statistics and bias for these sub-samples are presented in Appendix D. However, most importantly, and given the nature of this separation, it is crucial to ensure that the groups would still have followed parallel trends in the absence of treatment. The same approach applied in Chapter 5.2. was implemented, with the results also reported in the Appendix D, which still support the existence of parallel trends.

The regressions are presented in Table 18, with regressions (35) and (37) corresponding to the sample in which treated firms were underperforming prior to the transition, and regressions (36) and (38) to those in which treated firms were performing above the median.

Table 18: Difference-in-Differences Results According to Pre-Transition Performance

Table 18 reports the results from DiD regressions estimated via OLS, with ROA as the dependent variable, for both samples. Each sample was split according to the pre-transition performance, observed in the first year of the time window. The variable of interest is the interaction between the variables Transition and Post. All regressions are estimated with industry- and year-fixed effects. Standard errors, reported in parentheses, are robust to firm-level clustering. Statistical significance is indicated by * at the 10% level, ** at the 5% level, and *** at the 1% level. The adjusted R^2 and Mean VIF are also presented.

	Male-to-Female		**Female-to-Male**	
	Below Median	Above Median	Below Median	Above Median
Dependent Variable	**ROA (35)**	**ROA (36)**	**ROA (37)**	**ROA (38)**
Post	0.007	-0.011	-0.007	-0.026**
	(0.010)	(0.007)	(0.009)	(0.012)
Transition	-0.013	0.011	-0.029**	0.003
	(0.012)	(0.012)	(0.012)	(0.017)
Transition x Post	0.031**	0.006	0.000	0.020
	(0.015)	(0.010)	(0.019)	(0.021)
Financial Controls				
Size $_t$	0.025**	-0.011***	0.026***	-0.006
	(0.012)	(0.004)	(0.008)	(0.008)
Leverage $_t$	-0.077	0.013	-0.147*	0.043
	(0.068)	(0.028)	(0.082)	(0.041)
Investment $_t$	-0.048	-0.018	-0.085***	-0.064
	(0.038)	(0.089)	(0.028)	(0.168)
CEO Controls				
CEO's Age $_t$	-0.008	0.078*	-0.117**	0.048
	(0.057)	(0.043)	(0.058)	(0.072)
CEO Compensation Mix $_t$	0.018	0.096***	0.209**	0.069
	(0.044)	(0.027)	(0.094)	(0.047)
Board Controls				
Board Size $_t$	-0.003	0.006**	-0.004	0.009
	(0.004)	(0.003)	(0.003)	(0.006)
Board Gender Diversity $_t$	0.024	-0.059	-0.107	0.231**
	(0.056)	(0.039)	(0.080)	(0.105)
CEO Duality $_t$	0.031**	-0.001	0.006	-0.024
	(0.014)	(0.009)	(0.016)	(0.017)
Ownership Controls				
Institutional Ownership $_t$	0.041	0.021	0.038	-0.037
	(0.030)	(0.019)	(0.041)	(0.031)
Ownership Concentration $_t$	0.005	-0.033	0.091	-0.260***
	(0.036)	(0.046)	(0.094)	(0.058)
Industry controls	Yes	Yes	Yes	Yes
Year controls	Yes	Yes	Yes	Yes
N	780	780	410	410
Adjusted R^2	0.259	0.210	0.433	0.223
Mean VIF	1.85	1.74	1.89	1.87

Results demonstrate that, in the male-to-female sample, the effect is concentrated in the underperforming sub-sample, with these firms experiencing an average increase in ROA of 3.1 p.p. post-transition, *ceteris paribus*, while no impact is felt in the firms that were already experiencing higher performance. This effect is consistent with the notion of women being more preferable to take on management positions when a company is undergoing a crisis (Ryan & Haslam, 2007).

In the female-to-male sample, results remain insignificant, further supporting the idea that these transitions do not impact firm performance, even when considering different performance circumstances.

While these findings provide further support to the argument of bringing women into leadership positions, they can also have the detrimental effect of further cementing the "glass cliff" phenomenon, in which firms are more likely to choose women for management roles when a firm is underperforming (Cook & Glass, 2013b; Ryan & Haslam, 2007), and the "think crisis-think female" bias, which stems from the idea of "women as crisis managers" (Ryan et al., 2011).

Often times, women are only considered for management roles when there is a need to challenge the *status quo*: given the predominantly male history of company leadership, as long as firms remain performing according to expectations, more male successors are likely to be chosen. When a company, however, starts falling short, there is a perceived need for change, leading to the appointment of women (Bruckmüller & Branscombe, 2010).

Only viewing women as desirable for precarious leadership positions can lead to the reinforcement of gender stereotypes which, in turn, contributes to continuous gender discrimination, leaving them more susceptible to criticism due to the higher likelihood of organizational failure (Ryan et al., 2011). It is particularly important to consider the possible scenarios of failure: what will happen to women appointed in such circumstances if they fail to turn around the company and whether the existing difficulties prior to their appointment will be acknowledged (Bruckmüller & Branscombe, 2010).

6. Conclusion

> "'Breaking glass' by females, through the ceilings of upper middle management into strategy-making roles in the highest echelons, has a net benefit for firms in the long run" (Jeong & Harrison, 2017).

The presence of women in management positions remains an ongoing debate, as their persistent underrepresentation highlights "systemic inefficiencies" in translating skills into economic engagement and prosperity (World Economic Forum, 2025). Drawing from the Upper Echelons Theory (Hambrick & Mason, 1984), this dissertation considers CEO succession events involving gender transitions, with a particular focus on the performance implications of women attaining and departing from such roles, thereby contributing to the literature on CEO succession and gender in corporate finance and organizations.

For this reason, we focused on CEO successions involving gender change in the U.S. between 2000 and 2022, and analyzed each type of transition (male-to-female and female-to-male) relative to firms managed solely by the predecessor's gender over the same period. A DiD methodology was employed, complemented by a matching procedure, to understand the variation in the performance of firms which experienced a gender change in CEO (in relation to the control firms which did not) in the years following that gendered transition (relative to the years prior).

The evidence reveals that a CEO transition from a man to a woman increased firm performance, measured by ROA, by 1.5 to 2.3 p.p., *ceteris paribus*, while the inverse transition yielded no statistically significant effect. The results remained robust across multiple regression specifications, including a wide range of control variables and different combinations, decomposition of the effect via a dynamic DiD, and alternative dependent variables and identification strategies.

The conclusions drawn from this research underscore the importance of breaking the barriers that prevent women from reaching leadership positions, as doing so not only contributes to social justice and greater gender parity but also enables firms to tap into a source of greater economic performance. Moreover, this effect is concentrated in previously underperforming firms, thereby demonstrating the advantages of appointing women to leadership positions, namely their effectiveness in turning around struggling companies, but also further supporting the "think crisis-think female" stereotype.

In contrast, the results from female-to-male transitions are consistent with male successors causing less disruption than their female counterparts, due to the predominantly male history of corporate leadership. However, they also suggest that female leadership may generate organizational changes that persist beyond the tenure of the female CEO herself, as subsequent replacement by male successors yields no impact, further confirming the value of managerial practices established by women.

However, the present dissertation is not without its limitations. Firstly, while the design to construct the control groups was motivated by Faccio et al.'s (2016) previous work, it can be improved upon by controlling each gendered transition to a same-gender one (i.e., male-to-female transitions would be controlled for using male-to-male transitions, and vice-versa). While such design was not possible due to data availability, particularly the lack of female-to-female transitions, which are not only scarce overall, but also concentrated in later years, a common issue in previous works (Wu et al., 2024; Zhang & Qu, 2016); the chosen methodology may not fully disentangle the gender impact from the act of succession itself.

Nonetheless, the pre-transition matching applied can help mitigate these issues, by ensuring firms are comparable *ex-ante*, and the asymmetry across transition types is also informative: if CEO succession were the main driver of results, one would expect comparable effects. The fact that performance effects systematically appear solely in the male-to-female sample is therefore more consistent with a gender-specific mechanism rather than a succession-only mechanism.

Moreover, it is important to consider the possibility of sample selection bias, as the firms that experience a gendered transition may be fundamentally different from those that do not. While matching between treated and control groups helps reduce this issue, as it eliminates observable differences, a possible avenue for future research is the Heckman two-stage regression, to account for the probability of a firm experiencing gender-changing succession, as outlined by Zhang and Qu (2016). However, this requires a valid exclusion restriction, i.e., one must ensure that at least one variable that affects selection does not affect performance.

This study is also limited in its sample size, given the scarcity of female CEOs, an aspect that is inherent to the investigation topic itself and, thus, unavoidable. This can partially contribute to the lack of statistically significant results in the female-to-male sample. As more women integrate these roles, it is essential to extend this research to broader samples.

Additionally, another relevant aspect to highlight is the narrow post-transition period: while this decision was driven by the need to preserve sample size and discard as few transitions as possible, it does not allow for the analysis of long-term performance and relied on the assumption that the succession had an immediate impact.

Lastly, one cannot exhaustively exclude the possibility of omitted variables, since firm performance is affected by a large number of confounders, which may vary differently within each group, treated and control, across time.

Notwithstanding, we believe the empirical strategy implemented, strengthened by the robustness analyses conducted, still provides valuable insights into the dynamics of gender change in CEO succession.

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Appendix

Appendix A: Variable Description

Table A1: Description of the Original Variables Extracted from the Databases

Variable	Description	Data Provider	Manual Input
Firm-Year-CEO	Person who held the CEO role at a given firm for the majority of a fiscal year.	ExecuComp	No
CEO gender	Gender (male or female) of the CEO in Firm-Year-CEO.	ExecuComp	No
Total Assets	Book value of total assets (millions USD).	CompuStat	No
Earnings Before Interest and Taxes	Book value of EBIT (millions USD).	CompuStat	No
Total Long-Term Debt	Book value of total debt due in more than one year (millions USD).	CompuStat	No
Capital Expenditures	Book value of capital expenditures (millions USD).	CompuStat	No
Sales	Book value of net sales (millions USD).	CompuStat	No
Operating Cash Flow	Book value of cash flow generated from operating activities (millions USD).	CompuStat	No
CEO's Age	Age of the CEO as reported at the annual proxy statement.	ExecuComp	Yes
CEO Total Compensation	Total compensation (Salary + Bonus + Restricted Stock Grants + Long-Term Incentive Plan Payouts + Value of Options Exercised + Other) of the CEO as reported at the annual proxy statement (thousands USD).	ExecuComp	No
CEO Salary	Salary of the CEO as reported at the annual proxy statement (thousands USD).	ExecuComp	No
Board Size	Number of directors on board as reported at the annual proxy statement.	BoardEx	Yes
Proportion of Male Directors	Proportion of male directors on board as reported at the annual proxy statement.	BoardEx	Yes
Executive Title	Title the executive held in the indicated fiscal year.	ExecuComp	Yes
Institutional Ownership	Total institutional ownership, reported quarterly (% of shares outstanding).	LSEG	Yes
Ownership Concentration	Herfindahl-Hirschman index.	LSEG	Yes
Industry	4-digit Global Industry Classification Standard (GICS) codes.	ExecuComp	No

Table A2: Description of the Regression Variables

Variable	Description
Dependent Variables	
Return on Assets	Earnings before interest and taxes divided by total assets at fiscal-year-end.
Cash-Flow Return on Assets	Operating cash flow divided by total assets at fiscal-year-end.
Return on Sales	Earnings before interest and taxes divided by sales.
Independent Variables	
Pre	Dummy variable which takes the value of 1 if the observation belongs to the first year of the time window (t=-2).
Post	Dummy variable which takes the value of 1 if the observation belongs to the post-treatment period (t=+1, t=+2, t=+3).
First Year	Dummy variable which takes the value of 1 if the observation belongs to the first year post-treatment (t=+1).
Second Year	Dummy variable which takes the value of 1 if the observation belongs to the second year post-treatment (t=+2).
Third Year	Dummy variable which takes the value of 1 if the observation belongs to the third year post-treatment (t=+3).
Transition	Dummy variable which takes the value of 1 if the observation belongs to the treated group.
Financial Controls	
Size	Natural logarithm of total assets at fiscal-year-end.
Leverage	Total long-term debt divided by total assets at fiscal-year-end.
Investment	Capital expenditures divided by sales.
CEO Controls	
CEO's Age	Natural logarithm of CEO's age.
CEO Compensation Mix	Total variable and equity-linked compensation (total compensation subtracted from salary) divided by total compensation.
Board Controls	
Board Size	Number of directors present on the board as reported in the annual proxy statement.
Board Gender Diversity	Shannon Index, as of the annual proxy statement.
CEO Duality	Dummy variable which takes the value of 1 if the CEO is also the Chairman at fiscal-year-end.

Ownership Controls	
Institutional Ownership	As extracted from the database: total institutional ownership, reported quarterly (% of shares outstanding).
Ownership Concentration	As extracted from the database: Herfindahl-Hirschman index.

Appendix B: PSM and MDM Results

This section presents the matching results using solely either PSM or MDM, to further corroborate the choice of a hybrid approach. Similarly, in both methods, one-to-one nearest neighbor matching without replacement is used, and matching is enforced on the transition year. In PSM, matching was also restricted to common support observations.

Tables B1 and B2 report the balancing results using PSM, based on the same logit models (Table 3) estimated before. Unlike the chosen approach, in which bias was reduced for all covariates, six of which by more than 50%, using PSM resulted in a slight increase in bias for two covariates. While bias post-matching is mostly satisfactory, in the male-to-female sample, it is higher for all covariates when compared to the chosen method, resulting in a higher mean and median bias. Furthermore, two variance ratios considerably increased, with the investment ratio in the male-to-female sample surpassing 3.

Table B1: Covariate Balancing Diagnostics Post-PSM

Table B1 presents covariate balancing diagnostics in the both samples. U refers to the unmatched sample and M to the matched sample. Bias is defined as the standardized mean differences in each covariate between treated and control groups. The t-test reports whether or not the differences between groups are statistically significant. The last column reports the ratio between the variances of treated and control groups across each covariate.

Variable		Mean		% bias	% reduction |bias|	t-test		V(T)/ V(C)
		Treated	Control			t	p > |t|	
Male-to-Female								
ROA	U	0.086	0.080	4.4	82.5	0.45	0.655	0.34*
	M	0.086	0.087	-0.8		-0.10	0.921	1.22
Size	U	7.995	7.554	25.3	95.4	3.23	0.001	1.10
	M	7.995	8.015	-1.2		-0.10	0.923	0.88
Leverage	U	0.240	0.224	7.5	-1.4	0.91	0.361	0.91
	M	0.240	0.257	-7.6		-0.74	0.460	1.35
Investment	U	0.077	0.097	-5.4	-1.6	-0.49	0.625	0.06*
	M	0.077	0.056	5.5		1.75	0.080	3.34*
Female-to-Male								
ROA	U	0.091	0.087	3.9	4.8	0.31	0.760	0.63*
	M	0.091	0.095	-3.7		-0.30	0.761	1.79*
Size	U	7.914	7.497	22.5	80.0	1.89	0.059	0.91
	M	7.914	7.998	-4.5		-0.28	0.782	0.79
Leverage	U	0.262	0.197	28.7	81.8	2.72	0.007	1.62*
	M	0.262	0.250	5.2		0.35	0.723	2.30*
Investment	U	0.083	0.091	-3.1	51.3	-0.22	0.829	0.23*
	M	0.083	0.079	1.5		0.18	0.857	1.97*

Table B2: Overall Balancing Diagnostics Post-PSM

Table B2 presents the overall balancing diagnostics, including the mean and median bias.

	Sample	Mean Bias	Median Bias
Male-to-Female	Unmatched	10.6	6.4
	Matched	3.8	3.3
Female-to-Male	Unmatched	14.5	13.2
	Matched	3.7	4.1

Tables B3 and B4 present the results for the MDM. Compared to PSM, MDM did present overall more adequate results, and, compared to the hybrid approach, while mean bias in the male-to-female sample increased, it decreased in the female-to-male sample, mainly driven by a lower bias in the leverage covariate. The variance ratios are also similar, yet, in this approach, the investment ratio in the male-to-female sample is outside the recommended parameters, unlike in the matching method chosen.

Table B3: Covariate Balancing Diagnostics Post-MDM

Table B3 presents covariate balancing diagnostics in the both samples. U refers to the unmatched sample and M to the matched sample. Bias is defined as the standardized mean differences in each covariate between treated and control groups. The t-test reports whether or not the differences between groups are statistically significant. The last column reports the ratio between the variances of treated and control groups across each covariate.

Variable		Mean		% bias	% reduction |bias|	t-test		V(T)/ V(C)
		Treated	Control			t	p >|t|	
Male-to-Female								
ROA	U	0.086	0.080	4.4	90.3	0.45	0.655	0.34*
	M	0.086	0.086	0.4		0.05	0.958	1.00
Size	U	7.995	7.554	25.3	92.9	3.23	0.001	1.10
	M	7.995	7.963	1.8		0.16	0.876	1.03
Leverage	U	0.240	0.224	7.5	87.9	0.91	0.361	0.91
	M	0.240	0.238	0.9		0.08	0.933	1.08
Investment	U	0.077	0.097	-5.4	52.8	-0.49	0.625	0.06*
	M	0.077	0.067	2.5		0.71	0.479	1.38*
Female-to-Male								
ROA	U	0.091	0.087	3.9	99.3	0.31	0.760	0.63*
	M	0.091	0.091	-0.0		-0.00	0.998	1.64*
Size	U	7.914	7.497	22.5	78.3	1.89	0.059	0.91
	M	7.914	8.005	-4.9		-0.32	0.747	1.04
Leverage	U	0.262	0.197	28.7	72.2	2.72	0.007	1.62*
	M	0.262	0.244	8.0		0.51	0.611	1.61*
Investment	U	0.083	0.091	-3.1	58.6	-0.22	0.829	0.23*
	M	0.083	0.086	-1.3		-0.14	0.886	1.38

Table B4: Overall Balancing Diagnostics Post-MDM

Table B4 presents the overall balancing diagnostics, including the mean and median bias.

	Sample	Mean Bias	Median Bias
Male-to-Female	Unmatched	10.6	6.4
	Matched	1.4	1.4
Female-to-Male	Unmatched	14.5	13.2
	Matched	3.5	3.1

Moreover, with this method, industries are not taken into account. Matching without considering industry can produce invalid counterfactuals, since industries constitute an important confounder in corporate finance, especially within firm performance dynamics, being commonly controlled for when matching firms (Bennouri et al., 2018; Faccio et al., 2016; Schopohl et al., 2021).

With the hybrid matching, the restriction to common support ensured that the reduced sample was already comparable in terms of both financials and industries, and the inclusion of the propensity score in the computation of the distances means that industries were also considered when matching. With a pure MDM approach, in order to consider categorical variables, either these have to be encoded as binary, and added as a set of variables to the Mahalanobis distance (Stuart, 2010), or exact matching has to be enforced.

Table B5 presents the results for mean and median bias with either approach, illustrating that, when industries are considered, mean and median bias for the original four covariates increases relative to the previous approach, significantly so in the female-to-male sample.

Table B5: Overall Balancing Diagnostics Post-MDM with Industry Matching

Table B5 presents the overall balancing diagnostics, including the mean and median bias (for ROA, size, leverage and investment), when industries are taken into consideration in the MDM approach, either through exact matching on industry or inclusion of industry dummies in the computation of the Mahalanobis distance.

	Sample	Mean Bias	Median Bias
Male-to-Female	Unmatched	10.6	6.4
	Matched: Exact Match on Industry	2.0	1.8
	Matched: Industry Dummies	1.7	1.7
Female-to-Male	Unmatched	14.5	13.2
	Matched: Exact Match on Industry	15.0	14.6
	Matched: Industry Dummies	21.2	19.7

Hence, given that bias reduction in the MDM and hybrid approach was similar, but the hybrid one had the advantage of considering industries, we ultimately opted for that matching method. Nonetheless, to show that the results are not dependent on the matching procedure chosen, both the MDM and PSM methods were applied in Chapter 5.3.1.

Appendix C: Correlation Matrix

Table C1: Pearson Correlation Matrix

Table C1 presents the Pearson correlation matrix for all variables in the baseline model, in both samples.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Male-to-Female											
(1) ROA	1.000										
(2) Size	0.128	1.000									
(3) Leverage	-0.049	0.292	1.000								
(4) Investment	-0.103	0.229	0.186	1.000							
(5) CEO's Age	0.090	0.167	0.072	0.036	1.000						
(6) CEO Compensation Mix	0.198	0.485	0.158	0.072	0.105	1.000					
(7) Board Size	0.148	0.657	0.230	0.058	0.108	0.339	1.000				
(8) Board Gender Diversity	0.075	0.327	0.148	0.072	0.004	0.284	0.304	1.000			
(9) CEO Duality	0.087	0.129	-0.008	-0.011	0.238	0.048	0.065	-0.101	1.000		
(10) Institutional Ownership	0.123	0.051	0.003	0.061	0.027	0.191	-0.016	0.215	-0.078	1.000	
(11) Ownership Concentration	-0.156	-0.081	0.173	0.026	-0.065	-0.141	-0.093	-0.152	-0.031	-0.385	1.000
Female-to-Male											
(1) ROA	1.000										
(2) Size	0.171	1.000									
(3) Leverage	0.022	0.231	1.000								
(4) Investment	-0.128	0.238	0.135	1.000							
(5) CEO's Age	-0.070	0.220	0.062	-0.013	1.000						
(6) CEO Compensation Mix	0.251	0.540	0.117	0.104	0.084	1.000					
(7) Board Size	0.190	0.681	0.214	0.057	0.126	0.395	1.000				
(8) Board Gender Diversity	0.152	0.308	0.172	0.111	0.120	0.355	0.191	1.000			
(9) CEO Duality	0.012	0.221	0.078	0.007	0.178	0.077	0.131	0.052	1.000		
(10) Institutional Ownership	0.093	0.039	0.009	0.012	0.075	0.237	0.023	0.169	-0.060	1.000	
(11) Ownership Concentration	-0.172	-0.248	-0.022	0.014	-0.079	-0.292	-0.212	-0.307	-0.025	-0.453	1.000

Appendix D: Pre-Transition Performance Sub-Samples

In order to assess balance and allow comparison with Tables 8 and 10, similarly to what is conducted with the original samples, the descriptive statistics of key variables used when matching (ROA, Size, Leverage and Investment) for each sub-sample used in Chapter 5.4. are compiled below (Table D1), as well as the overall mean and median bias for all covariates (Table D2), all reported to t=-2.

Table D1: Descriptive Statistics of Key Variables for the First Pre-Treatment Period (Pre-Transition Performance Sub-Samples)

Table D1 presents the descriptive statistics of ROA, Size, Leverage and Investment – number of observations, mean, standard deviation, minimum value, and maximum value – for the sub-samples defined according to pre-transition performance.

	Obs.	Mean	Std. Dev.	Min.	Max.
Male-to-Female					
Below Median					
Transition = 1					
ROA	78	0.026	0.089	-0.425	0.081
Size	78	8.063	1.759	4.126	12.312
Leverage	78	0.262	0.194	0.000	0.838
Investment	78	0.110	0.173	0.000	1.233
Transition = 0					
ROA	78	0.038	0.088	-0.488	0.095
Size	78	8.065	1.762	4.065	12.463
Leverage	78	0.263	0.180	0.000	0.679
Investment	78	0.095	0.151	0.002	1.075
Above Median					
Transition = 1					
ROA	78	0.147	0.064	0.081	0.392
Size	78	7.926	1.816	4.805	11.732
Leverage	78	0.219	0.241	0.000	1.421
Investment	78	0.044	0.046	0.003	0.328
Transition = 0					
ROA	78	0.136	0.069	-0.007	0.415
Size	78	7.847	1.791	4.667	11.304
Leverage	78	0.216	0.238	0.000	1.552
Investment	78	0.042	0.039	0.003	0.232
Female-to-Male					
Below Median					
Transition = 1					
ROA	41	0.024	0.049	-0.125	0.078
Size	41	8.040	1.951	4.874	11.221
Leverage	41	0.263	0.201	0.000	0.717
Investment	41	0.125	0.227	0.000	1.333
Transition = 0					
ROA	41	0.054	0.042	-0.053	0.141
Size	41	7.829	1.851	4.219	11.796
Leverage	41	0.234	0.178	0.000	0.694
Investment	41	0.092	0.179	0.001	1.068

Above Median					
Transition = 1					
ROA	41	0.158	0.080	0.081	0.418
Size	41	7.789	1.683	4.897	11.723
Leverage	41	0.260	0.291	0.000	1.215
Investment	41	0.040	0.031	0.003	0.136
Transition = 0					
ROA	41	0.132	0.069	0.028	0.316
Size	41	7.830	1.736	4.683	11.834
Leverage	41	0.212	0.218	0.000	1.020
Investment	41	0.065	0.089	0.000	0.349

Table D2: Overall Bias for All Regression Covariates (Pre-Transition Performance Sub-Samples)

Table D2 presents the overall bias for all regression covariates (ROA, Size, Leverage, Investment, CEO's Age, CEO Compensation Mix, Board Size, Board Gender Diversity, Institutional Ownership and Ownership Concentration), as measured in the first period of the time window.

	Sample	Mean Bias	Median Bias
Male-to-Female	Below Median	12.0	10.2
	Above Median	21.7	16.4
Female-to-Male	Below Median	24.0	15.7
	Above Median	21.7	18.9

Assessing the descriptive statistics, while they still remain relatively similar, particularly the mean and standard deviation, it is possible to spot some larger differences compared to the original sample, particularly in the female-to-male sub-samples. Bias for all covariates measured at the first period of the time window also increases overall, even if still below 25% (Stuart, 2010). This is to be expected since the matching procedure was optimized for the whole sample, rather than these sub-samples.

Nonetheless, in the male-to-female below median sub-sample, from which we draw our main conclusions since it is the only sub-sample presenting statistically significant results in the subsequent regressions, the balancing results are generally satisfactory.

However, this imbalance in levels of our covariates is of concern to the extent that such bias could result in the firms following different trajectories in the absence of treatment, thus violating the parallel trends assumption (Baker et al., 2026). Thus, we conduct the same test presented in Chapter 5.2. to ensure that this premise still holds and our results remain valid.

Table D3 reports the *Transition x Pre* coefficients for the dynamic DiD conducted on all sub-samples.

Table D3: Parallel Trends Test (Pre-Transition Performance Sub-Samples)

Table D3 reports the coefficients for the interaction term between the variables Pre and Transition after running the same dynamic DiD as the one presented in Table 13, for the sub-samples defined according to pre-transition performance. Standard errors, reported in parentheses, are robust to firm-level clustering. Statistical significance is indicated by * at the 10% level, ** at the 5% level, and *** at the 1% level

Coefficient *Transition x Pre*	
Male-to-Female	
Below Median	Above Median
0.060 (0.012)	0.014 (0.009)
Female-to-Male	
Below Median	Above Median
0.030 (0.022)	0.003 (0.019)

Similarly to the original samples, all leads of treatment are small in magnitude and none are statistically significant, thereby ensuring that parallel trends still hold across all sub-samples.

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