



PHD

The role of CEOs and the board of directors in corporate governance

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Award date:
2023

Awarding institution:
University of Bath

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The role of CEOs and the board of directors in corporate governance

submitted by

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A thesis presented for the degree of Doctor of Philosophy

University of Bath

Department of Economics

May 2022

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Abstract

This thesis examines the role of CEOs and the board of directors in corporate governance. To this end, the thesis consists of three themes that assess the impact of top management teams on corporate outcomes from different perspectives.

Chapter 1 emphasizes the role of CEO power on firm performance. We find that CEOs' informal power positively affects firm performance. Our findings particularly highlight that the prestige power, a dimension of informal power proxied by the CEOs' educational background and networking, outweighs the other dimensions of power. In contrast, we find that CEOs' formal power, primarily driven by their legitimate authority vested by their positions in the organizations, and the extent to which they have an economic or voting interest in the organization, has a negative impact on firm performance.

Chapter 2 examines the impact CEOs have on employee satisfaction. Our findings suggest that certain CEO profiles are more likely to improve employee satisfaction even when companies are under high financial constraints. These include those with longer tenure, broader educational knowledge, and a lower ownership of company shares. In addition, our results indicate that companies with higher female representation on boards often correlate with higher employee satisfaction.

Chapter 3 examines the role of female executives on corporate environmental performance. Our results reveal that companies with gender diversity in their leadership are effective in implementing sustainability strategies. Moreover, our findings highlight the significant benefits of traits of overconfidence on female CEOs in terms of environmental sustainability.

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Acknowledgements

I would like to express my gratitude to my supervisor Dr. Stylianos Asimakopoulos. His support and guidance over the past years have contributed significantly to my development.

Moreover, I would like to thank my brother Qiaoguan. He has always been my pillar of support during my difficult times. His understanding and encouragement helped me to persevere through the challenges I faced over the few past years.

I would also like to thank my boyfriend, Alwin. I am thankful for his companionship, understanding, and support over these years. I learned a great deal from him. Especially his self-discipline and constant need to continuously improve himself. He made me a better person.

Finally, I am grateful for all the adversities I have faced throughout my tenure, it had moulded me into a stronger and more resilient person. I am now more confident to face the future challenges that are in store in my career and life.

“Stay hungry. Stay foolish.” I look forward to the next chapter of my journey and welcome what life has in store for me.

Preface

Since the 20th century, CEOs have been increasingly crucial to companies. They featured in conspicuous positions in the press, and more than a few of them (e.g. Steve Jobs and Elon Musk) even achieved celebrity status. In addition, it has been suggested that CEOs are the highest-ranking executives, and they are the pivotal drivers of firm performance. According to Abatecola and Cristofaro (2018), from 1950 to 2009, the percentage of performance differences attributed to the CEOs of US-listed companies increased significantly. Due to the dominant role of CEOs in modern companies, significantly more attention has been placed on CEOs in recent years.

Moreover, there is growing evidence that the board of directors also play an active role in determining the direction of the company. According to Hambrick and Mason's (1984) Upper Echelons Theory, one of the most influential perspectives in the strategic management literature, it emphasizes that the organization is a reflection of its top managers, and corporate outcomes are the result of collective choices by top management teams (Abatecola and Cristofaro, 2018). The core explanation of this theory is that corporate governance is a multifaceted task that considers the individual characteristics of executives and their collective impact. As a result, much of the recent research has been focused on the board of directors.

Given the critical role of CEOs and boards of directors in formulating corporate strategies, in this thesis, we evaluate their impact on corporate governance.

In chapter 1, we examine the role of CEO power¹ on firm performance. Both academic literature and practitioners share the belief that CEOs are the most powerful members of organizations. CEOs derive executive power primarily from the legitimate authority vested by their position (Daily and Johnson, 1997; Larcker and Tayan, 2012). They could also obtain power by controlling scarce and critical resources within the organization (Fleming and Spicer, 2014). In addition, it has been widely accepted that corporate outcomes are the results of CEOs exercising their power. Specifically, CEOs could shape the organizational results by directly exercising their power to coerce others to achieve a certain end result and by manipulating

¹According to Finkelstein (1992), power is the capacity of an individual to exert their will over others.

the decision-making progress (Fleming and Spicer, 2014).

On account of the decisive effect of CEO power on corporate outcomes, the impact of CEO power on firm performance has been a long-term concern (e.g. Adams et al., 2005; Veprauskaitė and Adams, 2013; Song and Wan 2019). However, the results of these studies are not conclusive. On the one hand, rooted in the standard agency theory (Jensen and Meckling, 1976), powerful CEOs may be motivated to maximize their wealth at the expense of shareholders by exploiting information asymmetries and their influence on the board of directors (Veprauskaitė and Adams, 2013). Consequently, CEO power is likely to be negatively correlated with firm performance. On the other hand, powerful CEOs could guide corporate strategy, enhancing entrepreneurship and reducing the risk of delays and disputes. As a result, CEO power is likely to benefit firm performance.

We believe that the controversy above is due to the existing literature that measured CEO power incomprehensively. Following Finkelstein (1992), executive-level power can be broken down into four dimensions: they are i) structural power; ii) ownership power; iii) prestige power; iv) expert power. Specifically, structural power is derived from the position of managers in the organizational hierarchy, which is the primary approach for managers to obtain executive power (Daily and Johnson, 1997; Larcker and Tayan, 2012). Ownership power reflects the extent to which the executive has an economic or voting interest in the organization (Daily and Johnson, 1997; Larcker and Tayan, 2012). In addition, structural power and ownership power are the two dimensions of formal power (Larcker and Tayan, 2012).

Moreover, manager' prestige power is primarily driven by their educational background and networking (Larcker and Tayan, 2012). Expert power is derived from managers' superior knowledge, experience, or the ability to effectively manage the external environment of the company (Daily and Johnson, 1997; Larcker and Tayan, 2012). In addition, prestige power and expert power are dimensions that constitute informal power.

Previous studies examining CEO power - firm performance nexus generate the power index incomprehensively. For example, Veprauskaitė and Adams (2013) and Song and Wan (2019) generated the CEO power index only with formal power. Custódio et al.'s (2013, 2019) studies introduced an index which primarily captured

the elements of CEOs' informal power.

In our study, we complement the measure of CEO power with the combination of all aspects of power as they are defined in Finkelstein (1992). To the best of our knowledge, we are the first to highlight the impact of formal and informal power concurrently on firm performance. Consequently, our study contributes to the literature on evaluating the impact of CEO power. We find that informal power positively affects firm performance, while formal power diminishes firm performance. Our results also highlight that prestige power dominates expert and formal power with respect to the overall impact of CEO power on firm performance.

Our findings suggest that the board of directors should take a more holistic view of the CEO-specific attributes, such as education, network, and work experience, simultaneously when selecting and hiring a CEO. In addition, this study is also beneficial to investors and policymakers by providing a broader perspective when evaluating CEOs' power. We suggest that the informal (prestige) power, proxied by the educational background and networking of the CEO, needs to be given additional weight over their professional experience or even formal power.

The following section of the thesis examines the impact of CEOs on corporate social responsibility. The attention on the responsibility of business to society is growing massively. Starting in the 1990s, a relatively small but increasing number of companies have begun to pay attention to their responsibilities to society (Eccles et al., 2014). With the growing emphasis on sustainability over the years from legal regulations, competitive pressures, and public scrutiny, an increasing number of companies have put sustainability at the top of their agenda. In response, companies develop market sustainable products and services, create positions such as chief sustainability officer, and publish sustainability reports for investors, activists, and the general public.

A milestone event that is worth mentioning is, on 19th August 2019, nearly 200 CEOs of the US's largest companies signed up for the Business Roundtable (BRT) statement and declaring that companies should deliver long-term value to all of their stakeholders, including customers, employees, suppliers, the communities in which they operate, and shareholders². After decades of following Nobel Prize-winning

²Business Roundtable - Statement on the Purpose of a Corporation
<https://www.businessroundtable.org/purposeanniversary>

economist Milton Friedman’s philosophy, there has been a considerable change from “the social responsibility of business is to increase its profits,” companies are now redefining their purpose to “improving our society.”

In chapter 2, we examine the impact of CEOs on employee satisfaction³. In fact, employee satisfaction has been a long-term concern in academia and enterprises, especially in typical 20th-century firms, emphasizing quality and innovation (Edmans, 2011). The benefits of employee satisfaction are apparent. For example, companies with outstanding employee satisfaction effectively recruit and retain talented employees, thereby improving firm performance (Edmans, 2012). Great Place to Work for in America survey concludes that organizations with a large number of satisfied employees have revenue growth three times that of other organizations, while the employee turnover rate is only half.

However, previous studies on employee satisfaction typically focus on a specific narrow field, such as the service industry (see, e.g., Ding et al., 2012; McCann et al., 2014). To the best of our knowledge, this study is the first to examine the effect of CEO characteristics on employee satisfaction. Therefore, our study extends the literature in management and corporate governance. The CEO characteristics we examined included CEOs’ tenure, ownership of company shares, working experience, and educational background.

Our findings reveal that CEOs with a more specialized educational background, such as a masters or doctorate degree, are less likely to improve employee satisfaction. The negative effect could result from CEOs’ decision-making requiring broad knowledge, whereas masters and doctorates focus on a narrow set of fields. In addition, according to the study in 2015 from Forbes⁴, the Master’s degrees that CEOs usually hold are primarily in the areas of economics, accounting, and engineering. These fields usually lack ethics courses, also economics courses more often than not focus exclusively on profits and self-interest ideas (Manner, 2010; Frank et al., 1993). Therefore, it is not surprising that we find a negative connection between CEOs’ specialized educational backgrounds and employee satisfaction.

³Employee satisfaction measures how happy workers are with their job and working environment (Sageer et al., 2012).

⁴Christian Stadler; Mar 12, 2015; Forbes
<https://www.forbes.com/sites/christianstadler/2015/03/12/how-to-become-a-ceo-these-are-the-steps-you-should-take/?sh=341bb3021217>

In contrast, CEOs with MBA degrees are more likely to improve employee satisfaction. This could result from MBA programs embracing ethics courses and the propositions of stakeholder theory. Therefore, CEOs with such a degree will be less inclined to focus exclusively on profit and self-interest (Manner, 2010). Consequently, we call for more ethics education to help students cultivate a sense of moral commitment to others.

Moreover, our findings indicate that CEOs with longer tenure are more likely to improve employee satisfaction. The positive correlation could benefit from the company-specific and job-specific skills accumulated over tenure (Veprauskaitė and Adams, 2013). In addition, CEOs with longer tenure can better handle strategic risks and benefit the company (Simsek, 2007). However, CEOs with large ownership interests would damage employee satisfaction. Because CEOs who are the major shareholders of the companies may pursue their own interests and influence the director selection process, which will weaken the effective board control (Veprauskaitė and Adams, 2013). In addition, our results are in favor of having younger CEOs. This could be attributed to older CEOs being more inclined to “enjoy the quiet life,” conservative in their work, and less likely to engage in creative innovation (Peni, 2014).

In general, our findings suggest a CEO profile with longer tenure, broader educational knowledge, and lower ownership of company shares. Our study contributes to CEOs’ succession plans when selecting the right candidate. It is beneficial to investors and policymakers to evaluate CEOs also. Moreover, we also find that when companies are facing financial constraints, CEOs with the above profile are more likely to improve employee satisfaction. This could attribute to the employees having a higher likelihood of being satisfied when the CEO displays characteristics like mentioned above when the firm is experiencing a higher level of uncertainty or is operating under an economic turmoil.

Additionally, our findings regarding the nexus between female executives and employee satisfaction call for enhanced attention. Our results reveal that female CEOs present a negative effect on employee satisfaction. However, companies with a higher proportion of female directors on board are more likely to have outstanding employee satisfaction. We believe that the positive correlation between female directors and

employee satisfaction could be a result of women's inherent value towards benevolence and universalism (Adams and Funk, 2012). As a result, women tend to protect and strengthen the well-being of others. In addition, it is a consensus that women have better performance in moral and ethical behavior than men (Mason and Muddrack, 1996). Thus, they care more about others' benefiting in the workplace (Ford and Richardson, 1994). Moreover, the conflicting results of female CEOs and the share of female directors on the board on employee satisfaction could be caused by female CEOs not having enough internal support and facing resistance to authority (Glass and Cook, 2016). Therefore, it is challenging for female CEOs to implement strategies that improve employee satisfaction when they do not have the support of their peers at the board level.

Our findings regarding the nexus between female executives and employee satisfaction contribute to the literature on top management diversity. It also directed our attention to the impact of female leaders on corporate outcomes. In fact, with the efforts and advocacy of gender equality, the issue of governance diversity is a relatively new area of inquiry and has attracted significant interest in corporate governance.

In chapter 3, we assess the role of female executives on corporate environmental sustainability. Previous studies examining the influence of female leaders are primarily focused on their impact on firm performance (see, e.g., Krishnan and Parsons, 2008; Khan and Vieito, 2013) and risk-taking (see, e.g., Schubert et al., 2000; Niessen and Ruenzi, 2019). However, there is a lack of work examining the impact of female leaders on corporate environmental performance. Therefore, our paper extends the literature on environmental sustainability and corporate governance.

In fact, there is growing attention on corporate sustainability. Since climate change is occurring, it is a consensus that protecting the environment should be prioritized. In response, mounting legal regulations and public scrutiny are pressurizing companies to adopt environmental responsibility strategies. For example, the Paris Agreement, a global agreement to reduce climate change, was negotiated at COP21 in Paris in 2015. The agreement is a legally binding international treaty. Today, 193 parties (192 countries and the EU) have joined the Paris Agreement. In addition, the 2021 COP26 climate summit, which calls for reducing and avoiding emissions, once again brought the urgency of environmental issues to the forefront.

With all these effects, we should expect the world to become more sustainable. Instead, climate change, water scarcity, and other environmental problems worsen. We believe that corporate resistance to environmental sustainability could arise from the rise of shareholder power, prompting a greater focus on short-term profitability rather than long-term growth and sustainability (Glass et al., 2016). As evidenced by McKinsey Global Survey⁵, in the short run, environmental programs have the lowest contribution to shareholder value as compared with the return on investment from social and governance programs.

In chapter 3, we examine the impact of female executives on corporate environmental performance, using the KLD dataset for the period 1993-2018. Our findings indicate that firms with female CEOs are able to reduce environmental concerns compared with their male counterparts. However, they lack the power to enhance overall environmental performance. To improve overall environmental performance, we suggest a higher proportion of female directors on boards.

Our findings contribute to the improvement of gender inequality. The tangible benefits of female representation in top management teams in driving corporate sustainability provide evidence against the stance that women are a “problem issue” of companies⁶.

In fact, the impact of women on environmental action generates a significant amount of coverage and discussion today. As UN Secretary-General António Guterres spoke on COP26 Gender Day on November 9th, 2021: “Climate change is the most important issue facing the world today while achieving gender equality is one of the unfinished businesses of our time, and one of the greatest human rights challenges in the world.” Therefore, like other organizations, companies, which are important institutions that directly affect a wide range of stakeholders, should reflect society as a whole (Rose, 2007). Consequently, gender diversity in top leadership seems to have a logical implication and may even be required by the articles of incorporation.

Moreover, in our study, we also extend our analysis by drawing on how overconfidence and national culture influence female CEOs’ decisions on environmental

⁵Valuing corporate social responsibility; February 1, 2009
<https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/valuing-corporate-social-responsibility-mckinsey-global-survey-results>

⁶Using a sample of top executive announcements from 1990 to 2000, Lee and James (2007) point out that the market reacts negatively to news of appointing female CEOs.

strategies. Our findings highlight that female CEOs with overconfident traits⁷ would overcome inherently conservative values. As a result, companies with overconfident female CEOs face fewer environmental problems and better overall performance. In fact, the impact of overconfident CEOs on corporate sustainability is a relatively new area of inquiry in corporate governance. To our knowledge, this study is the first to highlight the impact of overconfident CEOs in view of gender differences on corporate sustainability. Therefore, our findings contribute to the literature on the role of executives' psychological traits on organizational outcomes.

In addition, our findings about the role of female CEOs with individualistic culture traits⁸ on environmental performance indicate that the benefits of female CEOs in mitigating environmental concerns would be overshadowed by the values and beliefs of an individualistic culture that emphasizes self-interest. Our findings contribute to the literature on cultural perspectives in management. Previous studies have done some work on the influence of CEOs' cultural characteristics on corporate finance (see, e.g., Liu, 2016; Pan et al., 2020). However, insufficient work has been done to study the impact of leaders' cultural traits on corporate sustainability decisions. Therefore, our study integrates the gender studies area with culture research by showing that cultural traits are a crucial indicator that influence female managers' decision-making.

Finally, this study is also beneficial to investors and policymakers in evaluating companies' sustainability performance and top management teams. To improve the implementation of corporate sustainability, we suggest gender diversity in top management teams and appointing female CEOs, especially those from countries with collective culture and overconfident traits.

⁷In the most basic form, overconfidence is associated with individuals holding unrealistically optimistic views of the future by overestimating the benefits of future events (Rawson, 2021). Managers can be seen as "overconfident" if they over-invest their personal funds in their own company (Deshmukh et al., 2013).

⁸Individuals in individualistic societies (e.g. US and UK) believe that personal interests are more important than collective interests; they tend to value personal time, freedom, and independence.

Chapter 1

The role of formal and informal CEO power on firm performance

1.1 Introduction

There has been an increasing interest on the impact of CEO power¹ on corporate decision making and firm performance (Adams et al., 2005; Veprauskaitė and Adams, 2013; Seonghee et al., 2016; Sheikh, 2019; Song and Wan 2019; and Shahab et al., 2020). However, the results of these studies are not conclusive. For example, Larcker and Tayan (2012) propose that it is unclear the extent to which having a powerful CEO is beneficial to the company and its shareholders.

Some studies suggest that the relationship between the CEO and shareholders generates a standard agency theory scenario (Jensen and Meckling, 1976) where powerful CEOs may be motivated to maximize their wealth at the expense of shareholders by exploiting information asymmetries and their influence on the board of directors (Veprauskaitė and Adams, 2013). Consequently, these studies suggest that CEO power is likely to be negatively correlated with firm performance.

Other researchers, however, have a different point of view. For instance, Daily and Johnson (1997) point out that the high performance of companies such as Berkshire Hathaway and Microsoft are often attributed to their powerful CEOs, Warren Buffett and Bill Gates, respectively. Moreover, a powerful CEO can guide corporate

¹Throughout this paper we follow Finkelstein (1992) broad definition of CEO power as the capacity of an individual to exert their will over others.

strategy, enhancing entrepreneurship and reducing the risk of delays and disputes (Veprauskaitė and Adams, 2013). Therefore, these studies suggest that CEO power is likely to be positively correlated with firm performance.

We argue that the aforementioned controversy on the role of powerful CEOs on firm performance is due to the fact that the existing literature explores mainly *formal* CEO power based on structural and ownership metrics (e.g. Song and Wan, 2019).² However, the role of *informal* CEO power, based on prestige and expertise metrics, is (at least) equally important and needs to be taken into account concurrently when an index based CEO power is constructed.

Our aim is to provide a comprehensive measure of CEO power taking into account every dimension of power, as defined by Finkelstein (1992), *simultaneously*. We would also like to understand how each constructed index of CEO power influences firm performance.

In particular, Finkelstein (1992) has identified four dimensions of power: i) structural power; ii) ownership power; iii) prestige power; and iv) expert power. Given that the majority of the studies on CEO power - firm performance nexus generate a power index for CEOs focusing mainly on the impact of one or two components of CEO power, structural and/or ownership power,³ a significant element of the power profile of the CEO is not appropriately captured. We contribute to this stream of literature by providing a comprehensive empirical approach to incorporate each element of CEO power and uncover a consistent impact on financial decision making.

Structural power and ownership power are the two dimensions of *formal* power (Larcker and Tayan, 2012). Many existing economic papers have focused on the impact of CEO formal power. For example, Veprauskaitė and Adams (2013) examine the influence of powerful CEOs on the financial performance of UK firms with the power index that consists of CEO-chair duality, tenure, ownership, remuneration, and bonus compensation. Song and Wan (2019) create the power index with CEOs' founder status and CEO-chair duality to explore the impact of powerful CEOs on their compensation.

Custódio et al.'s (2013, 2019) studies focus mainly on the influence of *informal*

²See for example the related review provided by Haynes et al. (2019, Table 1)

³On many occasions these studies partially include some proxies for the remaining components of power but they do so by simply adding them as controls to their estimations and not as part of the power index they generate. We show in our work that this approach is problematic.

power. Their measure of CEO power includes, lifetime work experience, including number of positions that a CEO has held in the past, number of firms and industries that a CEO worked before, and a CEO experience dummy. In a different study, Lewellyn and Muller-Kahle (2012) take into account every dimension of CEO power, as defined by Finkelstein (1992) to assess the connection between CEO power and risk taking.⁴ Similarly, Han et al. (2016) take into account all the dimensions of power, apart from prestige, but in an additive way to assess the role of CEO power on firm performance. Finally, Haynes et al. (2019) provide a comprehensive review and summary of the findings on CEO power and firm performance in the related literature at their first table. Their summary shows that in 27 prior studies the CEO power is mainly assessed using the elements of formal power. At their paper, Haynes et al. (2019) use one composite CEO power index with four indicators, one for each of the four power dimensions as introduced by Finkelstein (1992) has identified four dimensions of power, and they do not disentangle the CEO power effects to formal and informal as we do in our paper.

In addition, researchers approach the topic of CEO power in different ways depending on their discipline. For example, research from the psychology perspective focuses mainly on the influence of leadership behavior, style, and soft skills. This line of work breaks down leadership styles into its base components. For instance, Peterson et al. (2009) examine the influence of positive personality traits (hope, optimism, resiliency) on transformational leadership of CEOs and firm performance in high-technology firms. Deinert et al. (2015) state how the “Big 5” personality traits affect performance via different sub-dimensions of transformational leadership. However, existing papers in the area of management and financial economics tend to focus more on “hard data” and concrete facts, such as duality, founder status, succession planning, marriage status and the concentration of CEOs’ titles (Choe et al., 2014; Sheikh, 2019; Song and Wan, 2019; Shahab et al., 2020; Black et al., 2021; Kim et al., 2021). For example, Cei and Doukas (2017) develop a new methodology on measuring CEO risk preference focusing on CEOs’ personal allocation of deferred compensation funds.

We use 8,166 CEO-year observations across 1,563 US firms for the period 1993-

⁴Their paper though does not combine the power dimensions as we do in our paper and their dataset is much shorter than ours.

2018. We first employ a principal component analysis (PCA) with various relevant CEO power proxies to eliminate the correlation among them, which identifies three significant components and explain almost 60% of their variability.⁵ These three groups of variables (components) are very well aligned with the types of power discussed earlier: expert, prestige and formal power. We then use the dynamic system GMM method to investigate the effect of formal and informal power (including prestige power and expert power) on firm performance. Our findings indicate that both expert power and prestige power have positive and consistent effects on firm performance, while formal power has a negative impact on firm performance. In addition, we find that the magnitude of the impact of prestige power on firm performance is much larger than that of expert and formal power.

To assess the validity of our results and compare our findings with the related literature, we conduct additional robustness tests. First, we split the power indices to analyze the effect of formal and informal power separately on firm performance. Second we introduce some of the power variables we eliminated in the first step as control variables, similar to the approach of the literature, separately from the constructed index. Our results verify the inconsistent outcome of the related literature when only one type of power is being assessed. This could be attributed to the omitted variable bias, loss of relevant information and/or the high correlation between the power proxy variables included as controls. These inconsistencies are in support of our approach to use a PCA with all the relevant CEO power proxies to eliminate the correlation between them and then verify the influence of the generated CEO formal and informal power indices on firm performance.

We also examine how financial pressure affects our key results. Based on Acharya et al. (2012), we define financial pressure as the ratio of cash flow to interest payments. Our results remain robust for companies experiencing low financial pressure. However, the benefits of CEO informal power indices on firm performance are suppressed when the companies experience high financial pressure. Finally, our key results remain robust to the inclusion of additional control variables.

This work contributes to the related literature in many ways. We complement the measure of CEO power with the combination of all aspects of power as they

⁵Florackis and Sainani (2018) follow a similar approach when they construct a chief financial officer (CFO) index using CFO-specific attributes.

are defined by Finkelstein (1992). Previous studies mainly focused on formal power, comprised by structural and ownership power, without addressing concurrently the role of informal power, prestige and expert power, or the other way around.⁶ For example, Custódio et al. (2013, 2019) introduce the general ability index that captures mainly some elements of CEO’s informal power, without considering though the other aspects of power concurrently in the creation of their index.⁷ Alternatively, Veprauskaitė and Adams (2013) and Song and Wan (2019) mainly focus on the elements of formal power to address issues regarding performance and compensation, respectively.

To the best of our knowledge, we are the first to highlight the impact of formal and informal (expert and prestige) power *concurrently* on firm performance using a methodology that is able to reduce the dimensionality issue and still contain the key relevant information. Our results indicate that CEO’s informal power, especially the component of prestige power, is the main driver of firm performance. This is especially relevant since in the fast-changing business world, informal power/influence seems to exert a greater force on others than formal power. As Steve Martin⁸ said on Influence and Persuasion: “In a world of inter-company partnerships, cross-functional teams and highly individualized workforces, playing the ‘do it because I’m the boss’ card is no longer an option”. Looking at the long run, leaders need to understand the needs and motivations of their followers and how to motivate them, and make sure they use the influence wisely, honestly, and ethically to nurture long-term, mutually beneficial relationships (Beagrie, 2006).

Our research also relates and contributes to the literature that examines the driving forces of CEO turnover by providing a more comprehensive analysis on powerful CEOs and their components. A report by PwC on the cost of CEO turnover due to failures, estimates that shareholders pay about \$112 billions a year (Botelho et al., 2017). The root of the problem may lie in the difficulty of selecting the right candidate, but it may also lie in the process of hiring a CEO. Therefore, our research

⁶See references within Haynes et al. (2019) for more details.

⁷However, they do control for these separately at their estimation. We show though in our work that these proxies should be included in the power index and not as control variables. In addition, the focus of their work is on the impact of CEO general ability index on CEO pay and innovation and not on firm performance.

⁸Steve Martin is the Director of Influential at Work UK, and the New York Times Bestselling author

provides board of directors more tangible and comprehensive criteria when recruiting CEOs.

Finally, our research is also beneficial to investors and policy makers by providing a broader perspective when evaluating CEOs' power. The informal (prestige) power of the CEO, such as educational background and networking, needs to be given additional weight over their professional experience or even formal power.

The remainder of the paper is structured as follows. Section 2 discuss the impact of CEO on firm performance. Section 3 introduces the role of power in organizations and how we measure CEO power. Section 4 provides an overview of our data. Section 5 shows our econometric approach. In Section 6 we present the results from our estimations. Section 7 provides a set of robustness tests. Finally, Section 8 concludes our paper.

1.2 Literature review

1.2.1 Do CEOs matter to firm performance?

In the 1980s, after examining why the most relevant business journals in the world focused on the socio-demographic characteristics of executives, Hambrick and Mason (1984) published a conceptual framework of Upper Echelons Theory (UET). The UET theory has been established as one of the most influential perspectives in strategic management literature. It emphasizes that the organization is a reflection of its top managers.

Moreover, since the 20th century, CEOs have been increasingly crucial to companies. They featured in conspicuous positions in the press, and more than a few of them even achieved celebrity status (Quigley and Hambrick, 2015). In addition, a growing literature has evidenced that CEOs are the pivotal drivers of corporate strategies and are responsible for corporate outcomes. For example, according to Abatecola and Cristofaro (2018), from 1950 to 2009, the percentage of performance differences attributed to the CEOs of US-listed companies increased significantly.

Besides, it has been suggested that the CEO is the corporate leader, and they set the tone for the company (Daily and Johnson, 1997). Academics and practitioners share the belief that the CEO is the most powerful organizational member in the

modern company. Therefore, in this study, we evaluate the role of CEO power on firm performance.

1.2.2 Power in the organization

According to Clegg et al. (2006) “power is to organization as oxygen is to breathing” and reveals power as the central relation of modern organizations and society (Fleming and Spicer, 2014). Many attempts have been made to study the concept of power in organizations, especially from the perspective of management and organizational science. Max Weber (1978) defined power as “the probability that one actor within a social relationship will be in a position to carry out his will despite resistance.” Weber’s definition inspired many scholars that have attempted a variety of approaches for assessing power in organizations.

There are several ways CEOs achieve power in the organization. First, they derive power from the legitimate authority vested by their position (Daily and Johnson, 1997; Larcker and Tayan, 2012). This is the primary approach for managers to obtain executive power. Second, the CEO’s power could also depend on his/her ability to manage uncertainty within an organization. Previous researchers have suggested that the underlying basis of power is the ability to manage organization uncertainty (Finkelstein, 1992; Daily and Johnson, 1997). The uncertainty may come from within or outside the organization. Specifically, internal sources of uncertainty include top management and directors. External sources of uncertainty exist in the task and institutional environment of the company. In addition, effective management of uncertainty is especially important for the CEO. Because they are ultimately responsible for the company’s processes and results. Third, control over scarce and crucial resources could be another factor for the CEO to achieve power (Fleming and Spicer, 2014). In other words, CEOs gain power over the organization partly due to they have access to scarce resources that others do not have.

CEOs could shape organizational results through the direct exercise of power to coerce others to achieve certain ends. Besides, CEOs could also influence organizational outcomes by manipulating the agenda (Fleming and Spicer, 2014). Agendas can be established by influencing decision-making progress, which is implicit in shaping relevant or important issues. In addition, as stated by Fleming and Spicer (2014),

individuals could subtly influence organizational decision-making processes by using his/her position in an organization. Because an individual’s position can be seen as a bridge between different social groups, providing them an opportunity to shape the distribution of information and resources. Therefore, CEOs’ networking is an essential way for them to influence decision-making processes, thereby manipulating agendas and ultimately shaping organizational outcomes.

1.2.3 Measuring CEO power

Finkelstein (1992) proposed four types of executive-level power: structural power, ownership power, prestige power, and expert power. Following Finkelstein’s (1992) work, our measure of *formal* CEO power combines structural power and ownership power considering: i) CEO tenure; ii) the extent of a CEO’s shareholdings, excluding options; and iii) CEO-Chairman duality. *Informal* CEO power is broken down to two distinct elements, expert and prestige power. Regarding expert power, we employ the following: i) the number of CEO positions held prior to joining the company; ii) the number of companies where the CEO has previously worked; and iii) the number of industries in which the CEO has previously worked. Finally, prestige power includes: i) whether a CEO has an MBA degree; ii) whether a CEO graduated from an Ivy League university; and iii) whether a CEO has a degree from a top business school.

The formal and informal power indices we use in this paper are constructed via a principal components analysis of all the proxies mentioned above. In particular, we choose the components (linear combinations of these proxies) that can more accurately reflect overall CEO power⁹.

1.2.3.1 The four elements of CEO power index

1. Structural power

Structural power, which is the main approach for managers to obtain executive power, is also known as hierarchical power or legitimate power (Hambrick, 1981; Daily and Johnson, 1997). Structural power is derived from the position of managers at the organizational hierarchy (Daily and Johnson, 1997; Larcker and Tayan, 2012). Additionally, Hambrick (1981) demonstrates that hierarchy is “the main predictor of

⁹In other words, we use the components with eigenvalues higher than one.

power”. Structural power enables the CEO to resolve disputes, for instance, strategy, acquisitions, organizational practices, and resource allocation in a manner consistent with his or her preferences. CEOs are also able to make “final decisions” about disagreements (Larcker and Tayan, 2012). Previous studies mainly proxy CEO’s structural power with a binary variable indicating chairman-CEO duality (Daily and Johnson, 1997; Pathan, 2009, Larcker and Tayan, 2012; Veprauskaitė and Adams, 2013; Song and Wan, 2019), or with the use of tenure indicating the number of years a CEO holds the post (Veprauskaitė and Adams, 2013).

Holding the position of CEO is a reflection of one’s power, holding the dual title of chairman and CEO would enhance one’s power (Daily and Johnson, 1997; Larcker and Tayan, 2012). Moreover, Veprauskaitė and Adams (2013) indicate that duality could increase a company’s financial performance by mitigating selection conflict among board members and improving decision-making efficiency. However, CEO duality also presents a conflict of interest. For the reason that the dual structure allows the CEO to control the board’s agenda, determine what information the board receives prior to the meeting, and lead board discussions (Daily and Johnson, 1997; Larcker and Tayan, 2012; Pathan, 2009; Veprauskaitė and Adams, 2013; Li et al., 2018; Song and Wan, 2019).

The length of tenure determines the autonomy of the CEO within the board. For example, Hermalin and Weisbach (1998) argue that the longer a CEO is in the post the more likely it is that he/she can influence the board in the selection of other board members. CEOs tend to appoint new directors loyal to them, which would weaken the effective board oversight of the CEO (Song and Wan, 2019). Moreover, since removing non-performing CEOs is a major function of the board, CEOs with longer tenure could also weaken the board’s decision to replace non-performing CEOs, reducing the effectiveness of CEO turnover and hurt firm performance.

2. Ownership power

Ownership power reflects the extent to which the executive has an economic or voting interest in the organization (Daily and Johnson, 1997; Larcker and Tayan, 2012). The “convergence of interest” hypothesis predicts that equity ties the economic interests of the CEO with those of the shareholders, thus providing the CEO with incentives

to maximize company's performance (Veprauskaitė and Adams, 2013).

Daily and Johnson (1997) indicate that CEOs who are major shareholders in the companies that they serve are likely to gain power because they effectively represent both management and shareholders. They also point out that CEOs with considerable equity in firms they serve, as a function of their ability to influence important firm decisions in an ownership capacity, are more likely to define the company's direction. Additionally, CEOs with considerable stock ownership may be able to protect themselves from involuntary dismissal. Equity holding CEOs also have greater influence in the director selection process. Moreover, Buchholtz and Ribbens (1994) find that CEO ownership has a negative relationship with the likelihood of resistance to a takeover. Thus, CEO stock ownership is an important mechanism in protecting shareholders' interests.

However, CEOs with significant ownership power in a firm could, for self-seeking reasons, pursue their own interests ignoring the interests of shareholders. Previous studies proxy CEOs' ownership power via the extent of CEO's shareholdings (Daily and Johnson, 1997; Larcker and Tayan, 2012; Veprauskaitė and Adams, 2013; Park et al., 2018).

3. Prestige power

Prestige power is perhaps the most intangible manifestation of power and arguably the most difficult to grasp and measure. For the reason that CEOs' prestige power could come from their educational background, relationships with external organizations or associations, government relationships, personal relationships with other "elites" and/or their network relationships, or even previous success (Larcker and Tayan, 2012). Thus, it is a challenge for researchers to measure prestige power.

Moreover, prestigious CEOs could help build the company's legitimacy, enabling the company to buffer itself from environmental uncertainties. As evidence of the potential legal influence of some prestigious company leaders, D'Aveni (1990) indicates that prestigious top managers' departure occurred five years before the bankruptcy filing. He points out that bankruptcy occurs when creditors withdraw their support for a company's top management team, and the support for the top team depends upon the team's prestige.

Previous studies mainly proxy CEOs' prestige power with the networking and attending elite educational institutions (Daily and Johnson, 1997; and Custódio et al., 2013). Attending elite educational institutions may provide some indication of a CEO's reputation level, thereby enhancing his/her level of prestige power (Daily and Johnson, 1997). Also, attending an elite school provides the CEO with access to other prestigious individuals that may become managers and board members increasing the information sharing effect.¹⁰

4. Expert power

Expert power derives from superior knowledge, experience, or the ability to effectively manage the external environment of the company (Daily and Johnson, 1997; Larcker and Tayan, 2012). Expert power enables the CEO to solve uncertain problems and thus increase his/her influence over the company (Larcker and Tayan, 2012). Moreover, expert power can also provide the CEO with means to exert control over directors and other members of the organization. If the CEO has more access to information than the non-management directors, he/she may control the access to such information. The lack of key firm-specific information may put directors at a significant disadvantage during board discussions.

Compared with CEOs with limited functional exposure, CEOs with exposure to various functional areas have the opportunity to develop internal and external connections in a broader range of areas (Daily and Johnson, 1997). These contacts enable the CEO to better manage the environmental uncertainties faced by the company. Thus, CEOs who play an important boundary-spanning role (i.e. breadth in managerial assignments) in the organization during their career would increase their expert power. Previous studies capture the expert power of a CEO through work experience. For example, Custódio et al. (2013) capture a CEO's expert power with his/her lifetime work experience, including number of firms and industries a CEO has worked before.

Note that these four dimensions of power are not mutually exclusive or necessar-

¹⁰We need to mention here that our definition of prestige power is different from that of Malmendier and Tate (2009). They define prestige power as the superstar status of the CEO. In a sense, this definition is more relevant to our informal power definition in this paper. Therefore our results are consistent with those of Malmendier and Tate (2009).

ily related. CEOs will have varying degrees of power, depending on the combination of the dimensions they exhibit and the importance of each dimension to the relevant corporate context. In addition, CEO's power can be exercised across a wide range of decisions, including decisions on corporate strategy, operations, acquisitions, organizational design, culture, and governance (Larcker and Tayan, 2012).

1.3 Data Analysis

We initially collect historical data on CEOs' background from BoardEx. Then we merge these data with ExecuComp to complete the profile of CEOs. The CEOs' data are then merged with Center for Research in Securities Prices (CRSP) and Compustat Fundamentals Annual data sets so as to map CEOs to firms and their financial data. Following Edmans et al. (2014) and Custódio et al. (2019) that suggest that CEOs' influence is not immediately reflected on firm performance but it contributes to firm value over time, we filter our data to include CEOs with at least three years of tenure. In addition, we winsorize our dataset at the 1% and 99% level. Our final sample contains 8,166 CEO-year observations across 1,563 US firms for the period 1993-2018.

1.3.1 Definition of variables

1.3.1.1 Performance variables

We measure a firm's financial performance using the following three indicators:

ROA (Return-on-Assets): ROA is an indicator of how well a company utilizes its assets, which relates annual accounting incomes to tangible assets used to generate cash flow (Veprauskaitė and Adams, 2013). ROA is calculated as earnings before interest and taxes divided by total assets.

ROE (Return-on-Equity): ROE is considered a measure of how effectively a company uses its shareholders' money to create profits. ROE is calculated as a company's net income divided by shareholders' equity.

ROIC (Return-on-Invested Capital): ROIC reflects how effectively a company uses its capital to generate returns. ROIC is calculated as net operating profit after tax divided by invested capital.

1.3.1.2 CEO formal power proxies

In our research, the three sources of CEO *formal* power are duality, tenure, and ownership.

Duality: In this study, duality is a dummy variable equal to 1 if the CEO is also the chairman of the board, and 0 otherwise. This variable has been used by many researchers before, for instance, Daily and Johnson (1997), Pathan (2009), Larcker and Tayan (2012), and Song and Wan (2019).

Tenure: Daily and Johnson (1997) and Park et al. (2018) indicate that tenure is the number of years a CEO has been in the position through the base year. In addition, Song and Wan (2019) argue that the CEO plays a role in selecting new directors who are responsible for overseeing the CEO's compensation arrangement. Thus, long-tenured CEOs are more capable of seizing control of the board and may pursue their own interests to the detriment of shareholders. In the present study, tenure represents the number of years a CEO has been in this position.

Ownership: It is the extent of a CEO's shareholdings. This indicator is expressed as the ratio of the CEO's shares to the total outstanding shares (Daily and Johnson, 1997; Larcker and Tayan, 2012; Veprauskaitė and Adams, 2013; Park et al., 2018). In this study, ownership is the percentage of total shares owned by the CEO, excluding options.

1.3.1.3 CEO informal power proxies

Prestige power and expert power are the two sources of informal power. Previous studies utilize CEOs' educational background and professional experience to measure their informal power. For instance, Daily and Johnson (1997) capture the CEO's prestige power from their educational background, they measure whether a CEO attended a prestigious undergraduate or graduate school. Custódio et al. (2013) capture CEOs' professional experience with the number of positions a CEO has held in his/her career, the number of firms and industries a CEO has worked in, and a CEO experience dummy variable.

In this study, we utilize the following proxies for CEO informal power:

Expert power

Previous CEO experience: The number of CEO positions held prior to joining the company.

Number of firms: This variable measures the number of companies where the CEO has previously worked at. Custódio et al. (2013) indicate that a CEO who worked at different firms before, has obtained valuable skills, which benefits the current firm.

Number of industries: This variable measures the number of industries that the CEO has previously worked in. Custódio et al. (2013) mention in their study that a CEO who worked at multiple industries has been exposed to various business environments, which is also beneficial to the current company.

Prestige power

MBA dummy: This dummy variable measures whether a CEO has an MBA degree. It is equal to 1 if the CEO has an MBA, and 0 otherwise.

Ivy League dummy: This dummy variable measures whether a CEO graduated from an Ivy League university, no matter if it was undergraduate, master's degree or PhD. This dummy is equal to 1 if the CEO graduated from an Ivy League university, and 0 otherwise.

Top Business School: This dummy variable measures whether a CEO holds a degree from a top business school. This dummy is equal to 1 if the CEO received a degree from a top business school, and 0 otherwise.¹¹

1.3.1.4 Control variables

Throughout our analysis, we include many financial variables to control for various firm characteristics, similar to the related literature, see i.e. Custódio et al. (2013), Veprauskaitė and Adams (2013) and Song and Wan (2019).

In particular we use: i) the natural logarithm of cash and short-term investments divided by total assets; ii) volatility as a risk proxy defined as the standard deviation of firm performance (ROA, ROE and ROIC) over five years; iii) Market-to-Book ratio to evaluate company's current market value relative to its book value; iv) growth of

¹¹The list of "Top Business Schools" is shown in the appendix. We would like to stress here that we have added many more schools in that list, as a robustness check, but we found that our key results remain valid.

sales; v) capital expenditures divided by total assets; vi) the ratio of inventory to total assets; vii) Book Leverage defined as the sum of long-term and short-term debt in current liabilities divided by total assets; viii) dividend payout ratio defined as the ratio of the total amount of dividends paid to the shareholders relative to the net income of the company; ix) the natural logarithm of CEOs' age; and x) the natural logarithm of firms' age.

1.3.2 Descriptive statistics

Table 1.1 shows the summary statistics of our variables. The mean *ROA* and *ROE* are 4.0% and 8.9% respectively, while the mean *ROIC* is 13.0%. Table 1.1 further shows that 57.5% of CEOs are also the chairman of the board, and the average tenure of CEOs is around 7 years. These values are similar to Custódio et al. (2013). Moreover, CEO tenure exhibits high volatility ranging from 3 to 35 years.¹² Finally, CEOs on average hold 2.5% of companies' outstanding shares, excluding options.

In addition, 19.0% of CEOs graduated from an Ivy League university (including undergraduate, master's degree, and PhD). Moreover, 26.4% of CEOs have an MBA, which is similar to Custódio et al. (2013) results, and 11.5% of CEOs received a degree from a top business school. The mean of the professional experience variables (expert power) indicate that the average CEO in our study has no significant experience of being CEO before or working at other companies and industries.

[Insert Table 1.1 here]

1.4 Methodology

In our econometric methodology we use a dynamic panel system Generalized Method of Moments (GMM) approach as it has been introduced by Hansen (1982) and Arellano and Bond (1991) and then further developed by Arellano and Bover (1995) and Blundell and Bond (1998).

This approach has been used widely in the fields of corporate finance and corporate governance. For example, Wintoki et al. (2012) estimate the relationship between board structure and firm performance using the dynamic GMM estimator

¹²Note that in this study we only considered CEOs with tenure of at least three years.

to alleviate endogeneity concerns. Veprauskaitė and Adams (2013) explore the relationship between powerful CEO and firm performance of UK firms using a GMM estimator to control for dynamic adjustments between corporate governance and firm performance.

In particular, Wintoki et al. (2012) discusses in detail the various endogeneity issues that arise in empirical corporate finance studies. Endogeneity leads to biased and inconsistent parameter estimators (see also Asimakopoulos et al. 2019). In our empirical analysis we have various possible sources of endogeneity: individual firm heterogeneity, the fact that current values of the independent variables might be a function of past values of the dependent variable, simultaneity between our power indices and firm performance, and omitted variables.

In panel data models firm heterogeneity is modeled with the use of individual effects. These effects capture various unobserved characteristics, such as technological differences, managers' ability and other low frequency changing unobserved variables. Let's consider initially a static panel data model:

$$Y_{it} = \beta' X_{it} + \gamma' Z_{it} + \eta_i + \varepsilon_{it} \quad (1.1)$$

where Y_{it} is the dependent variable, one of the three firm performance indicators; η_i is the individual firm heterogeneity; and X_{it} and Z_{it} are vectors which contain two sets of explanatory variables representing our constructed CEO power indices and other firm characteristics respectively. It is highly likely that such characteristics affect CEOs' decision making and as a result the individual firm effects are correlated with the explanatory variables, $E(\eta_i | X_{it}, Z_{it}) \neq 0$, for all t . We can remove individual effects from equation (1.1), but still this static model cannot accommodate for the case where current values of the explanatory variables are affected by past firm performance. This, for example, can be due to the case that high past firm performance generates higher liquidity which in turn alleviates financial constraints to CEOs. That issue can be solved with the implementation of a dynamic model where past firm performance, Y_{it-1} , is introduced as an explanatory variable:

$$Y_{it} = \phi' Y_{it-1} + \beta' X_{it} + \gamma' Z_{it} + \eta_i + \varepsilon_{it} \quad (1.2)$$

In order to obtain consistent estimators from equation (1.2) the following assumptions need to be satisfied: $E(Y_{it-s}(\varepsilon_{it} - \varepsilon_{it-1})) = 0$ and $E(X_{it-s}(\varepsilon_{it} - \varepsilon_{it-1})) = 0$ and $E(Z_{it-s}(\varepsilon_{it} - \varepsilon_{it-1})) = 0$ for $s \geq 2$ and $t=3, \dots, T$, see Arellano and Bond (1991) for more details.

Reverse causality may arise from the fact that firm performance and explanatory variables, such as powerful CEOs, are determined at the same time. For example, a very powerful CEO may lead to higher firm performance but this improved firm performance also increases the power of CEOs, $E(\varepsilon_{it}|X_{it}, Z_{it-1}) \neq 0$. This can be solved if we estimate equation (1.1) as: $Y_{it} = \beta'X_{it-1} + \gamma'Z_{it-1} + \eta_i + \varepsilon_{it}$. The problem here is that the β and γ coefficients are not comparable to equations (1.1) and (1.2) presented above. However, the orthogonality conditions presented here are sufficient for the consistent estimation of equation (1.2).

Taking the above into consideration, we estimate equation (1.2) using a dynamic panel system GMM model with a full instrument set since the time dimension is small compared to the cross-section, and thus we do not expect any small sample biases. This approach combines in a system the relevant equation in levels and in first differences. In addition, we use the orthogonality conditions of Arellano and Bond (1991). For every regression we test the validity of our estimators using initially the m_n test for the existence of n^{th} order serial correlation, which is asymptotically normally distributed with a null hypothesis of no-serial correlation of the differenced residuals. We also provide the Hansen J -test for over-identifying restrictions under the null of valid instruments with asymptotic χ^2 distribution.

1.5 Results

1.5.1 Principal components analysis (PCA)

Principal component analysis (PCA) is a dimensionality reduction method, which is mainly used to reduce the dimensionality of large data sets by converting large variable sets into smaller variable sets, which still contain most of the information in large data sets. The new set of variables, the principal components, are uncorrelated to each other and ordered so that the first few principal components retain most of

the information in all the original variables.

In this study, we utilize all the power proxies we presented in sections 4.1.1 - 4.1.3. Table 1.2 shows the principal components, eigenvalues, and proportions of the power proxies. The results indicate that only three components have eigenvalues higher than 1, which can explain 59.3% of the variation. Therefore, we retain the first 3 components for further research.

In Table 1.3 we show the resulted group of power proxies for each one of the three components. In particular, here we only show the power proxies with absolute value of loading above 0.2 in each component. The grouping of the power proxies is very interesting and unique. The first component includes only the expert power proxies (pc_1), whereas the second component includes only the prestige power proxies (pc_2) and the third component including mainly the three formal power proxies (pc_3). It is also worth noting that the PCA indicates that the most significant element of the overall power profile, in terms of capturing the overall variability of these proxies, is expert power, followed closely by prestige power and at the end is formal (structured and ownership) power.

As a result, the PCA included 9 potentially correlated power proxies and generated three uncorrelated components of CEO power with very clear economic interpretation. The contribution of each CEO power proxy on each component is also in line with the related literature, see e.g. Daily and Johnson (1997), Larcker and Tayan (2012), Park et al. (2018) and Song and Wan (2019). The three components, as resulted from the PCA, will be incorporated to our econometric analysis in the next section.

[Insert Table 1.2 here]

[Insert Table 1.3 here]

1.5.2 Empirical analysis

In this section we incorporate the results of the PCA discussed in the previous section and we assess the role of powerful CEOs on firm performance. In more detail, equation (1.2) presented in the previous section will become:

$$Perf_{it} = Perf_{it-1} + \beta' Power_{it} + \gamma' Controls_{it} + \eta_i + \varepsilon_{it} \quad (1.3)$$

where the dependent variable will be *ROA*, *ROE*, and *ROIC*. In addition, the *Power_{it}* vector will be consisted of the three components resulted from the PCA, *pc₁*, *pc₂*, and *pc₃*, referring to expert, prestige and formal power respectively. Finally, the *Controls_{it}* vector will incorporate all of the financial control variables presented in section 3.1.4.

The results are reported in Table 1.4. We find that a marginal increase of *pc₁* enhances *ROA*, *ROE*, and *ROIC* by 0.04, 0.07, and 0.01 respectively. In economic terms, we find that a one standard deviation increase in the expert power index (*pc₁*) will lead to an increase of about 5.5% in *ROA*, 10% in *ROE* and 1.8% in *ROIC*. This illustrates that expert power has a positive and consistent effect on every firm performance indicator we used. These results are also consistent with the work of Larcker and Tayan (2012) who argue that expert power, which derives from superior knowledge, experience, or the ability to effectively manage the external environment of the company, enables CEOs to solve uncertain problems, thus increasing firm performance.

Regarding the second power component, we find that a marginal increase of *pc₂* enhances *ROA*, *ROE*, and *ROIC* by 0.15, 0.18, and 0.07 respectively. In economic terms, a one standard deviation increase in prestige power index (*pc₂*) will lead to an increase of about 20% in *ROA*, 25.2% in *ROE* and 8.9% in *ROIC*. This shows that prestige power has a positive impact on firm performance. These results are also in accordance with those of Daily and Johnson (1997), Bhagat et al. (2010), and King et al. (2016).

The positive correlation between expert power and prestige power of CEOs and firm performance also proves that CEO informal power has overall a positive impact on corporations. This result is in line with Haleblan and Finkelstein (1993), Adams et al. (2005) and Veprauskaitė and Adams (2013). For example, Haleblan and Finkelstein (1993) indicate that although some researchers find a negative influence of CEO power on firm performance due to the classic agency theory between the CEO and shareholders, it does not tell the whole story. A powerful CEO can direct successfully corporate strategy, enhancing entrepreneurship and reducing the risk of delays and disputes (Veprauskaitė and Adams, 2013).

Our study indicates that prestige power has the most significant effect on firms'

profitability. The role of networking and attending elite educational institutions provides a strong indication of a CEO's reputation level, enhancing his/her level of prestige power and network (Daily and Johnson, 1997), leading to improved information sharing.

Expert power derives from superior knowledge, experience, and/or the ability to effectively manage the external environment of the company (Daily and Johnson, 1997; Larcker and Tayan, 2012). Therefore, expert power enables the CEO to solve uncertain problems and thus increase his/her influence over the company (Larcker and Tayan, 2012). Specifically, compared with CEOs with limited functional exposure, CEOs with exposure to various functional areas have the opportunity to develop internal and external connections in a broader range of areas (Daily and Johnson, 1997). These contacts enable the CEO to better manage the environmental uncertainties faced by the company.

Regarding formal power (pc_3), the results show a negative effect on firm performance where a marginal increase of pc_3 leads to a decrease of ROA , ROE , and $ROIC$ by 0.05, 0.05, and 0.01 respectively. This indicates that a one standard deviation increase of the formal power index (pc_2) will lead to a decrease of about 5.4% in ROA , 6% in ROE and 1.1% in $ROIC$. In addition, the influence of formal power on firm performance is not consistently significant. The estimated coefficient of pc_3 is only statistically significant for the case of ROA at the 5% level and it is not significant for the other two firm performance indicators. This negative correlation has been verified by previous researchers, e.g. Daily and Johnson (1997), Larcker and Tayan (2012), Pathan (2009), and Song and Wan (2019). For example, this negative correlation may be driven from the fact that CEO duality allows the CEO to control the board's agenda, determine what information the board receives prior to the meeting, and lead board discussions (e.g. Daily and Johnson, 1997; Larcker and Tayan, 2012; and Song and Wan, 2019). In addition, the length of tenure determines the autonomy of the CEO within the board and increase their influence in the selection of other board members. Therefore, our results confirm the agency theory argument that generates a negative relationship between formal power and firm performance.

Furthermore, our results are in favor of having an older CEO since we find that CEO age has a positive effect on firm performance. This is in line with Wang et

al. (2016) that they indicate that because of limited experience, younger CEOs often lack the complex and mature cognitive modes that older CEOs have. They also point out that CEO age may produce greater organizational commitment by reducing opportunism and agency costs, which may improve future firm performance. Similarly, Pfeffer and Salancik (1978) state that compared to younger CEOs, older CEOs have more legitimacy, stronger networks, and better access to resources.

The remaining financial variables are all in line with the related literature, i.e. Opler et al. (1999), Gao et al. (2013) and Asimakopoulos et al. (2019). In particular, we find that cash holdings and sales growth have a positive effect on firm performance, whereas book leverage has a negative effect on firm performance. Finally, the Hansen tests indicate that the instrumental variables are valid in our models, and the m_n tests show no autocorrelation issues in our models.

[Insert Table 1.4 here]

1.6 Robustness checks

1.6.1 Separating the formal CEO power index

To assess the validity of our results and compare our findings with the related literature, we conduct additional robustness tests. We first examine the effect of formal power on firm performance (ROA , ROE , and $ROIC$) on its own. To that end, we employ the principal components analysis (PCA) using only the three proxies of formal power, ignoring the information coming from the informal power proxies. The PCA generates only one component with eigenvalue higher than unity which is then used in equation (3).

Table 1.5 shows that this new CEO formal power index is negatively correlated with firm performance, as before, but this time it appears as statistically significant in every case. However, the identification tests indicate that the instrumental variables are only valid in the case of ROE .

[Insert Table 1.5 here]

The results obtained above might be due to the case of omitting the other proxies of power from the estimation. To eliminate the omitted variable bias due to lack of information on informal power, we add the individual CEO power proxy variables of

informal power in our model independently from the formal power index obtained from the PCA.

Table 1.6 shows that formal power still exhibit a negative effect on firm performance. However, the estimated coefficient is not statistically significant in the case of *ROIC*. In this experiment though the Hansen J-test shows that the instrumental variables are valid.

It is worth mentioning the fact that now all the estimated coefficients of the informal power proxies are not statistically significant in any case we consider. This is mainly driven by the high correlation among these variables, indicating that the PCA we performed in our benchmark analysis is better suited for uncovering the impact of powerful CEOs on firm performance.

[Insert Table 1.6 here]

1.6.2 Separating the informal CEO power indices

As a next step we repeat the above analysis for the case where we assess the impact of informal power indices on firm performance on their own (separately from the formal power index). We group the informal power indices by following the principal components analysis (PCA) for the informal power proxies ignoring all the information from the formal power proxies. The PCA in this case generates only two components with eigenvalue higher than unity, representing again expert and prestige power, which are then used in equation (3).

The results reported in Table 1.7 show that the two informal power indices have a positive effect on firm performance. However, the majority of the estimated coefficients are not statistically significant. Our identification tests suggest that in this case there are issues with the validity instruments. This is similar to the case presented in Table 1.5, indicating the important role of omitted variables.

[Insert Table 1.7 here]

To eliminate the omitted variable bias due to lack of information on formal power, we add the individual CEO power proxy variables of formal power in our estimations independently from the informal power indices obtained from the PCA.

Table 1.8 reports that the estimated coefficients of the individual formal power proxies are not statistically significant, apart from tenure. In addition, the two

informal power indices, even though they are positive, are not robustly statistically significant. This result may be driven by the high correlation among the formal power proxies and with the informal power indices.

[Insert Table 1.8 here]

Comparing the results from these robustness checks with our benchmark results we can immediately observe that splitting the power index leads to inconsistent results. Therefore, our estimated effect on firm performance is that of CEO formal and informal power, not of a CEO attribute that allows CEOs to attain more power.

Moreover, someone could attribute the results in this section to the omitted variable bias and the associated loss of information. However, the results are not improved even after the addition of the individual power proxy variables. This could be attributed to the fact that these power proxy variables are correlated with each other leading to inconsistent results.¹³

Overall, these inconsistent results indicate that our comprehensive research approach by first eliminating the dimensionality and correlation issues via a PCA for all the power proxy variables, and then assessing the influence of CEOs' power profile on firm performance, is better suited in this context.¹⁴

1.6.3 How financial pressure affect the results?

In this robustness check, we examine how financial pressure affects our key results. According to Acharya et al. (2012), financial pressure is defined as the ratio of cash flow to interest payments. Nickell and Nicolitsas (1999) point out that interest burden is a flow measure of financial pressure capturing the premium of borrowing costs or the probability of complete credit rationing.

How companies (and directors) respond to financial pressure is an important dimension of concern for companies. What actions does the company take in such circumstances?

¹³To further show that our results do not suffer from reverse causality issues, we have estimated a regression model predicting CEO power indices as dependent variables using as independent variables past year's firm performance indicators. We find that there is no statistically significant impact on CEO power from past firm performance, verifying the validity of our benchmark estimations. These results are available upon request.

¹⁴We should note here that any other approach that reduces the dimensionality and correlation issues might also work as well. However, we believe that the PCA we incorporated in our work is also able to generate economically intuitive results.

Most corporate finance models assume that companies require external finance from banks or financial markets for pursuing investment projects. Asimakopoulos et al. (2019) indicate that companies' investment decisions will be affected by the availability and cost of their external finance. Numerous studies have investigated the impact of financial pressure on investment decisions. As it has been widely emphasized in the literature, credit market imperfections, such as asymmetric information problems, result in a wedge between funds generated externally by issuing equity or debt and internally retained earnings (see, for example, Asimakopoulos et al. 2019 and references therein).

Moreover, a number of studies have concluded the negative connection between financial pressure and companies' investment decisions. For example, Nickell and Nicolitsas (1999) point out that all investment activities are affected adversely by the increase in borrowing costs. The impact is more adverse if the initial debt position of the company is unfavourable. Additionally, it could make it more difficult for companies to obtain additional credit to finance new investment projects. However, it also has some desirable properties. For example, it allows companies investing in projects in the absence of internal resources. Therefore, it is interesting to assess how the role and financial impact of CEO power is affected under financial pressure.

From Table 1.9 we can see that our results remain robust for companies experiencing low financial pressure. However, CEO power indicators do not have any significant impact on firm performance for companies with high financial pressure. These results indicate that the positive impact of CEO's informal power on firm performance could be overshadowed by the high financial pressure adverse conditions.

[Insert Table 1.9 here]

1.6.4 Introducing additional control variables

We extend our robustness checks with the addition of various control variables. In this subsection we extend the set of exogenous variables with the addition of tangibility and CEO overconfidence.

Malmendier and Tate (2015) define the overconfident CEO as the CEO that overestimates the value that he can create. In addition, Deshmukh et al. (2013) indicate that managers can be seen as "overconfident" if they over-invest their personal funds

in their own company.

Considerable effort has been devoted to investigating the impact of CEO overconfidence on firm outcomes. However, overall conclusions are inconsistent. Studies from various disciplines have long identified overconfidence as an unfavourable characteristic of CEOs that leads to adverse consequences for firm outcomes, such as value destruction through less comprehensive strategic decisions and engaging in excessive risk-taking (Burkhard et al., 2018). For example, Malmendier and Tate (2015) find that the overconfident CEO overestimates the value of the new investment and views the future external financing as more costly than internal funds. Therefore, investment choices of overconfident CEOs deviate from optimal options because they rely more on whether internal cash flow is available. Niu (2010) concludes that banks run by overconfident CEOs take more risk because overconfident CEOs tend to overestimate the accuracy of exogenous noisy signals. In addition, they also tend to underestimate the riskiness of future cash flows. Either way, overconfidence will lead to more risk-taking.

The more optimistic view suggests that CEO overconfidence could be beneficial for firm performance. Burkhard et al. (2018) state that overconfident CEOs tend to make decisions relatively quickly, and they tend to develop an inspirational and stimulating vision. In addition, CEO overconfidence is associated with a higher propensity to innovate since they are more likely to show overconfidence in challenging tasks rather than easy ones (Hirshleifer et al., 2012; Malmendier and Tate, 2015). As a result, overconfident CEOs are particularly enthusiastic about risky, challenging, and talent- and vision-sensitive investments and projects.

The most common way to measure CEO overconfidence is to use executives' decisions about their individual company stock option portfolio. This measurement method is originally introduced in Malmendier and Tate (2005), which was based on the fact that stocks and options are used as part of top executives' compensation in the US. In this situation, a rational executive will exercise stock options before they expire. However, the overconfident CEOs are more willing to hold options because they overestimate their companies' future performance, expecting to profit from future stock price appreciation. Building on this logic, Yung et al. (2015) present a measure of CEO overconfidence by using the amount of moneyness of vested options

held by CEOs, that is, a CEO is defined as overconfident if he/she delays the exercise of vested options, which are on average at least 67% in the money. In our study, we measure CEO overconfidence following the work of Yung et al. (2015) and we add it as a control variable in equation (1.3). Table 1.10 shows that the effect of CEO overconfidence on firm performance is not statistically significant.

Tangible assets are physical items of value used to generate revenues for the company and are not for sale to customers. In this work, tangibility is defined as the total net property, plant, and equipment divided by total assets. Since asset tangibility determines the valuation of the company's transferable assets by external financiers in the case of default, asset tangibility is a critical determinant of a company's external financing capability. The basic reasoning is that financial intermediaries rely to some extent on the option to liquidate assets in response to opportunistic behaviour or information asymmetry. Therefore, the degree of total asset tangibility ultimately sets an upper limit on a firm's total debt capacity (Musah et al., 2019). Therefore, it is important to assess if CEO power impact on firm performance is affected when we control for firm's debt financing ability via tangibility.

Table 1.10 shows that tangibility has a negative, but inconsistently significant, effect on firm performance. The negative associations may imply that these companies use their tangible assets as collateral to obtain more debt (Musah et al., 2019). Companies with more tangible assets generally have easier access to borrowing as these assets can be used as collateral. Moreover, controlling for firm's debt financing ability via tangibility, does not affect the role and impact of CEO power on firm performance.

[Insert Table 1.10 here]

To summarize, after adding these control variables in our empirical analysis, prestige and expert power indices still have a positive and statistically consistent effect on firm performance. Formal power has still a negative effect on firm performance but statistical significance is inconsistent. These results indicate that in our research, CEO overconfidence and the tangibility of the company do not affect our uncovered significant effect of CEO informal power on firm performance.

1.6.5 Does the board matters?

In this subsection we assess if board characteristics affect our key results. We further control if CEO gender plays any role on the CEO power-firm performance relationship.

Board is by far the most important internal device for the company. It aims to control and monitor management in order to prevent the management from opportunistic behaviour. The composition of the board of directors has always been an important issue in corporate governance, where the purpose is to determine a structure that aligns the interests of management and stakeholders (Rose, 2007). In previous studies, a number of board characteristics (e.g. board size, the portion of female directors, nationality diversity of board) have been assessed.

The literature provides mixed results on the relationship between board size and firm performance. Alabdullah et al. (2018) and Huu Nguyen et al. (2020) note that a larger board size could improve firm performance by improving decision-making and monitoring overall activities in a better way. In addition, a larger board is less likely to be dominated by management, thereby reducing information asymmetry and protecting the interests of shareholders. However, Garg (2007) argues that there is an inverse association between board size and firm performance. A smaller size of board is more effective. The various views on specific issues would extend the decision-making progress, and as a consequence, the board might end up more fragmented.

In recent years, the issue of governance diversity has attracted a great deal of interest in corporate governance literature, including the focus on whether board diversity, especially in relation to gender and foreign proportion, could enhance the board's competence and thus improve corporate performance. Rose (2007) states that the company, like other organizations, should reflect society as a whole because the company is an important institution that directly affects a wide range of stakeholders. Therefore, board diversity seems to have a logical implication and may even be required by law.

In studies of board diversity, researchers may use one or more attributes as proxies for diversity. The gender of board members seems to be the factor that gets the

most attention. Numerous studies have confirmed that board diversity could result in better firm performance (i.e. Lückcrath-Rovers, 2013; and Vo and Phan, 2013). The high portion of board diversity could be a positive signal to potential job applications, thereby attracting talented candidates from outside the circle that usually recruits board members (Rose, 2007). In addition, board diversity may serve as a positive signal to stakeholders, such as consumers, suppliers, and communities, to improve its reputation (Rose and Thomsen, 2004). Besides, board diversity could also increase the competition within the company's internal labour market because women and foreigners, for example, know that they are not excluded from the top positions in the company (Rose, 2007). Moreover, a higher degree of diversity is beneficial to the board's decision-making process because the mutual exchange of ideas stemming from board members from different backgrounds and life experiences would bring new perspectives on board issues (Rose, 2007; and Frijns et al., 2016).

As is shown in Table 1.11, in our study we find a positive correlation between board size and firm performance, similar to Alabdullah et al. (2018) and Huu Nguyen et al. (2020). We further find a positive correlation between the nationality diversity of the board of directors and firm performance. Finally, we find that female board members have a negative effect on firm performance. This finding is in line with Du Rietz and Henrekson (2000), Fischer (1992), and Rosa et al. (1996). Fischer (1992) and Rosa et al. (1996) indicate that all else equal, female entrepreneurs tend to underperform compared to their male counterparts in terms of conventional economic performance measures such as profitability and growth in sales, value added, and employment.

Overall, the additional board characteristics do not affect our benchmark CEO power results.

[Insert Table 1.11 here]

1.7 Conclusions

Using a large unbalanced panel data set from US listed firms and CEOs for the period 1993-2018, this paper examined the impact of CEO formal and informal power on firm performance. Previous studies mainly focused on formal power, comprised

by structural and ownership power, without addressing concurrently the role of informal power, prestige and expert power, or the other way around. To the best of our knowledge, we are the first to highlight the impact of formal and informal power concurrently on firm performance

The results of our study reveal that the CEO's informal power, especially prestige power, is the primary driver of firm performance, while formal power has a negative impact on firm performance. This is especially relevant since in the fast-changing business world, informal power seems to exert a greater force on others than formal power.

To assess the validity of our results, we further split the power indices to analyse the effect of formal and informal power separately on firm performance. We also introduced some of the power variables we eliminated in the first step as control variables separately from the constructed index, similar to the related literature. Our results verified the inconsistent outcome of the related literature when only formal or informal power is being assessed, due to the significant loss of information and the correlation among the control variables

Moreover, we examined the impact of financial pressure on our key results and we found that our results remain robust for companies experiencing low financial pressure. However, high financial pressure overshadowed the benefits of CEOs' informal power on firm performance. Finally, our key results remain robust to the inclusion of additional firm, CEO and board control variables.

1.7.1 Limitations and suggestions for future research

In this study, we evaluated the role of CEO power on firm performance using a data set from US listed firms and CEOs for the period 1993-2018. Future studies could examine this connection expanding to various countries and in different industries. Another dimension to assess could be the CEO's nationality and cultural origin, and whether he/she has overseas study/working experience.

Previous studies have done some work on the influence of CEOs' culture characteristics on corporate finance. For example, Liu (2016) and Pan et al. (2020) explore whether the cultural origin of CEOs matters for risk appetite and firm performance. CEOs' cultural heritage would affect their decision-making behaviour and appetite

with work choice (Pan et al., 2020).

Finally, future studies could also look into the relationship between CEO power and firm performance during economic turmoil. For example, a future study could examine whether companies with powerful CEOs perform better under high economic uncertainty compared to their counterparts.

Appendix A

Appendix A.1 Tables

Table 1.1: Summary statistics

Variables	Mean	St.dev.	Min	Median	Max	No. of obs.
Performance variables						
ROA	0.040	0.094	-0.476	0.044	0.269	12,176
ROE	0.089	0.302	-1.677	0.105	1.383	10,503
ROIC	0.130	0.103	-0.253	0.126	0.458	10,200
Formal power variables						
Tenure	7.011	4.357	3	6	35	12,176
Duality	0.575	0.494	0	1	1	12,176
Ownership	2.520	5.961	0	0.575	61.207	9,678
Expert power variables						
CEO exper.	0.013	0.114	0	0	1	12,176
No. firms exper.	0.035	0.196	0	0	2	12,176
No. Ind. exper.	0.009	0.099	0	0	2	12,176
Prestige power variables						
MBA dummy	0.264	0.441	0	0	1	12,176
Ivy League dummy	0.190	0.393	0	0	1	12,176
Top Business School	0.115	0.319	0	0	1	12,176
Control variables						
LCash	-2.670	1.461	-11.323	-2.502	-0.018	12,142
M-B ratio	1.984	1.308	0.783	1.538	8.461	12,147
SalesGrowth	0.084	0.193	-0.544	0.072	0.773	12,163
CapEx	0.045	0.049	0	0.030	0.277	11,943
Inv	0.095	0.122	0	0.052	0.613	12,043
BookLev	0.228	0.190	0	0.206	0.857	12,131
Div. payout ratio	0.173	0.451	-1.034	0.018	2.989	10,527
LAge	2.0221	0.791	0	2.079	3.258	12,176
LCEOage	4.033	0.122	3.296	4.043	4.454	12,176
ROAvol	0.051	0.103	0	0.024	2.674	12,176
ROEvol	0.540	9.784	0	0.054	429.076	10,830
ROICvol	0.047	0.290	0	0.027	28.688	10,356

Note: This table presents the mean, standard deviation, minimum, maximum, and the number of observations for each variable. Data was filtered to only contain complete data from CEOs with at least three years of tenure.

Table 1.2: Principal components, eigenvalues, and proportion of variance explained

Component	Eigenvalue	Difference	Proportion	Cumulative of variance explained
Comp1	2.094	0.209	0.233	0.233
Comp2	1.884	0.527	0.209	0.442
Comp3	1.358	0.490	0.151	0.593
Comp4	0.868	0.085	0.096	0.689
Comp5	0.783	0.030	0.087	0.776
Comp6	0.754	0.142	0.084	0.860
Comp7	0.612	0.268	0.068	0.928
Comp8	0.344	0.041	0.038	0.966
Comp9	0.303		0.034	1.000

Note: This table presents the results from the PCA. Number of components equals the total number of power proxy variables. The third column (differences) is the difference between eigenvalues. The first 3 components explain 59.3% of the variation.

Table 1.3: Principal Component Analysis

Variable	Comp 1	Comp 2	Comp 3	Unexplained variation
Tenure			0.499	0.640
Duality			0.590	0.521
Ownership			0.586	0.510
CEO exper.	0.573			0.308
No. firms exper.	0.617			0.193
No. Ind. exper.	0.520			0.419
Top Business School		0.647		0.201
MBA dummy		0.572		0.377
Ivy League dummy		0.488		0.497

Note: We only show the proxies with absolute value of loadings above 0.2 in each component.

Table 1.4: Panel data estimations

Variables	ROA		ROE		ROIC	
	Coef.	St. Err.	Coef.	St. Err.	Coef.	St. Err.
Constant	-1.543** [-2.17]	0.713	-1.861 [-1.51]	1.235	-0.552 [-1.23]	0.447
Dep.Var.(t-1)	0.209*** [5.22]	0.040	0.152*** [3.43]	0.044	0.486*** [11.36]	0.043
pc_1	0.039** [2.41]	0.016	0.071* [1.70]	0.042	0.013*** [2.67]	0.005
pc_2	0.147*** [2.99]	0.049	0.185* [1.86]	0.099	0.065** [2.45]	0.027
pc_3	-0.048** [-2.29]	0.021	-0.053 [-1.30]	0.041	-0.010 [-0.70]	0.014
ROAvol	-0.124** [-2.08]	0.059				
ROEvol			0.001 [0.20]	0.003		
ROICvol					-0.022 [-0.40]	0.056
M-B ratio	0.004 [0.62]	0.006	-0.009 [-0.54]	0.016	0.020*** [5.22]	0.004
LCash	0.016*** [2.96]	0.006	0.015 [1.24]	0.012	0.014*** [4.18]	0.003
SalesGrowth	0.108*** [8.01]	0.013	0.221*** [6.27]	0.035	0.115*** [11.14]	0.010
CapEx	-0.055 [-0.38]	0.143	-0.088 [-0.28]	0.314	0.013 [0.14]	0.094
Inv	-0.462** [-2.19]	0.211	-0.343 [-0.67]	0.516	0.208** [2.00]	0.104
BookLev	-0.354*** [-5.43]	0.065	-0.394** [-2.53]	0.156	-0.233*** [-6.30]	0.037
Div. payout ratio	0.009 [1.31]	0.007	0.046*** [3.16]	0.015	0.005 [1.05]	0.005
LCEOage	0.466** [2.45]	0.190	0.569* [1.70]	0.334	0.167 [1.38]	0.121
Lage	0.003 [0.24]	0.011	0.003 [0.14]	0.018	0.008 [1.52]	0.006
	Coef.	p-value	Coef.	p-value	Coef.	p-value
Hansen	245.52	0.155	98.32	0.136	238.2	0.246
Diff-Hansen	39.41	0.279	32.33	0.597	34.30	0.502
AR(1)	-8.620	0.000	-5.856	0.000	-5.626	0.000
AR(2)	1.046	0.295	-0.360	0.719	-1.560	0.119
No. of observations	8,166		8,020		7,186	
No. of groups	1,563		1,554		1,424	
No. of instruments	274		134		274	
Time and Ind. FE	YES		YES		YES	

Note: This table presents the results from a system GMM estimation. Data are filtered to only contain data from CEOs with at least 3 years of tenure. Dep. Var. (t-1) is the lagged dependent variable (ROA, ROE, ROIC). pc_n ($n = 1, 2, 3$) = principal components – expert power, prestige power, and formal power. Robust t-statistics are reported in brackets. *, **, and *** indicates significance at the 10%, 5% and 1% levels respectively.

Table 1.5: Regressions splitting the three power indices – formal power

Variables	ROA		ROE		ROIC	
	Coef.	St. Err.	Coef.	St. Err.	Coef.	St. Err.
Constant	-1.890*** [-3.38]	0.559	-2.595** [-2.31]	1.123	-0.687* [-1.79]	0.383
Dep.Var.(t-1)	0.232*** [6.47]	0.036	0.141*** [3.32]	0.042	0.515*** [13.92]	0.037
formal power pc_1	-0.091*** [-5.12]	0.018	-0.119*** [-2.87]	0.041	-0.028** [-2.02]	0.014
ROAvol	-0.142*** [-2.93]	0.048				
ROEvol			-0.0004 [-0.01]	0.003		
ROICvol					-0.023 [-0.42]	0.055
M-B ratio	0.012** [2.17]	0.005	0.001 [0.08]	0.014	0.024*** [6.78]	0.004
LCash	0.010*** [2.62]	0.004	0.006 [0.58]	0.010	0.012*** [4.41]	0.003
SalesGrowth	0.112*** [9.40]	0.012	0.225*** [6.75]	0.033	0.120*** [12.23]	0.010
CapEx	-0.141 [-1.24]	0.114	-0.132 [-0.44]	0.298	-0.045 [-0.56]	0.080
Inv	-0.580*** [-3.45]	0.168	-0.482 [-1.04]	0.462	0.152* [1.78]	0.086
BookLev	-0.302*** [-6.94]	0.043	-0.321** [-2.33]	0.138	-0.208*** [-7.86]	0.026
Div. payout ratio	0.004 [0.87]	0.005	0.037*** [2.74]	0.014	0.004 [1.09]	0.004
LCEOage	0.580*** [3.87]	0.150	0.790*** [2.58]	0.306	0.212** [2.05]	0.104
Lage	0.019*** [3.02]	0.006	0.022* [1.89]	0.012	0.016*** [3.92]	0.004
	Coef.	p-value	Coef.	p-value	Coef.	p-value
Hansen	232.36	0.025	196.24	0.402	221.42	0.072
Diff-Hansen	58.97	0.007	33.34	0.548	49.32	0.055
AR(1)	-9.56	0.000	-6.00	0.000	-6.39	0.000
AR(2)	1.28	0.021	-0.44	0.661	-1.51	0.131
No. of observations	8,166		8,020		7,186	
No. of groups	1,563		1,554		1,424	
No. of instruments	240		240		240	
Time and Ind. FE	YES		YES		YES	

Notes: This table presents the results from a system GMM estimation. Data are filtered to only contain complete data from CEOs with at least 3 years of tenure. Dep. Var. (t-1) is the lagged dependent variable (ROA, ROE, ROIC). formal power pc_1 is the formal power index derived with PCA ignoring all the information of informal power proxies. Robust t-statistics are reported in brackets. *, **, and *** indicates significance at the 10%, 5% and 1% levels respectively.

Table 1.6: Regressions splitting the three power indices – formal power and the individual variables of informal power

Variables	ROA		ROE		ROIC	
	Coef.	St. Err.	Coef.	St. Err.	Coef.	St. Err.
Constant	-2.599** [-2.28]	1.142	-2.326 [-1.46]	1.589	-0.360 [-0.53]	0.680
Dep.Var.(t-1)	0.210*** [5.25]	0.040	0.112** [2.49]	0.045	0.493 [13.43]	0.037
formal power pc_1	-0.082** [-2.56]	0.032	-0.105** [-2.21]	0.048	-0.016 [-0.75]	0.021
ROAvol	-0.112* [-1.79]	0.062				
ROEvol			-0.0004 [-0.11]	0.003		
ROICvol					-0.012 [-0.24]	0.051
CEO exper.	1.867 [1.39]	1.341	-0.571 [-0.35]	1.633	-0.582 [-1.08]	0.537
No. firms exper.	-1.600 [-1.53]	1.048	-0.462 [-0.31]	1.503	0.266 [0.59]	0.452
No. Ind. exper.	1.383 [1.29]	1.070	2.121 [1.08]	1.956	0.121 [0.22]	0.548
Top Business School	-0.089 [-0.33]	0.270	0.288 [0.48]	0.602	0.142 [1.01]	0.140
MBA dummy	0.074 [0.50]	0.147	-0.044 [-0.17]	0.268	0.060 [0.79]	0.076
Ivy League dummy	0.208 [0.93]	0.225	0.165 [0.31]	0.537	-0.017 [-0.13]	0.126
M-B ratio	0.014* [1.72]	0.008	-0.008 [-0.48]	0.016	0.021*** [5.27]	0.004
LCash	0.013** [2.10]	0.006	-0.002 [-0.14]	0.012	0.011*** [3.51]	0.003
SalesGrowth	0.117*** [8.63]	0.014	0.252*** [6.49]	0.039	0.120*** [11.48]	0.010
CapEx	-0.016 [-0.10]	0.158	0.032 [0.10]	0.323	-0.008 [-0.09]	0.093
Inv	-0.634*** [-2.59]	0.245	-0.778 [-1.51]	0.516	0.157 [1.38]	0.113
BookLev	-0.341*** [-5.31]	0.064	-0.281** [-2.03]	0.139	-0.225*** [-6.93]	0.032
Div. payout ratio	0.012 [1.62]	0.007	0.038*** [2.71]	0.014	0.004 [0.76]	0.005
LCEOage	0.705** [2.30]	0.307	0.692 [1.60]	0.432	0.124 [0.66]	0.189
Lage	0.018 [1.38]	0.013	0.002 [0.14]	0.017	0.009* [1.66]	0.006
	Coef.	p-value	Coef.	p-value	Coef.	p-value
Hansen	281.99	0.539	283.77	0.509	282.29	0.534
Diff-Hansen	37.39	0.360	36.17	0.414	40.60	0.237
AR(1)	-8.88	0.000	-5.87	0.000	-6.19	0.000
AR(2)	0.86	0.388	-0.62	0.534	-1.53	0.126
No. of observations	8,166		8,020		7,186	
No. of groups	1,563		1,554		1,424	
Time and Ind. FE	YES		YES		YES	

Notes: This table presents the results from a system GMM estimation. Data are filtered to only contain CEOs with at least 3 years of tenure. Dep. Var. (t-1) is the lagged dependent variable (ROA, ROE, ROIC). formal power pc_1 is the formal power index derived with PCA ignoring all the information of informal power proxies. Robust t-statistics are reported in brackets. *, **, and *** indicates significance at the 10%, 5% and 1% levels respectively.

Table 1.7: Regressions splitting the three power indices – informal power

Variables	ROA		ROE		ROIC	
	Coef.	St. Err.	Coef.	St. Err.	St. Err.	
Constant	-0.008 [-0.04]	0.211	-0.046 [-0.11]	0.418	0.022 [0.19]	0.118
Dep.Var.(t-1)	0.217*** [6.67]	0.032	0.126*** [2.74]	0.046	0.531*** [16.17]	0.033
informal power pc_1	0.036 [1.38]	0.026	0.046 [1.05]	0.044	0.005** [1.75]	0.003
informal power pc_2	0.057 [1.59]	0.036	0.068 [1.34]	0.051	0.020 [1.32]	0.015
ROAvol	-0.117*** [-2.67]	0.044				
ROEvol			0.004 [1.30]	0.003		
ROICvol					0.011*** [8.41]	0.001
M-B ratio	0.010** [2.23]	0.004	0.005 [0.35]	0.014	0.023*** [7.42]	0.003
LCash	0.010*** [3.20]	0.003	0.007 [0.80]	0.008	0.013*** [5.79]	0.002
SalesGrowth	0.102*** [10.45]	0.010	0.191*** [6.19]	0.031	0.115*** [13.81]	0.008
CapEx	-0.154 [-1.62]	0.095	-0.166 [-0.57]	0.290	0.020 [0.33]	0.062
Inv	-0.484*** [-3.63]	0.134	-0.602 [-1.33]	0.451	0.300*** [3.52]	0.085
BookLev	-0.326*** [-8.20]	0.040	-0.430*** [-3.45]	0.125	-0.213*** [-8.52]	0.025
Div. payout ratio	0.010** [2.49]	0.004	0.050*** [4.10]	0.012	0.004 [1.27]	0.003
LCEOage	0.053 [1.05]	0.050	0.088 [0.84]	0.104	0.016 [0.55]	0.029
Lage	0.005 [0.71]	0.008	0.012 [0.97]	0.012	0.011*** [3.24]	0.003
	Coef.	p-value	Coef.	p-value	Coef.	p-value
Hansen	254.92	0.015	233.58	0.108	251.01	0.022
Diff-Hansen	38.63	0.309	49.05	0.058	49.85	0.050
AR(1)	-10.76	0.000	-6.82	0.000	-8.64	0.000
AR(2)	1.29	0.197	-0.52	0.601	-1.23	0.219
No. of observations	10,287		10,110		9,129	
No. of groups	1,696		1,687		1,550	
No. of instruments	257		257		257	
Time and Ind. FE	YES		YES		YES	

Notes: This table presents the results from a system GMM estimation. Data are filtered to only contain CEOs with at least 3 years of tenure. Dep. Var. (t-1) is the lagged dependent variable (ROA, ROE, ROIC). informal power pc_n ($n=1,2$) are expert power and prestige power respectively. We employ the PCA to derive them ignoring all the information of formal power proxies. Robust t-statistics are reported in brackets. *, **, and *** indicates significance at the 10%, 5% and 1% levels respectively.

Table 1.8: Regressions splitting the three power indices – informal power and the individual variables of formal power

Variables	ROA		ROE		ROIC	
	Coef.	St. Err.	Coef.	St. Err.	Coef.	St. Err.
Constant	-0.325 [-1.46]	0.223	-0.430 [-0.91]	0.473	-0.344** [-2.38]	0.145
Dep.Var.(t-1)	0.226*** [6.18]	0.036	0.130*** [2.93]	0.044	0.496*** [13.14]	0.038
informal power pc_1	0.020 [1.19]	0.017	0.049 [1.12]	0.044	0.002 [1.12]	0.002
informal power pc_2	0.088** [2.10]	0.042	0.124 [1.61]	0.077	0.038* [1.84]	0.020
ROAvol	-0.130** [-2.33]	0.056				
ROEvol			0.0003 [0.11]	0.003		
ROICvol					-0.013 [-0.22]	0.060
Tenure	-0.003*** [-2.95]	0.001	-0.006* [-1.71]	0.003	-0.002** [-2.10]	0.0008
Duality	-0.017 [-0.78]	0.021	0.050 [0.59]	0.084	-0.014 [-1.00]	0.014
Ownership	0.0002 [0.08]	0.003	-0.006 [-0.78]	0.008	-0.001 [-0.48]	0.002
M-B ratio	0.008 [1.49]	0.005	-0.002 [-0.14]	0.014	0.022*** [6.13]	0.004
LCash	0.012*** [2.71]	0.004	0.009 [0.84]	0.010	0.013*** [4.35]	0.003
SalesGrowth	0.113*** [9.34]	0.012	0.223*** [6.48]	0.034	0.118*** [11.86]	0.010
CapEx	-0.086 [-0.76]	0.113	-0.076 [-0.25]	0.302	-0.005 [-0.06]	0.082
Inv	-0.380** [-2.52]	0.151	-0.254 [-0.56]	0.451	0.222*** [2.61]	0.085
BookLev	-0.326*** [-6.81]	0.048	-0.336** [-2.34]	0.143	-0.218*** [-7.24]	0.030
Div. payout ratio	0.009* [1.82]	0.005	0.045*** [3.32]	0.014	0.006 [1.41]	0.004
LCEOage	0.138** [2.52]	0.055	0.181 [1.46]	0.124	0.117*** [3.05]	0.038
LAge	0.005 [0.61]	0.008	0.002 [0.15]	0.016	0.011** [2.43]	0.004
	Coef.	p-value	Coef.	p-value	Coef.	p-value
Hansen	272.91	0.223	237.50	0.791	270.23	0.259
Diff-Hansen	54.18	0.020	19.79	0.982	34.87	0.475
AR(1)	-9.20	0.000	-6.02	0.000	-6.00	0.000
AR(2)	1.06	0.289	-0.51	0.611	-1.53	0.125
No. of observations	8,166		8,020		7,186	
No. of groups	1,563		1,554		1,424	
No. of instruments	308		308		308	
Time and Ind. FE	YES		YES		YES	

Notes: This table presents the results from a system GMM estimation. Data contain CEOs with at least 3 years of tenure. Dep. Var. (t-1) is the lagged dependent variable. informal power pc_n (n=1,2) are expert power and prestige power respectively. We employ the PCA to derive them ignoring all the information of formal power proxies. Robust t-statistics are reported in brackets. *, **, and *** indicates significance at the 10%, 5% and 1% levels respectively.

Table 1.9: Panel data estimations with high and low financial pressure

Variables	ROA			ROE			ROIC			
	Low			Low			Low			
	Coef.	St. Err.	High Coef.	St. Err.	Coef.	St. Err.	High Coef.	St. Err.	High Coef.	St. Err.
Constant	-0.374 [-0.28]	1.340	-0.510* [-1.80]	0.283	-0.034 [-0.01]	0.612	-0.489 [-0.80]	1.016	-1.047 [-1.03]	0.170
Dep. Var. ($t-1$)	0.025 [0.31]	0.080	0.258*** [4.77]	0.054	-0.013 [-0.19]	0.073	0.204*** [2.80]	0.072	0.373*** [5.17]	0.057
pc_1	0.016* [1.68]	0.010	0.033 [1.24]	0.026	0.082* [-1.82]	0.051	-0.037 [-0.72]	0.005	0.011** [2.35]	0.017
pc_2	0.089* [1.89]	0.047	-0.046 [-1.02]	0.045	0.224 [1.56]	0.107	-0.043 [-0.40]	0.023	0.074*** [3.23]	0.031
pc_3	-0.049* [-1.82]	0.027	-0.024 [-1.54]	0.016	-0.076 [-0.59]	0.039	-0.025 [-0.65]	0.022	-0.045** [-2.05]	0.010
ROAvol	-0.687*** [-3.71]	0.185	-0.032 [-0.45]	0.071	-0.059 [-0.59]					
ROEvol					-0.005*** [-5.22]	0.001	0.004** [2.44]	0.002		
ROICvol										
M-B ratio	0.021* [1.76]	0.012	0.016** [2.57]	0.006	-0.025 [-0.47]	0.017	0.009 [0.52]	0.055	-0.074 [-1.36]	0.086
LCash	-0.004 [-0.52]	0.008	0.006 [1.17]	0.005	-0.030 [-0.91]	0.016	-0.003 [-0.21]	0.007	0.024** [2.43]	0.004
SalesGrowth	0.078*** [3.51]	0.022	0.122*** [6.33]	0.019	0.245*** [3.34]	0.056	0.253*** [4.48]	0.017	0.107*** [6.18]	0.019
CapEx	-0.149 [-0.66]	0.227	-0.048 [-0.39]	0.123	-1.092 [-1.13]	0.432	0.620 [1.43]	0.182	-0.217 [-1.19]	0.122
Inv	-0.798*** [-2.97]	0.269	-0.329* [-1.95]	0.169	-0.922 [-0.78]	0.672	-0.930 [-1.38]	0.193	-0.231 [-1.19]	0.122
BookLev	-0.365*** [-4.08]	0.089	-0.187*** [-4.18]	0.045	-0.433 [-1.08]	0.169	-0.368** [-2.17]	0.076	-0.214*** [-4.30]	0.030
Div. payout ratio	0.006 [0.67]	0.008	0.002 [0.18]	0.012	0.089** [2.36]	0.023	0.043* [1.87]	0.007	0.004 [0.53]	0.006
LCFOage	0.179 [0.50]	0.359	0.150** [2.04]	0.074	0.179 [0.17]	0.166	0.175 [1.05]	0.271	0.329 [1.22]	0.044
LAge	0.021 [1.27]	0.017	0.018*** [1.96]	0.009	0.062 [1.35]	0.020	0.012 [0.59]	0.013	0.029 [2.15]	0.006
Hansen	215.50	0.646	226.36	0.443	205.61	0.573	241.07	0.932	193.31	p-value
Diff-Hansen	29.99	0.708	22.65	0.931	25.46	0.882	33.78	0.451	35.36	p-value
AR(1)	-3.38	0.001	-5.48	0.000	-3.02	0.002	-3.07	0.000	-3.63	0.439
AR(2)	-0.68	0.499	1.18	0.237	-1.98	0.048	-0.66	0.027	-2.22	0.529
No. of observations	2,009		2,612		1,967		2,578		1,959	0.000
No. of groups	647		717		640		708		631	0.402
No. of instruments	274		273		260		273		274	
Time and Ind. FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Note: This table presents the results from a system GMM estimation. Data are filtered to only contain CEOs with at least 3 years of tenure. Dep. Var. ($t-1$) is the lagged dependent variable (ROA, ROE, ROIC). pc_n ($n = 1, 2, 3$) = principal components – expert power, prestige power, and formal power. Robust t-statistics are reported in brackets. *, **, and *** indicates significance at the 10%, 5% and 1% levels respectively.

Table 1.10: Panel data estimations with additional control variables

Variables	ROA		ROE		ROIC	
	Coef.	St. Err.	Coef.	St. Err.	Coef.	St. Err.
Constant	-1.505*	0.795	-0.886	1.738	-0.587	0.540
	[-1.89]		[-0.51]		[-1.09]	
Dep. Var. (t-1)	0.208***	0.039	0.125***	0.047	0.487***	0.041
	[5.33]		[2.64]		[11.76]	
pc_1	0.035**	0.014	0.071*	0.044	0.013***	0.005
	[2.53]		[1.62]		[2.74]	
pc_2	0.142***	0.047	0.212**	0.097	0.067***	0.024
	[3.05]		[2.17]		[2.74]	
pc_3	-0.052**	0.025	-0.021	0.056	-0.011	0.019
	[-2.05]		[-0.37]		[-0.56]	
ROAvol	-0.126**	0.058				
	[-2.16]					
ROEvol			0.001	0.004		
			[0.20]			
ROICvol					-0.024	0.048
					[-0.50]	
M-B ratio	0.006	0.006	-0.012	0.015	0.020***	0.004
	[0.89]		[-0.80]		[5.11]	
LCash	0.0133**	0.006	0.012	0.013	0.014***	0.003
	[2.32]		[0.91]		[4.04]	
SalesGrowth	0.106	0.014	0.220***	0.037	0.115***	0.011
	[7.65]		[5.90]		[10.95]	
CapEx	-0.054	0.137	-0.095	0.310	0.035	0.086
	[-0.40]		[-0.31]		[0.41]	
Inv	-0.352	0.219	-0.322	0.507	0.212*	0.109
	[-1.61]		[-0.64]		[1.95]	
BookLev	-0.339***	0.065	-0.363**	0.157	-0.230***	0.037
	[-5.22]		[-2.31]		[-6.27]	
Div. payout ratio	0.014*	0.008	0.056***	0.019	0.007	0.004
	[1.79]		[2.94]		[1.53]	
LCEOage	0.477**	0.221	0.276	0.493	0.175	0.155
	[2.16]		[0.56]		[1.13]	
LAge	0.008	0.011	-0.008	0.020	0.008	0.007
	[0.72]		[-0.39]		[1.22]	
Tang.	-0.211*	0.121	-0.127	0.233	-0.002	0.064
	[-1.75]		[-0.55]		[-0.04]	
Overconf.	-0.080	0.111	0.208	0.268	0.004	0.071
	[-0.72]		[0.78]		[0.06]	
	Coef.	p-value	Coef.	p-value	Coef.	p-value
Hansen	270.50	0.255	229.84	0.380	268.10	0.289
Diff-Hansen	32.86	0.572	18.38	0.991	36.86	0.383
AR(1)	-8.76	0.000	-5.99	0.000	-5.69	0.000
AR(2)	1.10	0.272	-0.49	0.625	-1.52	0.129
No. of observations	7,795		7,656		7,125	
No. of groups	1,494		1,485		1,411	
No. of instruments	308		276		308	
Time and Ind. FE	YES		YES		YES	

Note: This table presents the results from a system GMM estimation. Data are filtered to only contain CEOs with at least 3 years of tenure. Dep. Var. (t-1) is the lagged dependent variable (ROA, ROE, ROIC). pc_n $n=1,2,3$ = principal components - expert power, prestige power, and formal power. Robust t-statistics are reported in brackets. *, **, and *** indicates significance at the 10%, 5% and 1% levels respectively.

Table 1.11: Panel data estimations with board characteristics

Variables	ROA		ROA		ROA		ROA	
	Coef.	St. Err.	Coef.	St. Err.	Coef.	St. Err.	Coef.	St. Err.
Constant	-1.537** (-2.161)	0.711	-1.285** (-2.001)	0.642	-1.214** (-2.079)	0.584	0.000 (-)	0.000
Dep.Var.(t-1)	0.209*** (5.209)	0.040	0.189*** (5.082)	0.037	0.195*** (5.266)	0.037	0.209*** (5.532)	0.038
ROAvol	-0.124** (-2.078)	0.060	-0.089 (-1.512)	0.059	-0.085 (-1.511)	0.056	-0.090* (-1.690)	0.053
pc_1	0.039** (2.413)	0.016	0.027** (2.082)	0.013	0.025* (1.945)	0.013	0.024* (1.852)	0.013
pc_2	0.148*** (2.999)	0.049	0.100** (2.497)	0.040	0.077** (2.541)	0.030	0.064** (2.299)	0.028
pc_3	-0.048** (-2.244)	0.021	-0.038** (-2.283)	0.017	-0.039*** (-2.602)	0.015	-0.039*** (-2.662)	0.015
M-B ratio	0.004 (0.613)	0.006	-0.003 (-0.374)	0.007	-0.001 (-0.103)	0.006	0.001 (0.082)	0.006
LCash	0.016*** (2.966)	0.006	0.014*** (2.800)	0.005	0.013*** (2.911)	0.004	0.013*** (3.135)	0.004
SalesGrowth	0.108*** (7.979)	0.013	0.112*** (8.722)	0.013	0.113*** (9.134)	0.012	0.114*** (9.215)	0.012
CapEx	-0.054 (-0.379)	0.143	0.089 (0.683)	0.130	0.065 (0.539)	0.121	0.058 (0.492)	0.117
Inv	-0.461** (-2.178)	0.212	-0.489*** (-2.680)	0.183	-0.527*** (-3.179)	0.166	-0.501*** (-3.079)	0.163
BookLev	-0.354*** (-5.413)	0.065	-0.366*** (-5.874)	0.062	-0.363*** (-6.701)	0.054	-0.341*** (-6.587)	0.052
Div. payout ratio	0.009 (1.307)	0.007	0.007 (1.129)	0.006	0.005 (1.038)	0.005	0.005 (1.023)	0.005
LCEO_age	0.464** (2.442)	0.190	0.372** (2.278)	0.163	0.363** (2.453)	0.148	0.340** (2.374)	0.143
LAge	0.002 (0.224)	0.011	0.002 (0.206)	0.009	0.003 (0.418)	0.008	0.007 (0.895)	0.007
CEO female	0.000 (0.006)	0.035	0.004 (0.152)	0.026	-0.008 (-0.322)	0.025	-0.009 (-0.367)	0.024
No. of Directors			0.004 (0.930)	0.004	0.004 (1.099)	0.004	0.003 (0.798)	0.003
Gender ratio					-0.040 (-0.505)	0.079	-0.020 (-0.276)	0.073
Nationality Mix							0.104** (2.179)	0.048
	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value
Hansen	245.34	0.156	253.24	0.185	272.93	0.153	292.23	0.129
Diff-Hansen	39.93	0.300	26.46	0.652	23.60	0.790	30.43	0.444
AR(1)	-8.61	0.000	-8.02	0.000	-8.15	0.000	0.444	0.000
AR(2)	1.04	0.296	1.02	0.309	1.05	0.294	0.68	0.499
No. of observations	8,166		6,911		6,911		6,804	
No. of groups	1,563		1,465		1,465		1,449	
No. of instruments	275		286		303		320	
Time and Ind. FE	YES		YES		YES		YES	

Note: This table presents the results from a system GMM estimation with additional board characteristics. Data are filtered to only contain CEOs with at least 3 years of tenure. Dep. Var. (t-1) is the lagged dependent variable of ROA. pc_n $n=1,2,3$) = principal components - expert power, prestige power, and formal power. Robust t-statistics are reported in brackets. *, **, and *** indicates significance at the 10%, 5% and 1% levels respectively.

Appendix A.2 List of variables

Variable	Description
Firm performance	
ROA	Earnings before interest and taxes divided by total assets
ROE	Net income divided by shareholders' equity
ROIC	Net operating profit after tax divided by invested capital
Formal power	
Duality	A dummy variable that is 1 if the CEO also serves as a chair
Tenure	The number of years a CEO has been at the post
Ownership	Percentage of total shares the CEO owned; options excluded
Expert power	
CEO exper.	The number of previous CEO post held
No. firms exper.	Number of firms where a CEO worked
No. Ind. exper.	Number of industries where a CEO worked
Prestige power	
MBA dummy	A dummy variable that is coded as 1 if the CEO has an MBA
Ivy League dummy	A dummy variable that is coded as 1 if the CEO graduated from an Ivy League university
Top Business School	A dummy variable that is coded as 1 if the CEO received his degree from a top business school
Firm and board characteristics	
LCash	The natural logarithm of cash and short-term investments divided by total assets
ROAvol	Standard deviation of ROA over five years
ROEvola	Standard deviation of ROE over five years
ROICvola	Standard deviation of ROIC over five years
SalesGrowth	growth of sales measure as $\log Sales_t - \log Sales_{t-1}$
M-B ratio	The current closing price of the stock divided by the most current quarter's book value per share
CapEx	Capital expenditures divided by total assets
Inv	The ratio of inventory to total assets
BookLev	The sum of long-term debt and debt in current liabilities divided by total assets (book leverage)
Div. payout ratio	The total amount of dividends paid to the shareholders divided by the net income of the company
LCEOage	The nature logarithm of CEOs' age
LAge	The nature logarithm of firms' age
CEO female	A dummy variable that takes the value of one when the CEO is female
No. of Directors	A measure of the size of the board in terms of numbers of directors
Gender ratio	Measures the proportion of female directors at the board
Nationality mix	Measures the nationality diversity of the board
Inst. Ownership	Measures the share of institutional owners of the firm

Appendix A.3 List of Ivy League Universities

Harvard University

Yale University

Princeton University

Columbia University

Brown University

Dartmouth College

University of Pennsylvania

Cornell University

Appendix A.4. List of Top Business Schools – according to FT 2019 MBA Rankings

Harvard University

Stanford University

INSEAD

Columbia University

London Business School

University of Pennsylvania

Yale University

University of California – Berkeley

MIT

Chapter 2

Assessing the CEO - employee satisfaction nexus

2.1 Introduction

“There is three billion working people in the world. And about 40% of them would say they’re happy at work. That means about 1.8 billion, or almost two billion people, are not happy at work.” This is a speech by Michael C. Bush in December 2018, who is the CEO of Great Place to Work for in America, the global research and analytics firm that produces the annual Fortune 100 Best Companies to Work For list.

Employee satisfaction has been a long-term concern in academia and enterprises. Previous related literature mainly revolved around one question: what is the impact of employee satisfaction on firm performance? However, various theories yield conflicting predictions. In traditional manufacturing firms, workers’ output can be measured easily. Satisfaction arises through extrinsic incentives such as piece pay. The traditional theory, represented by Taylor (1911), believes that workers should be regarded as input, and the purpose of management is to minimize input costs while maximizing production. Edmans et al. (2014) support this view and argue that in countries where labor market regulations have already ensured minimum worker welfare level (e.g. Germany), employee satisfaction can be considered a wasteful investment, especially in the short-run.

In contrast, more recent theories argue that typical 20th-century firms emphasize

on quality and innovation (Edmans, 2011). As a result, human capital has become an essential organizational asset, especially in knowledge-based industries such as pharmaceuticals and software. Moreover, the Human Resources Management (HRM) theory believes that employee satisfaction effectively recruits and retains talented employees and improves employee motivation (Edmans, 2012). The Social Exchange theory (Organ, 1977) argues that employees regard a pleasant work environment as a "gift" from the company and respond with increased work effort.

The Great Place to Work for in America survey supports these theories and concludes that organizations with a large number of satisfied employees have revenue growth three times that of other organizations, while the employee turnover rate is only half. In addition, using US data from 1984 to 2009, Edmans (2011) finds a strong, robust, positive correlation between employee satisfaction and shareholder returns.

The significant benefits of employee satisfaction on corporations have drawn a lot of attention. A Glassdoor report by Nunez in 2005 points out that organizational culture has the greatest impact on employee satisfaction. In addition, there is a natural assumption underlying organizational culture that leaders are the primary shaper and builder of organizational culture (Tsui et al., 2006). Leaders influence organizational culture through their distinctive personal traits and a series of distinctive behaviors. Moreover, researchers have shown that CEOs are the primary sources, transmitters, and maintainers of organizational culture, and they are ultimately responsible for defining and maintaining the organization's culture and values (e.g. Davis, 1984; Chamberlain and Huang, 2016). Therefore, CEOs should affect employee satisfaction through shaping company's culture.

In this study, we focus on CEOs rather than other top managers because CEOs are the highest-ranking executive in the company and hold a great deal of decision-making power (Quigley and Hambrick, 2015). Both academic literature and practitioners believe that the CEO is the core organizational member in the modern company (Daily and Johnson, 1997). They are also considered to be the ultimate owner of responsibility for the direction of the company. As a result, in this paper we assess the nexus between CEOs and employee satisfaction.

To the best of our knowledge, this study is the first to examine the effect of

CEO characteristics on employee satisfaction. Previous studies on CEO characteristics mainly assess their impact on corporate outcomes, focusing on CEOs' tenure (see, e.g., Simsek, 2007; Cook and Burrell, 2013), duality (see, e.g., Pathan, 2009; Veprauskaitė and Adams, 2013), ownership (see, e.g., Lilienfeld-Toal and Ruenzi, 2014; Song and Wan, 2019), working experience (see, e.g., Daily and Johnson, 1997; Custódio et al., 2019), and educational background (see, e.g., Bhagat et al., 2010; King et al., 2016).

Following the work of Edmans (2011, 2012), we measure employee satisfaction using the “100 Best Companies to Work For in America” list published by Fortune. This list is a thorough measure of overall employee satisfaction and is arguably the most respected and prominent measure available (Edmans, 2012). Our sample covers 13,469 firm-year observations in the US for the period 1992-2019. We end up with a highly unbalanced panel, in terms of firms that have entered the Top 100 list. To ensure that our results are not biased due to this imbalance, we initially implement a propensity score matching procedure and we end up with a balanced panel between firms that entered and those that never entered the Top 100 list. Then we investigate which type of CEOs are more likely to improve employee satisfaction. The CEO characteristics we examined in this study included CEOs' tenure, ownership of company shares, working experience, and educational background.

Our findings indicate that CEOs with longer tenure are more likely to improve employee satisfaction. The positive correlation could benefit from the company- and job- specific skills accumulated over tenure (Veprauskaitė and Adams, 2013). In addition, CEOs with longer tenure can better handle strategic risks and benefit the company (Simsek, 2007). However, CEOs with large ownership interests have a negative impact on employee satisfaction. CEOs who are the major shareholders of the companies could pursue their own interests and influence the director selection process, which will weaken the effective board control (Veprauskaitė and Adams, 2013). In addition, our results are in favor of having younger CEOs. This could attribute to older CEOs being more inclined to “enjoy the quiet life,” conservative in their work, and less likely to engage in creative innovation (Peni, 2014).

The findings regarding CEOs' educational background on employee satisfaction are novel and worth mentioning. We find that CEOs with a more specialized educa-

tional background such as a master's degree or a doctorate are less likely to improve employee satisfaction. However, CEOs with MBA degrees are more likely to improve employee satisfaction, but the effect is statistically insignificant. The negative effect could result from CEOs' decision-making requiring broad knowledge, whereas masters and doctorates focus on a narrow set of fields.

These results could also be attributed to their educational field of study since the amount and type of education would shape individuals' values and behaviors (Hambrick and Mason; 1984; Frank et al., 1993). For example, MBA programs embrace ethics courses and the propositions of stakeholder theory, which suggest companies consider the broad interest of stakeholders (e.g. employees, customers, suppliers, etc.). Therefore, it is not surprising that CEOs with MBA degrees are positively correlated with employee satisfaction. According to the study in 2015 from Forbes¹, the other Master's degrees of CEOs in our study are primarily in the areas of economics, accounting, and engineering. Since these fields lack ethics courses and economics courses focus exclusively on profits and self-interest ideas (Manner, 2010; Frank et al., 1993), it is not surprising that we find a negative effect of CEOs' Master's degrees on employee satisfaction. In fact, numerous researchers (e.g. Manner, 2010; McPhail, 2001) have uncovered similar results, albeit on a different context, and called for more ethics education to help students cultivate a sense of moral commitment to others.

To assess the validity of our results, we conduct several robustness tests. We first introduce various control variables, including CEO characteristics (CEO gender, founder, and US nationality) and board characteristics (board size, the proportion of female directors, nationality diversity of board). Our key results remain robust to the inclusion of these additional control variables. In addition, our results uncover a negative effect of female CEOs on employee satisfaction. The negative correlation could result from the consensus that women are more risk-averse than men (Schubert et al., 2000; Khan and Vieito, 2013), which may cause the company with female CEOs to miss the benefits of risky investment and further hurt employee satisfaction.

However, our findings suggest that a higher proportion of female directors on the board would improve employee satisfaction. The positive correlation could be a result

¹ Christian Stadler; Mar 12, 2015; Forbes
<https://www.forbes.com/sites/christianstadler/2015/03/12/how-to-become-a-ceo-these-are-the-steps-you-should-take/?sh=341bb3021217>

of women's inherent value towards benevolence and universalism (Adams and Funk, 2012). As a result, women tend to protect and strengthen the well-being of others. In addition, gender socialization theory shows that women have better performance on moral and ethical behavior than men (Mason and Mudrack, 1996). Thus, they care more about others' benefits in the workplace (Ford and Richardson, 1994). In fact, the issue of governance diversity is a relatively new area of inquiry and has attracted great interest in corporate governance. Our results contribute to this literature on top management team diversity.

We believe that the conflicting results of female CEOs and the share of female directors at the board on employee satisfaction could be caused by female CEOs not having enough internal support and facing resistance to authority (Glass and Cook, 2016). Therefore, it is challenging for female CEOs to implement strategies that improve employee satisfaction when they do not have the support of their peers at the board level.

We also examined how the previous year's employee satisfaction affected our key results. However, we found no significant correlation between the previous year's satisfaction performance and the company's current employee satisfaction. In our empirical analysis we followed Edmans et al. (2014) and Custódio et al. (2019), and we only considered CEOs with at least three years of tenure in our benchmark estimates. However, we found that the key results remain consistent even if we relax this assumption and we included all CEOs irrespective of tenure.

We also examine the effect of CEO characteristics on employee satisfaction without applying the matching procedure, using the entire unbalanced panel, and the key results remain consistent. Moreover, we show that firms under high financial pressure benefit the most, in terms of higher employee satisfaction, from having a CEO with the specific profile. Finally, we show that the firms that entered the Top 100 list in our sample experience abnormal returns, similar to Edmans (2012).

This paper contributes to the literature in several ways. First, our study contributes to the literature in management and corporate governance. To the best of our knowledge, this study is the first to examine the effect of CEO characteristics on employee satisfaction. Previous related studies on employee satisfaction typically focus on a specific narrow field, such as the service industry (i.e. Ding et al., 2012;

and McCann et al., 2014).

Second, our findings highlight the negative effect of CEOs' ownership of company shares on employee satisfaction. This finding is instrumental in CEOs' compensation plans. According to Kim and Lu (2011), stock ownership hurts firm performance and shareholders only when it exceeds a certain threshold. The harmful effect comes from excessive private benefits and entrenching effects. However, the equity-based compensation is beneficial to the company when the ownership level is low because the "convergence of interest" hypothesis predicts that equity ties the economic interests of the CEO with those of the shareholders. We suggest that the company should adjust the CEO's compensation plan structure.

Third, this study also contributes to CEOs' succession plans. Our findings indicate the negative effect of CEOs' Master's (and doctorate) degrees on employee satisfaction. However, CEOs with MBA degrees are more likely to improve employee satisfaction. This is possibly driven by the fact that MBA programs embrace ethics courses and the propositions of stakeholder theory. Therefore, CEOs with such a degree will be less inclined to focus exclusively on profit and self-interest (Manner, 2010).

Finally, our research is also beneficial to investors and policy-makers in evaluating CEOs. We suggest a certain CEO profile with longer tenure, broader educational knowledge, and lower ownership of company shares. CEOs with these characteristics are more likely to improve employee satisfaction and further financial performance given other firm-specific characteristics.

2.2 Literature review

2.2.1 The impact of employee satisfaction on firm outcomes

Employee satisfaction measures how happy workers are with their job and working environment (Sageer et al., 2012). It is a core indicator to identify specific needs for business improvement and a predictor for employee performance (McCann et al., 2014).

Previous studies on this topic primarily revolve around one question: What is the impact of employee satisfaction on firm performance? Theories provide contradictory

predictions. According to Taylor (1911), workers should be regarded as input, and the purpose of management is to minimize input costs while maximizing production. Edmans et al. (2014) support this point of view and argue that in countries where labor market regulations have already ensured minimum worker welfare level (e.g. Germany), employee satisfaction can be considered a wasteful investment, especially in the short-run.

However, the benefits of employee satisfaction on firm performance are also noticeable. Human resources management (HRM) theory puts forward several channels through which employee satisfaction improves firm performance. The first is to recruit and retain key employees. HRM theory believes that employees are valuable, and they are the main source of value creation in modern enterprises, especially in knowledge-based industries such as pharmaceuticals and software (Edmans, 2011, 2012). Employee satisfaction is an effective tool to prevent talented employees from being easily hunted away or leave the company.

Motivation is another channel from which employee satisfaction improves firm performance. Under Taylor's "piece rates" theory (1911), motivation can be achieved through extrinsic incentives such as piece pay or the threat of dismissal. This method worked in traditional manufacturing firms since workers' output can be measured easily. However, in typical 20th-century firms, employees' tasks, such as establishing customer relationships, are not easy to quantify. As a result, measuring the output of workers has become increasingly difficult. Therefore, the effectiveness of external incentives is reduced, and the role of internal incentives, such as satisfaction, is enhanced (Edmans, 2012). Moreover, according to Organ's (1977) social exchange theory, employees regard a pleasant work environment as a "gift" from the company and respond with increased work effort. Satisfied employees will assume the company's objectives as their own, which will trigger higher efforts, improving firm performance.

In addition to the theoretical research on the impact of employee satisfaction on firm performance, researchers have also conducted a number of empirical studies on it. For example, Schneider et al. (2003) examine the relationship between employee satisfaction and firm performance in the US from 1987 to 1995 and find a positive connection between the two. Edmans (2011) analyzes this relationship using "100

Best Companies to Work For in America” and finds a positive correlation amongst them. In addition, Edmans et al. (2014) conduct a cross-country study and conclude that the relative importance of employee satisfaction depends on the institutions of each labor market. Specifically, in countries with highly flexible labor markets, such as the US and the UK, employee satisfaction positively impacts firm performance. Given that hiring and firing are easier in a highly flexible labor market, employee satisfaction is an effective tool for recruiting and retaining talented employees. However, in a less flexible labor market, such as Germany, where labor market regulations have already ensured minimum worker welfare levels, the marginal benefit of increasing employee satisfaction may not justify its cost. In this situation, employee satisfaction can even be thought of as wasteful (Edmans et al., 2014).

2.2.2 The factors drive employee satisfaction

According to the work of Nunez (2015), organizational culture is the factor that has the most significant impact on employee satisfaction. Following O’Reilly et al. (1991), organizational culture is regarded as a set of core values consensually shared by organizational members. The literature on this topic can be broadly divided into two schools (Tsui et al., 2006). One school takes a phenomenological approach, focusing on understanding the concept and meaning of culture. The other school takes a functionalist approach and focuses on the consequences of organizational culture. This view is a dominant perspective in organizational culture, and empirical research has largely involved it, providing impressive evidence on the role of organizational culture in improving firm outcomes (Tsui et al., 2006; Tsai, 2011).

There is a natural assumption underlying the functionalist perspective that leaders are the main shaper and builder of organizational culture (Tsui et al., 2006). Leaders influence organizational culture through their distinctive personal traits and a series of distinctive behaviors. In addition, as the primary source, transmitter, and maintainer of organizational culture (Davis, 1984), CEOs are often described as charismatic, dynamic, and visionary (Trice and Beyer, 1993; Tsui et al., 2006). Similarly, Chamberlain and Huang (2016) highlight that CEOs are ultimately responsible for defining and maintaining the organization’s culture and values. Moreover, Tsui et al. (2006) indicate that the ultimate success of a CEO depends mainly on an

accurate reading of the organizational culture and on the ability to shape it to meet the shifting needs of the market. In summary, organizational culture is a consequence of a visionary and charismatic CEO.

The universality and importance of organizational culture requires management to recognize its impact on employee-related variables, such as employee satisfaction and job performance. However, Tsai (2011) represents that only a few studies were done on the relationship between organizational culture and employee satisfaction. Although the research on this aspect is limited, the influence of organizational culture on employee satisfaction cannot be ignored. Nunez (2015) reports that organizational culture has the most significant impact on employee satisfaction. Chamberlain and Huang (2016) examine what factors predict high CEO approval and find that company culture is a clear driver of CEO approval ratings. They explained that CEOs define and foster the overall workplace satisfaction ecosystem in the organization by setting company policies and through their behavior in the workplace.

2.2.3 Do CEOs matter to corporate outcomes?

In the 1980s, after examining why the most relevant business journals in the world focused on the socio-demographic characteristics of executives, Hambrick and Mason (1984) published a conceptual framework of Upper Echelons Theory (UET). The UET theory has been established as one of the most influential perspectives in strategic management literature. It emphasizes that the organization is a reflection of its top managers.

Moreover, since the 20th century, CEOs have been increasingly crucial to companies. They featured in conspicuous positions in the press, and more than a few of them even achieved celebrity status (Quigley and Hambrick, 2015). As a result, the influence of executives, particularly CEOs, on corporate outcomes is one of the central debates among organizational scholars. In addition, a growing literature has evidenced that CEOs are the pivotal drivers of corporate strategies and are responsible for corporate outcomes. For example, according to Abatecola and Cristofaro (2018), from 1950 to 2009, the percentage of performance differences attributed to the CEOs of US-listed companies increased significantly.

Besides, it has been suggested that the CEO is the corporate leader, and they

set the tone for the company (Daily and Johnson, 1997). Scholars and practitioners share the belief that the CEO is the core organizational member in the modern company. Therefore, in this study, we evaluate CEOs' profiles and their likelihood of affecting employee satisfaction.

2.2.4 How CEO characteristics affect corporate outcomes?

There is a growing literature assessing the effect of CEO characteristics on corporate outcomes. CEO characteristics mainly focused in these studies include CEOs' tenure, duality, ownership, working experience, and educational background.

CEO tenure

A number of studies have demonstrated the positive effect of long-tenured CEOs on corporate outcomes. For example, Veprauskaitė and Adams (2013) find a positive correlation between CEO tenure and firms' financial performance. This could result from long-tenured CEOs who have accumulated a good track record, have a deeper understanding of the company environment, and acquired company- and job- specific skills (Simsek, 2007; Veprauskaitė and Adams, 2013). In addition, according to the notions of 'reasoned risk-taking' and 'problem domain familiarity,' the more experienced a person has in dealing with strategic risks in the past, the less uncertainty he has about the possible outcomes of taking these risks, and the more reasonable these risks seem. Therefore, CEOs with longer tenure can be expected to better manipulate strategic risks and thus benefit the companies.

However, growing literature states an opposite point of view, emphasizing agent dominance occurs over CEO tenure (e.g. Cook and Burrell, 2013; Song and Wan, 2019). In corporate governance literature, the board of directors play an important role in monitoring agents such as the CEO. Long-tenured CEOs are successful in negotiating less monitoring from the board of directors (Cook and Burrell, 2013). In addition, Song and Wan (2019) indicate that CEOs play a role in selecting new directors responsible for overseeing them. Thus, long-tenured CEOs are more capable of seizing control of the board, resulting in CEOs pursuing their own interests first, to the detriment of shareholders in the process.

CEO duality

The impact of CEO duality on corporate performance is a key controversy in the corporate governance literature. CEO duality refers to the position where the executive manager also serves as the chairman of the board of directors.

Separation of ownership and management is one of the main aspects of modern corporate characteristics. This way, the agency problem arises because the manager is usually not the owner of the company they manage. According to the seminal work of Berle and Means (1932), the interests of managers are not well aligned with those of shareholders of listed companies. Executive managers will always seek to maximize their wealth and minimize their risk at the expense of the shareholders' value. Therefore, the principal needs to monitor the agent's decisions to ensure the conflict of interest between both sides is minimized.

However, the dual structure would diminish the effective monitor of the board of directors (Elsayed, 2007). When a CEO is also the chairman of the board, he/she could determine what information the board receives prior to the meeting, restricts the information flowing to the board of directors, and lead board discussions (Veprauskaitė and Adams, 2013). Thus, effective board control over management would be less likely when a CEO officially controls the board as chairman. Considerable empirical studies have also demonstrated the negative effect of CEO duality (see, for example, Daily and Johnson, 1997; Pathan, 2009; Veprauskaitė and Adams, 2013; Song and Wan, 2019).

In contrast, according to the stewardship theory (Donaldson and Davis, 1991), executive managers essentially want to be good stewards of the company rather than opportunistic. Under this assumption, CEO duality could mitigate selection conflict among board members and improve decision-making efficiency, thus increasing a company's financial performance (e.g. Davis et al., 1997).

CEO ownership

CEOs may invest heavily in their companies, leading to stock holdings constituting a dominant fraction of their personal wealth. For example, in 2010, nearly 10% of CEOs of S&P 1500 companies voluntarily held 5% or more of their company's stock (Lilienfeld-Toal and Ruenzi, 2014). The "convergence of interest" hypothesis predicts

that equity ties the economic interests of the CEO with those of the shareholders, thus providing the CEO with incentives to maximize the performance of the company (Veprauskaitė and Adams, 2013; Lilienfeld-Toal and Ruenzi, 2014).

However, stock ownership benefits firm performance only at low ownership levels (Kim and Lu, 2011). It can be harmful to shareholder value when it is beyond a certain threshold. The harmful effects may come from excessive private benefits, expropriation of minority shareholder wealth, and entrenching effects (Kim and Lu, 2011). Specifically, CEOs who are the major shareholders of the companies could pursue their interests for self-seeking reasons, ignoring the interests of shareholders (Veprauskaitė and Adams, 2013). In addition, according to Daily and Johnson (1997), CEOs with considerable stock ownership could protect themselves from involuntary dismissal. They tend to appoint new directors loyal to them, which would weaken the effective board oversight of the CEO (Song and Wan, 2019).

CEO working experience

CEOs' working experience also affects firm outcomes. Daily and Johnson (1997) state that compared with CEOs with limited functional exposure, CEOs with exposure to various functional areas have the opportunity to develop internal and external connections in a broader range of areas. These contacts enable the CEO to better manage the environmental uncertainties faced by the company, which increases firm performance. In addition, Custódio et al. (2019) indicate that CEOs gain general managerial skills² over their lifetime work experience and produce more patents. Furthermore, because the CEO gains knowledge beyond the firm's current domain, their skills can also be applied elsewhere when innovation projects fail.

CEO educational background

A considerable study has examined the impact of CEOs' educational background on firm performance (see, for example, Daily and Johnson, 1997; Bhagat et al., 2010;

²Custódio et al. (2019) capture the generality of a CEO's human capital based on lifetime work experience in publicly traded firms prior to the current CEO position. The General Ability Index consists of a CEO's past number of (1) positions, (2) firms, and (3) industries in which a CEO worked; (4) whether the CEO held a CEO position at a different company; and (5) whether the CEO worked for a multi-divisional firm (i.e., a company that reports more than one business segment).

King et al., 2016). King et al. (2016) indicate that CEOs' education positively affects the firms' performance. Especially, CEOs with management education (e.g. an MBA degree) exhibit better performance. In addition, CEOs' educational backgrounds could also be a source of prestige. Daily and Johnson (1997) state that CEOs attending elite educational institutions would benefit firm performance. Attending an elite school provides the CEO with access to other prestigious individuals who may become managers and board members, increasing the sharing effect.

Hambrick and Mason (1984) and Frank et al. (1993) suggest that the amount and type of education should contain "rich and complex information" that will shape an individual's values and behavioral beliefs. As a result, more recent studies on CEOs' educational backgrounds emphasize the educational field. For example, using a sample of 650 public US firms, Manner (2010) indicates that CEOs having a bachelor's degree in economics are negatively related to corporate social performance. In contrast, numerous studies support that CEOs with bachelor's degrees in humanities or "other" social sciences are positively correlated with corporate social performance (e.g. Rivera and De Leon, 2005; Manner, 2010). The opposite result could arise from individuals with economics backgrounds being less likely to cooperate than individuals in other fields of study, since they tend to focus exclusively on profits and self-interest.³

In addition, another strand of studies examine the influence of CEOs with MBA degrees on firm outcomes. For example, Huang (2013) and Manner (2010) conclude that CEOs with MBA degrees are positively associated with corporate social performance. The positive correlation could result from MBA programs embracing ethics courses and stakeholder theory propositions, which suggest companies consider the broad interest of its stakeholders.

³Frank et al.'s (1993) study find that after only studying microeconomics for one semester, students are less honest in answering ethical dilemmas and are less likely to cooperate or expect others to cooperate in the prisoner's dilemma experiment than before the class. Moreover, this effect is more pronounced in classes where economics professors emphasize self-interest models.

2.3 Research design

2.3.1 Data

We construct our dataset using several sources. Our full sample covers firms based in the U.S. for the period 1992-2019. We collect CEO data using BoardEx and ExecuComp databases. The firm specific financial data are collected from Compustat. We also collected data regarding employee satisfaction from the “100 Best Companies to Work For in America” list published by Fortune magazine.

The list was first published in a book in 1984 and published in the Fortune magazine each year since 1998. A firm’s ranking in the Best Companies list comes from two sources. Two-thirds of the score comes from employee responses to the Trust Index Survey created by the Great Place to Work for in America. This survey covers topics including credibility, respect, fairness, pride, and camaraderie. The remaining one-third comes from the Institute’s evaluation of factors such as a company’s demographic make-up, pay and benefits programs, and culture. The Best Companies list is a thorough measure of overall employee satisfaction and is arguably the most respected and prominent measure available (Edmans, 2012). Our final merged dataset includes 13,469 firm-year observations for the period 1992-2019.

2.3.2 Definition of variables

2.3.2.1 Employee satisfaction measure

We measure a firm’s employee satisfaction performance using the “100 best companies to work for in America” list. Therefore, we introduce the *TOP100 dummy* variable that takes the value of one if a company enters the TOP100 list at a certain year, and zero otherwise.

2.3.2.2 Independent variables

This study examines the effect of CEOs’ tenure, ownership, working experience, and educational background on employee satisfaction.

Tenure: This variable indicates the number of years a CEO has been in this po-

sition.

The noticeable novel empirical findings (e.g. Edmans et al., 2014; and Custódio et al., 2019) suggest that the influence of CEOs on firm performance is not immediate, they contribute to firm value over time. Therefore, in this study, we only considered CEOs with at least three years tenure. However, we also perform a robustness check including all CEOs, even with less than three years of tenure, and we find that our key results remain valid.

Duality dummy: This is a dummy variable equal to 1 if the CEO is also the chairman of the board, and 0 otherwise.

Ownership: It is the extent of a CEO's shareholdings. We define ownership as the percentage of total shares owned by the CEO, excluding options.

Prev. CEO exper.: Defines the number of years that a CEO has served as CEO prior to joining the company.

Prev. CFO exper.: Captures the number of years that a CEO has served as CFO prior to joining the company.

MBA dummy: This dummy variable measures whether a CEO has an MBA degree. It is equal to 1 if the CEO has an MBA, and 0 otherwise.

TOPMBA dummy: This dummy variable measures whether a CEO holds a degree from a top business school (see Appendix for the list of Top Business Schools). This dummy is equal to 1 if the CEO received a degree from a top business school, and 0 otherwise.⁴

Ivy League dummy: This dummy variable measures whether a CEO graduated from an Ivy League university, no matter if it was undergraduate or postgraduate degree. This dummy is equal to 1 if the CEO graduated from an Ivy League university, and 0 otherwise.

Master dummy: This dummy variable measures whether a CEO has a masters degree. It takes the value of 1 if the CEO has a masters degree, and zero otherwise.

PhD dummy: This dummy variable measures whether a CEO has a PhD. This dummy is equal to 1 if the CEO has a PhD, and zero otherwise.

⁴We have also experimented with the addition of more top business schools and the results remain valid.

2.3.2.3 Control variables

Throughout our analysis, we include many financial variables to control for various firm characteristics, similar to the related literature, see i.e., Custódio et al. (2013) and Veprauskaitė and Adams (2013).

In particular we use: i) the natural logarithm of cash and short-term investments divided by total assets; ii) capital expenditures divided by total assets; iii) book leverage defined as the sum of long-term and short-term debt in current liabilities divided by total assets; iv) the natural logarithm of CEOs' age; v) the nature logarithm of firms' age; vi) the nature logarithm of total asset; vii) the total net property, plant and equipment divided by total assets; and viii) the ratio of market value of assets to book value of assets.⁵

2.3.3 Descriptive statistics

Table 2.1 provides the summary statistics of firms that entered TOP100 and firms that have never entered TOP100. In our collected dataset we have 402 firm-year observations that have entered the TOP100 list, while 13,067 firm-year observations have never entered the TOP100 list. In addition, in companies that have entered the TOP100 list, CEOs have less ownership, are more likely to also serve as chairman, and have around one year longer tenure than CEOs of companies that have not entered the TOP100 list. Moreover, CEO tenure and ownership exhibits high volatility, especially in companies that have not entered the TOP100 list.

Table 2.1 further shows that CEOs in our study, on average, have no significant experience of being CEO and/or CFO before. In addition, CEOs of firms that have entered the TOP100 list are more likely to hold MBAs and less likely to hold a masters or a PhD. Finally, a higher proportion of top female managers appears in companies that have not entered the TOP100 list.

[Insert Table 2.1 here]

⁵In the appendix we provide a summary of all the variables we use in our study.

2.4 Model

2.4.1 Matching sample of firms entered and never entered the TOP100

To address the large imbalance in terms of firm-year observations that have entered the TOP100 list compared to those that have never entered the TOP100 list and to ensure the sample between the two groups of firms is more comparable, we implement a marginal propensity score matching approach.

This approach helps us isolate the impact of CEOs on employee satisfaction since we are going to use a subset of firms without ever being at the TOP100 list that are similar to firms that have entered the TOP100 list, in terms of certain firm characteristics. Specifically, we follow a one-to-one caliper matching procedure and we classify firms according to whether they have featured at the TOP100 list at any period in our sample (Group A) and to firms that have never entered that list in our sample (Group B). Each firm-year observation from group A will be matched with the closest observation in group B according to two control variables, total assets and book leverage.⁶

For our empirical analysis we are going to use the matched sample to avoid reaching conclusions based on the heavily unbalanced full sample between firms that have entered the TOP100 list and those that have never entered that list. However, we do perform a robustness check with the full sample and our key findings remain valid.

2.4.2 Logit and probit model

Logit and probit models are appropriate methods when the dependent variable y_i in the regression model is binary (0 or 1). In both models, 0 and 1 are asymptotic lines of the relevant function, and thus the probabilities may be infinitely close but never drop to 0 or rise to 1 (Brooks, 2014).

For the majority of the applications, since the densities are very similar, the

⁶In untabulated results we find that our results remain consistent even we choose additional control variables for the matching procedure.

logit and probit models will give very similar characterisations of the data (Brooks, 2014). However, when the distribution of y_i between 0 and 1 is very unbalanced, for example, when $y_i = 1$ occurs only 10% of the time, the model may give non-negligible different results. Stock and Watson (2006) suggest that in this case the logistic method is traditionally preferred. As a result, in this study, we use the logit model to investigate what CEO characteristics could provide a higher likelihood of increasing employee satisfaction.

2.5 Empirical analysis and results

2.5.1 Benchmark estimates

The benchmark regression of this study is as follow:

$$TOP100_{it} = CEO_Controls_{it} + Firm_Controls_{it} + \eta_t + \zeta_i + \varepsilon_{it} \quad (2.1)$$

where $TOP100_{it}$ is a dummy variable indicating if a firm is at the TOP100 list at a given year, as defined above. $CEO_Controls_{it}$ is a set of CEO characteristics, including tenure, duality, ownership, previous working experience, and educational background. The definition of these variables is presented in section 3.2.2. The $Firm_Controls_{it}$ vector incorporates all the financial control variables presented in section 3.2.3. Finally, η_t and ζ_i denote the year and industry fixed-effects respectively, whereas ε_{it} is the error term which is uncorrelated with the independent variables.

2.5.2 Benchmark results

Table 2.2 presents the benchmark results of our study. Apart from the logit model coefficients, which are estimated using the likelihood method, we also report the marginal effects of each variable in a separate column. The marginal effects reflect the marginal change in the probability of the dependent variable for a given marginal change in an independent variable.

As reported in Table 2.2, CEOs with longer tenure are more likely to improve employee satisfaction, thus enabling their companies to enter the TOP100. For each additional year of the CEO's tenure, firms are 0.5% more likely to enter the TOP100.

This positive correlation may be attributed to the fact that as tenure grows, CEOs accumulate a good track record, have a deeper understanding of the company environment, and acquire company- and job- specific skills (Simsek, 2007; Veprauskaitė and Adams, 2013).

Moreover, our results indicate that CEOs with a large ownership interest have a negative impact on employee satisfaction. Specifically, a 1% increase of CEOs ownership leads to 0.7% reduction in the likelihood of that firm entering the TOP100 list. Although the “convergence of interest“ hypothesis predicts that equity ties the economic interests of the CEO with those of the shareholders (Veprauskaitė and Adams, 2013), stock ownership benefits firm performance only at low ownership levels (Kim and Lu, 2011). It can be harmful to shareholder value when beyond a certain threshold. The harmful effects may come from excessive private benefits, expropriation of minority shareholder wealth, and entrenching effects (Kim and Lu, 2011; Veprauskaitė and Adams, 2013; and Song and Wan, 2019).

Furthermore, our results are in favor of having younger CEOs, where a 1% decrease in CEOs age lead to an increase of about 18.3% in the likelihood of the firm entering the TOP100 list. The possible impact of CEO age on firms’ success has attracted a lot of attention in the literature. Many studies have indicated that older executives have a competitive advantage over younger executives. However, in a recent study, Peni (2014) suggests that older CEOs are more conservative in their work and less likely to engage in creative innovation. Older CEOs are more prone to choosing projects that pay off before their retirement. In addition, they are also more inclined to advance their own goals and “enjoy the quiet life,” which may hurt the company.

Finally, our findings suggest that CEOs with a more specialized educational background, such as a masters degree or a doctorate, are less likely to improve employee satisfaction. In particular, CEOs with a masters degree are 13% less likely to enable their companies to enter the TOP100 list. In contrast, CEOs with MBA degrees would improve employee satisfaction, but the effect is not statistically significant at our benchmark estimation. The negative effect may be because CEOs’ decision-making requires broad knowledge, but a masters or a PhD degree focus on a specific narrow area. In addition, Hambrick and Mason (1984) and Frank et al. (1993) sug-

gest that the amount and type of education contain “rich and complex information” that will shape an individual’s values and behavioral beliefs. Therefore, the role of CEOs’ educational background depends on their field of study.

In addition, Forbes⁷ published an article in 2015 regarding CEOs’ educational background and concluded that over half of Fortune 100 CEOs have a degree in business, economics, or accounting, while 27% studied engineering or science, and 14% law. Therefore, although we did not provide a specific breakdown of the CEO’s field of study, in this study only 25.9% of CEOs have MBA degrees, while the others have masters degrees primarily in the field of economics, accounting, or engineering. Since these fields lack ethics courses or focus more on profits generation, it is not surprising that we find a significantly negative effect of CEOs’ with masters degrees on employee satisfaction.

The remaining financial variables are all in line with the related literature, i.e., Custódio et al. (2013) and Veprauskaitė and Adams (2013). In particular, we find that cash holdings, size of the firm (in terms of total assets), and capital expenditure have a positive effect on employee satisfaction.

[Insert Table 2.2 here]

2.6 Robustness checks

2.6.1 Introducing additional CEO characteristics

We first carry out our robustness checks with additional CEO characteristics. In more detail, equation (2.1) presented in section 2.5.1 becomes:

$$TOP100_{it} = CEO_Controls_{it} + Extended_CEO_Controls_{it} + Firm_Controls_{it} + \eta_t + \zeta_i + \varepsilon_{it} \quad (2.2)$$

where $Extended_CEO_Controls_{it}$ is an extended set of CEO characteristics that includes: $CEO_female_dummy_{it}$, a dummy variable that takes the value of one when the CEO is female; $Founder_dummy_{it}$, a dummy variable that takes the value of 1 if the CEO is the founder of the company; and $USnationality_{it}$, a dummy variable to

⁷Christian Stadler; Mar 12, 2015; Forbes <https://www.forbes.com/sites/christianstadler/2015/03/12/how-to-become-a-ceo-these-are-the-steps-you-should-take/?sh=341bb3021217>

control if the CEO has US nationality.

The results are reported in Table 2.3 (first two columns). Our results suggest that a female CEO has a significant negative effect on employee satisfaction. The negative correlation could result from the fact that women are more risk-averse than men. Numerous studies have supported this view. For example, Schubert et al. (2000) indicate that in terms of investment, women are generally more risk-averse than men, and this difference becomes more obvious as the ambiguity and uncertainty of investment increase. In addition, using US data from 1992 to 2004, Khan and Vieito (2013) conclude that when the CEO is a female the firm risk level is smaller than when the CEO is a male. We show that the risk-averse attitude of a female CEO may cause the company to miss the benefits of risk investment and further hurt employee satisfaction.

The remaining additional CEO characteristics are not statistically significant. Moreover, our key results, as presented in the previous section, remain consistent with the addition of these CEO characteristics.

2.6.2 Introducing additional board variables

The board of directors is an important internal device for the company. It aims to control and monitor management in order to prevent the management from opportunistic behavior. The composition of the board of directors has always been an important issue in corporate governance, where the purpose is to determine a structure that aligns the interests of management and stakeholders (Rose, 2007). In recent years, the issue of governance diversity has attracted a great deal of interest in corporate governance literature. A number of board characteristics (e.g. board size, the portion of female directors, nationality diversity of board) have been assessed in previous studies.

Following the previous literature, we examine whether key board of directors characteristics affect our benchmark results by extending our control variables of the benchmark estimation to include a set of board characteristics. In more detail,

equation (2.1) presented in section 2.5.1 becomes:

$$TOP100_{it} = CEO_Controls_{it} + Board_Controls_{it} + Firm_Controls_{it} + \eta_t + \zeta_i + \varepsilon_{it} \quad (2.3)$$

where $Board_Controls_{it}$ is a set of variables that includes: $Male_ratio_{it}$, measuring the share of male directors at the board; $Nationality_mix_{it}$, measuring the nationality diversity of the board; and $No.of_directors_{it}$ which measures the size of the board in terms of numbers of directors.

Table 2.3 (columns 3 and 4) shows that a higher share of females at the board of directors improves employee satisfaction. The positive correlation is attributed to the difference in cognitive traits of genders. Resulting from women's inherent value, they are more disposed to think of others than men (Lim and Chung, 2021). Especially, women generally value more on benevolence and universalism (Adams and Funk, 2012). As a result, they tend to protect and strengthen the well-being of others. Therefore, due to the personal values of women, which reflect the tendency to protect and strengthen their welfare, companies with a higher portion of the female board of directors are more likely to have better employee satisfaction (Lim and Chung, 2021). Moreover, gender socialization theory shows that women have better performance on moral and ethical behavior (Mason and Mudrack, 1996). Ford and Richardson (1994) support this theory and state that women are more concerned with ethical behavior than men in the workplace.

In addition, we find that positive (but statistically insignificant) effects of nationality diversity and the number of directors on employee satisfaction. Finally, our key results remain valid under the addition of these board of directors controls.

2.6.3 Combine the additional CEO and board of directors controls

Here we combine the additional set of CEO characteristics and board of directors variables that we added separately in the previous subsections.

The results are reported in the last two columns of Table 2.3. The findings regarding additional CEO and board of directors characteristics are consistent with the findings in the above subsections. In addition, we find that our benchmark results

remain valid.

[Insert Table 2.3 here]

2.6.4 The impact of previous employee satisfaction performance

The positive correlation between CEO characteristics and employee satisfaction could also result from the superior previous year's employee satisfaction. In fact, recent studies (e.g. Edmans, 2012; Schneider et al., 2003) have concluded that strong performance allows managers to increase the benefits of the employee, which will, in turn, improve employee satisfaction. To address this problem, we introduce the lagged employee satisfaction measure as a control variable to our benchmark estimation.

Table 2.4 shows that the satisfaction performance of the previous year has a positive impact on the company's employee satisfaction, as expected, but the result is statistically insignificant. Moreover, the key results of the CEO characteristics obtained at our benchmark estimation are still consistent.

[Insert Table 2.4 here]

2.6.5 Include all CEOs irrespective of tenure

So far we only considered CEOs with at least three years of tenure. This subsection estimates the effect of CEOs' characteristics on employee satisfaction including CEOs with tenure less than three years. Table 2.5 presents the results. We show that our key benchmark recommendations remain consistent. Moreover, the results in Table 5 emphasize the fact that CEOs with more specialised (narrow) educational background are less likely to increase employee satisfaction.

[Insert Table 2.5 here]

2.6.5.1 The role of financial pressure

In this subsection we further extend our analysis with the assessment of the role of CEOs' impact on employee satisfaction under high financial pressure. We follow Acharya et al. (2012) and we define financial pressure as the ratio of cash flow to interest payments. Many empirical studies have shown the importance and role of

firms' management when they operate under high financial pressure (see, for example, Asimakopoulos et al. 2019, 2021).

Our results show that firms under high financial pressure (Table 2.6 last two columns) benefit the most from having a CEO with higher tenure, less ownership, and less specialised educational background, compared to a low financial pressure situation (Table 6 first two columns). In other words, when the firm is experiencing higher level of uncertainty or is operating under an economic turmoil, the employees will have higher likelihood of being satisfied when the CEO is featuring the aforementioned characteristics that are also supported from our benchmark estimations.

[Insert Table 2.6 here]

2.6.6 Results without matching procedure (full sample)

In this subsection we take into consideration the full data sample by dropping the matching sample procedure we implemented at the benchmark estimation. As shown in Table 2.7, the key results remain valid. For example, a marginal increase in CEOs' tenure will increase firms' likelihood of entering the TOP100 list by 0.1%. In addition, CEOs with a masters degree are 3.8% less likely to enable their companies to enter the TOP100. Finally, marginal decrease in the CEO age will increase the likelihood of the firm entering the TOP100 list by 5.5%. Overall, the results under this robustness check are consistent with our benchmark estimation, but the magnitude of the effects is smaller due to the heavily unbalanced full sample.

[Insert Table 2.7 here]

2.6.7 Portfolio analysis

As a final robustness check we follow Edmans (2012) and we assess if our sample of firms that enters the TOP100 list experiences significant excess returns. Similar to the observation of Edmans (2012), we find that employee satisfaction among the companies in our sample is a persistent, yet not a permanent characteristic. About 20-30% of the companies leave the list every year (23% on average across all years in the sample).

We consider both equal-weighted and value-weighted portfolio returns. Table 2.8 shows the results of these regressions. Panel A shows the results for the equal-

weighted portfolio and Panel B for the value-weighted portfolio. The results in the first column of each panel indicate that the portfolio generates a significant (unadjusted) excess return. Controlling for the exposure to risk factors (second and third columns of each panel), we see that the value-weighted portfolio generates significant abnormal returns (alphas). Both portfolios load heavily on the market factor. This is to be expected given that most firms are large and therefore co-move more strongly with the market.⁸ Therefore, our sample of firms that have entered the TOP100 list exhibits similar results, in terms of excess returns, to that of the related literature (i.e. Edmans, 2012).

[Insert Table 2.8 here]

2.7 Conclusions

Employee satisfaction has been the focal point of academics, practitioners and corporations for a long time. However, previous studies on employee satisfaction typically focus on assessing its drivers on a specific narrow field or on the impact of certain leadership styles (see, e.g., Ding et al., 2012; McCann et al., 2014).

Our study aimed at contributing to this literature by examining the impact of various CEO characteristics on the likelihood of improving employee satisfaction. Specifically, we utilised a large dataset of US listed firms and we defined firms that entered the “Best Companies to Work For” in America (Top100 list) at a given year as having high employee satisfaction.

The results of our study reveal that CEOs with more specialized educational background, such as masters and doctoral degrees, are less likely to improve employee satisfaction. However, CEOs with MBA degrees are more likely to improve employee satisfaction. These adverse results could be attributed to CEOs’ decision-making requiring broad knowledge, whereas masters and doctorates focus on a narrow field without ethics courses and with larger focus on profits and self-interest (Manner, 2010; Frank et al., 1993). MBA degrees appear to have a positive effect on employee satisfaction due to the fact that they embrace ethics courses and the propositions of

⁸We further assess if the small sample of TOP100 - CEO matched sample of firms drives the results by winsorizing the stock returns at the 5% and 10% highest and lowest percentiles. The results remain consistent and are presented in Appendix B.5.

stakeholder theory. Therefore, consistent with Manner (2010) and McPhail (2001), our results call for more ethics education for students to help cultivate a sense of moral commitment to others.

Our findings also highlighted the negative effect of CEO ownership of company shares on employee satisfaction. This finding is instrumental in CEOs' compensation plans, and our results suggest that the company should adjust the CEO's compensation plan structure or strengthen the effective board oversight to the CEO. In addition, our study found that CEOs require some stability in terms of tenure in order to be able to implement their policies and affect employee satisfaction positively. CEO age also appeared to be an important factor in our analysis. In particular, we found that younger CEOs are more likely to improve employee satisfaction.

Moreover, our results revealed a negative effect of female CEOs on employee satisfaction. However, the findings suggested a higher representation of women on boards. Women tend to protect and strengthen the well-being of others, and have better performance on moral and ethical behavior (Mason and Mudrack, 1996; and Adams and Funk, 2012). The conflicting results of female CEOs and female board of directors on employee satisfaction could be caused by female CEOs not having enough internal support and facing resistance to authority (Glass and Cook, 2016). Thus, it is a challenge for female CEOs to implement strategies that improve employee satisfaction in this situation. In fact, the issue of governance diversity is a relatively new area of inquiry and has attracted great interest in the area of corporate governance.

The CEO characteristics we uncovered as significant in driving employee satisfaction remain consistent under various robustness checks. Finally, our results indicated that these CEO characteristics are essential in driving employee satisfaction when the firm operates under high financial pressure. In other words, we have shown that under a period of high uncertainty (high firm financial pressure), CEOs with the above profile are more likely to improve employee satisfaction.

Appendix B

Appendix B.1 Tables

Table 2.1: Summary statistics of firms entering TOP100 and firms never entering TOP100

Variables	<u>Mean</u>		<u>Std. Dev.</u>		<u>Min.</u>		<u>Median</u>		<u>Max.</u>		<u>Obs.</u>	
	Enter	Never Enter	Enter	Never Enter	Enter	Never Enter	Enter	Never Enter	Enter	Never Enter	Enter	Never Enter
	Top 100	Top 100	Top 100	Top 100	Top 100	Top 100	Top 100	Top 100	Top 100	Top 100	Top 100	Top 100
TOP100 dummy	1	0	0	0	1	0	1	0	1	0	402	13,067
Tenure	7.905	7.050	4.677	4.415	3	3	7	6	25	36	402	13,067
Duality dummy	0.644	0.586	0.479	0.493	0	0	1	1	1	1	402	13,067
Ownership	1.846	2.810	2.684	6.430	0.002	0	0.506	0.634	12.400	61.207	290	10,285
Prev. CEO exper.	0.030	0.013	0.170	0.112	0	0	0	0	1	1	402	13,067
Prev. CFO exper.	0.015	0.015	0.121	0.120	0	0	0	0	1	1	402	13,067
MBA dummy	0.294	0.258	0.456	0.437	0	0	0	0	1	1	402	13,067
TOPMBA dummy	0.137	0.116	0.344	0.321	0	0	0	0	1	1	402	13,067
Master dummy	0.027	0.082	0.163	0.274	0	0	0	0	1	1	402	13,067
Ivy dummy	0.249	0.198	0.433	0.399	0	0	0	0	1	1	402	13,067
PhD dummy	0.025	0.044	0.156	0.204	0	0	0	0	1	1	402	13,067
CEO female dummy	0.010	0.032	0.099	0.177	0	0	0	0	1	1	402	13,067
Founder dummy	0.067	0.065	0.251	0.246	0	0	0	0	1	1	402	13,067
US nationality	0.883	0.716	0.322	0.451	0	0	1	1	1	1	402	13,067
LCEO age	4.023	4.033	0.121	0.123	3.555	3.332	4.043	4.043	4.317	4.454	402	13,067
Male ratio	0.842	0.885	0.085	0.101	0.571	0.429	0.846	0.889	1	1	263	7,887
Nationality mix	0.101	0.076	0.141	0.146	0	0	0	0	0.600	0.800	263	7,729
No. of directors	10.810	9.231	2.458	2.554	6	4	11	9	21	33	263	7,887
Size	9.480	7.713	1.741	1.752	5.557	2.342	9.409	7.634	13.836	14.761	402	13,067
LCash	-2.256	-2.698	1.242	1.465	-7.181	-11.323	-1.942	-2.533	-0.349	-0.005	402	13,024
CapEx	0.050	0.046	0.064	0.053	0	-0.033	0.028	0.031	0.459	0.715	384	12,801
TobQ	2.813	2.010	2.233	1.844	0.779	0.401	2.019	1.525	15.252	78.565	402	13,065
BookLev	0.196	0.232	0.190	0.207	0	0	0.151	0.208	0.959	3.676	399	13,023
Tang	0.181	0.242	0.203	0.231	0	0	0.110	0.163	0.893	0.970	390	12,490
LAge	2.082	1.838	0.686	0.799	0	0	2.197	1.946	3.258	3.258	395	12,396

This table presents the mean, standard deviation, minimum, maximum, and the number of observations for each variable of firms entering TOP100 and firms never entering TOP100. Data were filtered to only contain complete data from CEOs with at least three years of tenure.

Table 2.2: Benchmark estimation

Variables	TOP100 dummy	Marginal effect
Tenure	0.183*** (3.01)	0.005*** (3.02)
Duality dummy	-0.247 (-0.35)	-0.007 (-0.35)
Ownership	-0.262*** (-2.89)	-0.007*** (-2.96)
Prev. CEO exper.	-0.444 (-0.44)	-0.013 (-0.45)
Prev. CFO exper.	0.948 (0.59)	0.027 (0.59)
TOPMBA dummy	-0.683 (-0.49)	-0.019 (-0.49)
MBA dummy	0.150 (0.16)	0.004 (0.16)
Master dummy	-4.579*** (-3.00)	-0.130*** (-3.06)
Ivy dummy	-0.132 (-0.15)	-0.004 (-0.15)
PhD dummy	-0.624 (-0.58)	-0.018 (-0.57)
LCEO age	-6.447*** (-2.81)	-0.183*** (-2.79)
Size	1.328*** (5.75)	0.038*** (5.78)
LCash	0.524** (2.20)	0.015** (2.29)
CapEx	15.571** (2.16)	0.441** (2.12)
TobQ	-0.046 (-0.77)	-0.001 (-0.78)
BookLev	-1.927 (-1.37)	-0.055 (-1.37)
Tang	-1.972 (-1.11)	-0.056 (-1.08)
LAge	0.512 (0.95)	0.015 (0.93)
Constant	10.524 (1.14)	
Observations	1,808	
Industry F.E.	YES	
Year F.E.	YES	

Note: This table presents the results from a logit estimation and the marginal effect of each variable. To ensure the sample of firms that entered the TOP100 and firms that have never entered the TOP100 list are more comparable, we implement a propensity score matching procedure. In particular, we use a caliper matching controlling for total assets (*size*) and book leverage (*BookLev*). In addition, data are filtered to only contain CEOs with at least 3 years of tenure. Robust t-statistics are reported in brackets. *, **, and *** indicates significance at the 10%, 5% and 1% levels respectively.

Table 2.3: Estimations with additional control variables

Variables	(1)		(2)		(3)	
	TOP100 dummy	Marginal effect	TOP100 dummy	Marginal effect	TOP100 dummy	Marginal effect
Tenure	0.180*** (2.92)	0.005*** (2.95)	0.194*** (2.63)	0.006*** (2.59)	0.196*** (2.64)	0.006*** (2.62)
Duality dummy	-0.192 (-0.27)	-0.005 (-0.27)	-0.233 (-0.32)	-0.007 (-0.31)	-0.368 (-0.50)	-0.011 (-0.49)
Ownership	-0.290*** (-2.99)	-0.008*** (-3.07)	-0.289*** (-3.36)	-0.008*** (-3.34)	-0.297*** (-3.29)	-0.009*** (-3.21)
Prev. CEO exper.	-0.038 (-0.04)	-0.001 (-0.04)	0.064 (0.04)	0.002 (0.04)	0.403 (0.31)	0.012 (0.31)
Prev. CFO exper.	-0.823 (-0.50)	-0.023 (-0.51)	1.097 (0.37)	0.032 (0.37)	0.898 (0.31)	0.027 (0.31)
TOPMBA dummy	-0.592 (-0.43)	-0.016 (-0.43)	0.158 (0.10)	0.005 (0.10)	0.185 (0.12)	0.005 (0.12)
MBA dummy	0.227 (0.23)	0.006 (0.23)	0.366 (0.39)	0.011 (0.39)	0.363 (0.39)	0.011 (0.39)
Master dummy	-4.430*** (-2.90)	-0.123*** (-2.97)	-3.368*** (-2.75)	-0.097*** (-2.69)	-3.363*** (-2.75)	-0.099*** (-2.72)
Ivy dummy	-0.527 (-0.59)	-0.015 (-0.59)	-1.692 (-1.58)	-0.049 (-1.62)	-1.698 (-1.63)	-0.050* (-1.67)
PhD dummy	-0.605 (-0.56)	-0.017 (-0.55)	-1.574 (-1.36)	-0.046 (-1.34)	-1.541 (-1.27)	-0.045 (-1.26)
LCEO age	-6.678*** (-2.91)	-0.186*** (-2.87)	-5.303* (-1.80)	-0.153* (-1.83)	-5.621* (-1.89)	-0.166* (-1.91)
Size	1.277*** (5.40)	0.036*** (5.44)	1.345*** (4.50)	0.039*** (4.83)	1.287*** (4.25)	0.038*** (4.58)
LCash	0.531** (2.21)	0.015** (2.31)	0.643** (2.33)	0.019** (2.42)	0.644** (2.36)	0.019** (2.46)
CapEx	14.973** (2.05)	0.417** (2.03)	5.632 (0.54)	0.163 (0.53)	6.243 (0.60)	0.184 (0.60)
TobQ	-0.047 (-0.78)	-0.001 (-0.79)	0.352** (2.51)	0.010** (2.37)	0.360*** (2.64)	0.011** (2.49)
BookLev	-2.064 (-1.45)	-0.058 (-1.46)	-2.852* (-1.75)	-0.083* (-1.79)	-2.886* (-1.76)	-0.085* (-1.80)
Tang	-1.854 (-1.04)	-0.052 (-1.02)	-0.551 (-0.22)	-0.016 (-0.21)	-0.581 (-0.23)	-0.017 (-0.23)
LAge	0.553 (1.01)	0.015 (0.99)	0.453 (0.73)	0.013 (0.74)	0.425 (0.69)	0.013 (0.70)
CEO female dummy	-3.700** (-2.35)	-0.103** (-2.45)			-4.106* (-1.72)	-0.121* (-1.73)
Founder dummy	0.180 (0.16)	0.005 (0.16)			-0.125 (-0.11)	-0.004 (-0.11)
US nationality	0.489 (0.63)	0.014 (0.63)			0.130 (0.14)	0.004 (0.14)
Male ratio			-6.181** (-2.12)	-0.179** (-2.25)	-7.024** (-2.29)	-0.207** (-2.38)
Nationality mix			-0.523 (-0.26)	-0.015 (-0.26)	-0.332 (-0.16)	-0.010 (-0.16)
No. of directors			0.096 (0.67)	0.003 (0.65)	0.096 (0.69)	0.003 (0.67)
Constant	12.036 (1.29)		13.723 (1.13)		16.318 (1.33)	
Observations	1,808		1,220		1,220	
Industry F.E.	YES		YES		YES	
Year F.E.	YES		YES		YES	

Note: This table presents our robustness checks where we introduce additional control variables to our benchmark estimation. Columns 2 and 3 show the results of the benchmark estimations with the inclusion of CEO gender, founder status, and US nationality. Columns 4 and 5 show the results of the benchmark estimation with the addition of board characteristics such as size, portion of male directors, and nationality diversity of the board. Finally, columns 6 and 7 show the results of the benchmark estimation with the addition of all the above variables. To ensure the sample of firms that entered the TOP100 and firms that have never entered the TOP100 are more comparable, we implement a propensity score matching procedure. In addition, CEOs with at least 3 years of tenure are applied. Robust t-statistics are reported in brackets. *, **, and *** indicates significance at the 10%, 5% and 1% levels respectively.

Table 2.4: Estimations including the lagged dependent variable as a control

Variables	TOP100 dummy	Marginal effect
lag TOP100 dummy	0.698 (0.81)	0.020 (0.81)
Tenure	0.186*** (3.01)	0.005*** (3.03)
Duality Dummy	-0.254 (-0.36)	-0.007 (-0.36)
Ownership	-0.263*** (-2.88)	-0.007*** (-2.94)
Prev. CEO exper.	-0.441 (-0.44)	-0.012 (-0.45)
Prev. CFO exper.	0.687 (0.48)	0.019 (0.48)
TOPMBA dummy	-0.679 (-0.48)	-0.019 (-0.49)
MBA dummy	0.176 (0.19)	0.005 (0.19)
Master dummy	-4.585*** (-2.97)	-0.129*** (-3.04)
Ivy dummy	-0.187 (-0.22)	-0.005 (-0.22)
PhD dummy	-0.554 (-0.51)	-0.016 (-0.50)
LCEO age	-6.500*** (-2.83)	-0.183*** (-2.81)
Size	1.318*** (5.69)	0.037*** (5.66)
LCash	0.517** (2.17)	0.015** (2.25)
CapEx	15.314** (2.12)	0.431** (2.08)
TobQ	-0.047 (-0.78)	-0.001 (-0.80)
BookLev	-1.977 (-1.39)	-0.056 (-1.40)
Tang	-1.925 (-1.09)	-0.054 (-1.06)
LAge	0.511 (0.94)	0.014 (0.92)
Constant	10.691 (1.16)	
Observations	1,808	
Industry F.E.	YES	
Year F.E.	YES	

Note: We introduce the lagged value of the dependent variable as a control. We incorporate again a propensity score matching procedure. The data are filtered to only contain data from CEOs with at least 3 years of tenure. Robust t-statistics are reported in brackets. *, **, and *** indicates significance at the 10%, 5% and 1% levels respectively.

Table 2.5: Empirical results using all CEOs irrespective of tenure

Variables	TOP100 dummy	Marginal effect
Tenure	0.130*** (3.07)	0.004*** (2.96)
Duality dummy	0.269 (0.55)	0.007 (0.55)
Ownership	-0.244*** (-4.16)	-0.007*** (-4.03)
Prev. CEO exper.	0.352 (0.42)	0.010 (0.42)
Prev. CFO exper.	0.921 (0.56)	0.026 (0.56)
TOPMBA dummy	-1.084 (-1.14)	-0.030 (-1.16)
MBA dummy	0.460 (0.66)	0.013 (0.67)
Master dummy	-3.354*** (-2.83)	-0.094*** (-2.80)
Ivy dummy	-0.715 (-1.09)	-0.020 (-1.09)
PhD dummy	-1.587*** (-2.69)	-0.044*** (-2.59)
LCEO age	-6.949*** (-3.92)	-0.194*** (-3.87)
Size	1.231*** (6.15)	0.034*** (6.09)
LCash	0.425** (2.40)	0.012** (2.38)
CapEx	8.272 (1.41)	0.231 (1.36)
TobQ	0.003 (0.06)	0.000 (0.06)
BookLev	-2.417* (-1.87)	-0.067* (-1.88)
Tang	-0.568 (-0.33)	-0.016 (-0.33)
LAge	0.684 (1.64)	0.019 (1.61)
Constant	12.462* (1.79)	
Observations	2,603	
Industry F.E.	YES	
Year F.E.	YES	

Note: This table presents the results using the entire sample of CEOs irrespective of tenure length. We still use a matched sample. Robust t-statistics are reported in brackets. *, **, and *** indicates significance at the 10%, 5% and 1% levels respectively.

Table 2.6: Empirical results using all CEOs irrespective of tenure but controlling for financial pressure

Variables	Low Financial Pressure		High Financial Pressure	
	TOP100 dummy	Marginal effect	TOP100 dummy	Marginal effect
Tenure	0.210** (2.02)	0.005* (1.93)	0.166* (1.92)	0.005* (1.89)
Duality dummy	0.124 (0.10)	0.003 (0.10)	0.161 (0.18)	0.005 (0.18)
Ownership	-0.248 (-1.04)	-0.005 (-1.06)	-0.221* (-1.74)	-0.007* (-1.84)
TOPMBA dummy	2.095 (1.41)	0.046 (1.40)	-1.401 (-0.87)	-0.043 (-0.86)
MBA dummy	-0.626 (-0.53)	-0.014 (-0.53)	2.584** (2.21)	0.080** (2.18)
Masters dummy	-10.198* (-1.70)	-0.223* (-1.78)	-2.219 (-1.09)	-0.069 (-1.11)
Ivy dummy	-2.160 (-1.37)	-0.047 (-1.34)	-1.237 (-1.06)	-0.038 (-1.10)
PhD dummy	1.491 (0.43)	0.033 (0.43)	-5.761* (-1.71)	-0.178* (-1.81)
Founder dummy	0.500 (0.17)	0.011 (0.17)	-2.732 (-1.12)	-0.084 (-1.14)
US nationality	-0.283 (-0.24)	-0.006 (-0.24)	-0.863 (-0.92)	-0.027 (-0.90)
Male ratio	-0.573 (-0.10)	-0.013 (-0.10)	-9.782** (-2.34)	-0.302** (-2.43)
Nationality mix	-6.510 (-1.63)	-0.143 (-1.63)	0.517 (0.17)	0.016 (0.18)
No. of Directors	-0.206 (-0.89)	-0.005 (-0.90)	0.442** (2.00)	0.014* (1.84)
Constant	-1.419 (-0.05)		20.859 (1.48)	
Observations	626		675	
Add. CEO Controls	YES		YES	
Firm Controls	YES		YES	
Industry F.E.	YES		YES	
Year F.E.	YES		YES	

Note: The results shown in this table implement the entire sample of CEOs irrespective of tenure length and we further split our sample to high and low financial pressure firms following the cash flow over interest payments as an indicator. We apply a matched sample procedure. Robust t-statistics are reported in brackets. *, **, and *** indicates significance at the 10%, 5% and 1% levels respectively.

Table 2.7: Empirical results using the entire data sample

Variables	TOP100 dummy	Marginal effect
Tenure	0.179*** (3.00)	0.001*** (2.83)
Duality dummy	-0.124 (-0.16)	-0.001 (-0.17)
Ownership	-0.231*** (-2.71)	-0.002** (-2.55)
Prev. CEO exper.	-0.347 (-0.36)	-0.003 (-0.36)
Prev. CFO exper.	0.826 (0.54)	0.007 (0.54)
TOPMBA dummy	-0.643 (-0.40)	-0.005 (-0.40)
MBA dummy	0.301 (0.30)	0.002 (0.30)
Master dummy	-4.757*** (-3.00)	-0.038*** (-2.78)
Ivy dummy	0.118 (0.12)	0.001 (0.12)
PhD dummy	-0.603 (-0.52)	-0.005 (-0.52)
LCEO age	-6.844*** (-2.84)	-0.055*** (-2.59)
Size	1.445*** (6.60)	0.012*** (5.82)
LCash	0.589** (2.57)	0.005** (2.51)
CapEx	13.403** (2.54)	0.108 (2.49)
TobQ	-0.023 (-0.44)	-0.000 (-0.44)
BookLev	-1.273 (-0.95)	-0.010 (-0.95)
Tang	-0.87 (-0.50)	-0.007 (-0.50)
LAge	0.719 (1.30)	0.006 (1.24)
Constant	7.900 (0.80)	
Observations	8,659	
Industry F.E.	YES	
Year F.E.	YES	

Note: This table presents the results from our benchmark estimation using the entire dataset, without a matching procedure. Data are filtered to only contain data from CEOs with at least 3 years of tenure. Robust t-statistics are reported in brackets. *, **, and *** indicates significance at the 10%, 5% and 1% levels respectively.

Table 2.8: Risk-adjusted returns

	Panel A. Equal-weighted			Panel B. Value-weighted		
α	0.752 (2.110)	0.086 (0.688)	0.121 (0.917)	0.957 (2.454)	0.387 (2.017)	0.491 (2.399)
β_{MKT}		1.103 (35.104)	1.086 (29.328)		1.089 (22.775)	1.037 (18.521)
β_{HML}		0.131 (1.857)	0.102 (1.487)		0.027 (0.257)	-0.045 (-0.559)
β_{SMB}		-0.044 (-1.008)	-0.016 (-0.277)		-0.442 (-5.690)	-0.343 (-4.225)
β_{UMD}		-0.096 (-2.498)	-0.092 (-2.290)		-0.057 (-1.027)	-0.046 (-0.815)
β_{RMW}			-0.08 (-0.959)			-0.209 (-1.609)
β_{CMA}			0.003 (0.029)			-0.053 (-0.414)
Obs.	252	252	252	252	252	252

Note: This table shows the results from regressions of the monthly excess returns of a portfolio of stocks in the TOP 100 list on risk factors. *MKT*, *HML*, *SMB*, *UMD*, are the market factor, value factor (high-minus-low), size factor (small-minus-big), and momentum factor (up-minus-down) of Fama-French (1993) and Carhart. *RMW* and *CMA* are the profitability (robust-minus-weak) and investment (conservative-minus-aggressive) factors, respectively. The sample period is from January 1998 to December 2018. Panel A shows the results for equal-weighted portfolios, whereas Panel B reports the results for value-weighted portfolios. Newey-West t-statistics are reported in parentheses below its coefficient.

Appendix B.2 List of variables

Variables	Description
Employee satisfaction measure	
TOP100 dummy	A dummy variable that is coded as 1 if the company enters the “100 Best Companies to Work For” in America list.
CEO characteristics	
Tenure	The number of years a CEO has been in this position.
Duality dummy	A dummy variable that is coded as 1 if the CEO also serves as the chairman of the board of directors.
Ownership	It is the extent of a CEO’s shareholdings. In this study, ownership is the percentage of total shares owned by the CEO, excluding options.
Prev. CEO exper.	The number of years that a CEO has served as CEO prior to joining the company.
Prev. CFO exper.	The number of years that a CEO has served as CFO prior to joining the company.
MBA dummy	A dummy variable that is coded as 1 if the CEO has an MBA.
TOPMBA dummy	A dummy variable that is coded as 1 if the CEO received his MBA from a top business school.
Ivy dummy	A dummy variable that is coded as 1 if the CEO graduated from an Ivy League university.
Master dummy	A dummy variable that is coded as 1 if the CEO has a master’s degree.
PhD dummy	A dummy variable that is coded as 1 if the CEO has a PhD.
Extended CEO characteristics	
CEO female dummy	A dummy variable takes the value of one when the CEO is female.
Founder dummy	A dummy variable that is coded as 1 if the CEO is the founder of the company.
US nationality	A dummy variable that is coded as 1 if the CEO is the US nationality.
Additional board variables	
Male ratio	It measures the proportion of male directors on the board.
Nationality mix	It measures the nationality diversity of the board.
No. of directors	It measures the size of the board in terms of the number of directors.
Firm characteristics	
LCash	The natural logarithm of cash and short-term investments divided by total assets.
CapEx	Capital expenditures divided by total assets.
BookLev	The book leverage is the sum of long-term debt and debt in current liabilities divided by total assets.
LCEO_age	The nature logarithm of CEOs’ age.
LAge	The nature logarithm of firms’ age.
Size	The nature logarithm of total asset.
Tang	The total net property, plant and equipment divided by total assets.
TobQ	The ratio of market value of total assets to book value of assets.

Appendix B.3 List of Ivy League Universities

Harvard University

Yale University

Princeton University

Columbia University

Brown University

Dartmouth College

University of Pennsylvania

Cornell University

Appendix B.4. List of Top Business Schools – according to FT 2019 MBA Rankings

Harvard University

Stanford University

INSEAD

Columbia University

London Business School

University of Pennsylvania

Yale University

University of California – Berkeley

MIT

Appendix B.5 Risk-adjusted returns (winsorized portfolios)

Winsorized at 5%						
	Panel A. Equal-Weighted			Panel B. Value-Weighted		
α	0.870 (2.973)	0.278 (2.575)	0.266 (2.342)	1.043 (3.133)	0.492 (3.094)	0.548 (3.189)
β_{MKT}		0.966 (31.653)	0.973 (29.020)		1.001 (24.147)	0.972 (20.337)
β_{HML}		0.029 (0.800)	0.030 (0.734)		-0.036 (-0.464)	-0.075 (-1.196)
β_{SMB}		0.006 (0.146)	-0.012 (-0.275)		-0.292 (-4.751)	-0.240 (-3.433)
β_{UMD}		-0.040 (-1.873)	-0.042 (-1.920)		-0.008 (-0.200)	-0.002 (-0.054)
β_{RMW}			0.011 (0.209)			-0.113 (-1.077)
β_{CMA}			0.034 (0.480)			-0.023 (-0.203)
Obs.	252	252	252	252	252	252

Winsorized at 10%						
	Panel A. Equal-Weighted			Panel B. Value-Weighted		
α	0.832 (3.534)	0.364 (3.706)	0.335 (3.227)	0.970 (3.481)	0.494 (3.545)	0.542 (3.673)
β_{MKT}		0.786 (26.219)	0.802 (24.473)		0.860 (23.294)	0.836 (20.062)
β_{HML}		0.003 (0.120)	0.020 (0.603)		-0.051 (-0.999)	-0.081 (-1.596)
β_{SMB}		0.037 (0.997)	0.003 (0.081)		-0.198 (-4.006)	-0.148 (-2.384)
β_{UMD}		-0.036 (-2.153)	-0.039 (-2.276)		0.004 (0.139)	0.009 (0.277)
β_{RMW}			0.051 (1.236)			-0.089 (-1.172)
β_{CMA}			0.034 (0.556)			-0.038 (-0.391)
Obs.	252	252	252	252	252	252

Note: This table shows the results from regressions of the monthly excess returns of a portfolio of stocks in the TOP 100 list on risk factors. The stock returns are winsorized at the top and bottom $q\%$ percentile, respectively ($q=5\%$ in the upper panel and 10% in the lower panel). *MKT*, *HML*, *SMB*, *UMD*, are the market factor, value factor (high-minus-low), size factor (small-minus-big), and momentum factor (up-minus-down) of Fama-French (1993) and Carhart. *RMW* and *CMA* are the profitability (robust-minus-weak) and investment (conservative-minus-aggressive) factors, respectively. The sample period is from January 1998 to December 2018. Panel A shows the results for equal-weighted portfolios, whereas Panel B reports the results for value-weighted portfolios. Newey-West t-statistics are reported in parentheses below its coefficient.

Chapter 3

The role of female top managers on environmental sustainability

3.1 Introduction

Business sustainability has come a long way. Starting in the 1990s, a relatively small but increasing number of companies have begun to pay attention to their responsibilities to society and adopted relatively effective policies to voluntarily incorporate social and environmental issues into their organizational processes (Eccles et al., 2014). Moreover, with the growing emphasis on sustainability over the years from legal regulations, competitive pressures, and public scrutiny, a great number of companies have put sustainability at the top of their agenda. A milestone event that is worth mentioning is, on 19th August 2019, 181 CEOs of the US's largest companies signed up for the Business Roundtable (BRT) statement and redefined the definition of the purpose of a corporation from focusing solely on shareholders' interests to deliver long-term value to all of their stakeholders¹.

Moreover, growing evidence has highlighted the opportunities for companies to implement strategic sustainability initiatives. Within the framework of stakeholder theory, companies' socially responsible behavior satisfies the interests of the various stakeholders (e.g., debtors, employees, customers, and local authorities). Therefore, enable companies to capture sustainable competitive advantages (Huang, 2013).

¹Business Roundtable - Statement on the Purpose of a Corporation
<https://www.businessroundtable.org/purposeanniversary>

Moreover, numerous empirical studies have proved that implementing sustainable strategies is financially beneficial to the company (see, e.g., Huang, 2013; Yoon et al., 2018). At the same time, the failure to commit to sustainability standards exposes companies to risks and costly lessons (see, e.g., Klassen and McLaughlin, 1996; Kang and Kim, 2014). In addition, sustainability initiatives would also create shareholders value. McKinsey Global Survey² on valuing ESG programs shows that 83% of executives and investment professionals say they expect ESG programs to create more value for shareholders within five years than they do today. Sparkes and Cowton (2004) also show that shareholders view the effort in socially responsible investment positively. Therefore, the perceived importance of corporate sustainability has soared as investors, regulators, and executives become increasingly aware that such programs are beneficial to corporate outcomes.

While the benefits for companies to implement strategic sustainability practices are apparent, business sustainability still has a long way to go. The resistance could arise from the rise of shareholder power, which prompts a greater focus on short-term profitability than long-term growth and sustainability (Glass et al., 2016). In addition, after decades of following Nobel economics laureate Milton Friedman’s philosophy that “the social responsibility of business is to increase its profits.” Maximizing the interests of owners is the social responsibility of companies is a deep-rooted concept.

Furthermore, it is noteworthy that environmental, social, and governance programs create value differently. McKinsey Global Survey³ reported that in the short run, environmental programs have the lowest contribution in shareholder value compared with the return on investment from social and governance programs. These findings could explain that despite soaring legal regulations and public scrutiny pressure on companies to adopt environmental responsibility strategies, businesses are still slow to do so (Glass et al., 2016). As a result, climate change, water scarcity, and other environmental problems worsen. In addition, the 2021 COP26 climate

²Valuing corporate social responsibility; February 1, 2009
<https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/valuing-corporate-social-responsibility-mckinsey-global-survey-results>

³Valuing corporate social responsibility; February 1, 2009
<https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/valuing-corporate-social-responsibility-mckinsey-global-survey-results>

summit, which calls for reducing and avoiding emissions, once again brought the urgency of environmental issues to the fore. Therefore, in this study, we draw attention to environmental sustainability dimension and examine the effect of women leaders on environmental responsibility.

Put gender aside, how business leaders influence corporate strategies with regard to social responsibility practices is a fundamental area of corporate governance. Much of these studies focused on CEOs, who are the highest-ranking executive in the company and hold a great deal of decision-making power (Quigley and Hambrick, 2015). Both academic literature and practitioners believe that the CEO is the core organizational member in the modern company (Daily and Johnson, 1997). They are also considered to be the ultimate owner of responsibility for the direction of the company.

However, there is evidence that boards also play an active role in determining the direction of the company. According to Hambrick and Mason's (1984) Upper Echelons Theory, one of the most influential perspectives in the strategic management literature, it emphasizes that the organization is a reflection of its top managers, and corporate outcomes are the result of collective choices by top management teams (Abatecola and Cristofaro, 2018). The core explanation is that corporate governance is a multifaceted task that considers the individual characteristics of executives and their collective impact. As a result, much of the recent research has been concerned with the board of directors.

Given the critical role of CEOs and boards of directors in formulating corporate environmental strategies, scholars have begun to identify how managerial characteristics are associated with corporate environmental responsibility. In this study, we focus on gender diversity in top managers and examine the effect of female CEO and board of directors on corporate environmental performance. In fact, with the efforts and advocacy of gender equality, the issue of governance diversity has attracted a great deal of interest in corporate governance literature. However, much of previous studies investigated the impact of female executives on firm performance (see, e.g., Krishnan and Parsons, 2008; Khan and Vieito, 2013) and risk-taking (see, e.g., Schubert et al., 2000; Niessen and Ruenzi, 2019). There is a lack of work examining the impact of female leaders on corporate environmental performance.

To address this gap, we draw on social role theory (Eagly, 1987) to illustrate the impact of female executives on corporate environmental performance. According to social role theory, women are more disposed to think of others than men (Lim and Chung, 2021), and they generally value benevolence and universalism more (Adams and Funk, 2012). This could be attributed to the fact that humans depend mainly on their mothers, at least in the early stages of life (Soewarno and Nugroho, 2021). In addition, historically, women's childbearing and lactation roles have led to a greater psychological and behavioral tendency to be considerate of others over time. As a result, women tend to protect and strengthen the well-being of others and are more caring, supportive, and socially oriented.

Moreover, a growing literature has evidenced that the differences between genders are deeply rooted and will be fundamentally maintained for those who have entered the company's upper echelons (see, for example, Glass et al., 2016; Marano et al., 2022). Accordingly, female executives are more likely to understand the various stakeholders and support the company's sustainability behavior (Lim and Chung, 2021). In addition, women have better performance on moral and ethical behavior (Mason and Mudrack, 1996), especially in undefined situations, where compliance by companies beyond the minimum is grey and uncertain (Smith and Rogers, 2000). As a result, as leaders, women express a more substantial commitment to environmental responsibility and care more about environmental harms than men (Hunter et al., 2004).

In this study, we obtain corporate environmental performance from the KLD database. Semenova and Hassel (2015) suggest that KLD ratings are considered a reliable, broad, and valid proxy for environmental performance. Our sample covers 9,221 firm-year observations in the US from 1993 to 2018. Moreover, this study measures environmental performance with strengths, concerns, and overall scores. We evaluate the impact of female executives on each scale separately. Environmental strengths focus on measuring the strategic initiatives a company has developed to increase environmental awareness and response. In contrast, environmental concerns measure compliance violations and pollution levels. The overall score is obtained by subtracting concerns from strengths. We further employ an ordered logistic model to examine the effect of gender diversity in top management teams on corporate en-

vironmental performance.

Our findings indicate that firms with female CEOs are able to reduce environmental concerns compared with their male counterparts. In addition to benefiting from the inherent value of women who are more disposed to think of others, the improvement of environmental concerns could also benefit from women having a better desire to protect the environment than men (Glass et al., 2016). Moreover, female CEOs are likely to be appointed in underperforming companies that are not competitive among candidates and begin under riskier circumstances (Glass and Cook, 2016; Lim and Chung, 2021). Building on this logic, female CEOs are more likely to be appointed in companies with poor environmental performance and further effectively improve environmental concerns. In addition, even after becoming the central member of the top management team, female CEOs still lack internal support and face resistance to authority compared to their male counterparts (Glass and Cook, 2016). In this circumstance, they would implement sustainability strategies to gain external support and further enhance their legitimacy and reputation. In other words, implementing sustainability activities could be a strategy for female executives to gain their reputation and authority. Therefore, companies with female CEOs should exhibit fewer environmental concerns.

Our findings also suggest that a higher proportion of female directors on boards would improve environmental performance. The benefits could result from female directors being more concerned with sustainability, represented by a higher portion of sustainability practices disclosure, thus leading to better sustainability commitment (Manita et al., 2018; Eccles et al., 2014). In addition, they tend to be more stakeholder focused and long-term oriented, thus promoting corporate sustainability (Matsa and Miller, 2013). Moreover, we also performed a robustness check to filter data with at least three female board members, and we found that the effect of female directors on increasing environmental strengths is more pronounced. This could be explained by leadership homophily theory, which indicates that demographic similarities among leadership group members would affect the ability and willingness of minority leaders to shape organizational outcomes (Glass et al., 2016).

Moreover, this study highlights the benefits of female CEOs with overconfident traits on corporate environmental performance. A CEO is recognized as overconfident

if he/she overestimates the value that he can create (Malmendier and Tate, 2015). In addition, it has been widely accepted that female CEOs are more risk-averse and more willing to focus on running a business with low volatility than their male counterparts. However, our study indicates that female CEOs with overconfident traits would overcome inherent conservative values and further implement sustainability strategies. As a result, companies with overconfident female CEOs are less likely to experience environmental issues, and environmental strengths are more likely to increase.

In addition, this study also examines cultural perspectives in management and hypothesizes that female CEOs' national culture would shape their impact on corporate environmental performance. In fact, culture has long been considered one of the fundamental determinants of differences between individuals. Numerous studies have demonstrated the direct influence of leaders' cultural traits on organizational outcomes (see, e.g., Ho et al., 2012; Marano et al., 2022). In this study, we draw on the individualistic culture, a fundamental dimension of culture that have been previously identified that relate to the corporate responsibility issue (Ioannou and Serafeim, 2012). Specifically, individualistic culture (e.g. US and UK) emphasize self-interest and believe that personal interests are more important than collective interests (Ho et al., 2012; Ioannou and Serafeim, 2012). Consequently, female CEOs with individualistic culture generally lack collective consciousness, and they are less likely to consider the interests and welfare of others. Our findings suggest that the benefits of female CEOs on mitigating environmental concerns will be overshadowed by the values and beliefs from individualistic culture. Besides, our results also point out that overconfident traits would significantly reverse the negative effect of individualistic culture on environmental concerns.

To assess the validity of our results, we conduct several robustness tests. Specifically, we examined the impact of the previous year's environmental performance, and we found that our key results remain consistent. Moreover, in our empirical analysis, we followed Edmans et al. (2014) and Custódio et al. (2019) and only considered CEOs with at least three years of tenure in our benchmark estimates. We further relaxed this assumption and included all CEOs irrespective of tenure. Our findings suggest that the female CEOs could effectively improve environmental concerns only

when they have been in this position for at least three years. Our results are in line with Hambrick and Mason (1984). They indicate that strategic initiatives implemented by management manifest or become apparent typically with the “lag times”.

This study contributes to the literature in several ways. First, our paper extends the literature on environmental sustainability and corporate governance. Previous studies in this area mainly measure companies’ responsibility with the overall score, and it is a measurement of the comprehensive sustainability performance of companies on environmental, social, and corporate governance. However, there is insufficient work focused on corporate environmental performance. In addition, rather than examining the impact of gender diversity in top management teams within a broader corporate sustainability framework, we evaluate the effect on environmental strengths, concerns, and overall performance specifically. Although Glass et al. (2016) examined the effect of women leaders on promoting environmental performance to some extent, they only tested the effect with the dataset of Fortune 500 firms over ten years. In addition, their study did not find a direct correlation between female leaders and environmental performance. Our study extends the work of Glass et al. (2016) and incorporates a large-scale KLD dataset with companies of S&P 500, Domini 400 Index, Russell 1000, and Russell 2000 for the period 1993-2018.

Second, to our knowledge, this study is the first to highlight the impact of overconfident CEOs in view of gender differences on corporate sustainability. It has been widely accepted that CEOs’ characteristics influence corporate outcomes. However, existing papers in corporate finance tend to focus more on “hard data” and concrete facts. As a result, previous studies on CEO characteristics mainly revolved around CEOs’ tenure (see, e.g., Simsek, 2007; Cook and Burrell, 2013), duality (see, e.g., Pathan, 2009; Veprauskaitė and Adams, 2013), ownership (see, e.g., Lilienfeld-Toal and Ruenzi, 2014; Song and Wan, 2019), working experience (see, e.g., Daily and Johnson, 1997; Custódio et al., 2019), and educational background (see, e.g., Bhagat et al., 2010; King et al., 2016). Only a few studies worked on CEOs’ psychological traits (see, e.g., Petrenko et al., 2016; Sauerwald and Su, 2019). In addition, an emerging research stream is focusing on the impact of overconfident CEOs on corporate sustainability. For example, McCarthy et al. (2017) show that CEO overconfidence is negatively related to CSR. In addition, Sauerwald and Su (2019) find

that overconfident CEOs increase the gap between what they say and what they do in terms of CSR. However, the impact of overconfident CEOs in view of gender differences on corporate sustainability is a lack of concern. Therefore, our study contributes to the literature on the role of executives' psychological traits on organizational outcomes.

Third, our study also contributes to the literature on cultural perspectives in management. Previous studies have done some work on the influence of CEOs' cultural characteristics on corporate finance. For example, Liu (2016) and Pan et al. (2020) explore whether the cultural origin of CEOs matters for risk appetite and firm performance. Their findings highlight that CEOs' cultural heritage would affect their decision-making behavior and appetite for work choices (Pan et al., 2020). However, insufficient work has been done to study the impact of leaders' cultural traits on corporate sustainability decisions. Therefore, our study integrates the gender studies area with culture research by showing that cultural traits are a crucial source that influences female managers' decision-making.

Fourth, this study also contributes to the improvement of gender inequality. The tangible benefits of female representation in top management teams in driving corporate sustainability provide evidence against the stance that women are a “problem issue” of companies⁴. In addition, the impact of women on environmental action generates a significant amount of coverage and discussion today. COP26 Gender Day took place on November 9th, 2021. This event recognizes and celebrates gender equality and the empowerment of females in climate policy and action. Speaking at the event, UN Secretary-General António Guterres said: “Climate change is the most important issue facing the world today while achieving gender equality is one of the unfinished business of our time, and one of the greatest human rights challenges in the world.” Besides, Rose (2007) states that the company, like other organizations, should reflect society as a whole because the company is an important institution that directly affects a wide range of stakeholders. Therefore, gender diversity in top leadership seems to have a logical implication and may even be required by the articles of incorporation.

Finally, our research is also beneficial to investors and policy-makers in evaluat-

⁴Using a sample of top executive announcements from 1990 to 2000, Lee and James (2007) point out that the market reacts negatively to news of appointing female CEOs

ing companies' sustainability performance and top management teams. To improve the implementation of corporate sustainability, we suggest gender diversity in top management teams and appoint female CEOs, especially those from countries with collective culture and overconfident traits.

3.2 Literature review

3.2.1 Corporate sustainability and environmental strategies

According to the United Nations Global Compact-Accenture CEO study (2010), 93% of the 766 participating CEOs from around the world declared that sustainability issues are “important” or “very important” for the future success of their organizations. In response, a growing number of executives are allocating considerable attention and resources to the company's sustainability strategies. A notable representative example, Paul Polman, the former CEO of Unilever, is a voice of business leaders calling for corporate social responsibility. In 2010, he created Unilever's Sustainable Living Plan⁹, which aims to cut by half the greenhouse gas of Unilever products and ensure full supplier adherence to sustainability practices by 2020. In addition, companies develop market sustainable products and services, create positions such as chief sustainability officer, and publish sustainability reports for investors, activists, and the general public.

For all these efforts, we should expect the world to become more sustainable. However, climate change, water scarcity, and other environmental problems worsen. Moreover, despite legal regulations and public scrutiny pressure requiring companies to carry out corporate social responsibility measures regarding the environment, companies have been slow to implement environmental strategies. The resistance could attribute to the rise of shareholder power, which prompts a greater focus on short-term profitability rather than long-term growth and sustainability (Glass et al., 2016). In addition, rooted in shareholder theory, maximizing the interests of owners is the only social responsibility of companies. Under this assumption, the cost of implementing sustainability activities would diminish shareholders' benefits

⁹Unilever Sustainable Living Plan (November 2010)
<https://assets.unilever.com/files/92ui5egz/production/9752ff2d82b8afabb507eb92c47b5dad795801d5.pdf/unilever-sustainable-living-plan.pdf>

(Fatemi et al., 2018). As a supplement, Kim and Lyon (2015, p. 705) state that “the entire environmental regulatory paradigm is built around the idea that firms must be forced to make environmental improvements because they would otherwise find them costly or unprofitable, and thus not undertake them on their own.” From this point of view, sustainability practice is not a voluntary implementation by the company but a mandatory choice imposed by regulations.

Although developing long-term sustainability could appear at odds with maximizing shareholder value in the short term, academics and environmental advocates are increasingly arguing that sustainability and profitability are not a zero-sum game. In fact, growing evidence has proved that implementing sustainable strategies is financially beneficial to the company (see, e.g., Huang, 2013; Yoon et al., 2018). The benefits could result from implementing sustainable strategies that enable companies to capture sustainable competitive advantages (Huang, 2013). Moreover, within the framework of stakeholder theory, companies’ socially responsible behavior satisfies the interests of the various stakeholders (e.g., debtors, employees, customers, and local authorities). Specifically, companies with better sustainable performance can attract customers who value such expenditures and thus tend to pay more for their products and services. It would also enhance the company’s potential to attract qualified employees. In addition, investors would accept lower financial returns of companies with notable sustainable performance because they receive satisfaction from buying shares in socially spending companies. Besides, managers would regard sustainable activities as a means to improve their satisfaction and social accumulation (Fatemi et al., 2018; Li et al., 2018).

Specific to environmental sustainability, Boiral et al. (2012) find that Canadian companies that committed to reducing greenhouse gas emissions showed better financial performance than firms that did not. In addition, Sinkin et al. (2008) posit that companies that adopt ecologically sustainable practices achieved higher market values than firms that did not.

Moreover, a growing literature has suggested that the failure to commit to environmental standards exposes companies to risks and costly lessons. Studies have found that media scrutiny of companies’ violations leads to sharp declines in stock prices. For example, Klassen and McLaughlin (1996) analyzed 22 negative corporate

environmental news (e.g. gas leak, oil spill, etc.) and 140 pieces of positive environmental news (e.g. environmental award announced by independent third parties), reported that negative news is followed by negative stock return. In addition, Kang and Kim (2014) point out that the company would lose part of its market share if the news on CSR in the previous year were negative. In addition, shareholders are concerned about the financial risk in the form of fines and legal liability when a company has a poor environmental record (Glass et al., 2016).

3.2.2 Gender and sustainability activities

To illustrate the effect of female senior managers on corporate sustainability, we draw on social role theory. Social role theory (Eagly, 1987) provides validated comprehensive empirical support for the pervasive psychological and behavioral differences between men and women. It suggests that gender differences are socially constructed. Historically, men's greater physical size and strength and women's childbearing and lactation have created stereotypes that certain activities are more efficiently carried out by one gender than the other (Marano et al., 2022; Ridgeway, 2001). Over time, the gendered division of labor translated into differentiated social roles for men and women, which further caused psychological and behavioral gender differences. Specifically, men are socialized to be more autonomous, individualistic, and competitive (Glass et al., 2016), while women are more disposed to think of others (Lim and Chung, 2021). In addition, women generally value benevolence and universalism more (Adams and Funk, 2012). As a result, women tend to protect and strengthen the well-being of others.

Moreover, the social role differences remain significant even when men and women occupy positions that are more tightly linked to the working context than gender (Ridgeway, 2001), or even similar organizational roles and meet the same selection criteria, such as senior executives (Marano et al., 2022). Numerous studies have evidenced that the differences between genders are deeply rooted and will be fundamentally maintained for those who have entered the company's upper echelons. Therefore, due to the personal values of women, which reflect the tendency to care and concern for others, female executives are more likely to understand the various stakeholders inside and outside the company and, consequently, support the com-

pany's sustainability behavior (Lim and Chung, 2021).

In addition, women have better performance on moral and ethical behavior (Mason and Mudrack, 1996), especially in undefined situations (Smith and Rogers, 2000). Therefore, in countries lacking stringent sustainable regulations (e.g. the US), where compliance by companies beyond the minimum is grey and uncertain, female managers would be more proactive in addressing environmental issues than males (Glass et al., 2016).

Moreover, as leaders, women tend to be more caring, supportive, and socially oriented. Because in terms of caring ethics, women are superior to men, which manifests as women are more able to meet others' needs and consider caring behaviors than men. One moral support is that humans depend mainly on their mothers, at least in the early stages of life (Soewarno and Nugroho, 2021).

Empirical studies have evidenced that gender diversity in top management teams is positively associated with corporate sustainability. For example, Lim and Chung (2021) find that companies led by female CEOs have an active overall CSR participation in the US. In addition, McGuinness et al. (2017) show that gender diversity in the executive team of Chinese listed companies would improve CSR performance.

However, notable studies suggest that corporate sustainability activities could be a strategy for female executives to gain their reputation and authority. Specifically, top female managers are more likely to face obstacles than males when sitting in leadership positions. As Fortune Magazine has published, although the number of female CEOs in the Fortune 500 has increased in the past decade, the proportion of female CEOs in 2021 is still only 8.2%. This phenomenon allows the hypothesis that women face many invisible obstacles when holding leadership positions, and studies have put forward the term "glass ceiling" to introduce this phenomenon (Oakley, 2000). Moreover, even after becoming the central member of the top management team, female CEOs still do not have enough internal support and face resistance to authority because the typical appearance of leaders formed in a long time is different from those of female CEOs (Glass and Cook, 2016). In this situation, female CEOs expect to gain external support by implementing sustainability activities. Since it has been widely recognized that participating in sustainability activities could enhance the legitimacy and reputation of the company (Minor and Morgan, 2011), this

positive influence would also benefit key decision-makers who drive decision-making (Lim and Chung, 2021).

Taken together, we believe that companies with great gender diversity in top management teams would have better environmental performance. Thus, we predict the following:

Hypothesis 1. Companies led by female CEOs would perform better on environmental performance and experience fewer environmental concerns than with male CEOs.

Hypothesis 2. Companies with large numbers of female representations on boards would perform better on environmental performance and experience fewer environmental concerns than companies with fewer women on boards.

3.2.3 The role of overconfident traits

In the most basic form, overconfidence is associated with individuals holding unrealistically optimistic views of the future by overestimating the benefits of future events (Rawson, 2021). In addition, Deshmukh et al. (2013) indicate that managers can be seen as “overconfident” if they over-invest their personal funds in their own company.

A growing literature in corporate finance has well documented that CEO overconfidence is associated with firm outcomes (see, for example, Malmendier and Tate, 2015; Burkhard et al., 2018). The optimistic view suggests that CEO overconfidence could be beneficial for firm outcomes. For example, Burkhard et al. (2018) state that overconfident CEOs tend to make decisions relatively quickly, and they tend to develop an inspirational and stimulating vision. In addition, Malmendier and Tate (2015) indicate that CEO overconfidence is associated with a higher propensity to innovate since they are more likely to show overconfidence in challenging tasks (Malmendier and Tate, 2015).

However, another stream of studies has identified overconfidence as an unfavorable characteristic of CEOs that leads to adverse consequences for firm outcomes, such as value destruction through engaging in excessive risk-taking (Burkhard et al., 2018). For example, Niu (2010) concludes that banks run by overconfident CEOs take more risk because overconfident CEOs tend to overestimate the accuracy of exogenous noisy signals. In addition, they also tend to underestimate the riskiness of future cash flows. Either way, overconfidence will lead to more risk-taking. Thus, we

predict the following:

H3. Companies led by overconfident female CEOs would perform worse on environmental performance and are more likely to experience environmental concerns.

3.2.4 The role of national culture

Culture is considered one of the fundamental determinants of differences between individuals, primarily attributed to the differences in values and belief systems. This is not only true for individuals but also organizations (Ho et al., 2012). In addition, Crossland and Hambrick (2011) indicate a direct impact of cultural traits on managerial discretion. Therefore, we expect that cultural traits would influence management decisions related to the company's environmental sustainability.

One fundamental dimension of culture that has been previously identified that relates to the issue is individualistic culture (Ioannou and Serafeim, 2012). In 1980, Hofstede had a worldwide study. In this study, based on responses in an extensive survey, each country was assigned an individualism index on a scale of 0 to 100, and the results revealed that the United States had the highest individualism index in the world, followed by Australia, the United Kingdom, and Canada (Hofstede, 2001).

Moreover, according to Ho et al. (2012), individualistic culture (e.g. US and UK) emphasizes self-interest, and the bonds between individuals are loose. Individuals in individualistic societies believe personal interests are more important than collective ones. They tend to value personal time, freedom, and independence. In the country, individuals who are low on individualism (e.g. Latin American and Asian countries) are considered "collectivists". They place the interest and welfare of the group ahead of themselves (Ho et al., 2012). Transferring these findings into the corporate sustainability domain, we expect that top female managers with individualistic culture would lower corporate environmental performance. Therefore, we predict the following:

H4. Companies led by female CEOs with individualistic culture would perform worse on environmental performance and are more likely to experience high environmental concerns.

3.3 Research design

3.3.1 Data

We construct our dataset using several sources. Our full sample covers firms based in the US for the period 1993-2018. We collect CEO data using BoardEx and ExecuComp databases. The firm specific financial data are collected from Compustat.

Environmental measures were obtained from Kinder, Lydenberg and Domini (KLD). Since 1988, the KLD rating agency has conducted research on corporate responsibility performance. Initially, KLD's list of companies included all members of the S&P 500 Index and Domini 400 Index. In 2001, members of the Russell 1000 Index were added to the KLD database. In 2003, members of the Russell 2000 Index were further included in the KLD database.

As noted by prior literature, KLD data cover a broad range of important corporate sustainable attributes of a large sample of companies (Manner, 2010; Walls et al., 2012). In addition, Chatterji et al. (2009, p. 2) suggest that "KLD's social and environmental ratings are among the oldest and most influential and, by far, the most widely analyzed by academics." As a result, KLD ratings are considered a reliable, broad, and valid proxy for environmental performance (Semenova and Hassel, 2015).

In addition, the KLD database measures corporate environmental performance using a number of positive (i.e. strengths) and negative (i.e. concerns) indicators⁶. Specifically, environmental strengths focus on measuring the strategic initiatives a company has developed to increase environmental awareness and response. It incorporates the following seven elements: beneficial products and services; pollution prevention; recycling; clean energy; property, plant, and equipment; management systems; and other strength. On the other hand, environmental concerns measure compliance violations and pollution levels. It involves the following seven elements: hazardous waste; regulatory problems; ozone depleting; substantial emissions; agricultural chemicals; climate change; and other concern. These indicators are binary variables coded as 1 if the company meets the particular criterion and 0 otherwise.

Moreover, previous research has primarily measured companies' sustainability

⁶Details about the strengths and concerns indicators see the following, http://www.pornsit-jiraporn.com/Getting_Started_With_KLD_STATS.pdf

with the net performance (i.e. overall score) (see, for example, Bear et al., 2010; Lim and Chung, 2021). The common method to obtain the overall score is to subtract concerns from strengths (Semenova and Hassel, 2015). However, for a more in-depth investigation of the connection between female executives and corporate environmental performance, in this study, we evaluate the impact on environmental strengths, environmental concerns, and overall environmental performance separately.

Furthermore, Cheung et al. (2018) point out that the aggregation methods have potential drawbacks. Specifically, KLD scores are inflated in industries that are not sensitive to certain ESG dimensions, including the environment, human rights, and employee relations. In addition, there is a lack of comparability between years as the number of indicators varies over time. Therefore, to minimize the potential limitations of aggregation methods, we follow Deng et al. (2013) and use a relative aggregation method to generate the adjusted environmental performance measures. The formula is shown below:

$$Env.Perf._t = \frac{\sum_{p=1}^{n_t} Strengths_p}{n_t} - \frac{\sum_{q=1}^{m_t} Concerns_q}{m_t}$$

Where $Env.Perf._t$ is the environmental score at time t . $Strengths_p$ is the p th strengths indicator at time t . $Concerns_q$ is the q th concerns at time t . They are binary variables that equal to 1 if the company meets the particular criterion and 0 otherwise. In addition, n_t and m_t are the total number of strength and concerns indicators, respectively, at time t . This method ensures meaningful year-to-year comparisons, as strengths and concerns indicators are summed and then averaged each year before calculating environmental scores (Cheung et al., 2018).

3.3.2 Definition of variables

3.3.2.1 Firm environmental performance

We measure a firm's environmental performance using the following variables.

Overall: Corporate overall environmental performance.

Strengths: Corporate exemplary environmental performance.

Concerns: Corporate environmental issues.

3.3.2.2 Independent variables

This study examines the effect of top female managers on corporate environmental performance. Specifically, we test the female CEOs (*CEO female dummy*) and the proportion of women on the board (*Female ratio*).

3.3.2.3 Control variables

CEO controls

We include a set of CEO controls (*CEO_Controlsit*) throughout our analysis, including CEOs' tenure, age, founder, educational background, individualistic nationality, and overconfident traits.

Tenure: This variable indicates the number of years a CEO has been in this position. Hambrick and Mason (1984) suggest that there are "lag times" for strategic initiatives implemented by management to manifest or become apparent. Following the empirical work of Edmans et al. (2014) and Custódio et al. (2019), we only considered CEOs with at least three years of tenure in this study.

CEO age: This variable measures the age of the CEO.

Founder dummy: It is a dummy variable that takes the value of 1 if the CEO is the founder of the company.

MBA dummy: This dummy variable measures whether a CEO has an MBA degree. It is equal to 1 if the CEO has an MBA, and 0 otherwise.

Ivy League dummy: This dummy variable measures whether a CEO graduated from an Ivy League university, no matter if it was undergraduate or postgraduate degree (see Appendix for the list of Ivy League universities). This dummy is equal to 1 if the CEO graduated from an Ivy League university, and 0 otherwise.

Master dummy: This dummy variable measures whether a CEO has a masters degree. It takes the value of 1 if the CEO has a masters degree, and zero otherwise.

PhD dummy: This dummy variable measures whether a CEO has a PhD. This dummy is equal to 1 if the CEO has a PhD, and zero otherwise.

Individualistic dummy: It is a dummy variable that is coded as 1 if the nationality (see Appendix for the list of countries identified as individualistic culture) of the CEO is identified as individualistic culture.

Overconfidence dummy: It is a dummy variable that is coded as 1 if the CEO is

recognized as overconfident.

Board controls

Although CEOs are recognized as the primary driver of the company, there is growing evidence emphasizing the importance of corporate boards on impact corporate strategies and policies. In addition, the board of directors is an important internal device for the company. It aims to control and monitor management in order to prevent the management from opportunistic behavior. Given that firm strategies are determined by both CEOs and board of directors, the effect of the board on firm outcomes cannot be neglected.

Moreover, the composition of the board of directors has always been an important issue in corporate governance. The purpose is to determine a structure that aligns the interests of management and stakeholders (Rose, 2007). In this study, we controlled for a set of board characteristics (*Board_Controlsit*), including board size (*No. of directors*) and the nationality diversity of the board (*Nationality mix*).

Firm controls

Similar to the related literature, see i.e., Custódio et al. (2013) and Veprauskaitė and Adams (2013). The firm controls included in this study are i) the nature logarithm of total assets; ii) the nature logarithm of firms' age; iii) capital expenditures divided by total assets; iv) book leverage defined as the sum of long-term and short-term debt in current liabilities divided by total assets.

3.3.3 Descriptive statistics

Table 3.1 shows the summary statistics of our variables. In this study, we collected environmental performance of 9,221 companies. Around 3.2% of companies in our study has female CEOs. The average board size is 9, and 12% of the board of directors are women. The average tenure of CEOs is around 7 years. These values are similar to Custódio et al. (2013). In addition, CEO tenure exhibits high volatility ranging from 3 to 35 year.

Moreover, 26.8% of CEOs have an MBA, which is similar to Custódio et al. (2013) results, and 18.8% of CEOs graduated from an Ivy League university (including undergraduate, master's degree, and PhD).

[Insert Table 3.1 here]

3.4 Model

In this study, we use an ordered logistic model to examine the effect of gender diversity in top management teams on corporate environmental performance. Unlike the logit model, which is appropriate when the dependent variable in the regression is binary (0 or 1), the ordered logistic model is used to estimate relationships between an ordinal dependent variable and a set of independent variables. An ordinal variable is a variable that is categorical and ordered, for instance, “poor,” “good,” and “excellent,” which might indicate a person’s current health status or the repair record of a car.

Since this study evaluates corporate environmental performance separately with strengths, concerns, and overall performance, they are categorical and ordered. As a result, the ordered logistic model is an appropriate method response.

3.5 Empirical analysis and results

3.5.1 Benchmark estimates

The benchmark regression of this study is as the follow:

$$\begin{aligned} Overall_{it} = & CEO_Female_{it} + Female_Ratio_{it} + CEO_Controls_{it} + Board_Controls_{it} \\ & + Firm_Controls_{it} + \eta_t + \zeta_i + \varepsilon_{it} \end{aligned} \quad (3.1)$$

$$\begin{aligned} Strengths_{it} = & CEO_Female_{it} + Female_Ratio_{it} + CEO_Controls_{it} + Board_Controls_{it} \\ & + Firm_Controls_{it} + \eta_t + \zeta_i + \varepsilon_{it} \end{aligned} \quad (3.2)$$

$$\begin{aligned} Concerns_{it} = & CEO_Female_{it} + Female_Ratio_{it} + CEO_Controls_{it} + Board_Controls_{it} \\ & + Firm_Controls_{it} + \eta_t + \zeta_i + \varepsilon_{it} \end{aligned} \quad (3.3)$$

where $Overall_{it}$ is the overall environmental performance of the company. $Strengths_{it}$ indicates corporate environment strengths, which focus on strategic initiatives and plans developed by the company to enhance environmental awareness and response. In contrast, $Concerns_{it}$ represents environmental concerns, which measures issues

such as compliance violations and pollution levels of the company. CEO_Female_{it} is a dummy variable indicating if the CEO is female. $Female_Ratio_{it}$ measures the portion of female directors on the board. $CEO_Controls_{it}$ is a set of CEO characteristics, including CEOs' tenure, age, founder, educational background, individualistic nationality, and overconfidence. The definition of these variables is presented in section 3.3.2.3. $Board_Controls_{it}$ is a set of variables that includes board size (*No. of directors*) and the nationality diversity of the board (*Nationality mix*). The $Firm_Controls_{it}$ vectors incorporate all the financial control variables presented in 3.3.2.3. Finally, η_t and ζ_i denote the year and industry fixed-effects respectively, whereas ε_{it} is the error term which is uncorrelated with the independent variables.

3.5.2 Benchmark results

Using the ordered logistic model, in this study, we examined the impact of top female managers on corporate environmental performance. Table 3.2 presents the benchmark results of our study. Our results show that female CEOs are more beneficial in improving environmental concerns than their male counterparts. Specifically, companies with female CEOs are about 6.78%⁷ more likely to have no environmental concerns. However, they are failing to improve the overall environmental performance. Therefore, our results do not support Hypothesis 1, which predicts that companies led by female CEOs would perform better on environmental performance and experience fewer environmental concerns.

This could attribute to women having a better desire to protect the environment than men. Conducting surveys, Bord and O'Connor (1997) find that women are more concerned with environmental concerns (e.g. hazardous waste sites and global warming) than men. In addition, using a sample of top executive announcements from 1990 to 2000, Lee and James (2007) point out that the market reacts negatively to news of appointing female CEOs. Therefore, one can presume that the negative biases and perceptions toward female CEOs are widespread. Accordingly, in many cases, female CEOs are appointed in underperforming companies and begin under riskier circumstances (Lim and Chung, 2021). This could result from the CEO posi-

⁷It is the marginal effect of female CEOs on environmental concerns. The marginal effects reflect the change in the probability of the dependent variable given a 1-unit change in an independent variable.

tions of underperforming companies are not competitive among candidates, and thus, women face fewer barriers to entry (Glass and Cook, 2016). Therefore, we believe that companies with poor environmental performance are more likely to appoint female CEOs and further effectively improve environmental concerns.

Besides, female CEOs generally do not have enough internal support and face resistance to authority compared with their male counterparts because the typical appearance of leaders formed in a long time is different from those of female CEOs (Glass and Cook, 2016). In this circumstance, female CEOs expect to gain external support by implementing sustainability activities to overcome their challenges. Because participating in sustainability activities could enhance the legitimacy and reputation of the key decision-makers of the decision (Minor and Morgan, 2011). Therefore, companies with female CEOs having environmental concerns will be better off.

Moreover, Hypothesis 2 predicts that companies with a higher proportion of female representations on boards would perform better on environmental performance and experience fewer environmental concerns. We find mixed support for Hypothesis 2. The results in Table 3.2 affirm that board gender diversity is positively associated with environmental performance. Specifically, a 1% increase of gender diversity on board is associated with being around 12.50%⁸ more likely to have positive environmental strengths scores. However, there is no significant relationship between female directors and environmental concerns.

Our findings are in line with the work of Bear et al. (2010) and McGuinness et al. (2017). First, the positive impact of female directors on environmental performance could be attributed to the inherent values of women. First, the positive effect could attribute to the inherent values of women. Specifically, women tend to be more disposed to think of others (Lim and Chung, 2021) and place a higher value on benevolence and universalism (Adams and Funk, 2012). Second, the positive connection could also result from female directors being more concerned with sustainability, leading to greater transparency in corporate governance. Numerous studies have indicated the positive effect of female directors on ESG disclosure (see, e.g., Manita et al., 2018; Husted and de Sousa-Filho, 2019). In addition, ESG disclosure is a crucial

⁸It is the marginal effect of female directors on environmental strengths.

pillar measuring the extent of companies' commitment to sustainability. For example, Eccles et al. (2014) find that the ESG disclosure scores were relatively high for companies that did well in sustainability. Finally, female directors tend to be more stakeholder focused and long-term oriented (Matsa and Miller, 2013). It presents with they are better able to integrate the interest of multiple stakeholders than men and are more likely to concern with the interests of a broader range of stakeholders when making decisions.

[Insert Table 3.2 here]

3.6 Further analysis

3.6.1 Female CEOs with overconfident traits

We further extend our analysis by drawing on how overconfident traits influence female CEOs' decisions on environmental strategies.

Regarding the measurement of CEO overconfidence, the most common way is to use executives' decisions about their individual company stock options portfolio. This measurement method was initially introduced in Malmendier and Tate (2005), based on the fact that stocks and options are used as part of top executives' compensation in the US. In this situation, a rational executive will exercise stock options before they expire. However, the overconfident CEOs are more willing to hold options because they overestimate their companies' future performance, expecting to profit from future stock price appreciation. Building on this logic, Yung et al. (2015) present a measure of CEO overconfidence by using the amount of moneyness of vested options held by CEOs; that is, a CEO is defined as overconfident if he/she delays the exercise of vested options, which are on average at least 67% in the money. In this study, we measure CEO overconfidence following the work of Yung et al. (2015) and add overconfident female CEO as a control variable.

Table 3.3 presents that environmental concerns are significantly mitigated in companies with overconfident female CEOs, and they are also contributing to increasing environmental strengths. Specifically, companies with overconfident female CEOs are around 52.11% less likely to have environmental issues and around 17.86% more likely to have positive environmental strengths scores. Therefore, our findings do

not support Hypothesis 3, which predicts that companies led by overconfident female CEOs would perform worse on environmental performance and are more likely to experience environmental concerns.

Numerous studies have evidenced that female CEOs are more risk-averse than their male counterparts and more willing to focus on running a business with low volatility. However, our findings suggest that female CEOs with overconfident traits would overcome inherent conservative values and further implement sustainability strategies.

[Insert Table 3.3 here]

3.6.2 Female CEOs with individualistic culture

In this subsection, we extend our analysis by evaluating the role of national culture in shaping female CEOs' decisions on environmental strategies. Specifically, we include a dummy variable to indicate if female CEOs come from individualistic countries as a control variable to our benchmark estimates.

The results are reported in Table 3.4. Our findings suggest that environmental issues are exacerbated significantly in companies with female CEOs from countries recognized as individualistic. Specifically, companies with female CEOs with individualistic culture are around 37.83% more likely to have higher environmental concerns. Our findings support Hypothesis 4 to some extent, which predicts that companies led by female CEOs with individualistic culture are more likely to experience high environmental concerns.

This finding attaches evidence to the fact that individuals from individualistic societies generally lack collective consciousness. Accordingly, they are less likely to consider the interests and welfare of others. As a result, we highlight that the benefits of female CEOs on mitigation environment concerns will be overshadowed by the values and beliefs of individualistic culture. In addition, our key results, as presented in the previous section, remain valid.

[Insert Table 3.4 here]

3.6.3 Overconfident female CEOs with individualistic culture

In this subsection, we combine the above ideas, including both indicators: overconfidence and individualistic culture, in our benchmark estimations.

The results are presented in Table 3.5. Our findings highlight that the female CEOs with overconfident traits would significantly reverse the negative effect of individualistic culture on environmental concerns. Notably, companies with overconfident female CEOs from countries recognized as individualistic culture are 51.09% less likely to have environmental concerns.

[Insert Table 3.5 here]

3.7 Robustness checks

3.7.1 The number of female board members

Critical mass theory (Kanter, 1977) suggests that the nature of group interactions depends on the size. When the size of a subgroup reaches a certain threshold or critical mass, the influence of this subgroup increases significantly. Implicating this finding in gender diversity studies, we expect a qualitative change only when women reach a certain threshold. Moreover, Manita et al. (2018) and Konrad et al. (2008) point out that the threshold for a female board is met when there are at least three female directors on the board. This means that only when there are at least three women on the board is it possible to increase the likelihood of hearing their voices and thoughts and significant changes in dynamics within the board. Therefore, we further filter our data to include at least three female board members in this section.

Table 3.6 presents the results. We show that our key benchmark results remain consistent. In addition, our findings reveal that the effect of female directors on increasing environmental strengths is more pronounced when there are at least three female board members on board. Specifically, a 1% increase in board gender diversity results in approximately a 37.27% increase in the likelihood of a company's environmental strengths scores greater than 0. The positive connection can be explained by leadership homophily theory. Specifically, the demographic similarities between or

among leadership group members would affect the ability and willingness of minority leaders to shape organizational outcomes (Glass et al., 2016). Therefore, female directors representing minority groups in the organization are only likely to shape organizational outcomes when the threshold is met.

[Insert Table 3.6 here]

3.7.2 The impact of previous environmental performance

The effect of female executives' strategies decision on environmental practices could also result from the previous year's environmental performance. Numerous studies have proved that companies with better sustainable performance would also capture financial benefits (see, e.g., Huang, 2013; Yoon et al., 2018). Therefore, companies with superior environmental performance in the previous year allow the managers to allocate resources to sustainability projects, further promoting corporate sustainability. To address this, we introduce the lagged environmental performance measure as a control variable to our benchmark estimation.

Table 3.7 shows that the previous year's environmental performance positively affects the company's environmental performance as expected. Specifically, companies with exemplary environmental performance last year still performed outstandingly, while those with environmental issues performed even worse. However, our key results remain consistent.

Notably, Table 3.7 also highlights that while companies with female CEOs are less likely to have environmental concerns, they lack the authority to enhance overall environmental performance. This could be attributed to female CEOs generally not having enough internal support and facing resistance to authority (Glass and Cook, 2016). Therefore, only when the size of females in the leadership teams reaches a certain threshold they have the potential to shape organizational strategies.

[Insert Table 3.7 here]

3.7.3 Include all CEOs irrespective of tenures

So far, we only considered CEOs with at least three years of tenure. In this subsection, we include all CEOs irrespective of tenure. Table 3.8 shows the results. We find that our key benchmark recommendations remain consistent. In addition, we suggest that

the improvement of female CEOs on environmental concerns is only present when the CEO is tenured for at least three years. This could result from the “lag times” in which strategic initiatives implemented by management manifest or become apparent (Hambrick and Mason, 1984).

[Insert Table 3.8 here]

3.7.4 Estimations with matching procedure

In benchmark estimations, we suggest that companies appoint female CEOs and gender diversity on boards to improve corporate environmental sustainability. In this subsection, we implement the propensity score matching procedure to address the potential concerns that the outstanding environmental performance in companies with diverse top management teams may stem from the inherent characteristics of these firms.

This approach helps us isolate the impact of female top managers on corporate environmental sustainability since we are going to produce a subset of companies with poor environmental performance that are similar in terms of certain firm characteristics to companies that perform outstandingly in environmental performance. Specifically, we follow a one-to-one caliper matching procedure and classify two groups of companies. They are Group A, a group of companies with outstanding environmental performance⁹. Group B consists of the remaining companies. Each firm-year observation from Group A will be matched with the closest observation in Group B according to two control variables, total assets (*Size*) and book leverage (*Book-Lev*). Moreover, since, in this study, we measure environmental performance with strengths, concerns, and overall scores, this matching approach is implemented in each of the sub-measure.

We further estimate our benchmark regressions with matched samples. The results are presented in Table 3.9. Consistent with benchmark results, our findings show that companies led by female CEOs have fewer environmental concerns than their male counterparts. Specifically, companies with female CEOs are about 37.04%¹⁰ less likely to have environmental concerns. The magnitude of the effect is significantly

⁹Here, we define companies with outstanding environmental performance if their overall scores (strengths) exceed 0; or have no environmental concerns.

¹⁰It is the marginal effect of female CEOs on environmental concerns.

more pronounced than the result in our benchmark estimation without the matching procedure. This could result from the matching procedure improved the large imbalance in terms of firm-year observations of companies with outstanding environmental performance to the remaining companies.

Moreover, the results of estimations with the matched sample also highlight the benefits of board gender diversity on environmental performance. Specifically, a 1% increase in gender diversity on board is associated with being around 41.75% more likely to have positive overall environmental scores.

[Insert Table 3.9 here]

3.8 Conclusions

Corporate sustainability has been a focal point for academics, investors, regulators, and business groups for a long time. In addition, rooted in Hambrick and Mason's (1984) Upper Echelons Theory, it is widely accepted that corporate outcomes are the result of collective choices by top management teams. As a result, numerous studies worked on examining how managerial characteristics influence corporate sustainability practices. However, prior studies primarily measured sustainability with overall performance (e.g. Bear et al., 2010; Lim and Chung, 2021). They are less focused on the environmental dimension.

This study aimed to contribute to this literature by examining the effect of female leaders on corporate environmental performance. In addition, our study investigated a more in-depth concern and measured environmental performance with strengths, concerns, and overall score separately. Specifically, we utilized a large dataset of US-listed firms from the KLD database from 1993 to 2018. Notably, we also extended our analysis by assessing how traits of overconfidence and national culture influence female CEOs' decisions on corporate environmental strategies.

Our results revealed that female CEOs are disposed of more concerning environmental issues than their male counterparts. However, since they do not have enough internal support and face resistance to authority, they lack the power to enhance overall environmental performance. Therefore, to improve overall environmental performance, we suggest a higher proportion of female directors on boards.

Our findings extend the literature on environmental sustainability and corporate governance. It also contributes to improving gender inequality. The impact of women on environmental action generates a significant amount of coverage and discussion today. The tangible benefits of female representation on boards in driving corporate sustainability provide evidence of diversity in top management teams.

This study also highlighted that female CEOs with overconfident traits would overcome inherently conservative values. As a result, companies with overconfident female CEOs face fewer environmental problems and better overall performance. In fact, the impact of overconfident CEOs on corporate sustainability is a relatively new area of inquiry in corporate governance. Moreover, the effects of overconfidence in light of gender differences have been particularly underrepresented. Therefore, our findings contribute to the literature on the role of executives' psychological traits on organizational outcomes.

Furthermore, our findings indicated that the benefits of female CEOs in mitigating environmental concerns would be overshadowed by the values and beliefs of an individualistic culture that emphasizes self-interest. In addition, our results also pointed out that overconfident traits would significantly reverse the negative effect of individualistic culture on environmental concerns.

Finally, we showed that the benefits of female executives in driving environmental sustainability remain consistent under various robustness checks.

Appendix C

Appendix C.1 Tables

Table 3.1: Summary statistics

Variables	Mean	Std. Dev.	Min.	Median	Max.	Obs.
Overall	0.035	0.185	-1	0	1	9,221
Strengths	0.069	0.178	0	0	1	9,221
Concerns	0.033	0.127	0	0	1	9,221
CEO female dummy	0.032	0.177	0	0	1	9,482
CEO age	56.675	6.862	27	57	81	9,482
Founder dummy	0.069	0.253	0	0	1	9,482
Overconfidence dummy	0.343	0.475	0	0	1	9,482
Individualistic dummy	0.729	0.444	0	1	1	9,482
Tenure	6.991	4.414	3	6	35	9,482
Ivy dummy	0.188	0.391	0	0	1	9,482
MBA dummy	0.268	0.443	0	0	1	9,482
Master dummy	0.088	0.284	0	0	1	9,482
PhD dummy	0.051	0.219	0	0	1	9,482
Female ratio	0.119	0.104	0	0.111	0.625	7,472
No. of directors	8.969	2.170	4	9	21	7,472
Nationality mix	0.085	0.148	0	0	0.800	7,367
Size	7.380	1.623	2.342	7.289	13.569	9,482
CapEx	0.051	0.049	0	0.035	0.277	9,445
BookLev	0.216	0.185	0	0.199	0.857	9,443
LAge	2.044	0.795	0	2.197	3.258	9,482

Note: This table presents the mean, standard deviation, minimum, median, maximum, and the number of observations for each variable. Data was filtered to only contain complete data from CEOs with at least three years of tenure.

Table 3.2: Benchmark estimation

Variables	(1) Overall	(2) Strengths	(3) Concerns
CEO female dummy	-0.142 (-0.36)	-1.299* (-1.65)	-3.101** (-2.45)
LCEO age	-0.602 (-1.11)	-0.136 (-0.14)	0.350 (0.24)
Founder dummy	0.085 (0.38)	-1.391* (-1.69)	-2.715 (-1.38)
Overconfidence dummy	-0.091 (-0.59)	0.216 (0.88)	0.529 (1.42)
Individualistic dummy	0.143 (0.98)	0.062 (0.24)	-0.405 (-0.89)
Tenure	0.008 (0.50)	-0.019 (-0.70)	-0.084** (-2.08)
Ivy dummy	-0.180 (-0.88)	-0.342 (-1.06)	0.052 (0.11)
MBA dummy	0.154 (0.81)	0.303 (1.11)	-0.042 (-0.11)
Masters dummy	-0.178 (-0.72)	-0.122 (-0.26)	-0.284 (-0.44)
PhD dummy	-0.148 (-0.38)	0.780 (1.61)	0.919** (2.04)
Female ratio	1.351* (1.96)	2.001* (1.96)	1.653 (0.93)
No. of directors	0.034 (0.91)	0.112** (2.18)	0.079 (1.12)
Nationality mix	0.969** (2.23)	0.893 (1.51)	-1.381 (-1.13)
Size	0.301*** (4.46)	1.295*** (13.66)	1.497*** (9.31)
CapEx	-2.040 (-1.58)	-1.409 (-0.60)	3.846 (1.43)
BookLev	0.109 (0.33)	0.274 (0.55)	2.074** (2.34)
LAge	0.247*** (2.91)	0.578*** (3.40)	-0.259 (-1.23)
Observations	6,254	6,254	6,254
Industry F.E.	YES	YES	YES
Year F.E.	YES	YES	YES

Note: This table presents the results from an ordered logistic model. Data are filtered to only contain data from CEOs with at least 3 years of tenure. Robust t-statistics are reported in brackets. *, **, and *** indicates significance at the 10%, 5% and 1% levels respectively.

Table 3.3: Estimations with overconfident female CEOs

Variables	(1) Overall	(2) Strengths	(3) Concerns
CEO female dummy	-0.889*** (-4.01)	-2.934*** (-3.63)	-1.937 (-1.32)
LCEO age	-0.593 (-1.09)	-0.192 (-0.19)	0.390 (0.27)
Founder dummy	0.105 (0.48)	-1.341 (-1.63)	-2.728 (-1.39)
Overconfidence dummy	-0.175 (-1.12)	0.108 (0.43)	0.578 (1.54)
Individualistic dummy	0.141 (0.96)	0.056 (0.22)	-0.402 (-0.89)
Tenure	0.008 (0.46)	-0.020 (-0.72)	-0.085** (-2.10)
Ivy dummy	-0.185 (-0.91)	-0.329 (-1.02)	0.053 (0.11)
MBA dummy	0.161 (0.86)	0.361 (1.36)	-0.049 (-0.13)
Masters dummy	-0.183 (-0.74)	-0.112 (-0.24)	-0.261 (-0.41)
PhD dummy	-0.143 (-0.37)	0.815* (1.68)	0.915** (2.03)
Female ratio	1.376** (1.99)	2.039** (1.97)	1.609 (0.91)
No. of directors	0.030 (0.80)	0.111** (2.15)	0.081 (1.14)
Nationality mix	0.976** (2.24)	0.881 (1.49)	-1.429 (-1.16)
CEO female*Overconf.	1.711** (2.24)	2.880** (2.33)	-23.704*** (-13.63)
Size	0.302*** (4.47)	1.301*** (13.69)	1.489*** (9.32)
CapEx	-1.871 (-1.43)	-1.234 (-0.52)	3.787 (1.41)
BookLev	0.110 (0.34)	0.254 (0.51)	2.078** (2.35)
LAge	0.247*** (2.90)	0.576*** (3.38)	-0.257 (-1.22)
Observations	6,254	6,254	6,254
Industry F.E.	YES	YES	YES
Year F.E.	YES	YES	YES

Note: This table presents the results from an ordered logistic model. *CEO female*Overconf.* indicating female CEOs with overconfident traits. Data are filtered to only contain data from CEOs with at least 3 years of tenure. Robust t-statistics are reported in brackets. *, **, and *** indicates significance at the 10%, 5% and 1% levels respectively.

Table 3.4: Estimations with female CEOs with individualistic culture

Variables	(1) Overall	(2) Strengths	(3) Concerns
CEO female dummy	-0.614 (-1.62)	-1.659 (-1.55)	-20.391*** (-22.93)
LCEO age	-0.602 (-1.11)	-0.143 (-0.14)	0.349 (0.24)
Founder dummy	0.081 (0.37)	-1.391* (-1.69)	-2.716 (-1.38)
Overconfidence dummy	-0.095 (-0.62)	0.213 (0.87)	0.529 (1.42)
Individualistic dummy	0.127 (0.85)	0.058 (0.23)	-0.406 (-0.89)
Tenure	0.008 (0.51)	-0.019 (-0.70)	-0.084** (-2.08)
Ivy dummy	-0.180 (-0.88)	-0.344 (-1.07)	0.052 (0.11)
MBA dummy	0.154 (0.82)	0.304 (1.11)	-0.042 (-0.11)
Masters dummy	-0.178 (-0.72)	-0.122 (-0.27)	-0.284 (-0.44)
PhD dummy	-0.147 (-0.37)	0.785 (1.61)	0.920** (2.04)
Female ratio	1.366*** (1.97)	2.001* (1.96)	1.653 (0.94)
No. of directors	0.033 (0.89)	0.112** (2.18)	0.079 (1.12)
Nationality mix	0.975** (2.24)	0.896 (1.51)	-1.380 (-1.13)
CEO female*Ind. culture	0.590 (0.98)	0.397 (0.29)	17.311*** (11.61)
Size	0.300*** (4.44)	1.295*** (13.67)	1.497*** (9.31)
CapEx	-2.022 (-1.56)	-1.400 (-0.60)	3.846 (1.43)
BookLev	0.100 (0.31)	0.273 (0.55)	2.073** (2.34)
LAge	0.249*** (2.92)	0.579*** (3.41)	-0.259 (-1.23)
Observations	6,254	6,254	6,254
Industry F.E.	YES	YES	YES
Year F.E.	YES	YES	YES

Note: This table presents the results from an ordered logistic model. *CEO female*Ind. culture* indicating female CEOs with individualistic culture. Data are filtered to only contain data from CEOs with at least 3 years of tenure. Robust t-statistics are reported in brackets. *, **, and *** indicates significance at the 10%, 5% and 1% levels respectively.

Table 3.5: Estimations with overconfident female CEOs with individualistic culture

Variables	(1) Overall	(2) Strengths	(3) Concerns
CEO female dummy	-0.818*** (-3.82)	-2.952*** (-3.69)	-1.963 (-1.35)
LCEO age	-0.591 (-1.08)	-0.202 (-0.20)	0.390 (0.27)
Founder dummy	0.094 (0.43)	-1.343 (-1.63)	-2.727 (-1.39)
Overconfidence dummy	-0.168 (-1.09)	0.106 (0.43)	0.577 (1.54)
Individualistic dummy	0.123 (0.83)	0.051 (0.20)	-0.401 (-0.89)
Tenure	0.008 (0.50)	-0.019 (-0.70)	-0.085** (-2.10)
Ivy dummy	-0.182 (-0.89)	-0.331 (-1.03)	0.053 (0.11)
MBA dummy	0.163 (0.87)	0.366 (1.37)	-0.049 (-0.13)
Masters dummy	-0.186 (-0.75)	-0.113 (-0.24)	-0.261 (-0.41)
PhD dummy	-0.151 (-0.39)	0.814* (1.67)	0.915** (2.03)
Female ratio	1.402** (2.02)	2.046** (1.97)	1.609 (0.91)
No. of directors	0.029 (0.78)	0.111** (2.15)	0.081 (1.14)
Nationality mix	0.967** (2.22)	0.877 (1.48)	-1.429 (-1.16)
CEO female*Overconf.*Ind.	1.804** (2.09)	2.979** (2.39)	-23.242*** (-13.44)
Size	0.302*** (4.47)	1.300*** (13.69)	1.489*** (9.32)
CapEx	-1.884 (-1.45)	-1.233 (-0.52)	3.790 (1.41)
BookLev	0.104 (0.32)	0.252 (0.51)	2.079** (2.35)
LAge	0.246*** (2.88)	0.575*** (3.38)	-0.257 (-1.22)
Observations	6,254	6,254	6,254
Industry F.E.	YES	YES	YES
Year F.E.	YES	YES	YES

This table presents the results from an ordered logistic model *CEO female*Overconf.*Ind.* indicating overconfident female CEOs with individualistic culture. Data are filtered to only contain data from CEOs with at least 3 years of tenure. Robust t-statistics are reported in brackets. *, **, and *** indicates significance at the 10%, 5% and 1% levels respectively.

Table 3.6: Empirical results with at least three female board members

Variables	(1) Overall	(2) Strengths	(3) Concerns
CEO female dummy	-0.241 (-0.55)	-1.862* (-1.86)	-3.474* (-1.90)
LCEO age	-0.640 (-0.59)	1.080 (0.48)	2.425 (0.69)
Founder dummy	-0.076 (-0.12)	-25.615*** (-15.53)	-23.541*** (-9.22)
Overconfidence dummy	0.372 (1.59)	1.043** (2.31)	1.179* (1.90)
Individualistic dummy	-0.072 (-0.29)	-0.257 (-0.59)	0.102 (0.11)
Tenure	-0.007 (-0.25)	-0.015 (-0.31)	-0.031 (-0.32)
Ivy dummy	0.483 (1.48)	0.604 (0.99)	-0.571 (-0.76)
MBA dummy	-0.550* (-1.79)	-0.331 (-0.74)	1.408* (1.80)
Masters dummy	-0.440 (-0.94)	-0.535 (-0.63)	-1.059 (-0.81)
PhD dummy	0.034 (0.06)	-0.486 (-0.49)	-1.472 (-0.71)
Female ratio	1.373 (1.42)	4.570** (2.36)	-1.663 (-0.51)
No. of directors	0.007 (0.10)	0.142* (1.65)	0.114 (0.89)
Nationality mix	-0.092 (-0.13)	0.410 (0.35)	0.613 (0.32)
Size	0.586*** (5.44)	1.801*** (8.10)	1.675*** (3.80)
CapEx	1.555 (0.58)	1.637 (0.31)	12.472* (1.66)
BookLev	0.119 (0.21)	-1.598 (-1.63)	-3.658 (-1.31)
LAge	0.335** (2.01)	0.637** (2.03)	-0.159 (-0.33)
Observations	994	994	994
Industry F.E.	YES	YES	YES
Year F.E.	YES	YES	YES

Note: This table presents the results from an ordered logistic model. Data are filtered to include CEOs with at least 3 years of tenure and 3 female board members. Robust t-statistics are reported in brackets. *, **, and *** indicates significance at the 10%, 5% and 1% levels respectively.

Table 3.7: Benchmark estimation with previous year's environmental performance

Variables	(1) Overall	(2) Strengths	(3) Concerns
Lag performance	10.781*** (27.18)	9.858*** (19.74)	13.115*** (17.04)
CEO female dummy	-0.275** (-2.22)	-1.217*** (-3.83)	-1.128* (-1.65)
LCEO age	-0.180 (-0.68)	0.110 (0.26)	1.331** (2.45)
Founder dummy	-0.010 (-0.10)	-0.797** (-2.09)	-1.845* (-1.78)
Overconfidence dummy	-0.096 (-1.31)	0.080 (0.82)	0.279** (2.30)
Individualistic dummy	0.084 (1.06)	-0.080 (-0.74)	-0.313** (-2.02)
Tenure	0.013* (1.76)	-0.002 (-0.15)	-0.069*** (-3.91)
Ivy dummy	-0.057 (-0.68)	-0.205* (-1.70)	0.070 (0.46)
MBA dummy	0.054 (0.70)	0.005 (0.05)	-0.137 (-1.02)
Masters dummy	-0.070 (-0.52)	0.000 (0.00)	-0.215 (-0.91)
PhD dummy	-0.117 (-0.69)	0.080 (0.37)	0.013 (0.03)
Female ratio	1.019*** (2.61)	1.135** (2.26)	0.136 (0.18)
No. of directors	-0.005 (-0.23)	0.048* (1.84)	0.028 (0.91)
Nationality mix	0.353 (1.41)	0.217 (0.69)	-0.879* (-1.71)
Size	0.132*** (3.71)	0.513*** (9.20)	0.429*** (7.10)
CapEx	-1.368 (-1.57)	0.258 (0.21)	4.626*** (3.59)
BookLev	-0.327* (-1.72)	-0.191 (-0.70)	0.831** (2.45)
LAge	0.131*** (2.62)	0.228*** (2.70)	-0.025 (-0.30)
Observations	6,254	6,254	6,254
Industry F.E.	YES	YES	YES
Year F.E.	YES	YES	YES

Note: This table presents the results from an ordered logistic model. Data are filtered to include CEOs with at least 3 years of tenure and 3 female board members. Robust t-statistics are reported in brackets. *, **, and *** indicates significance at the 10%, 5% and 1% levels respectively.

Table 3.8: Include all CEOs irrespective of tenure

Variables	(1) Overall	(2) Strengths	(3) Concerns
CEO female dummy	-0.201 (-0.60)	-0.681 (-1.22)	-0.792 (-0.75)
LCEO age	-0.185 (-0.43)	0.370 (0.47)	-0.058 (-0.05)
Founder dummy	0.089 (0.43)	-1.304** (-1.96)	-2.146 (-1.38)
Overconfidence dummy	-0.051 (-0.38)	0.088 (0.40)	0.205 (0.75)
Individualistic dummy	0.133 (1.02)	0.156 (0.70)	-0.162 (-0.48)
Tenure	0.009 (0.72)	-0.009 (-0.45)	-0.066** (-2.18)
Ivy dummy	-0.050 (-0.29)	-0.217 (-0.86)	-0.025 (-0.07)
MBA dummy	0.132 (0.86)	0.352 (1.62)	0.026 (0.09)
Masters dummy	0.029 (0.14)	0.139 (0.37)	-0.530 (-0.95)
PhD dummy	-0.409 (-1.01)	0.442 (0.88)	0.781** (2.13)
Female ratio	1.321** (2.15)	2.410*** (2.83)	0.593 (0.42)
No. of directors	0.016 (0.51)	0.110*** (2.71)	0.125** (2.04)
Nationality mix	0.750** (2.02)	0.974* (1.83)	-0.056 (-0.06)
Size	0.268*** (4.35)	1.179*** (14.12)	1.268*** (8.95)
CapEx	-1.068 (-0.98)	0.419 (0.21)	2.435 (1.10)
BookLev	-0.188 (-0.62)	0.029 (0.06)	2.177*** (2.88)
LAge	0.196*** (2.88)	0.521*** (3.83)	-0.121 (-0.70)
Observations	9,014	9,014	9,014
Industry F.E.	YES	YES	YES
Year F.E.	YES	YES	YES

Note: This table presents the results using the entire sample of CEOs irrespective of tenure length. Robust t-statistics are reported in brackets. *, **, and *** indicates significance at the 10%, 5% and 1% levels respectively.

Table 3.9: Benchmark estimations with matching procedure

Variables	(1) Overall	(2) Strengths	(3) Concerns
CEO female dummy	-2.436*** (-2.70)	-2.554*** (-2.81)	-5.089** (-2.34)
LCEO age	-0.366 (-0.25)	0.087 (0.07)	3.745 (1.51)
Founder dummy	-1.091 (-1.04)	-0.527 (-0.52)	-4.809** (-2.30)
Overconfidence dummy	(0.46)	0.067 (0.22)	2.022*** (3.42)
Individualistic dummy	0.339 (0.92)	0.093 (0.26)	-0.080 (-0.14)
Tenure	-0.049 (-1.23)	-0.036 (-0.97)	-0.263*** (-3.54)
Ivy dummy	-0.805** (-2.08)	-0.701* (-1.87)	1.248* (1.89)
MBA dummy	0.177 (0.51)	0.325 (0.92)	-0.989 (-1.57)
Masters dummy	-0.195 (-0.34)	-0.408 (-0.75)	-0.951 (-1.01)
PhD dummy	-0.204 (-0.24)	1.137 (1.48)	1.109 (0.96)
Female ratio	3.861** (2.33)	1.711 (1.12)	1.580 (0.56)
No. of directors	0.167* (1.94)	0.242*** (2.99)	0.167 (1.26)
Nationality mix	1.423 (1.44)	-0.071 (-0.08)	-0.692 (-0.35)
Size	1.431*** (8.33)	1.610*** (9.68)	1.985*** (5.24)
CapEx	-2.018 (-0.50)	-2.341 (-0.62)	6.798 (1.42)
BookLev	-0.867 (-1.00)	-1.085 (-1.32)	4.409*** (3.15)
LAge	0.820*** (2.97)	0.511** (2.20)	-0.816** (-2.08)
Observations	2,230	2,482	1,337
Industry F.E.	YES	YES	YES
Year F.E.	YES	YES	YES
Year F.E.	YES	YES	YES

Note: This table presents the results of estimations with matching procedure. To isolate the impact of female top managers on corporate environmental sustainability, we implement a propensity score matching procedure. In particular, we use a one-to-one caliper matching controlling for total assets (*Size*) and book leverage (*BookLev*). In addition, data are filtered to only contain data from CEOs with at least 3 years of tenure. Robust t-statistics are reported in brackets. *, **, and *** indicates significance at the 10%, 5% and 1% levels respectively.

Appendix C.2 List of variables

Variables	Description
Environmental performance measures	
Overall	Corporate overall environmental performance.
Strengths	Corporate environmental strengths.
Concerns	Corporate environmental concerns.
Independent variables	
CEO female dummy	A dummy variable takes the value of one when the CEO is female.
Female ratio	It measures the proportion of female directors on the board.
CEO controls	
Tenure	The number of years a CEO has been in this position.
Ivy dummy	A dummy variable that is coded as 1 if the CEO graduated from an Ivy League university.
MBA dummy	A dummy variable that is coded as 1 if the CEO has an MBA.
Master dummy	A dummy variable that is coded as 1 if the CEO has a master's degree.
PhD dummy	A dummy variable that is coded as 1 if the CEO has a PhD.
LCEO age	The nature logarithm of CEOs' age.
Founder dummy	A dummy variable that is coded as 1 if the CEO is the founder of the company.
Individualistic dummy	A dummy variable that is coded as 1 if the nationality of the CEO is identified as individualistic culture.
Board controls	
No. of directors	It measures the size of the board in terms of the number of directors.
Nationality mix	It measures the proportion of directors from different countries on the board.
Firm controls	
Size	The nature logarithm of total asset
CapEx	Capital expenditures divided by total assets.
LAge	The nature logarithm of firms' age.
BookLev	The book leverage is the sum of long-term debt and debt in current liabilities divided by total assets.

Appendix C.3 List of Ivy League Universities

Harvard University

Yale University

Princeton University

Columbia University

Brown University

Dartmouth College

University of Pennsylvania

Cornell University

Appendix C.4 Countries identified as individualistic culture

Australia

Belgium

Canada

Czech

France

Germany

Ireland

Israel

Italy

Netherlands

New Zealand

South Africa

United Kingdom

United States

Conclusions of the thesis

Building on Upper Echelons Theory (Hambrick and Mason, 1984), which emphasizes that the organization is a reflection of its top managers, and corporate outcomes are the collective impact of individual characteristics of executives by shaping corporate strategies (Abatecola and Cristofaro, 2018). As a result, massive attention has been placed on top management teams, represented by CEOs and the board of directors of corporations. In this thesis, we evaluate the impact of CEOs and the board of directors on corporate governance.

In chapter 1, we examined the role of CEO power on firm performance. Previous studies (e.g. Daily and Johnson, 1997; Larcker and Tayan, 2012) have demonstrated that CEOs are the most powerful members of corporations. In addition, it has been widely accepted that corporate outcomes are the results of CEOs exercising their power (Fleming and Spicer, 2014). As a result, the impact of CEO power on firm performance has been a long-term concern (e.g. Adams et al., 2005; Veprauskaitė and Adams, 2013; Song and Wan, 2019). However, the results of these studies are not conclusive.

We believe that the controversial results on the nexus between CEO power and firm performance are due to the existing literature that measured CEO power incomprehensively. Specifically, previous studies partially proxied the power index on CEOs' formal power (e.g. Veprauskaitė and Adams, 2013; Song and Wan, 2019) or informal power (Custódio et al., 2013 and 2019). CEOs derive formal power primarily from the legitimate authority vested by their positions in the organizations; and the extent to which they have an economic or voting interest in the organization. However, CEOs gain informal power primarily from their educational background, networking, and professional experience (Daily and Johnson, 1997; Larcker and Tayan, 2012).

To address the gap in measuring CEO power, in chapter 1, we complemented the measure of CEO power with a combination of formal and informal power. We find that informal power positively affects firm performance, while formal power diminishes firm performance. Our findings also highlight that with respect to the overall impact of CEO power on firm performance, prestige power is one dimension of in-

formal power, proxied by the CEOs' educational background and networking, which dominates other dimensions of power. To the best of our knowledge, we are the first to highlight the impact of formal and informal power concurrently on firm performance. Consequently, our study contributes to the literature on evaluating the impact of CEO power.

In addition, our study suggests that the board of directors should take a more holistic view of the CEO-specific attributes when selecting and hiring a CEO. CEOs' educational background and networking particularly need to be given additional weight. Our findings contribute to CEOs' succession plans. A report by PwC on the cost of CEO turnover due to failures estimates that shareholders pay about \$112 billions a year (Botelho et al., 2017). The root of the problem may lie in the difficulty of selecting the right candidate, however it may also lie in the process of hiring a CEO. Therefore, our research provides the board of directors with more tangible and comprehensive criteria when recruiting CEOs.

Moreover, this study is also beneficial to investors and policymakers by providing a broader perspective when evaluating CEOs' power. Our findings suggest that the informal (prestige) power, such as educational background and networking capabilities of the CEO, needs to be given additional weight over their professional experience or even formal power.

In chapter 2, we examined the impact of CEOs on employee satisfaction. Specifically, we evaluated what CEO characteristics would improve employee satisfaction. Employee satisfaction has been a long-term concern in academia and enterprises. However, according to a speech in December 2018 by Michael C. Bush, the CEO of Great Place to Work for in America, a global research and analytics firm, about 60% of working people in the world would say they are dissatisfied with their work.

In addition, with the growing emphasis on corporate responsibility from legal regulations and public scrutiny over the years, how businesses improve our society has been a focus of attention. However, previous studies on employee satisfaction typically focus on a specific narrow field, such as the service industry (see, e.g., Ding et al., 2012; McCann et al., 2014). To the best of our knowledge, this study is the first to examine the effect of CEO characteristics on employee satisfaction. Therefore, our study extends the literature in management and corporate governance.

Our findings suggest a certain CEO profile with longer tenure, broader educational knowledge, and lower ownership of company shares. CEOs with these characteristics are more likely to improve employee satisfaction. As a result, Our study is beneficial to investors and policymakers and CEOs' succession plans when evaluating CEOs.

Moreover, our findings regarding CEOs' educational backgrounds are worth attention. We found that CEOs with MBA degrees are more likely to improve employee satisfaction. However, CEOs with other master's degrees are less likely to improve employee satisfaction. We believe that the inconsistent results could attributed to the MBA programs covering broad areas of business administration^[11]. In addition, MBA programs embrace ethics courses and the propositions of stakeholder theory. Building on this logic, we would expect CEOs with MBA degrees have better performance in moral and ethical behavior, and they would care more about the benefits of others in the workplace. Therefore, it is not surprising that companies led by CEOs with MBA degrees have outstanding employee satisfaction performance. Besides, the positive effect of MBA degrees on employee satisfaction further supports our concerns on curriculums. Consistent with Manner (2010) and McPhail (2001), we call for more ethics education to help students cultivate a sense of moral commitment to others.

In chapter 3, we examined the role of female executives on corporate environmental performance. Since climate change is occurring, it is a consensus that protecting the environment should be prioritized. In addition, the 2021 COP26 climate summit, which calls for reducing and avoiding emissions, once again brought the urgency of environmental issues to the forefront. However, corporate environmental sustainability seems to have a long way to go, as environmental programs have the lowest contribution to shareholder value in the short run.

Chapter 3 focused on female executives. It has been widely accepted that women have better performance in moral and ethical behavior than men (Mason and Mu-drack, 1996). In addition, benevolence and universalism are intrinsic values rooted in women, and thus they tend to protect and enhance the well-being of others (Adams and Funk, 2012). Accordingly, as leaders, women are more likely to understand the various stakeholders and support the company's sustainability behavior (Lim and

¹¹See the example of the core courses of MBA in the University of Cambridge, Judge Business School.
<https://www.jbs.cam.ac.uk/programmes/executive-mba/curriculum/programme-structure/courses/>

Chung, 2021). As a result, we expected companies with diverse leadership teams to perform better in sustainability performance.

Our results highlighted that companies with female CEOs are less likely to have environmental concerns. However, to improve overall environmental performance, we suggest a higher proportion of female directors on boards. Because as a minority group in the organization, female directors are only likely to shape organizational outcomes when they reach a critical mass (Glass et al., 2016). Our findings extend the literature on environmental sustainability and corporate governance. In addition, the tangible benefits of female executives in driving corporate sustainability provide evidence for diversity in top management teams and thus could contribute to improving gender inequality.

Moreover, in our study, we also extended our analysis by drawing on how overconfidence and national culture influence female CEOs' decisions on environmental strategies. Our findings highlighted that female CEOs with overconfident traits would overcome inherently conservative values and thus facilitate corporate environmental sustainability. However, the benefits of female CEOs in mitigating environmental concerns would be overshadowed by the values and beliefs of an individualistic culture that emphasizes self-interest. Our findings contribute to the literature on the role of executives' psychological traits on organizational outcomes and extend the literature on cultural perspectives in management.

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