

Beyond "One Size Fits All": The Impact of gender and overconfidence on the non-executive director compensation structure

Abstract:

This paper investigates the impact of gender and overconfidence on the non-executive compensation structure. Using a large sample of non-executive directors obtained from BoardEx over the 1999-2019 period I document that women non-executives receive significantly lower compensation compared to male directors. Thus, I find evidence on the existence of a gender pay gap at the non-executive director level. Additionally, I find support that the woman under confidence is a contributing factor. Female non-executives are rewarded with lower incentive pay and demand higher salary premiums for bearing a certain level of pay risk. Together, these findings suggest, that at least to some degree, the gender biases and personal beliefs experienced by the directors, contribute to the gender gap at a non-executive level. Furthermore, my findings provide evidence that the non-executive compensation is not only driven by the firm-specific characteristics but also by the individual traits and the board position of the director. Consequently, companies should design their compensation contracts in such a manner that they will reflect those specific features. Thus, firms should go beyond "one size fits all".

Keywords: Non-executive directors, Compensation design, Managerial Biases, Gender, The gender pay gap, Corporate Governance, Behavioral Finance, Boards of directors

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1.Introduction

"To understand boards, we need to understand the people who sit on them" (Adams, 2017).

Non-executive directors facilitate several important functions within the corporate board. Their main role is to represent the shareholder interests by monitoring the top management and contribute to strategic decision-making. They also provide a valuable set of resources and bring various experience and expertise to the company. While previous research has mainly focused on the compensation design awarded to the executive team, like the CEO, little attention is paid to the design of compensation contracts for non-executive directors. Indeed, the scarce research investigating directly the non-executive director remuneration provides relatively mixed evidence. For instance, Boyd (1996) documents that the NEDs (non-executive director's) reimbursement has a significant and positive impact on the CEO compensation, and Hahn & Lasfer (2010) finds that the higher non-executive pay is essentially a repayment for an increase in executive compensation. This gap in the literature is impressive, given the fact that combined non-executive remuneration is usually higher than CEOs, and the corporate board is mostly comprised of outsiders (PwC, 2020). Additionally, individual directors can hold multiple board positions (Fich & Shivdasani, 2004) which can also contribute to their substantial income. Therefore, is this omission from the fact that is complex to determine the factors that underline the non-executive directors' compensation, or is this the case "one size does not fit all", i.e., recommendations and practices cannot be universal for all firms? Academics examine this matter with various theoretical views which are also used in the literature to study the benefits that those directors bring to the corporate board.

Prior studies on non-executive director remuneration have mainly utilized the well-known agency framework. Within this framework, the monitoring role of the NEDs helps alleviate the agency problem arising between the managers and those who govern the firm. The notion is that stronger monitoring should ensure the company is more efficient when drawing up contracts with the top management, so minimizing the agency cost. Going further, by bringing fresh perspectives in terms of "learned" and "adopted" skills as well as previous experience and expertise, the non-executives are required to actively participate in the decision-making process. Lastly, looking at the resource dependency theory, another main responsibility of the non-executive directors is to provide resources and valuable connections to the firm, through relations with numerous organizations and established networks with a large number of companies (Hillman & Dalziel, 2003). Consequently, the individual contribution of each director could be beneficial to the efficiency of the board. To build a theoretical framework for my study, I have utilized these three dimensions (namely, the monitoring and advisory function as well as the resource dependency theory).

By doing so, I contribute to the limited research on the topic of non-executive director remuneration, which has so far mainly focused on the specific firm characteristics as elements that shape the NEDs compensation. Furthermore, this study was highly motivated by the growing pressures for increased gender diversity in the boardroom. According to the research company Equilar, the number of female directors in 2020 is 25.9% compared to 18.9% in 2015. The study covers the largest 500 US companies, as per revenue. However, there is little to almost no improvement for female directors in the leadership (7.5% in 2020 as supposed to 7.4% in 2015) (Kerber, 2021). Those figures also include female non-executive directors. Therefore, one can assume women still face significant obstacles when attempting to pursue higher management positions. The number of women sitting on board has recently come under scrutiny since investors put higher consideration on diversity issues and few studies have built the notion that indeed the firm performance is positively correlated with greater gender representation. However, practitioners emphasize that despite the benefits that the women may yield, female directors are systematically rewarded with lower compensation in comparison to their male counterparts. As a response, regulatory bodies have purposed reforms to mandate gender equality pay and to promote the disclosure of gender pay gaps by companies (Lipman, 2015). Still, findings that aim to conclude on the topic of why females receive far less pay are inconclusive.

One of the prevalent reasons is women tend to be risk-averse in comparison to men. So female directors are more unwilling to accept income risk and to take part in salary negotiations. Another aspect is the female segregation in smaller firms or lower waged occupations. Moreover, gender discrimination and social standards might be further conditions that contribute to the gender pay gap (Hill, Plimmer & Boulton, 2010). In a comprehensive review of the specific determinants that might have an impact upon the outsiders' remuneration, Goh & Gupta (2016) find that indeed female non-executives are paid less. Hence, although most studies investigate this matter at the top management level, it becomes evident that gender pay discrepancies are also persistent at the non-executive director level. Consequently, my study aims to shed some light on the individual characteristics of the non-executive directors, and more specifically what drives the gap between female and male compensation.

The Traditional Financial theory relies heavily on the assumption that managers and investors are fully rational, leading to the agency problem (Jensen & Meckling, 1976). As a response, the more innovative literature in Behavioural Finance further addresses these concerns and documents that managers, like all other individuals, may suffer from psychological biases that have an impact on firm decisions (Malmendier and Tate, 2005). Remarkably, academics have failed to establish a connection between the psychological biases of the non-executive directors and how they cooperate with those of the top managers when making business choices. Since major corporate decisions require board approval before they can be implemented, the board of directors might have an essential influence on the company outcomes and should be considered a decision-maker. Therefore, the broad picture of psychological biases on decision-making in firms should consider not only the top management but also the non-executives as they usually hold the prevalent sits on the board. Specifically, some academics

have studied whether and to what degree overconfidence as a personal psychological bias, both in terms of emotions and cognitivism, plays a role in the firm's decision-making process. The concept of overconfidence has multiple spectra. For instance, the "better than average" effect (Huang & Kisgen, 2012) stipulates that overconfident people tend to overestimate their abilities and competence. Furthermore, individuals who experience this psychological bias can shift the accurateness of the information attributable to them so it can meet their positive beliefs about future outcomes. Moreover, the "illusion of control" aspect of overconfidence, suggest that directors overrate their ability to persistently hold control over the business activities and results (La Rocca, Neha Neha & La Rocca, 2019). According to Malmendier & Tate (2005, 2008), overconfident managers overstate their leadership capability responsible for firm future success and thus often inflate company value. In the financial literature, it is well documented that gender has a significant effect when it comes to value creation and decision-making. Studies also reveal women are less overconfident than men since they are more likely to underestimate their abilities and are extra thoughtful with financial matters (Barber and Odean 2001). Huang and Kisgen (2012) find that male managers are more inclined to participate in acquisition activities and typically companies managed by predominantly male boards are associated with higher debt financing, consistent with the notion that men are displaying higher overconfidence. On the other hand, female directors are found to have a positive corporate impact as they are affiliated with lower firm layoffs (Matsa & Miller, 2013), reduced acquisition activity and not as significant bid premiums (Levi, Li & Zhang, 2014). Thus, these papers support the view that females contribute to better decision-making. Additionally, drawing conclusions from the social role theory (Eagly, 2009), females exhibit collective behaviour, meaning that they are far more focused on sustaining relations and are more caring when it comes to the wellbeing of others. On the contrary, the man put greater value on qualities like ambition, power and status. Consequently, one can assume that the "soft" skills demonstrated by the female NEDs can play a positive role when winning the trust of executives, who alternatively may share company-specific information that could help women non-executives to make more informed decisions (Zalata, Ntim, Choudhry, Hassanein & Elzahar, 2019). Furthermore, women managers are associated with a higher company reputation (Heugens, Riel & Van Den Bosch, 2008) along with a greater alliance with shareholder interests and more comprehensive reporting. Also, economic-based theories in behaviour research advocate females are more risk-averse due to their specific psychological trades and beliefs. Females are found to be less aggressive and shy away from the competition. Indeed, women managers are characterized as more independent, unbiased, conservative and objective. Consequently, these "solid" trades (namely objectivity, independence, the willingness to accept lower risks) can create a prerequisite for more effective monitoring of the top management team as supposed to male directors (Zalata, Ntim, Choudhry, Hassanein & Elzahar, 2019).

This raises the question of why female directors are so important and if they yield so many benefits why women still receive lower compensation in comparison to their male counterparts. This paper aims to examine these pay discrepancies at the non-executive level. Essentially, I will explore

whether the behavioural differences between male and female managers affect their compensation contracts. More specifically, I will investigate the impact of gender and overconfidence on non-executive remuneration contracts and if companies optimally adjust those contracts to reflect the personal biases and beliefs exhibited by those directors. To my knowledge, this is the first paper that combines the individual with behavioural characteristics to study the determinants of non-executive compensation.

Using a sample of non-executive directors obtained from BoardEx for the period 1999-2019, I first document that female non-executives receive significantly lower compensation compared to their male counterparts. My findings are further confirmed by a propensity-score matching approach which controls for self-selection bias and potential discrimination in the company's appointment choices. These results are in alliance with prior literature, supporting the existence of the gender pay gap at the non-executive level (Goh & Gupta, 2016). After controlling for job responsibilities and positions, although not significant, I found that female Chair Directors receive higher pay. Former research supports this outcome; indeed, it is well-established that the compensation of the non-executives is positively related to committee positions and board meeting attendance (Belcredi & Bozzi, 2019). Looking at individual and firm-level determinants that could influence female pay, I find that compensation is increasing with independence, tenure and age. However, contrary to previous studies, my results stipulate there is a negative relation between previous board experience and qualifications when looking at the women managers.

Next, to examine the behavioural biases that may impact the NEDs compensation contracts design, I have utilized the proven overconfidence measures from Malmendier and Tate (2005,2008). In general, I find support to the perception that overconfident directors receive greater option-based incentives. These findings adhere to Malmendier & Tate (2005, 2008) and Humphrey-Jenner et al., (2016). Focusing on the female directors, consistent with the view that women are less overconfident, I find women NEDs are awarded significantly less incentive pay compared to male directors. Moreover, female directors require higher risk premiums when facing unpredictable outcomes. It is more probable that this risk premium will be rewarded in terms of additional cash, i.e., higher salary as supposed to higher option or equity compensation (variable pay). Thus, the gender discrepancies in the remuneration awarded to the non-executives might stem from the women directors under confidence. Essentially, the pay gap might be attributable to the design of the compensation packages that female non-executives are more willing to accept. To conclude, I found that, at least to some degree, the gender biases and personal beliefs experienced by the directors, contribute to the gender gap at the non-executive level.

This thesis makes the following contributions to the literature. While the issues concerning the gender pay gap have been vastly discussed in the media and among regulatory bodies, academic evidence in this area remains scarce. By incorporating an assortment of various tests and methodologies, I confirm women are persistently rewarded less than men, and this notion holds at the non-executive director level. Therefore, I bring a fresh perspective and additional argumentation to the ongoing debate

surrounding the pay inequality between genders and the importance of its disclosure. Furthermore, I deliver a possible explanation that sheds some light on the gender pay discrepancies. Firstly, the fact that women are less overconfident than men, and secondly the lack of women directors on the corporate boards. By doing so, I contribute to the compensation literature, and more specifically I add to the studies examining the impact of gender-specific choices involving risk and incentive-based remuneration (e.g., Graham, et al.,2013). Furthermore, I compliment the Behavioural Finance literature focusing on the aspect of overconfidence since my findings support the notion that indeed the lower risk aversion and under confidence experienced by women partially affect the present gender pay gap (Malmendier and Tate, 2005). Lastly, I provide insight into the corporate governance stream of research. This study adopts the well-known corporate governance theories to observe the way that organizations draft compensation contracts for their NEDs, conversely, academics mainly utilize these same theories to conclude on the benefits that non-executives bring to the corporate boards (e.g., Adams and Ferreira, 2009; Ahern and Dittmar, 2012). Consequently, this study touches upon the assets and capabilities of the non-executive directors, thus providing intuition as to why these directors are so valuable.

The remainder of the paper is structured as follows. Section 2 provides a theoretical background. Section 3 summarizes the related literature and develops my hypothesis. Section 4 describes the sample and research design. Section 5 presents my results and robustness tests and Section 6 concludes.

2. Theoretical Background

Many academics have questioned the importance of non-executive directors sitting on the board. The best practices of the Corporate Governance code convey that the critical responsibility of independent directors is their monitoring role; they need to ensure that the management is acting in the best interest of the shareholders. However, in practice, non-executive directors can be proactive, helping the management in decision-making or passive under a powerful CEO. Therefore, corporate governance theories contribute to the understanding of the role and responsibilities of non-executive directors in organizations and how they impact the company performance. Namely, agency theory, resource dependency theory and human capital theory (Nicholson & Kiel, 2007). Before diving further into non-executive compensation would be beneficial to explore these theories to develop further understanding of the role and responsibilities of non-executive directors.

2.1. Agency theory

Most public companies separate ownership from a control between those who govern the company (managers) and the owners (shareholders); this is known as the agency relationship. According to the agency theory, the agent should act in the best interest of the principle. Nevertheless, if the same agent is deemed to be irrational, they might not always fulfil their part of the bargain by

acting in his/her interest instead of principles. Intuitively both parties aim to maximise their wealth while implying the lowest cost. Consequently, an agency cost arises to mitigate these divergent interests. According to Jensen and Meckling (1976), agency costs can be split into three categories: monitoring costs; bonding costs and residual loss. Where monitoring costs represent the payment made to the agent to solidify the alignment of interests, bonding costs stand for the security that the management would act in the principal's best interest and residual loss is characterized as a cost that arises because those interests are rarely homogeneous. Also, Jensen and Meckling (1976) further stipulate that agency costs can be mitigated by optimizing control and monitoring. In this line of thought, boards are the instrument that can ensure the agency relationship is regulated. This can be accomplished by undertaking regular audits as well as different assessments of performance (Davis et al., 1997). Furthermore, non-executive directors, who are also believed to be independent of the management, can successfully facilitate both the monitoring and control function. Thus, a greater representation of independent non-executives sitting on the corporate boards will be optimal for establishing good corporate governance and better representation of the shareholder interests (Nicholson & Kiel, 2007).

2.2. Resource dependence theory

The resource dependence theory is another corporate governance theory used by academics to develop an understanding of the objectives and role of the non-executive directors serving on the corporate boards. Bezemer (2007) examines the benefits that non-executive directors bring to the organization. More specifically, his research emphasizes the importance of network connections. Non-executive directors are crucial players in the corporate world who have the power to minimize reliance on outside sources. For instance, when a well-connected non-executive director is appointed to the board, the firm can gain access to valuable resources as well as approval and support from vital external parties. Cohen et al. (2008) point out that the key role of non-executive directors is to bring the partnership to the company. Moreover, NEDs can be valuable when shaping firm strategy and adopting new policies.

2.3 Theory and non-executive director remuneration

2.3.1 Secondary agency relation

One of the reasons explaining the scarce research on non-executive compensation in comparison to CEO and executive remuneration is the general intuition that the role of non-executive directors is far less critical than the one of the top management team. However, non-executive directors are beneficial as they act both as a monitor of the CEO and the executive team as well as facilitate the shareholder interests within the company. Consequently, interests may differ, and agency problems may arise between shareholders and non-executive directors (Bryan et al., 2000). This concept has been first noted by Perry (1999) as the "secondary agency costs". Secondary agency costs become evident when shareholders and non-executive directors' interests are dissimilar. When non-executives benefits are

closely related to the management, this creates a harmful view of the director's primary responsibilities. Precisely, the control and monitoring function. Little research is conducted on the secondary agency problem in contrast to the well-established agency theory (Cordeiro et al., 2005; Cordeiro et al., 2007). One of the reasons that explain why independent directors' interests could be further aligned with executives rather than the principals is the concept of group behaviour. For instance, when the board directly appoints non-executive directors. Furthermore, if an affiliation exists between the nomination committee and the higher management, this could result in distortion of shareholder interests. Additionally, Cordeiro (2005) provides evidence that the director capability to extract benefits is related to the number of years that an individual director is employed in the company. Thus, non-executive compensation should be designed in such a manner that aligns directors' objectives with those of the shareholders.

2.3.2. Financial motivation and incentives for non-executive directors

The growing academic and regulatory interest in non-executive compensation design as an incentive mechanism relates to the fact that non-executive remuneration has dramatically increased since the late nineties. This increase gained attention because outsiders can influence their compensation level when holding a board position in the firm's remuneration committee (Cordeiro et al., 2000; Hahn, 2006). Furthermore, Yermack (2004) shows that non-executive remuneration used as an incentive tool has received notable criticism as it is believed to induce the opportunistic behaviours of the directors. The idea behind this view is that non-executive directors not only play a crucial role in determining their compensation but also can impact the duration of their service in the company. As a response to this matter and the increasing pressure from institutional investors, the Corporate Governance standards were developed. According to the provisions of best practice, one way of mitigating the secondary agency problem is to reward non-executives with stock and stock options. Cordeiro et al. (2000) argue this pressure created by influential investors not only leads to an increase in duties and potential legal responsibility, but also to more time and effort non-executive directors must spend in their directorships. Consequently, this accountability to the organization is a prerequisite for the demand for higher compensation.

In the US, stock and options rewards are a well-established part of non-executive remuneration. The National Association of Corporate Directors advocates outsiders should be paid for their "value". Correspondingly, CalPERS, a large public pension fund, recommends that non-executive remuneration should include a minimum of 50% stock, where the majority should consist of stock options (Cordeiro et al., 2000; Hahn, 2006).

Another aspect of the non-executive's compensation plan is cash remuneration. Vafeas (1999) illustrates that for most US-based companies cash rewards consist of annual base salary, flexible fees related to the number of board and committee meetings attended. Along with cash rewards, firms typically provide directors with incentive plans to ensure their interests are aligned with those of the

shareholders. Generally, there are two types of incentive contract-restricted stock plans and stock option plans. A restricted share stock plan provides the NEDs with a pre-arranged number of shares annually worth an agreed amount of money on the grant date. Directors are not allowed to sell these shares before the restriction period ends. The second type of incentive award is the stock option plan. Similarly, to restricted stocks, options are also paid yearly. Usually, the fair market value of options is identical to their exercise price. Farrell et al. (2008) investigates 237 Fortune 500 companies for the period 1998-2004 and finds that companies prefer paying variable equity compensation rather than cash and fixed-number equity compensation. To summarize non-executive compensation contracts, comprise fees related to board and committee meetings, stock rewards and annual retainers.

Most studies argue the determinants of non-executive remuneration are not the individual director characteristics like skills, gender and age, but compensation contracts are drafted based on the role of the individual director in a given organization, including the number of committees participating in, and whether he/she is the chairman/chairwoman of a committee. However, in the early 2000s, a series of corporate scandals and the increasing number of lawsuits against boards combined with the absence of qualified non-executives disturbed the corporate world. Changes in board compositions as well as attracting new talent were rather problematic since, simultaneously, the demand for skilful and independent directors was growing. Adding to this and with the new requirements for higher board diversity, especially in terms of gender, it is reasonable to assume that companies will benefit from appointing more female directors as this would allow them to choose from a larger talent pool.

3. Literature review and hypothesis development

Previous research on non-executive remuneration shows there is no single consistent approach providing evidence on the factors and policies adopted by companies to determine non-executive compensation. The economic perspective, dominant in most studies, builds upon the well-known agency theory. This view assumes the well-designed compensation plan will limit the director's opportunistic behaviour, thus will help mitigate the secondary agency problem arising between the management and the shareholders. In this line of thought, providing performance-based incentives will facilitate better the principal interests in the company (Marchetti and Stefan Elli 2009). Therefore, such papers investigate the pay-performance concerning non-executive remuneration. However, the evidence is not consistent throughout the studies (Fernandes 2007).

As a response, a more recent stream of research has shifted the perspective of agency theory by incorporating different social, behavioural, psychological and managerial theories that aim to explain better the affiliation between company perceptions and policies used for drafting outsider's compensation contracts. According to Gomez-Mejia and Wiseman (1997), labour market theory plays a crucial role in determining the director's compensation. The variation in pay is a result of the market

demand for directors. Furthermore, Ezzamel and Watson (1998) suggest it would be optimal for companies to reward outsiders with a "going rate" to minimize the director's retention. Linking agency theory to the resource-dependence perspective, Boyd (1996) finds a significant relation between non-executive remuneration, company profitability, firm size and directors' wealth. Similar results hold for directors compensation in non-profit organizations. Thus, these studies confirm the assumption that human capital has an impact on the determinants of non-executive compensation.

In contrast, the opposite view has also been recognized in the literature. The economic theory has gained criticism due to the assumption that a clear link exists between the firm and the compensation contract as well as the belief that directors will adopt opportunistic behaviour. Consequently, academics have turned to the social-psychological motivation that drives non-executive compensation. Cordeiro and Rajagopalan (2003), for instance, examine the institutional theory and show that companies may adopt similar practices when drawing compensation contracts due to pressure imposed by large institutional shareholders and different regulatory bodies. Furthermore, Gomez-Mejia and Wiseman (1997) note that firms may also rely on well-established remuneration practices to gain popularity in their industry. Also, Adams (1963) introduces the equity theory and further stipulates employees choose effort level in accordance to the reward they are receiving back, where internal (comparison with other employees in the company) and external (similar firm or industry) benchmarking exist (Martin and Peterson, 1987). Gomez-Mejia and Wiseman (1997), suggest that compensation plans for outside directors should be drafted in such a manner that they will facilitate the firm's competitive strategy and future development. If this convention fails to be followed, this can result in a detrimental outcome for the organization as directors will lack the proper motivation to implement the company strategy effectively. However, investigated separately, the theories mentioned above, provide limited evidence on how companies evaluate optimal compensation contracts for their non-executive directors (Bender, 2003). This limitation brings the need for further research grounded on the social-economic perspective. Following behavioural scholars, Filatotchev et al. (2006) found a negative relationship between powerful executives and the incentives provided for independent directors. Other academics like Hempel and Fay (1994) have primarily focused on firm-specific characteristics as determinants of outsider's compensation. They study a large sample of US-based firms and document that remuneration plans are usually designed following the company board size as well as the frequency of board meetings. However, those features are not correlated to the CEO remuneration or company profitability as Hempel and Fay (1994), Boyd (1996) confirms this hypothesis and finds that company size, performance and directors stock rewards are the primary factors shaping the outsiders' remuneration contracts. Fitch and Shivdasani (2006) examine the introduction of stock-based compensation for non-executive directors, whereas Ryan and Wiggins (2004) study the importance and contribution of outsiders to the board. The main drawback surrounding these studies is they are limited to the objectivity of independence rather than the directors' characteristics including gender, personal beliefs and individual expertise needed for fulfilling such specific high-profile jobs. Although these findings contribute to the general

understanding of the non-executive compensation design, it cannot be assumed results might be limited only to the firm characteristics, thus not a strictly accurate representation of the real-world practices. Therefore, I will look further into the economic perspective of the human capital theory by incorporating the individual characteristics and the personnel psychological and behavioural view of the NEDs.

Since agency theory predominately highlights how corporate governance features impact contracts designed for outside directors, it is vital to look at the way the board is made up. Regarding the board composition, Carver (2013) reports on the benefits that a director's diversity brings to the firm. Schippers et al. (2003) further propose that greeter diversity in terms of gender, expertise and skills are vital for the company long term success. Building upon this notion, Huse and Rindova (2001) document that diversified boards can attract various shareholder groups and therefore strengthen their position within the organization. Board diversity can be defined with different aspects such as gender and ethnic diversity as well as the individual's skill set and age. However, this paper will further focus on the remuneration design for female non-executive directors as a part of the broader regulatory debate on board diversity.

3.1 Gender Diversity

The question of higher gender diversity on the corporate board rose before 2017 when asset managers and large groups of institutional shareholders introduced voting policies regarding this matter. A belief exists that greater female representation on the board has a positive impact on the decision-making process as diversification brings different perspectives. The rationale is women might need to invest sufficiently in human capital, like education, expertise and experience, compared to their male peers to gain the attention of the decision-makers for top corporate positions. Moreover, since women executive directors are often employees or owners of the company, it can be argued non-executives might have to be even more knowledgeable and skilful to be freely appointed to the board. The human capital theory proposes that qualifications and tenure result in economic benefits, therefore higher remuneration. Additionally, professional success can also be considered a part of human capital as it relies on specific know-how. Climbing the corporate ladder reflects both competence and knowledge. Female non – executives, unlike female executives that are usually characterized with long tenure in the firm, are more likely to have various managerial experience in previous positions. Never-the less, this variation of skills can boost the thinking out of the box mindset required for successful problem-solving.

The trend of increasing gender diversity in the boardroom is expected to grow in the upcoming years. Indeed, the latest Deloitte Report "A global Perspective" shows that female directors worldwide are 16.9%, which marks a 1.9% increase compared to the previous report published in 2017 (Women in the boardroom A global perspective, 2020). Therefore, it would be beneficial to investigate further how female directors are compensated. Board independence is another aspect of interest in regulators and the public due to the monitoring and advisory role these directors execute in the company.

Combining these two features, the first part of this thesis aims to investigate how this emerging trend of appointing women directors impacts their compensation design and, more specifically, which factors drive the female non-executive directors' remuneration.

Despite the tremendous theoretical foundation, existing studies provide mixed evidence regarding the board's gender composition and firm performance. Also, as most research on compensation design builds upon the well-established corporate governance theory, it is only logical to address gender diversity in the same manner. Three main theories are facilitating the belief that greater gender diversity would be beneficial for corporate boards, enhancing performance and strengthening the effectiveness of the board: agency theory, resource dependency and human capital theory (Terjesen, Sealy & Singh, 2009). Looking from an agency perspective, Francoeur et al. (2008) confirm women bring different viewpoints on complex business matters; furthermore, this can help minimize the informational biases in formulating business strategy. Virtanen (2010) studies Finnish boards and finds that female directors are more likely to take a proactive role in comparison to their male colleagues. Moreover, women usually ask more questions (Bilimoria, 2006), have a participating leadership style and better communication skills (Eagly and Johnson, 1990). Also, Pan and Sparks (2012) find organizations with greater female director representation adhere to higher ethical standards. Furthermore, other studies show that gender diversity is positively associated with more detailed and transparent public information (Gul, Srinidhi & Ng, 2011), thus appointing female non-executive directors to the board can help strengthen the relationship with shareholders. Additionally, women directors contribute to board development assessment as well as designing and implementing training programs (Nielsen and Huse, 2010). Female NEDs are also found to be better monitors of the top management. Precisely, women directors are associated with better meeting attendance and are more likely to sit on monitoring committees such as the audit and compensation committees (Adams and Ferreira, 2009). Also, Adams and Ferreira (2009) show that CEO turnover is more sensitive to stock performance when there is a larger female board representation. Collectively, this evidence facilitates the idea that women are more effective monitors. Furthermore, turning back to the resource dependency theory, female managers will bring unique and valuable resources as well as new connections to their boards.

In conclusion, a significant share of the literature suggests that greater female representation will have a positive impact on the board. Although at present, there is an increasing trend in appointing women to the management team, they are still relatively few female non-executive directors. Consequently, they may be considered a scarce resource, placing firms in need to compete for a limited pool of female directors. If this prediction is correct, companies will be willing to pay additional remuneration rewards to attract and retain talent. In this line of thought, women, directors should earn higher compensation. This leads to the first hypothesis:

Hypothesis 1: Female non-executive directors are paid a higher compensation.

Following the economic view, there is mixed evidence on the benefits of gender diversity. Campbell & Minguez Vera (2009) suggest that a higher representation of female directors is correlated with lower company value. A study on the Norwegian boards provides similar results by documenting that declines in both market value and operating performance are associated with the existence of gender quotas (Ahern and Dittmar, 2012). Also, Singh et al. (2008) find that female directors are usually more qualified before the appointment, meaning it is highly unlikely for women with the same expertise to be selected. Also, women can experience bias since they are not part of the "old boys' network" (Smith, 2014). Another aspect is one of Tokenism, suggesting that the primary reason for recruiting women in board positions is the pressure imposed by external forces (Farrell & Hersch, 2005). Combining these arguments with the well-established evidence from the compensation literature that the gender gap in pay exists, it becomes uncertain whether Hypothesis 1 will be accepted or rejected.

3.2 Overconfidence

Some well-established papers relating to behavioural finance have focused on the perception of managerial overconfidence (Malmendier and Tate, 2005). Brown and Sarma (2007) define overconfidence as the overestimation of the individual own abilities and consequences relating to these individuals' circumstances along with the underestimation of the risk or change of future events (Xuan, 2006). The concept of overconfidence arises from psychological literature and is based on several conventions. First, persons tend to overvalue their abilities, when comparing themselves to an anonymous benchmark or a peer group (Weinstein and Klein, 2002). Moreover, often individuals tend to rate their qualities above average due to self-serving attribution bias. Therefore, they are more likely to relate personal accomplishments to abilities rather than pure luck, hence enhancing personal self-confidence (Tversky, 1995). Also, people are likely to be more overconfident about outcomes they believe are under their control (Weinstein and Klain, 2002). Most studies investigating overconfidence have primarily focused on the top management team. It has been well-documented in the literature that overconfident CEOs can have a significant impact on many corporate policies, therefore one can assume directors who exhibit this psychological trait would take different board decisions compared to rational boards. For instance, Beavers and Mobbs (2019) suggest that overconfident directors have higher attendance on board meetings and are more likely to sit on the nomination or compensation committee. Additionally, overconfident directors are associated with the appointment of an overconfident CEO. Weinstein (1982) shows that overconfident individuals want to be in control; therefore, we can assume that overconfident NEDs can dominate the decision-making process and influence other managers to follow their perceptions. For example, overconfident directors can encourage the CEO to take on risky projects through their authority to evaluate CEO performance and set CEO compensation. Building on this idea, Hirshleifer, Teoh & Low (2011) finds that overconfident directors are associated with not only higher R&D expenses but also greater innovation yields, such as citations and patents. Since overconfidence plays a crucial role in decision-making, it is vital to consider the effect that this

psychological bias has on corporate policies and the company value as well as on the shareholder wealth creation achieved through investment decisions. Therefore, it is important to investigate how compensation contracts optimally adjust to this bias. The scarce literature investigating non-executive compensation has mainly focused on the "objective" variables of their role, without accounting that outsiders' remuneration also varies with their professional profile, believe and expertise. The lack of attention paid to the NEDs personal characteristics probably allows these studies to obtain only partial results about the remuneration policies and practices adopted by the listed companies (Marchetti and Stefanelli 2009).

As previously mentioned, often studies rely on the economic perspective of analysis through the agency theory, identifying the compensation as an incentive instrument of the board to mitigate agency problems existing between shareholders and management. So, the compensation is linked to the company's performances (Bebchuk & Fried, 2003). Thus far, however, academics have failed to view directors as potentially self-serving agents who would need to be properly motivated to fulfil their role. For instance, if a company pursues a multibillion-dollar acquisition, this will also require an excessive amount of work from the board. Studies show that non-executive directors often face time constraints due to their involvement with positions in other firms (Fich & Shivdasani, 2006) and due to reputational concerns and legal suits, outsiders are likely to be risk-averse (Kaplan & Harrison, 1993). However, these same studies do not acknowledge the directors' characteristics. Since overconfident people are likely to engage in riskier behaviour due to their belief in positive outcomes, we can assume directors possessing this bias will be willing to accept greater risks. Furthermore, non-executives are rewarded with stock compensation, a portion of their income and forthcoming wealth is related to the future value of the company. Consequently, overconfident directors may want to further gain from such compensation schemes as due to their positive beliefs in their abilities, they might intentionally pursue riskier strategies. Deutsch & Valente (2012) advocates outsiders may act in their interest due to dissimilar risk preferences, personal connections with the business elite or their ties with the management. Therefore, providing incentive-based compensation contracts should help mitigate the secondary agency problem, hence motivating directors to monitor executive activities and provide performance-enhancing resources to the firm (Deutsch & Valente, 2012). Consequently, as non-executive compensation is similar to one of the executives, one can anticipate that companies will adjust their compensation schemes following the overconfidence level of the NEDs so that risk-taking levels are optimal (Gervais, Heaton and Odean, 2011).

Humphrey-Jenner et al. (2016) explore the executive overconfidence and compensation structure. Their findings support the notion provided by previous research that overconfident bias is positively associated with incentive heavy compensation contracts. The paper further stipulates it is relatively inexpensive for the firm to offer remuneration schemes with greater option and equity intensity since overconfident executives are more bullish about their capability and their company's prospects. Hence, they tend to overvalue such compensation. Furthermore, the paper extends this view

and emphasis that another benefit of option-incentive contracts offered to overconfident managers lies in the belief that indeed this contract will induce higher effort and investment levels that are otherwise costly to achieve with rational managers. Humphrey-Jenner et al. (2016) also find this result holds for non-CEO directors. Moreover, the influence of non-CEO executive overconfidence on compensation is not related to the CEO overconfidence. This shows that companies draw compensation contracts from the individual characteristics of the manager and not solely on the firm-specific features. Since non-executive directors are highly responsible for the firm future value and their duties and compensation design resembles one of the executives, we can expect this estimation to be incorporated in their remuneration plans. Although both genders can exhibit the psychological trait of overconfidence, evidence from the literature suggests females respond differently to pay-for-performance than males. Indeed, recent evaluations advise the pay for performance practice is accountable for the growth in wage dispersion in the US (Lemieux et al., 2009). Women may respond less to incentive pay for several cultural and psychological reasons. For instance, men and women have different emotional reactions to uncertainties that are likely to affect the possibility of outcomes. Thus, faced with performance pay, female directors might take actions that decrease the variance but also the performance. This result may emerge due to the difference in confidence. Generally, men are considered overconfident, while women are more emotional, thoughtful, and not as individualistic (Byrnes et al. 1999). Overconfidence has an impact on the incentives as agents rationally will select to employ different strategies to enhance performance only if the expected return is higher than the cost, and the predicted return depends on their assessment of their probability of success. Under confident managers will undervalue this probability, thus will be less likely to improve performance to benefit from performance pay (Bandiera, Fischer, Prat & Ytsma, 2017). Lahav et al. (2015) investigate whether compensation methods impact male and female overconfidence. The study is attended under the circumstances of natural stress caused by a final exam, and the task concerns the participants' self-evaluation in a genuine situation. The findings show that fixed compensation is optimal for reducing overconfidence of females in settings requiring self-assessment of personal abilities and stress, while the male participants, who tend to be more overconfident than women, evaluate their skills more precise when provided with performance-based compensation (Lahav, Nir & Siniver, 2015). Another aspect that may play a role in setting directors' compensation is the negotiation process. Babcock and Laschever (2009) find women are less likely to negotiate their remuneration. Indeed, the study shows that eighty-five per cent of men believe that it is in their own hands to make sure that the firm will reward them "what they were worth"; however, only seventeen per cent of women shared the same belief. This proves further women tend to undervalue their abilities, which can also be contributed to the view that they are less overconfident.

From a theoretical view, managers are more overconfident than the rest of the population due to selection bias. Consequently, people seeking managerial positions are inherently more overconfident about their abilities as future managers (Gervais, Heaton and Odean, 2003). Additionally, Gervais, Heaton and Odean (2003) find overconfidence can increase the value of the firm. Thus, the decisions

of overconfident managers align better with the interest of the shareholders than those of rational managers. Therefore, we can conclude that since non-executive directors act as the "ultimate" agents of the shareholders and bear crucial responsibility for the firm future value, their characteristics such as gender and overconfidence would be incorporated in their compensation designs. Considering that the overconfidence bias can be mitigated or rewarded with incentive compensation contracts and the fact that female and male managers respond differently to pay for performance, I hypothesise the following:

Hypothesis 2: Overconfident female directors are paid differently compared to overconfident male directors.

4. Research Design

4.1 Sample

The data sample is obtained from BoardEx and Compustat databases available at Wharton Research Data Services. The dataset is unbalanced as not all firms have the same number of observations. The BoardEx database covers most publicly traded US companies along with some of the largest private firms. However, for the purpose of this research, I have focused only on the listed US corporations. The law does not bound companies to disclose the compensation of the non-executives, which explains to some extent the limited research provided on this topic. However, under the Securities and Exchange Commission's ("SEC"), listed firms in the US stock exchange are required to do so. Therefore, the US setting will best facilitate the purpose of this study.

To begin with I used the BoardEx database to obtain individual directors characteristics and compensation data since this database provides the most comprehensive information at a director level. Compustat is used to extract company financial information for the control variables. BoardEx provides "Company ID" as a unique firm-level identifier that is not compatible with other financial data sources. However, BoardEx contains CIK, ISIN¹ and the firm name as additional identifiers. At a firm level, I merged BoardEx and Compustat using the CIK numbers and the six-digit CUSIPs (derived from the ISIN). To ensure the accurateness of the matches, I have further compared the company names from BoardEx with the company names from Compustat. Furthermore, I used CRSP to obtain information on the company stock. Additionally, I attempted to maximize the number of observations instead of directly dropping those with missing data. The only observations excluded are observations related to the construction of the overconfidence measure since they are vital to the analysis. All other missing values are treated as zeros. Lastly, motivated by previous studies, I have omitted financial and utility firms with SIC codes varying from 4900 to 4999 and 6000 to 6999 as they are subject to differential

¹ The International Securities Identification Number (ISIN).

legislation and regulations. After these alterations, the final sample contains 15,282 firm-year observations for the period 1999 – 2019.

4.2 Measuring Director Overconfidence

The greatest challenge faced in this research is to construct a reasonable measure of overconfidence. Approximating for overconfidence is fundamentally hard as no direct measures are examining this psychological trait. Previous literature in the field of financial research provides several methods of measuring overconfidence. Malmendier and Tate (2005,2008), for instance, adopt both a quantitative and qualitative approach to assess CEO overconfidence. Firstly, the proxy for CEO overconfidence by examining the executive's option exercising behaviour. The concept behind this approach is that risk-averse, undiversified CEOs will not hold their options up to the expiration date. Furthermore, the researchers also suggest a qualitative measure based on media publications. CEO overconfidence is further confirmed if the executives use several times the words "confident" and "optimistic" as supposed to "reliable" and "conservative" in published interviews and articles. However, this thesis will only look at the quantitative measure of overconfidence.

Along with the annual compensation and bonuses for serving the board, directors' remuneration plans also include company stock options. I have followed the method used in Malmendier and Tate (2005,2008) to compute the overconfidence measures which, allowed me to distinguish the overconfident non-executives. For this purpose, I used the BoardEx database. BoardEx offers comprehensive remuneration data, including the option rewards of all directors and their timing events. When the options are deep-in-the-money they need to be exercised as soon as they become exercisable. If directors fail to do, so they would face under – diversified idiosyncratic company risk. Consequently, I used this concept to create a proxy for overconfidence by recognizing NED's who repeatedly do not diversify their assets in the corporation. Following Malmendier and Tate (2005,2008), I have applied a threshold of 67% ² as a cutoff point in classifying options that are deep in the money, thus finding directors who exhibit the overconfidence psychological trade. I used BoardEx as a source to extract the exercise price for both exercisable and non-exercisable options held by each non-executive for each year.³ However, for the purpose of this research, the sample is restricted only to exercisable options. Moving forward, I have compared the exercise price of the options held by the non-executives to the average stock price of that company in the last fiscal year. When the median stock price is more than the 67% threshold established for the exercise price of that company in the last year, I have presumed

² The variable Holder 67 is constructed following Malmendier and Tate (2005,2008). They have utilised the Hall and Murphy (2002) framework as a conceptual guide for the purpose of establishing a rational benchmark for percentage in -the-money or above at which the directors should exercise newly vested stock options.

³ The BoardEx data base provides 'na – options -wealth' table which contains details regarding the options held by each director in a firm for each fiscal year. This includes the number of both exercisable and inexecrable options; the exercise price; the vesting date and the date at which the options will expire etc.

the options are deep-in-the-money. If the director is rational, those options should have been disposed of through the year but remain unexercised at the year-end. Malmendier and Tate (2005,2008) consider a manager overconfident if he/she holds options that are at least 67% in the money at two consecutive years. However, after performing various robustness tests, Hirshleifer et al. 2012 documents that results remain unchanged if the director holds 67% or more vested options only once in the sample. This study follows the ladder approach. Klayman et al., (1999) imply that overconfidence is a persistent trait, consequently once a director has been identified as overconfident, he/she remains overconfident for the entire sample period. The percentage of moneyness for each director in each year is calculated as follows:

$$\text{Option moneyness} = \frac{\text{Stock price} - \text{exercise price}}{\text{exercise price}} * 100$$

In the model, the stock price represents the average stock price over the last fiscal year and the exercise price is the strike price of exercisable options awarded to the directors. Furthermore, I have calculated the options that are in the moneyness for every director in each year and aggregated NED's option stock when they have several exercisable options that have not been disposed of through the year. The director is then classified as overconfident if he /she delays the exercise of vested 67% in-the-money options at least once while sitting on the board. The final data set consists of 15,286 non-executive director observations. Out of the whole sample, 5,082 directors are labelled as overconfident, among those 1,107 are found to be overconfident females.

4.3 Alternative reasoning of option-based overconfident measures

When establishing overconfidence measures, the financial literature conveys the assumption that directors are under-diversified, which results in overexposure to the idiosyncratic firm risk. Consequently, this provides them with a greater incentive to adopt early exercising behaviour. Thus, directors must have a positive view of the firm's prospects if they hold their options above a certain threshold. Opposingly, Malmendier and Tate (2005,2008) suggest there might be other explanations why executives decide not to exercise. Some reasons considered are signalling, board pressure, inside information as well as personal risk tolerance. Since overconfidence is believed to be a personal trait, one can conclude that non-executive directors might also suffer from this psychological bias. Therefore, this study will briefly examine alternative interpretations of the directors' options exercising behaviour.

4.3.1 Risk Tolerance

Individual risk preferences may have a crucial impact on the director's decision to dispose of his/her company assets. Previous studies suggest two expressions of overconfidence, specifically overestimation and miscalibration (Campbell et al.,2011). Managers may hold their options as they have a higher risk appetite and not only due to overconfidence. Alternatively, it has been argued that risk tolerance fails to address the unwillingness to using leverage financing. CEOs with higher risk tolerance

would be more prompt to increase the company debt when undertaking new projects. Accordingly, non-executive directors experiencing the same psychological bias could also be in favour of such decisions. However, Malmendier and Tate (2005;2008) find the opposite to be true. A further concern about the option-based measure of overconfidence is that it could address the underestimation of stock volatility as supposed to the overestimation of forthcoming earnings. The no-arbitrage option pricing theory stipulates that option value rises simultaneously with volatility. Building on this notion, studies document that high variance leads to earlier options exercising behaviour (Bettis, Bizjak and Lemmon 2005; Carpenter, Stanton and Wallace 2009). Therefore, underestimating variance should result in a delay in option exercise. Consequently, the option -based variable would indeed measure under confidence rather than overconfidence (Malmendier & Tate, 2005, 2008, and Yan,2011).

4.3.2 Optimal exercise behaviour

Deciding on the most favourable time to exercise options can be challenging as the ideal exercise time depends on the market stock forecast. Additionally, the stock price can further vary with different estimates like tax and interest rates as well as dividend pay-outs. The tax rate can be one of the main reasons which contribute to either the early exercise or the holding of option grants. Supposing that a director wants to exercise early, he/she would need funds to exercise. Therefore, if they opt to borrow, they will owe interest, but if personal resources are used, they will sacrifice the interest that would have been earned on that monetary reward. Also, early exercise prompts an immense tax charge. Typically, director compensation is taxed at regular rates on the intrinsic "value gain ", the variance between the strike and the stock price. The tax is payable in the present tax year, particularly upon early exercise. Accordingly, this could motivate to hold options or to induce early exercise so that directors can benefit from tax incentives. If they deliberate the stock will depreciate, they will exercise quickly and only be deemed to pay income tax. However, if the options are held for a year, the director would pay a lower rate of capital gains tax. Besides, the strike price and timing of an option could be other considerations when estimating a favourable exercise time. As the time value of options might be significant so it could be rational for directors to hold their options.

4.4 Empirical models and variables

4.4.1 Research method on the impact of gender on the non-executive director compensation

To test the hypothesis developed previously in this study, I use Ordinary Least Square Regressions (OLS)⁴. In addition, all regression models consider variables recognized in the field of compensation research. The full list of variables is disclosed in Appendix 1, Table A.

⁴ Following the approach of Malmendier and Tate (2005) and Hirshleifer et al., (2012) my paper also uses OLS regression to approximate the research model.

The following base regression model is applied to examine the first hypothesis, namely, whether gender influences non-executive director compensation:

(1)

Ln(Total Compensation)

$$\begin{aligned}
 &= a_0 + \beta_1 \text{Female} + \beta_2 \text{Age} + \beta_3 \text{Number Directors} + \beta_4 \text{Comitee roles} + \beta_5 \text{Indepenent} \\
 &+ \beta_6 \text{Ln Network Size} + \beta_7 \text{Previous Boards} + \beta_8 \text{Current Boards} + \beta_9 \text{Tenure} \\
 &+ \beta_{10} \text{Number Qualifications} + \beta_{11} \text{Firm Size} + \beta_{12} \text{ROA} + \beta_{13} \text{Market Capitalization} \\
 &+ \beta_{14} \text{Tobin's } Q + \beta_{15} \text{Leverage} + \beta_{16} \text{R\&D} + \beta_{17} \text{MTB} + \beta_{18} \text{Capital expeniditre} \\
 &+ \beta \text{Industry and year controls} + \epsilon
 \end{aligned}$$

The dependent variable in the first equation (1) is the compensation awarded to the non-executive director during the year. The level of compensation is examined through two measures: total compensation (total cash and non-cash compensation) and total direct compensation (comprised of total compensation plus other cash compensation, employers defined retirement and pension contribution for the period). The independent variable of interest is Female, an indicator variable which equals 1 if the director is female and 0 if male. H1 suggests that female directors receive higher compensation since they might be perceived as a valuable resource to the firm if that is the case the coefficient of Female Director should be significantly positive. However, if the gender gap exists on the non-executive level, the female coefficient would be negative. Furthermore, to evaluate the determinants of non-executive remuneration, a set of director-and company-specific independent measures are comprehended in the regression. The measures are selected in such a manner that they aim to reflect the service, monitoring and resource dependence roles and theories explaining the non-executive compensation.

Firstly, the variable independent delegates for the official statement of independence⁵, as required by the Sarbanes- Oxley act, i.e., the US Corporate Governance Code. Secondly, the service variables selected for this study cover the individual director's skills and competence. Directors age (Age), time on the board (Tenure) as well as current (Current Board) and previous board positions (Previous Boards) are proxies for directors' experience and expertise and are likely to be positively associated with compensation⁶. Ogden and Watson (2012) discover that when deciding on the director's compensation packages, often the remuneration committee takes into account the individual's competence and knowledge to attract and retain talent, thus creating a prerequisite for the company

⁵ The Sarbanes–Oxley Act does not specifically specify independence of the NEDs. However, a formal description of independence is provided under section 301 (best practices for board appointment and committee purposes). An ‘independent director’ is considered as one who is independent of the management and not affiliated with any business or other relations which can materially intervene with the application of professional judgement ("Sarbanes-Oxley Act - Summary of Key Provisions", 2021).

⁶ The variables Current and Previous boards relate to the number of current and previous boards of listed company board sits held by the individual director (Goh & Gupta, 2016).

long-term success. Moreover, experience gained in former boards is recognized as an illustration of status and external validity in the labour market (Fama and Jensen, 1983). Yet, tenure might also indicate the director's involvement with the executive team. Indeed, (Vafeas,1999) finds non-executives who have spent substantial time in a firm might develop personal relations with the top management team therefore might fail to fulfil their monitoring role. Furthermore, in alliance with the resource-based theory, this paper further incorporates the variable network size which measures the connectedness of the individual director from previous employment, education and other activities. Following Singh et al.(2008), this study includes variable capturing the director's education. The number of qualifications and their specification can offer insight into each director's ability to provide well-informed recommendations to the board, hence their ability to actively participate in the decision-making process. In that manner, DeFond, Hann, and Hu (2005) reveal the market reacts positively to companies that employ directors with vast accounting experience in their audit committees. Education can be an intriguing variable since it will not only signify the individual level of competence but can also provide an intuition about networking. As mentioned before, female directors can experience prejudice while serving the board or even before the appointment, as they may lack the connections gained by their male counterparts in elite schools, i.e., " the old boy network ". Number of qualifications measures the numbers of qualifications obtained by the individual director at the last, the Annual Report Date (BoardEx data dictionary, 2021). In alliance with the above-mentioned measures of expertise, I expect that education will be also positively related to compensation. Lastly, the model also contains the variable committee roles. This allows me to control for additional monetary rewards in respect of meeting fees paid to the non-executive directors since those roles require further involvement and responsibilities (Adams&Ferreira,2009; Boyd,1996; Brick et al.,2006; Cordeiro et al.,2000; Linn&Park, 2005). Committee roles provide an estimate for the main firm committees including the Audit Committee; the Remuneration Committee and the Nomination Committee where the NED serves during the fiscal year.

4.4.2 Firm Characteristics

This paper further includes several firms -level control variables grounded on findings from previous research as well as related studies on non-executive compensation. All company-level measures are lagged with 1 year because often compensation is designed at the start of the new year. The firm size provides a notion for the company business activities and reflects the complexity of the company operations. Moreover, previous studies found a positive connection between firm size and non-executive compensation (Cordeiro et al., 2000; Hempel&Fay, 1994). I have constructed Firm size as the logarithm of closing total assets. Another conventional variable in the compensation research is the Market-to-book ratio (MTB) (Katz, &Gomez-Mejia, 2000). MTB is vital as it indicates the firm future growth opportunity, also found to have a positive affiliation to non-executive remuneration (Linn&Park, 2005). MTB is designed by adding the company market capitalization with the company total debt, then divided by the book value of total assets. Firm performance is estimated with the

accounting measure return on assets (ROA), and the financial measures MarketCapitalization⁷, Capital expenditures and Tobin's Q. I have calculated ROA by dividing the net income by the total assets. Opposed to the accounting measure ROA, which reflects past performance, Tobin's Q captures future market expectations, this is a reasonable proxy for future competitive advantage (Montgomery and Wernerfelt, 1988). These measures aim to indicate the potential pay-for-performance rewards available to the NEDs. Evidence from previous research mostly concludes pay is greater for firms characterized by a larger size, various growth opportunities and superior firm performance. Leverage, which is computed by the division of long-term debt on total assets, provides an estimation for the likelihood that additional monitoring in the firm will be necessary to minimize further agency conflicts arising from the debt. Yet, mixed evidence exists on the affiliation between debt and compensation (Mehran, 1995). Furthermore, this study includes the total number of directors on the board used as a proxy of the board size. Two prevalent intuitions explain the link between board size and non-executive remuneration. Firstly, smaller boards might be a criterion for the bigger involvement of the non-executive directors, therefore they will receive higher compensation (Hempel&Fay,1994). Secondly, some papers document NEDs sitting on larger boards are better rewarded (Brick et al., 2006).

A firm may have various non-executive directors per year and the individual compensation plan may vary with the specific industry. Following Yermack (1995), this thesis includes industry and year fixed effects in the regression model to capture director-level variation. Moreover, I have conducted additional robustness tests to further evaluate the reliability of my results. The robustness tests are presented in the results section.

4.4.3. The non-executive board position and remuneration

Following the approach of Belcredi & Bozzi (2019), this study aims to go one step further in the investigation of the determinants of non-executive compensation. For this purpose, I have extended the base model (1), i.e. the relation between gender and non-executive compensation as follows:

(2)

Ln(Total Compensation)

$$\begin{aligned}
 &= a_0 + \beta_1 \text{Female Chair} + \beta_2 \text{Female} + \beta_3 \text{Chair} + \beta_4 \text{Age} + \beta_5 \text{Number Directors} \\
 &+ \beta_6 \text{Comitee roles} + \beta_7 \text{Indepent} + \beta_8 \text{Ln Network Size} + \beta_9 \text{Previous Boards} \\
 &+ \beta_{10} \text{Current Boards} + \beta_{11} \text{Tenure} + \beta_{12} \text{Number Qualifications} + \beta_{13} \text{Firm Size} \\
 &+ \beta_{14} \text{ROA} + \beta_{15} \text{Market Capitalization} + \beta_{16} \text{Tobin's Q} + \beta_{17} \text{Leverage} + \beta_{18} \text{R\&D} \\
 &+ \beta_{19} \text{MTB} + \beta_{20} \text{Capital exependitre} + \beta \text{Industry and year controls} + \epsilon
 \end{aligned}$$

⁷ For the computation of the Market Capitalization, Capital expenditures and Tobin's Q refer to Table A Appendix 1.

The dependent variable in the second regression model (2)⁸ is the remuneration paid to the non-executive board member throughout the year. The independent variable is the Female Chair, an indicator variable that equals 1 if the director holds a chair position and is also female. The non-executive directors might have several roles within the management team therefore, their compensation should reflect those roles accordingly. NEDs who hold chair positions receive greater compensation as normally pay is related to the individual's effort and expertise. Indeed, previous studies imply the compensation awarded to non-executives who are also Chairs has a far greater resemblance to the compensation awarded to the executives. Additionally, prior studies reveal the monetary benefits are positively related to committee positions and attendance of board meetings. Therefore, I expect that non-executives who are also Chairs or participate in one or more committees would receive higher rewards (Belcredi & Bozzi, 2019).

4.4.4. Research method: The impact of gender and overconfidence on the non-executive remuneration

To test the second hypothesis, stipulating that overconfident female directors are paid differently compared to overconfident male directors, I applied the following regression models:

(3)

Ln(Total Compensation)

$$\begin{aligned}
 &= a_0 + \beta_1 \text{Holder67} + \beta_2 \text{Age} + \beta_3 \text{Number Directors} + \beta_4 \text{Comitee roles} + \beta_5 \text{Chair} \\
 &+ \beta_6 \text{Independent} + \beta_7 \text{Ln Network Size} + \beta_8 \text{Previous Boards} + \beta_9 \text{Current Boards} \\
 &+ \beta_{10} \text{Tenure} + \beta_{11} \text{Number Qualifications} + \beta_{12} \text{Firm Size} + \beta_{13} \text{ROA} \\
 &+ \beta_{14} \text{Market Capitalization} + \beta_{15} \text{Tobin's } Q + \beta_{16} \text{Leverage} + \beta_{17} \text{R\&D} + \beta_{18} \text{MTB} \\
 &+ \beta_{19} \text{Capital exependitre} + \beta_{20} \text{Industry and year controls} + \varepsilon
 \end{aligned}$$

And:

(4)

Ln(Total Compensation)

$$\begin{aligned}
 &= a_0 + \beta_1 \text{OC Female} + \beta_2 \text{Female} + \beta_3 \text{Chair} + \beta_4 \text{Age} + \beta_5 \text{Number Directors} \\
 &+ \beta_6 \text{Comitee roles} + \beta_7 \text{Independent} + \beta_8 \text{Ln Network Size} + \beta_9 \text{Previous Boards} \\
 &+ \beta_{10} \text{Current Boards} + \beta_{11} \text{Tenure} + \beta_{12} \text{Number Qualifications} + \beta_{13} \text{Firm Size} \\
 &+ \beta_{14} \text{ROA} + \beta_{15} \text{Market Capitalization} + \beta_{16} \text{Tobin's } Q + \beta_{17} \text{Leverage} + \beta_{18} \text{R\&D} \\
 &+ \beta_{19} \text{MTB} + \beta_{20} \text{Capital exependitre} + \beta_{21} \text{Industry and year controls} + \varepsilon
 \end{aligned}$$

⁸ The second regression model uses the same dependent variables as model (1), i.e., Total compensation and Total direct compensation.

The dependent variables in both equations are Total Direct Compensation, Total Compensation and Option Compensation. The independent variable in the first regression model is Holder_67 which captures the overconfidence of the individual non-executive director. Whereas the independent variable in the second regression model is OC Female, a binary measure that equals one if the director is female and is classified in the overconfidence group. All control variables are comparable to the measures used in the previous regression equations and are described above.

5. Results

5.1 Descriptive statistics

Table 1 provides an overview of the director's sample, both individual and firm characteristics. The sample is comprised predominately of male directors 13,157 in contrast to 2,129 female non-executives. Interestingly, about half of the female directors are labelled as overconfident.⁹ Some studies find that gender differences in risk -aversion and overconfidence are no longer evident, especially in higher-level positions (Atkinson, Baird, and Frye, 2003). Furthermore, female directors succeeded through a rigorous selection process, so one could expect little to no difference between genders when examining the overconfidence bias. Thus, this intuition might explain the higher percentage of overconfident females in the sample. The overconfidence measure Holder 67 classifies 46.33% of the NEDs in the whole sample as overconfident, slightly lower than the benchmark set by previous research.¹⁰ However, traditional research examining overconfidence focuses on CEOs and executives rather than non-executives.

Table 1 further depicts that the average tenure of the directors in the sample is 6.3 years, NEDs age is on average 62 years, and they are commonly sitting on two boards. The vast expertise and experience are characterized by having two degrees on average complimented with four previous board roles. In alliance with resource-dependence theory, the individuals are well-connected with a network size of a medium of 1518 contacts.

A challenge faced in this research is the limited availability of data on non-executive option compensation. Previous findings provide mixed evidence on the reasoning for firms to reward NEDs with stock options. On one hand, options compensation is beneficial for cash-constrained firms as a substitute for cash salary (Yermack,1995). Options are also tax-deductible, providing the flexibility of creating non-debt tax shields (Babenko andTserlukevich, 2009). Also, stock options are valuably attributed to retain and sort specific employees (i.e., in the case of overconfidence). Oyer and Schaefer

⁹ The sample consist of total 2,129 Female Directors of which 1,107 are found to be overconfident.

¹⁰ Malmendier & Tate (2005, 2008) and Hirshleifer et al., (2012) label 51.3 % and 61.1% of the executives as overconfident, respectively.

(2005) state that stock options attract optimistic and productive employees who put a greater value on the options compared to the market price. Alternatively, this is believed that stock options provide a reward for the collective performance, which induces free-riding (Oyer 2004). Furthermore, as mentioned earlier, the disclosure of non-executive compensation is not bound by the corporate laws which lead to lesser disclosure. Hence, the data availability upon the subject is scarce. The number of observations on option compensation is 7,846 in contrast to 15,286 for total compensation.

[Insert Table 1]

5.2 Non-executive compensation structure and gender

Table 2 provides the results of the OLS regressions used to test Hypothesis 1: Female non-executives are paid a higher compensation. The first two regression models focus solely on the impact of gender on the dependent variables Total Compensation and Total Direct Compensation. Models three and four go one step further to account for remuneration alterations arising from the individual's position, i.e., if the NED sits on the board as Chairman/Chairwomen. Whereas columns five and six depict the variance in the remuneration attributable to Female Chair directors. The coefficient of Female non-executives is significantly negative at a 5% level, thus contrary to H1 this study finds strong evidence that female directors receive lower compensation in comparison to the male counterparts. Therefore, H1 is rejected. These findings control committee positions and are persistent after controlling for age, experience, know-how as well as firm characteristics. Furthermore, the intuition of these results is supported by Farrell and Hersch (2005) and Singh et al. (2008). According to these academics, employing females on the board might be interpreted as tokenism, hence a symbolic effort of the management team to fulfil the provisions and codes of best practice as well as to satisfy the stakeholder demands for diversity. Thus, females "monitor" or "token" statue causes them to be perceived as not as valuable compared to male directors. One possible explanation could be that since women are chosen from a limited talent pool, they may lack the skills and previous experience of their male colleagues. For instance, Ahern & Dittmar (2012) find that newly appointed female directors have held fewer board positions and are often younger than their male counterparts. Furthermore, shareholder activism not necessarily stands for the idea that diversity leads to more value creation. Indeed, an analysis performed by Bloomberg shows 5 of the largest US activist funds managed to employ around a hundred directors, for five years, among them only seven were women. This may indicate shareholders are interpreting female recruitment to the board as a sign firm is less engaged in maximizing returns than achieving public goals (Solal & Snellman, 2021). Hence, appointing female directors might be considered an expensive experiment. For instance, a few years ago, Apple's investors rejected the company diversity plan to appoint more minorities to the board since these policies would be too restrictive. At the time the management team was composed of eighteen board members, of whom fifteen were white males (The Guardian, 2021). Since investors are mostly concerned about earnings, engaging in diversification can result in a negative market reaction. In this line of thought, the remuneration

committee might deliberately penalize female directors by offering them lower compensation. The aforementioned notion is further supported by the "taste of discrimination" theory introduced by Becker (1971). According to his findings, employers who dislike a certain group of individuals will reward those individuals with substantially lower pay than equally competent employees in the more favourable group. So, if investors (whose interests are represented by the board) experience a discrimination bias against women directors, females will receive lower remuneration than their male colleagues, despite possessing comparable skills and working in similar companies (Elkinawy & Stater, 2011).

Controversy, the introduction of international gender diversity reforms, like gender quotas and the newly established California law¹¹ aims to minimize judgement by shifting from the "old boy network" and assuring that competent women are allowed to lead. Previous research also claims the superior capability of female directors to positively influence various governance structures and firm outcomes. For instance, Adams and Ferreira (2009) document a positive relationship between gender diversity and company performance. Moreover, a different stream in the literature shows that the presence of female directors efficiently prevents corporate fraud and corruption (Ho, Li, Tam & Zhang, 2014). Hence, previous studies and the real-life practice deliver mixed results on the stakeholder view upon appointing women on the board.

As predicted, the role held by the non-executives within the board is an important factor in setting their compensation, although not significant, models 5 and 6 (Table 2) provide evidence of a positive relationship between Female Chair and both Total and Total Direct Compensation. Since being a Chair requires specific leadership skills and expertise as well as exerting extra effort, the board might find female directors more suitable for the role. Indeed, Virtanen (2010) documents that female board members, in contrast to their male peers, are more inclined to take proactive roles on their boards. Moreover, Eagly and Johnson (1990) find women adopt a participative leadership style and possess better collaboration skills. Besides, the regression results show that membership in a board committee is linked to higher compensation due to the extra effort and time required for such roles. Therefore, the role of NED within the board explains variances in pay that may exist across directors.

Table 2 provides further support of the established observation that tenure and age are positively associated with non-executive remuneration (Adams and Ferreira, 2009). The above results confirm this belief also holds for women directors. However, the coefficients for previous board experience and qualifications are significant and negative. The ladder stipulates that firms put a higher emphasis on the current performance of the female director within the company rather than experience and skills that are "learned" in an academic environment or gained through previous positions. Furthermore, the lack of a woman in the top position is often clarified with the speculation that they are not part of the "old boy network", that often defines boards (Smith, 2014). Commonly, directors with diversified networks

¹¹ Under the California law all publicly traded companies that operate in the State of California should have at least one female director sitting on the board till the end of 2021. Boards with five members should appoint two females, while boards of six need to have three women. Firms that do not comply will face substantial fines.

are regarded as a treasured resource to the firm, as one of the main responsibilities of the non-executives is to bring various connections to the firm, which could explain the adverse relationship between Network size and compensation awarded to female directors. However, women directors are characterized as much more independent, thus they better fulfil the objective of the NEDs role. Independence is a prerequisite for better counsel and monitoring of the board, therefore should have a positive influence on firm value. Consequently, this could be perceived as an advantage by the shareholders so would shift upwards the compensation. The results presented in Table 2 support this view as the relationship between independence and compensation is highly significant.

Existing research on the topic of non-executive compensation has vastly focused on firm characteristics. It is well-established that firm size has a positive impact on the outsider's compensation (Adams & Ferreira, 2009). Since the coefficient for firm size is positive and significant, the general increase in remuneration due to the complexity and larger responsibilities arising from managing a large firm will also result in higher female compensation. However, the regression models show an inverse relationship between the female compensation and the MTB ratio. This result might highlight a free-ride problem evident in companies with greater growth options and larger boards. Moreover, a possible explanation might be that such firms require agility and more informed decision-making, aspects that might be lost due to information asymmetry amongst the management (Lehn et al., 2009). Contrary, I have found the coefficient for Tobin's Q is positive and significant. This indicates the remuneration of female NEDs is positively correlated with firm complexity and benefits from monitoring since Tobin's Q is used as a proxy for investment opportunities. Moreover, a statistically significant correlation is observed between leverage and compensation. Palvia et al. (2013) find women on board are less overconfident in their risk assessment and may promote more conservative business strategies and lower debt financing, thus lower corporate leverage. This intuition provides support to the view that female directors add value to the management and the decision-making process. Furthermore, since women are labelled 'tougher monitors, highly diversified boards may appear more reliable in the eyes of the creditors. Therefore, companies would be more prone to pay, female directors accordingly to attract and retain them. To summarize, the discussed results, show that some firm characteristics partially drive female compensation but also depend on the individual characteristics of the woman directors.

[Insert Table 2]

5.3 Overconfidence and the remuneration awarded to the non-executive directors

5.3.1 Overconfidence

The second part of the research examines whether overconfident female directors are paid differently compared to overconfident male directors. Firstly, I will examine the general impact of overconfidence on the non-executive director remuneration. Previous research investigating the relationship between this psychological bias and compensation is mainly modelled around

reimbursement awarded to the CEO. However, NED remuneration packages are designed in such a manner that they will reflect the agency-cost minimization, arising from their monitoring and advisory duties and control separated from ownership. In this line of thought, one can assume that remuneration offered to the non-executives is designed to resemble remuneration granted to the CEO. This notion differentiates with the criticism that board members usually play a passive and ineffective role and are avoiding conflict with the top management team. Hence, their characteristics and behavioural trades should be accurately reflected in their pay. Furthermore, Humphrey-Jenner et al. (2016) document non-CEO executives, like CEOs, receive higher incentive-based compensation, independently of the CEO overconfidence. Since my results mostly align with the previous literature, I believe the already established philosophies could provide a valuable ground for my findings.

My study supports the notion established in prior studies that on average overconfident directors receive higher compensation than non-overconfident directors. Interestingly, contrary to Humphrey-Jenner et al. (2016), who find overconfidence is negatively associated with cash incentives¹², the coefficient of Total Compensation is positive and significant (0.008**). Since non-executives have different capabilities and specific expertise and are carefully chosen from a talent pool, they might self-select themselves into a firm. So, NEDs will have greater bargaining power when it comes to compensation. Accordingly, they can require a higher annual base pay and a greater signing bonus. Indeed, the cost of human capital, similarly to other commodities, will vary with the supply and demand. Few studies have examined the way that companies elect non-executives. The ladder has concluded the NED's labour market is nothing like an open market and that the remuneration of the non-executives practically always contains some sort of suitable and substantial reward (Hahn & Lasfer, 2010).

The coefficient of Option Compensation is positive and significant at 5% (0.017**). This suggests that overconfident directors receive greater option-based incentives. These findings are further supported by Malmendier & Tate (2005, 2008) and Humphrey-Jenner et al. (2016). Jensen and Murphy (1990) and Fich and Shivdasani (2004) find that when non-executive directors are rewarded with higher equity and option grants, their interests become more aligned with those of the shareholders. Furthermore, Geravis, Heaton & Odean (2011) adopt the notion it could be valuable to provide overconfident managers with highly incentive contracts. Overconfident directors' optimistic views on the company future value are mirrored in their option exercising actions. To the extent that incentive-based compensation aligns their interests with investors, this remuneration design helps alleviate the secondary agency problem in listed firms. So, overconfident directors will profit from the increased performance as they hold unexercised and vested options on their company stock. Greater incentive compensation will particularly motivate the overconfident directors because they will overestimate the cost of such incentives and the probability that thresholds linked to these incentives will be reached

¹² Humphrey-Jenner et al. (2016) incorporate the variable cash – intensity, which measures the total CEO compensation gained from cash, i.e. base salary and cash bonuses. In alliance with their study, I have obtained the BoardEx measure Total Compensation (Salary + Bonuses) for each individual director.

(Geravis, Heaton & Odean, 2011). Moreover, if an overconfident manager places an immense probability on favourable outcomes, it is relatively cheap for the company to offer remuneration with higher option rewards. Hence, the incentive pay will take advantage of the manager's misevaluation supposed to give out incentives. Furthermore, such contracts are believed to encourage greater effort that could be expensive to accomplish with rational directors Humphrey-Jenner et al. (2016). Indeed, the literature investigating non-executive remuneration strongly supports the idea that NED remuneration is designed in such a manner that reflects their performance and effort to motivate them to perform efficiently their duties. Accordingly, it could be optimal for firms to provide higher option incentives to the outsiders who exhibit overconfidence bias.

Furthermore, the coefficients on the firm control variables are in alliance with prior studies (Humphrey-Jenner et al., 2016; Skantz,2012). Firm size is positively related to all three dependent variables -Total Direct Compensation (0.111**); Total Compensation (0.103**) and Option Compensation (0.216**). While Age and Tenure are negatively associated with compensation. Leverage is negatively linked to the examined measures for remuneration. Therefore, my findings support the idea that firms that suffer from cash constraints are more likely to offer higher option compensation. Whereas Tobin's Q which I incorporated as a proxy for future value is positively associated with compensation. Interestingly, contrary to previous research, I have found R&D is negatively correlated with all three dependent variables. Observing at N of directors (a proxy for board size), companies with larger boards tend to offer higher remuneration. One reason could be to provide an incentive to the directors. Firstly, greater information asymmetry will be more present in such boards, secondly, this could be due to the complexity of the decision-making process and the greater responsibility for supervision of the top management team.

Cognitive entrenchment is a term used to describe the behaviours and beliefs that professionals adopt through the lengthy expertise in their fields. When professionals are gathered in a decision-making team, cognitive entrenchment is highly likely to be emphasized. In other words, individuals will be more inclined on their professional views, so will be less eager to accept different opinions or new information. Moreover, overconfident individuals are even more centred around their concepts, particularly when surrounded by other specialists (Vieira, 2016). I have found that N Qualifications and Previous Boards are negatively associated with option compensation with a high statistical significance. Thus, companies with high saturation of specific board expertise might deliberately offer a higher cash compensation, in terms of base salary and bonuses, as supposed to incentive compensation to mitigate potential problems arising within the decision-making process.

5.3.2 Gender and Overconfidence

Having documented the relation between overconfidence and the compensation awarded to the non-executives, now I aim to examine the role of female overconfidence as a contributing aspect. The results are presented in Models 4-6 (Table 3). I find OC Female is negatively correlated with two of the

dependent measures, i.e., Total Direct Compensation and Option Compensation. Hence, I have once again confirmed generally women non-executive directors systematically receive lower compensation than their male counterparts.

Muñoz-Bullón (2010) discovered women receive lower total compensation after controlling for specific characteristics such as firm performance, firm size, time on the board and role. He measures total pay as the ex-post total compensation, which contains monetary rewards from option exercises. The author also finds a negative but not significant correlation between the female indicator and salary. As such, he concludes that at the base pay level the gender gap is almost non-existent and that ex-post variable pay is the most significant determinant of the gap in total pay. The negative and significant coefficient for Option compensation (-0.050*) indicates that female directors might be less capable of accurately timing their options when using inside firm information or are not as insightful when it comes to evaluating underwater options. Huang & Kigsen (2013) further support these notions. Their findings show that male directors are more inclined to hold deep-in-the-money stock options as well as are more likely to hold to these options till expiration. The academics interpret these observations as evidence that male directors exhibit higher confidence. Furthermore, a less overconfident manager will opt for lower-income risk and will require a contract with a lower level of incentive-based compensation. Consequently, a director pay-performance sensitivity will increase if he/she can positively influence the distribution of the company's pay-outs (for instance by providing more active council or by holding greater responsibilities) or because the director is less willing to take risks. Lower risk appetite is believed to be allied with overconfidence through higher at-risk compensation Malmendier & Tate (2005, 2008). Graham et al., (2013) advocate that is less plausible for women directors to agree on remuneration that consists of a considerable share of stock options, bonus pay and other additional benefits. Which explains the significant adverse coefficient of Total Direct Compensation (-0.041**). Indeed, female managers are found to prefer piece -rate as supposed to tournaments (pay based on the performance of others), even if their capabilities suggest differently (Gneezy et al.,2003). Furthermore, if the female non-executives are less overconfident than males, they should require additional compensation in the form of "safe" pay (cash reward) rather than additional option compensation. Thus, this reasoning is in alliance with my results. The coefficient for Total Compensation is positive and significant at 5% (0.005**). Together these findings support the second hypothesis that female non-executives are indeed paid differently compared to their male peers. Furthermore, I find the variance in the remuneration might be due to the female director's under-confidence. More specifically, the gap in the remuneration might be attributable to the design of the compensation packages women non-executives are more inclined to accept.

[Insert Table 3]

5.4 Robustness Tests

5.4.1 Propensity Score matching approach

Previous papers document women directors might not be randomly assigned to firms. Consequently, potential endogeneity bias could be present in the main regression results. Female non-executives may self-select themselves in certain types of firms or may face gender discrimination by corporate boards (Huang & Kisgen, 2013). Therefore, I have used propensity score matching to address such concerns. Tucker (2011) provides a comprehensive review of the method when examining the result from the observable measure on the outcome of interest. When using IV estimations one can minimize selection problems arising from unobservable characteristics by introducing bias correction terms in the regression. However, when using the propensity score matching, I control for selection issues by pairing treated and untreated observations based on a sample of observable characteristics. Table 4 reports regression results on the relation between gender and compensation with a propensity score-matched approach. Firstly, the propensity scores are computed using a Probit model, where the female director variable (Female) is regressed on firm size, committee roles, Independent, ROA, Market Capitalization, Tobin's Q, Leverage, R&D and MTB and industry and year dummies. Secondly, the propensity scores obtained from the basis regression are used to perform the nearest neighbour match with replacement to other firms for each year and industry with a caliper of 0.1. After the matching, I have re-examined the link between gender and compensation using the propensity score-matched sample. Table 4, model (1) shows the results where Total Compensation is the dependent variable. Moreover, the second table uses Tot Direct Compensation as a dependent variable. I have partly followed the model example of (Harris, Karl & Lawrence, 2017). The results once more confirm the negative relation between Female and Compensation. The coefficients for Log Total Compensation and Log Total Direct Compensation are -0.024** and -0.022**, respectively. Therefore, my findings are robust and are facilitating the idea that women non-executives are persistently awarded lower compensation.

[Insert Table 4]

5.4.2 Propensity Score matching approach: Selection Bias

Furthermore, companies that hire overconfident directors can systematically differentiate in characteristics compared to the firms which recruit rational directors. Thus, the basis regression results can be influenced by variances in company characteristics. To begin with, I estimate a logit regression on the probability of the female director being overconfident. The independent variable is an indicator variable that equals 1 if the female director is overconfident and 0, if not. The control variables are all the measures incorporated in the basic regression model (Table 3). I have obtained the estimated propensity scores from the logit regression. Furthermore, I have used the estimated propensity score in the first stage as the proxy for the overconfident female (OC_Female). The dependent variables are Total Compensation, Total Direct Compensation and Option Compensation in models (1), (2) and (3),

respectively. The methodology is partially obtained from Humphrey-Jenner et al. (2016) and Nanda & Silveri (2014). The results are presented in Table 5. Again, the coefficient for the three dependable variables is negative and significant. Thus, this additional test is consistent with my main results. Accordingly, even if classified as overconfident, female directors receive lower remuneration in comparison to male directors.

[Insert Table 5]

5.4.3 Non-executives with multiple boards positions

When a director holds multiple board positions, he/she will face less exposure to the under-diversified idiosyncratic company risk from one company. Consequently, it could be potentially argued NEDs serving on multiple boards cannot be labelled as overconfident if they fail to exercise their deep-in-the-money options promptly. To inspect further this concern, I have repeated the tests reported in the main regression (Table 3) on a restricted sample which only covers the directors who hold two or less than two board positions. The rationale behind this approach is when a director takes one or two boards sits, he/she will have sufficient exposure to undiversified company-specific risks from one company and can be labelled as overconfident if they don't exercise their in-the-money options. Results are presented in Table 6. This methodology technique follows the approach of Chowdhury & Zhang (2019). For all the dependable variables, the coefficient estimating non-executive overconfidence is positive and significant. Moreover, the results display a stronger relation in comparison to the original coefficients presented in Table 3 (models 1-6). To conclude my results are robust and hold when the NEDs face undiversified company tailored risk and can be classified in the overconfidence group as they fail to exercise their vested firm options.

[Insert Table 6]

5.4.4 Technological Industries

The fact that overconfident directors have positive beliefs for their firm's future value is the main concept that drives my results and provides a causal link between the overconfidence bias and the option remuneration awarded to the non-executives. Such behavioural biases are more evident in industries that suffer from greater information asymmetry problems. Undoubtedly, the technology industry is characterized as the one with the highest information asymmetry. Therefore, I believe my results will be more apparent in the technology sector. Furthermore, various papers stipulate that some industries, in particular, the tech industry is more likely to appoint overconfident CEOs as it is believed that by taking higher risks, he/she can increase the firm value. Consequently, one can adopt the notion that this would be accurate for the directors themselves. Since they not only play a vital role in the decision-making process but are also responsible for the CEO selection. So, I have again performed the basic regression model (Table 3) on a sample of technological industries. The sample is created by only selecting industries with SIC codes corresponding to Information Technologies, Business Equipment

and Telephone and Television Transmission. The sample is further checked by comparing the SIC code with the company name. The result is presented in Table 7. The coefficients for Holder_67 are again positive and significant. Indeed, the regression results are higher in magnitude as compared to the initial results (Table 3). Therefore, I have confirmed that the relation between overconfidence and remuneration is more evident in industries characterised by greater information asymmetry. Thus, the behavioural biases experienced by the directors do indeed drive my results.

[Insert Table 7]

6. Conclusion and Limitations

6.1 Conclusion

In this study, I set out to investigate the remuneration of the non-executive directors. More specifically, the centre of this research is the impact of gender and the psychological bias overconfidence and if and how these two individuals and director specific trades (interpreted separately and together) influence the way that firms draft their compensation contracts. Academics and the press assert women on the corporate boards are still perceived as less valuable, despite the increasing pressure of higher gender diversity. I first document whether pay discrepancies are evident using a large sample of non-executives over the 1999-2019 period and find evidence of a significant gender pay gap. Even though I attempted to validate my results using an assortment of robustness tests, I cannot discard the possibility that the gender pay variances arise from some unobservable labour market dynamics related to the appointment of women NEDs. Consequently, I investigated probable explanations for the gender gap. To do this, I have turned to the Behavioural Finance literature. My findings reveal women receive less incentive pay; due to the structure of the pay packages, they are more willing to accept. The ladder is consistent with the well-established notion that women are indeed less overconfident than men. Moreover, I have also found that some company-specific characteristics and the individual director's position within the board also influence the compensation rewarded to the NEDs. For instance, I observed a positive relation between independence, Tobin's Q (a proxy for investment opportunities) and female compensation. Going further I found that female directors are associated with lower corporate leverage and are highly suitable for chair positions. Therefore, my paper supports the view established in the previous studies that indeed, bringing gender diversity to the board can have a positive impact on corporate decisions, thus future value creation.

As a closing statement, I point out that this study indicates there are interesting differences between the male and female non-executives regarding their corporate decision-making and benefits that they bring to the board. Further research is needed into overconfidence measures for female managers, even though this task is complicated by the relative lack of female directors. If academic research like this can show investors and corporate boards that women will create as much value as

their male counterparts, gender quotas and reforms might not be needed altogether. A change in the perception of female directors may well be an important step towards future gender equality in corporate boardrooms. Consequently, the disappearance of the gender pay gap.

6.2 Limitations

Even though the previous section confirmed the reliability of my results, some limitations to this research are still present. The first and fundamental drawback to this study is the limited number of observations obtained for the overconfident female directors. However, this is not essentially an explicit drawback of my data set, as generally, there is a small number of female directors sitting on the corporate boards. This is well established in the growing debates and regulatory actions about improving gender diversity in the boardroom. Yet, it can cause a misrepresentation in the results since it remains unclear whether the overconfidence bias is displayed universally between men and women. Another aspect is the company attributes that can impact not only the motivation of female directors to join the firm but also the incentives of companies to appoint women directors to their firms. “Board composition is not exogenously determined rather is affected by prior decisions and firm characteristics that in turn affect board decisions. Thus, any observed relationship between board composition and firm outcomes may be caused by the factors that determined the board composition in the first place” (Johnson, Schnatterly, & Hill, 2013 p.25).

Moreover, it could be argued whether the option moneyness is the most reliable measure for examining director overconfidence. Malmendier & Tate (2005, 2008) state that option moneyness could be influenced by external factors including specific company characteristics, corporate governance etc. Furthermore, option moneyness could heavily rely on exogenous market events. For instance, a director can be overconfident, but the cause of the financial crisis in 2008 (present in the sample), his/her options might not have such high market value to be categorized as such. Thus, this could be sample selection bias. Another limitation is that the overconfidence measure from Malmendier & Tate (2005, 2008) is absolute. However, this is because of the nature of the binary variable: the value it takes is either one or zero, whereas it's highly likely that the overconfidence is characterized with a range as supposed to a binary state.

Lastly, the endogeneity issue cannot be fully excluded unless undertaking a natural experiment approach. Malmendier & Tate (2005, 2008) document that some of these matters are mitigated in their paper by using an extensive list of control variables and fixed effects. In my research I have included an even greater number of measures and robustness tests, however, bias due to the omission of variables is not eliminated.

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Appendix 1

Table A Variable Definition and Construction

<i>Variable name</i>	<i>Definition</i>	<i>Database and Sources</i>
<i>Director Compensation</i>		
Total Compensation	Salary plus Bonus.	BoardEx
Total Direct Compensation	Total Direct Compensation Equals Salary plus Bonus; plus, Other Compensation; plus Employers Defined Retirement/Pension Contribution for the period.	BoardEx
Option Compensation	A valuation of Options awarded at the end of the period for the individual director based on the closing stock price of the Annual Report Date selected. (Intrinsic Value of Options Awarded in Last Year (in 000s))	BoardEx
<i>Director Characteristics</i>		
Female	Dummy variable which takes the value of 1 if the individual director is female and 0 otherwise.	BoardEx
Age	Individual's director Age. (fyear – yearofbirth)	BoardEx
Committee roles	The number of committees the NED sits on during the financial year. (Audit, Remuneration or Nomination committee.)	BoardEx Source: (Mallin et al., 2015)
Independent	Number of independent Directors on the board as classified at the end of the fiscal year in the annual report.	BoardEx Source: (Mallin et al., 2015)
Network Size	Network size of selected individual (number of overlaps through employment, other activities, and education.	BoardEx Source: (Goh & Gupta, 2016)
Tenure	The number of years on the board of directors (including in time spent in other board roles).	BoardEx Source: (Goh & Gupta, 2016)
Previous Boards	The number of boards of listed companies on which the director has previously been a member.	BoardEx Source: (Goh & Gupta, 2016)
Current Boards	The number of boards of listed companies on which the director currently sits.	BoardEx Source: (Goh & Gupta, 2016)
Number of qualifications	The number of qualifications held by the individual director.	BoardEx
Chair (Indicator variable)	Indicator variable equal to 1 if the director holds a Chair position. (variable is estimated from the role name provided in BoardEx)	BoardEx Source: (Goh & Gupta, 2016)

Female Chair (Indicator variable)	Indicator variable equals 1 if the director holds a Chair position and is female.	BoardEx
Number of Directors (NED)	Number Directors (NED) on the board at the Annual Report Date.	BoardEx
<i>Firm Characteristics</i>		
Firm Size	Log of AT (Log of Asset Total)	Compustat Source: (Humphery-Jenner et al., 2014)
ROA	The company's return on assets, defined as the net income scaled by total assets (in Compustat codes: "ni/at").	Compustat Source: (Humphery-Jenner et al., 2014)
Market Capitalization	The market value of equity calculated as the stock price times the number of shares outstanding. (prcc_f*csho) (Compustat).	Compustat Source: (Humphery-Jenner et al., 2014)
Tobin's Q	The ratio of the sum of the market value of equity and the book value of debt to total assets. (at+prcc_f*csho-ceq)/at. (Compustat)	Compustat Source: (Humphery-Jenner et al., 2014)
Leverage	The sum of debt in current liabilities plus long-term debt divided by total assets. ((dltt+dlc)/at)	Compustat Source: (Humphery-Jenner et al., 2014)
R&D	Research and Development expenditures scaled by total assets. (max (0, xrd)/at)	Compustat Source: (Humphery-Jenner et al., 2014)
Market to Book Ratio (MTB)	Market Capitalization plus Total Debt, divided by the book value of total assets.	Compustat Source: (Goh & Gupta, 2016)
Capital expenditure	Capital expenditure scaled by total assets. (capx/at)	Compustat
<i>Overconfidence measure</i>		
Holder_67	OC directors are defined as the directors who hold deep-in-the-money exercisable options <i>once</i> in the sample (cutoff in the moneyness of 67%). Overconfident directors are defined by 1; non-overconfident by 0.	BoardEX Source: (Hirshleifer et al., 2012)
OC Female	Indicator variable which takes the value of 1 if the director is female and overconfident.	

Table 1 Descriptive statistics

This table presents the number of observations, mean, standard deviation, minimum, median and maximum values for all test and control variables. The observations are at the non-executive director-year level. Total direct compensation is the sum of salary, bonus and other pension contribution rewarded to directors. Total compensation includes salary and bonus paid to the non-executive directors. Option compensation is obtained from the BoardEx database and provides information on the estimated intrinsic value of exercisable options awarded to each director in the last fiscal year. The description and construction of all firm and individual level control variables are presented in table A above. The span of the sample period is 1999-2019. All continuous variables are winsorized at 1% and 99%.

	<i>n</i>	<i>Mean</i>	<i>S. D</i>	<i>Min</i>	<i>0.25</i>	<i>Mdn</i>	<i>0.75</i>	<i>Max</i>
<i>Panel A. Director Compensation ('000)</i>								
Total compensation	15,286	68.883	244.963	0.000	25.000	48.000	80.000	21627.000
Total Direct compensation	15,286	88.615	540.522	1.000	30.000	55.000	88.000	44070.000
Option Compensation	7,846	96.118	270.141	0.000	13.000	37.000	83.000	7182.000
<i>Panel B. Director and firm characteristics</i>								
Number of Directors (NED)	15,286	10.190	2.401	4.000	8.000	10.000	12.000	22.000
Independent	15,286	4.351	3.059	1.000	2.000	7.000	9.000	38.000
Committee roles	15,286	2.542	1.631	1.000	1.000	2.000	3.000	6.000
Tenure (years)	15,286	8.141	7.167	0.000	2.900	6.300	11.200	60.900
Age (NED)	15,286	61.070	7.943	31.000	56.000	62.000	67.000	93.000
Network Size	15,286	2085.739	2024.466	13.000	688.000	1518.000	2921.000	19736.000
Previous Boards	15,286	5.395	5.146	1.000	2.000	4.000	7.000	103.000
Current Boards	15,286	2.543	1.632	1.000	1.000	2.000	3.000	35.000
Number of Qualifications	15,286	2.281	1.16	0.000	2.000	2.000	3.000	14.000
Female	15,286	0.139	0.346	0.000				1.000
Chair	15,286	0.045	0.208	0.000				1.000
Female Chair	15,286	0.001	0.023	0.000				1.000
ROA	15,286	0.023	0.52	-34.775	0.024	0.06	0.097	0.773
MTB	15,286	2.017	1.597	0.000	1.073	1.559	2.415	15.777
Leverage	15,286	0.233	0.212	0.000	0.079	0.213	0.336	3.676
Firm Size	15,286	8.265	1.796	0.193	7.308	8.385	9.471	13.59
R&D	15,286	0.052	0.107	0.000	0.000	0.017	0.073	2.449
Tobin's Q	15,286	2.351	1.584	0.149	1.425	1.904	2.702	16.149
Capital Expenditure	15,286	594.735	1722.103	0.000	40.63	135.600	455.700	37985.000
<i>Panel C. Overconfidence measures</i>								
Holder67	15,286	0.537	0.499	0.000				1.000
OC Female	15,286	0.072	0.259	0.000				1.000

Table 2 Non-executive compensation structure and gender

This table depicts the OLS regression results of the impact of gender on the non-executive remuneration. The dependent variables are Total Compensation (models 1-3-5) and Total Direct Compensation (models 2-4-6). The independent variable in models (1-2) is Female, a dummy variable that equals 1 if the director is female or 0 otherwise. For presentation purpose, I use Comp. as an abbreviation for Compensation. The independent variable in models (2-3) is Chair, a binary measure that takes the value of 1 if the non-executive director is also a Chair, and 0 if he/she does not hold a Chair position. The independent variable in models 5-6 is also a dummy variable that equals 1 if the director is Female and Chair or 0 if it does not meet those conditions. All independent variables are lagged with one year. All regression models include both Industry and Year fixed effects. The number of observations and R squared is also presented in the table. The standard errors are robust to heteroscedasticity and clustered by R-values displayed in the parentheses. The statistical significance level is specified as follows: 1% (***), 5% (**), at 10% (*). Variable definitions and construction are disclosed in Appendix 1, Table A.

	(1) (Log) Total Comp.	(2) (Log) Total Direct Comp.	(3) (Log) Total Comp.	(4) (Log) Total Direct Comp.	(5) (Log) Total Comp.	(6) (Log) Total Direct Comp.
Female Chair					0.388 (0.326)	0.378 (0.377)
Female	-0.034** (0.014)	-0.032** (0.017)	-0.005** (0.014)	-0.002** (0.016)	-0.007** (0.014)	-0.003** (0.016)
Chair			0.865** (0.049)	0.884* (0.055)	0.860** (0.050)	0.879* (0.055)
Age	0.002*** (0.001)	0.003*** (0.001)	0.002*** (0.001)	0.004*** (0.001)	0.002*** (0.001)	0.003*** (0.001)
N Directors	0.038*** (0.003)	0.034*** (0.003)	0.038*** (0.003)	0.034*** (0.003)	0.038*** (0.003)	0.034*** (0.003)
Committee roles	0.048* (0.066)	0.056* (0.081)	0.039* (0.064)	0.048* (0.079)	0.039* (0.064)	0.048* (0.079)
Independent	0.010*** (0.003)	0.008*** (0.003)	0.007*** (0.003)	0.004*** (0.003)	0.007*** (0.003)	0.004*** (0.003)
Network Size	-0.000*** (0.000)	-0.000*** (0.000)	0.000*** (0.000)	-0.000*** (0.000)	0.000*** (0.000)	-0.000*** (0.000)
Tenure	0.016*** (0.001)	0.018*** (0.001)	0.012*** (0.001)	0.013*** (0.001)	0.012*** (0.001)	0.013*** (0.001)
Previous Boards	-0.003*** (0.001)	-0.004*** (0.001)	-0.00200* (0.001)	-0.003*** (0.001)	-0.002*** (0.001)	-0.003*** (0.001)
Current Boards	-0.047* (0.066)	-0.053* (0.080)	-0.039* (0.064)	-0.044* (0.079)	-0.039* (0.064)	-0.044* (0.079)
N Qualifications	-0.003** (0.005)	0.001** (0.005)	-0.004** (0.004)	0.000** (0.005)	-0.004** (0.004)	-0.000** (0.005)
Firm Size	0.106*** (0.006)	0.110*** (0.007)	0.118*** (0.006)	0.122*** (0.007)	0.118*** (0.006)	0.122*** (0.007)
ROA	-0.041** (0.029)	-0.043** (0.022)	-0.043** (0.027)	-0.038** (0.019)	-0.042** (0.027)	-0.038** (0.019)
Market Cap	-0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
Tobin's Q	0.122** (0.046)	0.039* (0.053)	0.126** (0.043)	0.038** (0.050)	0.127** (0.043)	0.039** (0.050)
Leverage	0.065** (0.030)	0.064** (0.039)	0.060** (0.028)	0.060** (0.038)	0.058** (0.029)	0.058** (0.038)
R&D	-0.098* (0.075)	-0.048* (0.078)	-0.109* (0.069)	-0.066* (0.073)	-0.107* (0.069)	-0.065* (0.073)
MTB	-0.124*** (0.046)	-0.041 (0.053)	-0.125*** (0.043)	-0.038 (0.050)	-0.127*** (0.043)	-0.039 (0.050)
Cap Expenditures	0.000*** (0.000)	-0.000** (0.000)	0.000*** (0.000)	-0.000*** (0.000)	0.000*** (0.000)	-0.000*** (0.000)
Constant	2.279*** (0.070)	2.325*** (0.074)	2.128*** (0.067)	2.178*** (0.072)	2.131*** (0.067)	2.181*** (0.072)
Observations	14,860	15,286	14,860	15,286	14,860	15,286

R-squared	0.440	0.337	0.482	0.376	0.482	0.376
Industry FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 3 Non-executive compensation structure and overconfidence

This table contains OLS regressions for the relation between overconfidence and non-executive remuneration. Models (1-3) regress the dependent variables Total Direct Compensation, Total Compensation and Option Compensation on the independent variable Holder_67 (a proxy for overconfidence). Whereas the remaining models (4-6) regress the same dependent variables on OC Female, a binary variable used as an estimate for overconfident female directors. For presentation purpose, I use Comp. as an abbreviation for Compensation. The detailed description of all control variables is displayed in Table A. All independent variables are lagged with one year. All continuous variables are winsorized at 1% and 99%. Robust standard errors in the parentheses *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

	(1) (Log) Total Direct Comp.	(2) (Log) Total Comp.	(3) (Log) Option Comp.	(4) (Log) Total Direct Comp.	(5) (Log) Total Comp.	(6) (Log) Option Comp.
OC Female				-0.041** (0.043)	0.005** (0.040)	-0.050* (0.091)
Female				-0.013** (0.035)	-0.043** (0.033)	-0.071* (0.077)
Holder_67	0.005** (0.018)	0.008** (0.016)	0.017** (0.035)	0.010** (0.020)	0.007** (0.018)	0.323** (0.038)
Age	-0.002*** (0.001)	-0.001*** (0.001)	-0.003*** (0.002)	-0.001*** (0.001)	-0.001*** (0.001)	-0.002*** (0.002)
Committee roles	0.078* (0.099)	0.074* (0.087)	-0.033* (0.177)	0.083* (0.099)	0.077* (0.087)	-0.023* (0.177)
Independent	0.009*** (0.004)	0.009*** (0.004)	0.005*** (0.009)	0.009*** (0.004)	0.009*** (0.004)	0.005*** (0.009)
Network Size	-0.000*** (0.000)	-0.000*** (0.000)	0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	0.000*** (0.000)
Tenure	-0.016*** (0.001)	-0.013*** (0.001)	-0.002*** (0.002)	-0.016*** (0.001)	-0.013*** (0.001)	-0.002*** (0.002)
Previous Boards	-0.003*** (0.002)	-0.002*** (0.001)	-0.002*** (0.003)	-0.003*** (0.002)	-0.002*** (0.001)	-0.003*** (0.003)
Current	-0.071* (0.098)	-0.066* (0.086)	0.022 (0.177)	-0.075* (0.098)	-0.069* (0.087)	0.013 (0.177)
N Qualifications	-0.006*** (0.007)	-0.010*** (0.006)	-0.014** (0.013)	-0.006*** (0.007)	-0.010*** (0.006)	0.014** (0.013)
Chair	0.874* (0.075)	0.875* (0.066)	0.694* (0.093)	0.871* (0.075)	0.872* (0.066)	0.685* (0.093)
N Directors	0.030*** (0.005)	0.039*** (0.004)	0.075*** (0.009)	0.030*** (0.005)	0.039*** (0.004)	0.075*** (0.009)
Firm Size	0.111** (0.011)	0.103** (0.010)	0.216** (0.020)	0.112** (0.011)	0.104** (0.010)	0.218** (0.020)
ROA	-0.458* (0.095)	-0.456* (0.083)	0.551 (0.153)	-0.459** (0.095)	-0.457** (0.083)	0.546 (0.152)
Market Cap	0.000*** (0.000)	0.000*** (0.000)	-0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	-0.000*** (0.000)
Tobin's Q	0.230* (0.073)	0.276* (0.062)	0.366 (0.131)	0.231* (0.073)	0.278* (0.062)	0.361 (0.131)
Leverage	-0.007* (0.059)	-0.019* (0.055)	-0.147* (0.093)	-0.006* (0.059)	-0.019* (0.055)	-0.146* (0.093)
R&D	-0.477 (0.152)	-0.508 (0.140)	-1.787 (0.347)	-0.474 (0.152)	-0.505 (0.140)	-1.793 (0.345)
MTB	-0.228* (0.072)	-0.276* (0.062)	0.693 (0.131)	-0.230* (0.072)	-0.278* (0.062)	0.688 (0.131)
Cap Expenditures	-0.000*** (0.000)	-0.000*** (0.000)	0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	0.000*** (0.000)
Constant	2.391*** (0.103)	2.306*** (0.096)	1.327*** (0.195)	2.398*** (0.103)	2.322*** (0.097)	1.357*** (0.197)

Observations	7,845	7,653	7,845	7,845	7,653	7,845
R-squared	0.424	0.512	0.339	0.424	0.512	0.339
Industry FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4 Propensity Score matching approach

This table presents the regression results on the link between gender and compensation based on a propensity score-matched method. The propensity scores are calculated using a Probit regression model. First, I regress the Female (binary variable) on all control variables. Secondly, I use the propensity scores obtained from the basis regression to perform the nearest neighbour match with replacement to other firms for each year and industry with a caliper of 0.1. Next, I re-examine the link between gender and compensation using the propensity score-matched sample. The dependent variable in model (1) is Total Compensation, whereas the Dependent variable in model (2) is Total Direct Compensation. All the variable in these models are previously specified. The symbol *, ** and *** indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	(1) (Log) Total Compensation	(2) (Log) Total Dir Compensation
Female	-0.024** (0.012)	-0.022** (0.016)
N Directors	0.013*** (0.007)	0.011*** (0.009)
Independent	0.010*** (0.008)	0.010*** (0.010)
Committee roles	0.235 (0.170)	0.126 (0.189)
Tenure	0.020*** (0.003)	0.021*** (0.003)
Age	0.000*** (0.002)	0.003*** (0.003)
Network Size	-0.000*** (0.000)	-0.000*** (0.000)
Previous Boards	-0.004*** (0.003)	-0.004*** (0.004)
Current Boards	-0.189 (0.169)	-0.087 (0.188)
N Qualifications	0.004** (0.011)	0.006** (0.014)
Chair	1.237 (0.353)	1.262 (0.403)
Firm Size	0.161** (0.020)	0.155** (0.022)
ROA	-0.723 (0.301)	-0.743 (0.413)
Market Capitalization	-0.000*** (0.000)	-0.000*** (0.000)
Tobin's Q	0.064 (0.126)	-0.014 (0.143)
Leverage	0.060* (0.080)	0.036* (0.070)
R&D	-0.689 (0.376)	-0.557 (0.505)
MTB	-0.043 (0.127)	0.027 (0.145)
Cap Expenditures	0.278 (0.470)	0.273 (0.486)
Constant	2.172*** (0.006)	2.212*** (0.001)

Observations	2,077	2,124
R-squared	0.533	0.420
Industry FE	YES	YES
Year FE	YES	YES

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5 Propensity Score matching approach: Selection Bias

In the first stage, I estimate a logit regression on the probability of a female director being overconfident. The independent variable is a dummy variable that has the value of 1 if the Female director is overconfident and 0, otherwise. The dependent variables are Total Compensation (model 1); Total Direct Compensation (model 2) and Option Compensation (Model 3). The propensity scores are obtained from the logit regression. I used the estimated propensity score in the first stage as the proxy for the overconfident Female (OC_Female). All control variables are incorporated in the previous regression models. The symbol *, ** and *** indicate statistical significance at the 1%, 5%, and 10% level, respectively.

		(1) Total Comp.	(2) Total Dir Comp.	(3) Option Comp.
	First-stage OC Female			
OC Female (0/1)		-1.237** (0.025)	-1.443** (0.031)	-2.028* (0.075)
Female		-0.003** (0.014)	0.001** (0.016)	-0.099** (0.044)
Holder_67		0.000** (0.011)	0.006** (0.012)	0.317** (0.035)
N Directors	0.046** (0.016)	0.043*** (0.003)	0.038*** (0.003)	-0.069*** (0.009)
Independent	0.047** (0.021)	0.003*** (0.003)	0.000*** (0.004)	0.002*** (0.009)
Committee roles	0.787 (0.461)	0.103* (0.066)	0.122* (0.080)	-0.075 (0.181)
Tenure	-0.007*** (0.006)	0.012*** (0.001)	0.013*** (0.001)	0.001*** (0.002)
Age	-0.059*** (0.005)	-0.002*** (0.001)	-0.002*** (0.002)	-0.006*** (0.004)
Network Size	0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	0.000*** (0.000)
Previous Boards	-0.073*** (0.010)	-0.006*** (0.001)	-0.008*** (0.002)	-0.009** (0.004)
Current Boards	-0.707 (0.461)	-0.098* (0.065)	-0.113* (0.079)	-0.077 (0.180)
No Qualifications	0.055** (0.027)	-0.000*** (0.005)	-0.005*** (0.005)	0.021** (0.013)
Chair	-2.241 (0.505)	0.810** (0.048)	0.819** (0.053)	0.599* (0.095)
Firm Size	0.157** (0.028)	0.128*** (0.007)	0.133*** (0.007)	0.235** (0.021)
ROA	0.058 (0.090)	-0.038** (0.028)	-0.032** (0.019)	0.529 (0.153)
Market Cap	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	-0.000*** (0.000)
Tobin's Q	0.228 (0.224)	0.143** (0.042)	0.058** (0.050)	-0.334 (0.131)
Leverage	0.063 (0.160)	0.068** (0.029)	0.066** (0.038)	0.146* (0.093)
R&D	0.617 (0.427)	-0.052* (0.070)	-0.018* (0.073)	1.856 (0.347)
MTB	-0.241	-0.144**	-0.058**	0.660

	(0.222)	(0.042)	(0.050)	(0.131)
Capital Expenditures	-0.000***	-0.000***	-0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
Constant	-0.863	2.343*	2.466*	1.781
	(0.320)	(0.092)	(0.099)	(0.253)
Observations	15,286	14,860	15,286	7,755
R-squared	0.445	0.484	0.377	0.240
Industry FE	No	YES	YES	YES
Year FE	No	YES	YES	YES

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 6 Non-executives with multiple boards positions

This table presents the OLS regression results of the impact of overconfidence on the compensation structure focusing on directors with less than three board seats. The dependent variables are Total Direct Compensation (1-4); Total Compensation (2-5) and Option Compensation (3-6). In the first 3 models, the independent variable is the dummy variable measuring the overconfidence of the directors (Holder 67) which takes on the value of one if the individual director is labelled as overconfident and 0, if not. The independent variable in models (4-5-6) is overconfident female, a dummy which equals 1 if the director is both female and overconfident or 0 if it does not meet those conditions. For presentation purpose, I use Comp. as an abbreviation for Compensation. All independent variables are one year lagged variables. All models include both firm fixed effects and year fixed effects. The number of firm-year observations and R-squared are also included. Standard errors are robust to heteroskedasticity and are clustered by firm. P-values are given in parentheses. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *, respectively. Detailed variable definitions are provided in Appendix 1, Table A.

	(1) Total Dir Comp.	(2) Total Comp.	(3) Option Comp.	(4) Total Dir Comp.	(5) Total Comp.	(6) Option Comp.
OC Female				-0.033*	0.057*	-0.036
				(0.056)	(0.051)	(0.118)
Female				-0.013**	-0.077**	-0.058*
				(0.046)	(0.043)	(0.082)
Holder_67	0.011**	0.021**	0.380**	0.016**	0.012**	0.385**
	(0.023)	(0.020)	(0.046)	(0.024)	(0.021)	(0.048)
Age	0.003***	0.002***	0.005***	0.003***	0.002***	0.005***
	(0.001)	(0.001)	(0.003)	(0.001)	(0.001)	(0.003)
Committee roles	-0.193	-0.176	0.382	-0.188	-0.176	0.390
	(0.218)	(0.167)	(0.252)	(0.217)	(0.168)	(0.252)
Independent	0.006***	0.003***	0.001**	0.006***	0.002***	0.000**
	(0.006)	(0.005)	(0.012)	(0.006)	(0.005)	(0.012)
Network Size	-0.000***	-0.000***	0.000***	-0.000***	-0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Tenure	0.015***	0.012***	0.000***	0.015***	0.012***	0.000***
	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.003)
Previous Boards	0.000***	0.002***	-0.001***	-0.000***	0.002***	-0.002***
	(0.002)	(0.002)	(0.005)	(0.002)	(0.002)	(0.005)
Current Boards	0.224	0.215	-0.318	0.219	0.216	-0.327
	(0.219)	(0.169)	(0.253)	(0.219)	(0.169)	(0.253)
N Qualifications	-0.004***	-0.013***	0.017**	-0.004***	-0.013***	0.016**
	(0.009)	(0.008)	(0.016)	(0.009)	(0.008)	(0.016)
Chair	0.842*	0.846*	0.636	0.840*	0.843*	0.629
	(0.082)	(0.077)	(0.112)	(0.082)	(0.077)	(0.112)
N Directors	0.023***	0.035***	-0.069**	0.023***	0.035***	-0.069**
	(0.006)	(0.005)	(0.012)	(0.006)	(0.005)	(0.012)
Firm Size	0.123**	0.108**	0.221**	0.124**	0.109**	0.223**
	(0.013)	(0.012)	(0.025)	(0.013)	(0.013)	(0.025)
ROA	-0.537	-0.546	0.590	-0.539	-0.548	0.585
	(0.137)	(0.124)	(0.187)	(0.137)	(0.123)	(0.187)
Market Cap	0.000***	0.000***	-0.000***	0.000***	0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Tobin's Q	0.228*	0.266*	-0.134	0.230*	0.269*	-0.130
	(0.094)	(0.081)	(0.167)	(0.094)	(0.081)	(0.167)
Leverage	-0.053*	-0.023*	0.226	-0.054*	-0.022*	0.224
	(0.082)	(0.076)	(0.121)	(0.083)	(0.077)	(0.121)
R&D	-0.594	-0.707	1.771	-0.591	-0.706	1.777
	(0.198)	(0.188)	(0.432)	(0.198)	(0.188)	(0.429)
MTB	-0.228*	-0.269*	0.459	-0.229*	-0.273*	0.456
	(0.093)	(0.080)	(0.167)	(0.093)	(0.080)	(0.167)
Cap Expenditures	-0.000***	-0.000***	0.000***	-0.000***	-0.000***	0.000**

	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	2.296**	2.257**	0.869**	2.302**	2.279**	0.892**
	(0.036)	(0.027)	(0.049)	(0.037)	(0.028)	(0.051)
Observations	8,691	8,691	8,691	8,691	8,691	8,691
R-squared	0.446	0.532	0.255	0.446	0.533	0.256
Industry FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 7 Technological Industries

This table presents the OLS regression results of the effect of overconfidence and compensation using sample firms in the high-tech industry. All independent variables are one year lagged variables. All models include both firm fixed effects and year fixed effects. For presentation purpose, I use Comp. as an abbreviation for Compensation. The number of firm-year observations and R-squared are also included. Standard errors are robust to heteroskedasticity and are clustered by firm. P-values are given in parentheses. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *, respectively. Detailed variable definitions are provided in Appendix 1, Table A.

	(1) Total Dir Comp.	(2) Total Comp.	(3) Option Comp.	(4) Total Dir Comp.	(5) Total Comp.	(6) Option Comp.
OC Female				-0.006** (0.054)	0.029** (0.052)	-0.178 (0.163)
Female				0.005** (0.043)	-0.035** (0.042)	-0.104 (0.138)
Holder 67	0.032** (0.020)	0.029** (0.019)	0.240* (0.061)	0.033** (0.022)	0.026** (0.020)	0.263* (0.064)
Age	0.001*** (0.001)	-0.000*** (0.001)	-0.004*** (0.004)	0.001*** (0.001)	-0.001*** (0.001)	-0.006*** (0.004)
Committee roles	0.053 (0.114)	0.138 (0.103)	-0.275 (0.334)	0.053 (0.114)	0.140 (0.103)	-0.251 (0.335)
Independent	0.001*** (0.006)	0.003*** (0.005)	-0.022** (0.017)	0.001*** (0.006)	0.002*** (0.005)	-0.026 (0.018)
Network Size	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)
Tenure	0.015*** (0.001)	0.013*** (0.001)	-0.004*** (0.004)	0.015*** (0.001)	0.013*** (0.001)	-0.004*** (0.004)
Previous Boards	-0.005*** (0.002)	-0.004*** (0.001)	-0.001*** (0.005)	-0.005*** (0.002)	-0.004*** (0.002)	-0.001*** (0.005)
Current Boards	-0.044 (0.113)	-0.131 (0.102)	0.304 (0.333)	-0.044 (0.113)	-0.133 (0.102)	0.286 (0.333)
N Qualifications	0.008*** (0.008)	0.002*** (0.008)	0.015** (0.023)	0.008*** (0.008)	0.002*** (0.008)	0.016** (0.023)
Chair	1.013* (0.098)	0.935* (0.090)	0.720 (0.178)	1.014* (0.098)	0.934* (0.090)	0.704 (0.178)
N Directors	0.028*** (0.006)	0.031*** (0.005)	-0.102** (0.018)	0.028*** (0.006)	0.031*** (0.005)	-0.100** (0.018)
Firm Size	0.179** (0.011)	0.170** (0.010)	0.197** (0.030)	0.179** (0.011)	0.170** (0.010)	0.205** (0.030)
ROA	-0.110 (0.110)	0.052 (0.106)	-0.042 (0.338)	-0.109 (0.109)	0.051 (0.106)	-0.040 (0.336)
Market Cap	-0.000*** (0.000)	0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	0.000*** (0.000)	-0.000*** (0.000)
Tobin's Q	0.444* (0.083)	0.508* (0.073)	-0.978 (0.258)	0.444* (0.083)	0.509* (0.073)	-0.976 (0.258)
Leverage	0.024* (0.087)	0.104* (0.083)	0.476 (0.241)	0.023* (0.087)	0.106* (0.083)	0.468 (0.241)
R&D	-0.535 (0.222)	-0.365 (0.196)	2.286 (0.704)	-0.536 (0.222)	-0.362 (0.196)	2.328 (0.703)
MTB	-0.460* (0.083)	-0.533* (0.072)	1.300 (0.258)	-0.460* (0.083)	-0.534* (0.073)	1.297*** (0.258)
Capital Expenditures	-0.000*** (0.000)	-0.000*** (0.000)	0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	0.000*** (0.000)
Constant	1.872** (0.013)	1.923*** (0.007)	2.429** (0.021)	1.871** (0.013)	1.931*** (0.007)	2.476** (0.022)
Observations	4,849	4,849	4,849	4,849	4,849	4,849
R-squared	0.421	0.486	0.272	0.421	0.486	0.274
Industry FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES

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

