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Overcoming the Gender Gap in Entrepreneurship: The Impact of CEO Gender on IPO Performance

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ABSTRACT

Even though feminism and equality are becoming more prominent, women still earn less, get promoted less frequently, and are underrepresented in leadership positions. Ever since the NASDAQ index was founded in 1971, only 29 companies have gone public represented by a female CEO. However, even some of the most popular companies worldwide are led by female CEOs. This study investigates the extent of the effect of CEO gender on Initial Public Offering (IPO) performance. All IPOs from firms with a female CEO are compared to a random sample of IPOs from firms with a male CEO. This is done through Independent Samples T-tests, ANOVA, and Fisher's Exact Test on data retrieved from Crunchbase and the NASDAQ index.

The results indicate that CEO gender has a significant effect on IPO performance. CEO gender has a moderately positive effect on both the pre-IPO firm valuation and the post-IPO firm valuation, and it has a small positive effect on the IPO value. Thus, CEO gender has a significant positive value on IPO valuation, at the disadvantage of female CEOs. A moderately negative relationship was found between CEO gender and the amount of underpricing, indicating that female CEOs experience higher underpricing in their IPOs. There is also a moderately positive relationship between CEO gender and both short-term and long-term IPO performance, indicating that firms with a female CEO experience lower short- and long-term IPO performance. Finally, this study indicates that CEO gender and the type of industry that a firm operates in are not independent. No evidence has been found for a relationship between female board representation and firm performance or underpricing. Suggestions to counter such gender bias include equal pay for jobs and positions, as well as equal promotions and career opportunities. Placing more women in top positions might diminish the gap between feminism and masculinity approaches in business; men and women can learn from each other in any position. Gender bias in the application process can be eliminated by structured interviews or skill-based assessments.

Finally, future research could research the effect of CEO gender on a given set of firms and compare them more thoroughly. One could also investigate the effect of CEO gender on IPO performance within specific firms. The effect of CEO gender on exit strategy could be studied, or a completely different exit strategy could be investigated. Finally, one could investigate whether 'hot issue periods' can be identified in a given time period or test a relationship between CEO gender and IPO timing.

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1. INTRODUCTION

Did you know that Tinder and Bumble, two of the most popular dating apps nowadays, were founded by the same woman? Whitney Wolfe Herd was one of the co-founders of Tinder at the age of only 23, but after two years she was forced to leave the company due to sexual harassment by her then-boyfriend (Sophia, 2021). As she was recovering from the trauma, she founded her own dating app at the age of 25; on Bumble, women make the first move. Wolfe Herd became the youngest female to take a company public and she was extremely successful in doing so; with its Initial Public Offering (IPO) in 2021, Bumble was valued at \$2.15 billion (Tully, 2021). Moreover, Bumble is one of only 29 US companies with a female CEO that have gone public through IPO ever since the NASDAQ index was founded in 1971 (Business Insider, 2022). This millennium, from 2000 until 2021, there have been 5.753 IPOs in the US (Stock Analysis, 2022). Of these IPOs, not even 1% was led by a female Chief Executive Officer (CEO). However, the lack of IPOs led by female CEOs cannot be ascribed to a lack of firms with a female CEO, since approximately 40% of US companies have female founders and CEOs (Shepherd, 2020).

Even today, in a world where female entrepreneurship is growing, problems with the gender gap and gender bias remain; women still earn less, get promoted less frequently, and continue to be underrepresented in leadership positions (St. Catherine University, 2022). Feminism, gender equality, and female entrepreneurship are becoming more prominent, which makes it interesting to investigate the current effect of gender on firm performance. IPOs are considered the most successful exit strategies for investors (Alemany & Andreoli, 2018). While the number of firms going public on the NASDAQ grows rapidly, the number of companies with a female CEO going public is still significantly low for a society in which the gender gap is decreasing. Hence, the research question for this study reads as follows: *“To what extent does CEO gender affect the IPO performance of NASDAQ firms in the period 2000-2021?”*

An IPO can be defined as the first sale of a company's shares to the public (Brealey, Myers, & Allen, 2020). The gender gap is referred to as the difference between the way men and women are treated in society, or between what men and women do and achieve (Guzman & Kacperczyk, 2019; Dheer, Li, & Treviño, 2019). Gender bias refers specifically to the unfair difference in the way women and men are treated (Dheer, Li, & Treviño, 2019; Bigelow, Lundmark, McLean Parks, & Wuebker, 2012; Zimmer, 1988). Gender bias leads to a gender gap (St. Catherine University, 2022). This study further investigates the impact of gender bias on IPO performance by testing ten hypotheses related to CEO gender on various aspects of IPO performance, such as the pre-IPO valuation and post-IPO valuation of a firm, the IPO value, the occurrence of underpricing and the amount of underpricing. The ten hypotheses are tested at the hand of three statistical tests: the Independent Samples T-Test, ANOVA, and Fisher's Exact test.

In contrast to other studies, this research focuses on the relationship between CEO gender and IPO performance. Various studies have investigated gender bias, the gender gap, and IPO performance separately. However, they have not investigated the relationship between gender and later-stage financing like IPO performance as thoroughly as this research does. Rather, previous studies have focused on the relationship between gender and early-stage financing; the IPO prospectus specifically; female board representation and firm performance; and the effect of gender on firm performance in broad terms.

Bigelow et al. (2012) researched potential gender bias in IPO prospectus evaluations and found that women are less likely to attract IPO investors, thus relying on more informal forms of financing such as credit cards (Bigelow, Lundmark, McLean Parks, & Wuebker, 2012). Liu et al. (Liu, Wei, & Xie, 2014) have investigated whether female directors improve firm performance in China, finding that female representation on the Board of Directors has a positive impact on firm performance, yet few firms have a strong percentage of female representation on their board (2014). Reutzel and Belsito (2015) have investigated the relationship between females on the Board of Directors and underpricing, and they found that females on the board are viewed by investors as having a negative effect on firm performance (Reutzel & Belsito, 2015). Guzman and Kacperczyk (2019) have investigated gender disparities in early investment stages and found that women are three times less likely than men to obtain external capital from investors (Guzman & Kacperczyk, 2019).

This study contributes to the existing literature on subjects such as female entrepreneurship, the gender gap, gender bias, and board gender diversity in several aspects. First, this research adds to literature on female entrepreneurship, since this research focuses on firms with a female CEO that have opted for an IPO, which is considered the most successful exit strategy for Venture Capitalists. Second, this study contributes to the existing literature on the gender gap and gender bias because it focuses on a significant difference in IPO performance for firms with female CEOs and male CEOs. Finally, this thesis also broadens the literature on the growing number of female leaders and female entrepreneurship in general, as well as for various industries such as bioscience and pharmaceuticals, communications, and IT.

The findings of this research can also be useful to businesses. They could stimulate firms to include more women on their boards of directors and encourage women to participate more in entrepreneurship. Further, the insights on female leaders in various industries could pose an opportunity window for other female entrepreneurs or women wanting to start a business. The results of this research should motivate female entrepreneurs with successful private firms to go public, which brings more balance to the NASDAQ firm leadership ratio between men and women. Overall, all such practical implications contribute to closing the gender gap and diminishing gender biases.

This paper starts with a literature framework to touch on previous research, findings and relevant literature related to the gender gap, the IPO concept, and the hypotheses of this research. More specifically, for the gender gap, the feminist theory will be discussed, along with the history of the gender gap and the growth of female entrepreneurship. Then, gender bias in practice will be discussed, as well as the social learning theory, tokenism theory, and gender schema theory. Next, IPOs will be explained along with their steps and performance assessment. The three theories on IPO anomalies will also be reviewed. Based on the theories and literature, ten hypotheses will then be formulated. Subsequently, the methodology discusses the research design, the sample and selection, the measurement, and the data analysis of variables, as well as the method of data collection for this research. The results are then shown and analysed, followed by the discussion and conclusion on key findings, limitations, implications, and directions for future research are given.

2. LITERATURE REVIEW

This section of the paper presents a literature study and a theoretical framework on the gender gap and gender bias, female entrepreneurship, and IPOs. It aims to give readers a better understanding of the aforementioned subjects before framing hypotheses and conducting research.

The chapter is divided into four subsections. The theoretical framework for this research includes a total of seven theories. The first subsection discusses the history of the gender gap, the development of female entrepreneurship, its current status, and feminist theory. This is followed by a subsection on the definition of gender bias, the social learning theory, the tokenism theory, and the gender schema theory. The motives for and steps in an IPO are discussed, and the three theories on IPO anomalies are elaborated. This chapter is finalized with a hypothesis formulation, based on the theoretical framework and empirical findings.

2.1 Gender Gap

This subchapter further elaborates on the gender gap, its history, key developments, and the status quo. It aims in understanding the gender gap in business and it discusses the feminist theory. More specifically, it elaborates on the development of female entrepreneurship and women in business. The feminist theory is a theory that was developed based on the gender gap, and it is used to frame hypotheses and discuss the findings within this thesis.

2.1.1 How has the gender gap developed throughout the years?

For centuries, women served their household while men worked. It was only after the Second World War that women gained a more prominent position in society; expansion of the education system fuelled

women's educational attainment and their potential earnings, and modern contraception and abortion rights gave women more freedom about if or when they wanted children (Bryson, Joshi, Wielgoszewska, & Wilkinson, 2020, p. 843). In addition, policies such as the Equal Pay Act in 1970 and national minimum wages around 1999 led to a substantial rise in women's pay (Bryson, Joshi, Wielgoszewska, & Wilkinson, 2020, p. 844; Zimmer, 1988).

The World Economic Forum is an international organization that aims to improve entrepreneurship in the global public interest, while also maintaining the highest standards of governance (World Economic Forum, sd). It has investigated the global gender gap by benchmarking 156 countries and creating an index that ranges from 0 to 100. It can be interpreted as the distance to parity; in other words, the percentage of the gender gap that has been closed (World Economic Forum, 2022, p. 5). Since the first edition in 2006 up until 2021, this distance to parity has only reached 42,7% out of 100%, meaning that men still dominate the working field (World Economic Forum, 2022, p. 36). A recent study in the Netherlands revealed that out of the 50 best-performing public companies on the AEX and Midkap exchanges, 47 companies are led by male CEOs (van Gorp & Schouten, 2023). One company is led by both a man and a woman, leaving only two female CEOs on the Dutch exchange markets.

Caliendo et al. (2014) find that women are less willing to take risks and are thus less likely to switch to entrepreneurship (Caliendo, Fossen, Kritikos, & Wetter, 2014). Bigelow et al. (2012) and Guzman and Kacperczyk (2019) have analysed several investment stages. Bigelow et al. (2012) found that female entrepreneurs are less likely to attract IPO investors, thus relying on more informal forms of financing (Bigelow, Lundmark, McLean Parks, & Wuebker, 2012). Guzman and Kacperczyk (2019) found that female-led ventures are up to three times less likely to obtain funding in the beginning stages of entrepreneurship compared to male-led ventures (Guzman & Kacperczyk, 2019).

2.1.2 How has female entrepreneurship developed throughout the years?

Over the years, women have stood up for themselves and feminism has increased. For instance, in 2017 the '#MeToo' movement, in which Harvey Weinstein was accused of sexual harassment, was one of the milestones of feminism. After famous actresses engaged in the movement, more than twelve million people across Twitter and Facebook used the hashtag 'MeToo', indicating that they were either a victim or knew a victim of sexual harassment (Blackburn, 2022). At first, the social media movement was a way for survivors of sexual harassment, sexual assault, and sexual bullying to share their stories (Blackburn, 2022). In fact, the '#MeToo' phrase dates to 2006, when Tarana Burke, an advocate for women in New York, wanted to let victims know that they were not alone (Blackburn, 2022). Over the years, the movement has grown to be a

global movement that enabled significant changes, both legally and within society: changes include sharper enforcement, investigation mechanisms, and penalties for unacceptable behaviour, as well as quotas for females in a company or certain positions (Blackburn, 2022).

Marlow and McAdam (2013) found that there are still more male CEOs in sectors with scope for market expansion, such as technology and higher-order services (Marlow & McAdam, 2013). In addition, they find that female CEOs and their firms are constrained rather than underperforming, due to women also participating more within the household rather than acting as the dominant breadwinner (Marlow & McAdam, 2013). Similarly, the World Economic Forum found that due to the COVID-19 pandemic in 2019, many women turned to home-schooling their children and healthcare (World Economic Forum, 2022).

Over the past twenty years, female entrepreneurship has developed tremendously. From 2000 until 2018 the number of female entrepreneurs grew by 114% (Lebowitz, sd). While Caliendo et al. (2014) found that women are less willing to take risks and are thus less likely to switch to entrepreneurship, there has been a growth of 43% in female entrepreneurship from 2019 to 2020, during the COVID-19 pandemic (World Economic Forum, 2022, p. 35; Caliendo, Fossen, Kritikos, & Wetter, 2014). According to the National Women's Business Council, this growth can be ascribed to either of two reasons: women become entrepreneurs out of necessity, since the traditional labour force probably does not fit with their economic needs, or they simply want to exploit a business opportunity (Lebowitz, sd). This is also in line with one of the three trends identified by Hiscox's 'Rise of the women entrepreneurs' research. Their three trends are as follows: first, they identify an upward trend in female entrepreneurship, either due to necessity or wanting to exploit a market opportunity; secondly, they found that female entrepreneurs are taking advantage of their unique qualities such as the ability to promote their business, to delegate and to be patient; third, the research confirms that there is optimism about future top positions for females and the workforce in general (Hiscox Inc. , 2018). In accordance with the findings of Guzman and Kacperczyk (2019), Hiscox (2018) also found that female entrepreneurs still struggle to find sufficient credit and capital.

Further, the World Economic Forum found that, across 22 countries, the share of female founders has doubled in the past five years, while the share of male founders has increased by 55% (World Economic Forum, 2022, p. 35). Yet, the global share of women in leadership positions is only 31%; these positions are often in non-governmental and membership organizations, education, healthcare, media and communication, and the public sector (World Economic Forum, 2022, p. 36). Similarly, Guzman and Kacperczyk (2019) found that women are more likely to start firms in industries associated with local business activities and care, rather than differentiated technologies such as biotechnology and IT (Guzman & Kacperczyk, 2019).

2.1.3 Feminist theory

The first theory related to the gender gap is the feminist theory. This theory is an expansion of feminism into a theoretical discourse to understand the nature of gender inequality. 'Feminism' is defined as the belief that women should be allowed to have the same rights, power, and opportunities as men; they should be treated equally (Bem, 1981). People who support feminist theory and feminism are called feminists. Their main objective is to diminish gender inequality by offering the same rights to women and men. For instance, if a woman wants to become CEO or take her company public, she should have the right and opportunity to do so. Yet, according to the World Health Organization, women all over the world face gender inequalities such as restrictions on mobility, lack of decision-making power, lower literacy rates, and educational opportunities, and discriminatory attitudes of communities and health providers (World Health Organization, sd).

There are five key concepts connected to such feminist constructionism. The first key concept is related to the word 'gender' itself. In feminist theory, the word 'gender' is not only viewed as biological sex. Rather, it is a social meaning given to the differences between the sexes. Within feminist theory, gender thus refers to the norms, behaviours, and roles associated with either being a man or a woman (Ferber & Nelson, 2009).

Secondly, at the base of feminist constructionism is that many gender characteristics that are traditionally attributed to either women or men based on biology are actually human characteristics. These human characteristics can either be defined as 'feminine' or 'masculine'. This is also referred to as the process of *gender typing*. Such gender patterns have been developed and attributed throughout history and cross-culturally. Believing that certain traits are of the essence to either men or women can be referred to as *essentialism*.

Another problem with 'gender' as a word, according to the feminist theory, is that it is negatively associated with 'pertaining to women'. Attributes traditionally associated with men are viewed as neutral and universal, while traits only associated with women are contaminated with gender. This view can be referred to as *masculinism*; the masculine ideal is normal, and any feminine aspects are considered marginal and inferior. The feminist theory is already considered inferior due to the power of many myths about masculinity.

The fourth belief of feminism is that the privileges of masculine ideals are based on unjust and damaging defamations of feminine-attributed qualities. To counter masculine ideals, feminine ideals should be validated. The final key concept of feminist constructionism is that in modern cultures, femininity is associated with connective and relationship ideals while masculinity is associated with ideals of separation. Science and business throughout the years have been primarily formed by masculinity. Hence, feminine

ideals are at a disadvantage in both science and business. These five concepts of feminist theory will be used to discuss the extent of the gender gap within the samples of this research.

2.2 Gender Bias

This subchapter aims to elaborate on the definition of gender bias, and empirical findings related to gender bias in female entrepreneurship and women in business. While the gender gap refers to fundamental gender inequality in social, political, intellectual, cultural, and economic opportunities and attainments, gender bias refers to clear favouritism towards one gender over another; in business, men are still favoured over women, as investigated by many researchers. In fact, Dheer et al. (2019) found that, across countries, women are thirty percent less likely than men to start a business (Dheer, Li, & Treviño, 2019). The three theories elaborated on in this chapter are discussed to provide a better understanding of gender bias in practice, they are used to frame hypotheses, and they are also used to discuss the presence of gender bias within the samples of this study.

2.2.1 Is there a gender bias in business?

The findings of Yang and Aldrich (2014) show that the expectations for males to be the main breadwinners and for women to compromise for the sake of their family are still imprinted on tasks in business; women often work in healthcare and education, or 'inferior' jobs such as administration and secretary (Yang & Aldrich, 2014, p. 321). These expectations originate from the social learning theory and gender schema theory, which are implemented from an early age, as well as the tokenism theory in business.

Skaggs et al. (2012) found that women need to gain stronger numerical presence in top positions before being able to create more equal leadership in lower ranks (Skaggs, Stainback, & Duncan, 2012, p. 945). More recent studies such as that of Liu et al. (2014) find that boards with three or more women have a stronger positive impact on firm performance than boards with less than three women, which supports board gender diversity. Finally, Huang and Kisgen (2013) have investigated the financial and investment decisions made by male and female executives; one of their findings is that female executives are more risk averse in their decisions and that investors react more favourably to financial decisions made by firms with female executives (Huang & Kisgen, 2013). That is because decisions by women are often more balanced and nuanced than decisions by men.

2.2.2 Social learning theory

The first theory on gender bias and gender inequality is the social learning theory. This theory, developed by Albert Bandura (1971), is based on Pavlov's experiments and Skinner's influence on behaviourism, and it

implies that social behaviour is learned by observation and imitation of others, or by direct experience (Bandura, 1971). The social learning theory is based on the sex-typing of gender associations by societies. This gender typing can be defined as the stereotypical categorization of people, behaviours, and appearances based on conventional perceptions of what is typical for any sex or gender (Bandura, 1971).

Sandra Bem (1981) also studied the social learning theory to construct her gender schema theory, which will be discussed in this chapter as well. According to her, the social learning theory emphasizes observation and imitation, as well as the reward-punishment system for sex-appropriate and sex-inappropriate behaviour. Due to the theory's generality, the social learning theory is often included in the basis of feminist arguments. If gender or sex does not prove to be special, then gender typing is neither inevitable nor unmodifiable. In other words, the social learning theory accounts for several gender-related and stereotypical behaviours.

The social learning theory and gender typing can also be identified in topics on business, such as female entrepreneurship. A study by Yang and Aldrich (2014) found that the expectations for men to be the main breadwinner within a household and women to comprise for the sake of their family are still imprinted on tasks in business. More specifically, they find that on average, men have more entrepreneurial and job-related tasks and few household-related tasks whereas women have more household tasks than job-related tasks.

Even with the educational systems and working environments of today, women still earn less, get promoted less frequently, and are underrepresented in leadership positions (St. Catherine University, 2022). More generally, UNICEF identifies seven main forms of gender bias that should be eliminated to achieve gender equality: women often lose out on educational opportunities for a better future due to childcare; in turn, women get paid less than men due to lower education, limited capabilities, and limited availability; women face more health risks related to childbirth and anticonception, and are not always taken seriously by doctors because femininity is often associated with softness; and finally, there is a lack of female representation in leadership roles due to the gender bias that the masculinity of men is needed to lead any entity successfully (Concern Worldwide, 2022).

2.2.3 The tokenism theory

Rosabeth Kanter introduced 'tokenism' in 1977. This theory refers to avoiding criticism and giving the impression of fair treatment by doing something, for instance employing someone who belongs to a minority group (Zimmer, 1988). The research included a case study involving 20 saleswomen in a sales force of 300 people in total. During this case study, Kanter (1977) found three common experiences shared by the

saleswomen, which led her to construct the tokenism theory; a theory in which people from a minority group are viewed as 'tokens' (Zimmer, 1988).

According to Kanter (1977), these experiences included heightened visibility, boundary heightening, and assimilation. Explicitly, *heightened visibility* creates higher performance pressure, *boundary heightening* is when the token must work harder to become an insider or remain an outsider, and *assimilation* refers to a tendency of the dominant group to distort token characteristics or behaviours as stereotypical. In the latter case, women either fight assimilation or take on a role that limits their growth opportunities. (Zimmer, 1988, p. 66).

This case study can be generalized and applied to the female workforce in general. Kanter (1977) found that women at all employment levels engaged in 'typically female work', which was then pointed out by others within the organization as proof that women were unfit for traditionally male jobs, such as leadership positions (Zimmer, 1988, p. 65). This essentialism is a reoccurring theme throughout history, even today. More specifically, Kanter (1977) argues that tokenism emerges in highly skewed groups in which minorities are smaller than 15% of the total; within this research, men were the dominant group, and women were viewed as the 'tokens', resulting in women being treated as representatives or symbols for their minority group rather than individuals (Zimmer, 1988, p. 656). As already discussed in the literature chapter, the female share of leadership positions nowadays is still only 31%, according to the World Economic Forum's Global Gender Gap Report (World Economic Forum, 2022, p. 36).

As elaborated on by Yoder (1991), Kanter's (1977) case study was subject to three confounding factors: gender status, occupational inappropriateness, and intrusiveness. At any given time, token gender affects the token's status; negative experiences may not be the same for male and female tokens. This *gender status* problem can be checked by comparing the negative experiences of token men with token women; if these experiences diverge so much that the negative consequences only apply to female tokens, gender bias is confirmed (Yoder, 1991, p. 180).

Kanter's (1977) study is also subject to *occupational inappropriateness* since the female tokens performed jobs that were considered unsuitable for women at the time. More specifically, token academic women were considered 'double deviants', women were not supposed to be working and higher education for women was rare (Yoder, 1991). Hence, by studying high-level saleswomen in her case study, Kanter (1977) applied both aspects of double deviance: gender status and occupational inappropriateness. The gender typing of occupations is defined by two aspects: the ratio of women to men workers and what is deemed appropriate work for men and women (Yoder, 1991, p. 182). By applying the tokenism theory on gender-inappropriate

occupations for both male tokens and female tokens, Yoder (1991) found that male tokens do not experience any negative consequences, whereas female tokens face performance pressure, boundary heightening, and assimilation; all three consequences originally identified by Kanter (1977).

Finally, the tokenism theory is subject to *intrusiveness* in favour of men. More precisely, the higher the presence of men in an occupation, the higher the pay and prestige. In occupations where women dominate the working field, they do not have higher pay or prestige. The original tokenism theory fails to separate the effect of token's experiences and the effect of growing token numbers. Intrusiveness is only considered when token numbers increase and a skewed group remains (Yoder, 1991, p. 185). Here, female tokens still must face the consequences of being a minority group.

2.2.4 Gender schema theory

The gender schema theory was originally conceptualized by Sandra Bem (1981) and it elaborates on the cognitive development of children. The gender schema theory argues that a child's cognitive processing of whether a culture's definitions are feminine or muscular mediates gender typing. The gender schema theory is thus a combination of the previous three theories: the social learning theory, the psychoanalytic theory, and the cognitive developmental theory.

The gender schema theory is similar to the cognitive developmental theory. Yet, the gender schema theory argues that social communities also contribute to a child's gender typing, whereas the cognitive developmental theory does not consider external factors. The gender schema theory is also similar to the social learning theory since both theories suggest that gender typing can be learned. However, the gender schema theory implies that gender typing is neither inevitable nor unmodifiable (Bem, 1981). Such gender typing results in gender-schematic processing, which in turn creates gender differences.

The gender schema theory advocates that children learn about their society's cultural definitions of femininity and masculinity based on many gender-linked associations such as anatomy, reproductive function, and the division of labour (Bem, 1981). Unlike any other previously elaborated theory, the gender schema theory argues that children also learn to use these associations in evaluating and assessing any kind of new information. Children thus learn to be *gender-schematic*: any given decision is automatically and unwittingly considered from a gendered point of view (Bem, 1981). If a decision does not fit a child's definition of femininity or masculinity, the decision is rejected without further consideration. Hence, the gender schema theory is based on a cognitive structure of dimensions that form a nonconscious ideology.

Such gender-schematic processing also happens in business. A study by the Dutch company TechLeap found that a significant number of Dutch companies with male founders operate in software, fintech, marketing, or media, respectively. Dutch companies led by females operate mostly in health, marketing, fashion, and education. Remarkably, the total number of male founders is up to sixteen times as much as the total number of female founders. In addition, the number of companies with male founders that operate in software is twice as high as in fintech, which is the second-best industry. For companies with female founders, there are no significant differences between the industries. (TechLeap, 2019).

2.3 Initial Public Offerings

As already explained, an IPO can be defined as the first sale of a company's shares to the public (Brealey, Myers, & Allen, 2020). This section further defines the IPO. It explains how an IPO works, elaborates on the motives behind an IPO, explains the measurement of IPO performance, and discusses the three anomalies related to IPOs. This chapter aims to provide a better understanding of an IPO, its process, and the theories related to IPO performance before the hypotheses are framed.

2.3.1 What is an IPO?

An IPO is considered the most profitable exit route for private investors, and they are used to exit the best-performing ventures (Alemany & Andreoli, 2018, p. 538). Other exit routes are a merger of acquisition, liquidation or selling to familiar people (Alemany & Andreoli, 2018, p. 538). An IPO is a visible exit from successful portfolio firms that allows venture capitalists with reputation incentives to establish their reputation (Alemany & Andreoli, 2018, p. 538). Ever since the NASDAQ was founded in 1971, there have been almost 6.000 IPOs up until 2021; yet there have been fewer than 30 IPOs led by women (Business Insider, 2022). There are various motives for an IPO, and it is a complicated process to do an IPO, as further elaborated on in the next two subsections.

2.3.2 How does an IPO work?

There are many steps in arranging and completing an IPO. The first step is to select underwriters. Underwriters can be considered the intermediary, and they serve three roles: underwriters provide management with financial and procedural advice, they buy the issue, and they resell it to the public (Brealey, Myers, & Allen, 2020, p. 399). The managing underwriter selects a syndicate of underwriters to buy and resell a company's issue of shares. The company, the underwriters, and a firm of lawyers and accountants then prepare a registration statement for the Securities and Exchange Commission (SEC), which includes detailed information about the firm's history, current business, and future plans. Investors receive the most important parts of this registration statement in the form of a prospectus; this includes information on the offering and

the company, dividend policy, management, executive compensation, stockholders, underwriting, and legal matters (Brealey, Myers, & Allen, 2020, pp. 422-424).

During the process of the SEC, the company and its underwriters can start to build the issue price. Through a so-called roadshow, the underwriters talk to potential investors, who can indicate how much of the stock they would like for a certain price. Through this book-building method, the number of shares and the definitive price can be determined; not all investors have to be treated equally, so the company and the underwriters can reward certain investors for their input and trust (Brealey, Myers, & Allen, 2020, p. 400). After the SEC approves the IPO, the issue price is fixed, and the sale is finalized, a mandatory “quiet period” of 40 follows. After this period, underwriters publish reports on the company and their recommendations on its stock (Brealey, Myers, & Allen, 2020, p. 400).

2.3.3 Why do an IPO?

IPOs offer six benefits: going public enables companies to raise money in public equity markets; it enhances the reputation of the firm; it establishes a market price for the company’s shares; it allows pre-IPO owners to cash out; it allows the firm to raise money when other financing sources are depleted or too costly; and it allows the firm to pay for future acquisitions by using the shares as an acquisition currency (Alemany & Andreoli, 2018, pp. 545-546). Firms also tend to go public to attract analysts’ attention, to minimize the cost of capital, or to broaden the base of ownership (Brealey, Myers, & Allen, 2020, p. 396).

There are disadvantages to going public. IPOs are very time-consuming to complete, and there are high direct and indirect costs. Direct costs include underwriter fees, fixed costs of legal advice, audit fees, registration fees, the IPO prospectus, and many more. Indirect costs refer to disclosure costs due to disclosure rules, as well as the money that is left on the table with underpricing (Alemany & Andreoli, 2018, p. 546). There is potential for loss of control, and competition can take advantage of the prospectus that should be published. When a firm goes public, there is constant pressure on managers to report increases in profits (Brealey, Myers, & Allen, 2020, p. 397). Finally, there is much red tape involved when running a public company. Complaints about red tape have only increased since the Sarbanes-Oxley Act (SOX) was introduced in 2002. It sought to prevent a repeat of previous corporate scandals, but it also brought an increased reporting burden that caused many firms to remain private; thus, the number of IPOs plummeted.

2.3.4 How can you measure IPO performance?

There are multiple measures of IPO performance used throughout various studies, but six reoccurring measures are highlighted (Bellin & Ethridge, 2022; Mortensen, 2020). The first measure is the ‘*first-day pop*’,

which refers to the increase between the opening price and closing price on the first day of the IPO. The bigger this first-day pop, the more successful the IPO. Secondly, the '*multiple relative to market*' refers to an IPO offering price relative to the valuation multiples of comparable companies. Similar to the first-day pop measure, a higher multiple indicates a more successful IPO. Third, the '*offer-to-current return*' measure is another measure of IPO performance. It represents the cumulative return created by the growth from the initial IPO price to the current market price. Fourth, *meeting the forecasts of analysts* is another measure of IPO performance. Similarly, *executing the IPO according to plan* is another measure of successful IPO performance; even small problems during the IPO process can harm a company. Finally, *visibility, credibility, and reputation* are also measures of IPO performance. Higher visibility, reputation, and credibility indicate a more successful IPO performance.

Out of these six measures, only the 'offer-to-current return' measure is used to measure IPO performance, along with underpricing. Underpricing is the increase between the initial IPO price and the closing price on the first day of trading (Alemany & Andreoli, 2018, p. 549). The first measure, the offer-to-current return is chosen as a measure of long-term performance, since it provides a ratio of the initial IPO price, ranging from January 1st 2000 to December 31st 2021, compared to the share price on January 5th 2023. The second measure, underpricing, is chosen as a measure of short-term performance since it compares the closing price on the first day of trading to the initial IPO price. Other aforementioned measures provide a weaker presentation of IPO performance and were thus not chosen for this study.

2.3.5 Three anomalies related to IPOs

According to Ritter (1991), Alemany and Andreoli (2018), and Guo et al. (2006), there are three anomalies that characterize IPOs: initial underpricing, the "hot issue" market phenomenon, and long-term underperformance (Ritter, 1991, p. 1; Alemany & Andreoli, 2018; Guo, Lev, & Shi, 2006). These theories refer to three unexplained patterns in stock prices for IPOs, which will be further elaborated on in this subsection.

2.3.5.1 Initial underpricing

Initial underpricing is when IPO shares are sold at an IPO price that is below the market price on the first day of trading; in other words, the initial offer price is too low (Alemany & Andreoli, 2018, p. 549). There are four explanations for initial underpricing: first of all, a price discount makes it easier for investment banks to sell the IPOs; secondly, it attracts more investors and it improves liquidity after the IPO; third, it compensates investors for the risks associated with investing in IPO shares; and finally, it compensates investors for truthfully revealing their demand for shares in the so-called book-building procedure, in which the demand for the stock is estimated (Alemany & Andreoli, 2018, pp. 549-551).

In addition, there are two explanations as to why underpricing makes sense. First, researchers have found that underpriced shares tend to realize very high returns in the short run (Jay & Chen, 2000). The second explanation is related to the winner's curse. The highest bidder in an auction has probably overestimated the issue value and, unless bidders recognize this problem, the buyer will overpay; if bidders are aware of such danger, their bids are likely to be adjusted downwards correspondingly (Brealey, Myers, & Allen, 2020, p. 404). Investors who cannot distinguish between attractive and unattractive issues are exposed to the winner's curse, so underwriters need to underprice to attract such uninformed investors.

In contrast to the findings of Liu et al. (2014), Reutzel and Belsito (2015) found a clear gender bias among investors, in which the presence of female directors in boardrooms is considered a negative firm feature; as the number of female directors increases, so does the underpricing (Reutzel & Belsito, 2015, p. 35). More recently, Rau et al. (2022) found that, on average, firms with such gender-diverse boards experience 8.6% more underpricing, resulting in approximately \$20.94 million unrealized IPO proceeds (Rau, Sandvik, & Vermaelen, 2022).

2.3.5.2 "Hot issue" market phenomenon

The second anomaly is the "hot issue" market phenomenon, which argues that the excessive optimism from investors causes IPO prices to rise above fundamental value on the first day of trading, which remains so for long periods (Ritter, 1991, p. 4). There are three hypotheses for the "hot issue" market phenomenon: the capital demand hypothesis, the information asymmetry hypothesis, and the investor sentiment hypothesis. The capital demand hypothesis argues that more firms might go public when general economic conditions improve because they need capital; the information asymmetry hypothesis suggests that companies might postpone going public at times when information asymmetry problems are severe; and finally, the investor sentiment argues that firms might go public during periods when overoptimistic investors overvalue shares (Alemany & Andreoli, 2018, pp. 553-554; Ritter, 1991). According to Wang and Yung (2018), in a "hot issue" market phenomenon, investors cannot distinguish between high- and low-quality IPO firms, hence both experience high returns in the short run (Wang & Yung, 2018). However, in the long run, firm performance is revealed, which results in low-quality firms eventually facing much lower returns, which leads to long-term underperformance. To investigate the "hot issue" market phenomenon, we focus on the investor sentiment hypothesis identified by Alemany and Andreoli (2018). There have been many ups and downs in the period of 2000 until 2021, such as the launch of Facebook in 2004, the launch of the first iPhone in 2007, the global financial crisis of 2008, the Brexit that was voted on in 2016, or the COVID-19 pandemic that started in 2019. All such activities can impact hot issue IPO periods.

2.3.5.3 *Long-term underperformance*

Long-term underperformance occurs when the IPO shares appear to be overpriced and thus do not meet the expectations or set standards (Ritter, 1991, p. 3). There are three explanations for long-term underperformance. For one, it can happen when over-optimistic investors initially overestimate the profitability of the IPO shares and thus overpay (Alemany & Andreoli, 2018, p. 552; Ritter, 1991). Secondly, underperformance can also be based on the size and book-to-market ratios associated with the IPO firms; the share price is higher than the IPO company's book value (Alemany & Andreoli, 2018, p. 552; Ritter, 1991). Lastly, long-term underperformance can also occur when there is a divergence of opinions between investors. Over time, these diverging opinions narrow, and the stock rates become more realistic (Alemany & Andreoli, 2018, p. 553; Ritter, 1991).

2.4 Hypothesis formulation

This subchapter aims to construct hypotheses by means of the theoretical framework, as well as present relevant findings of previous studies for each hypothesis. An overview of previous studies can be found in section 3.2.

2.4.1 *Gender and IPO valuation*

Many studies have investigated the relationship between gender and firm performance. While most studies have investigated the relationship between board gender diversity and firm performance, several other studies have investigated other aspects of gender bias and firm performance. For one, Bigelow et al. (2012) have studied the presence of gender bias in IPO prospectus evaluations. They found a significant relationship between CEO gender and IPO evaluations, suggesting that female CEOs experience lower IPO evaluations. In addition, they found that IPOs led by female CEOs are considered less attractive. Moreover, in line with essentialism, tokenism theory, and the gender schema theory, Bigelow et al. (2012) found that males would be more likely than females to view female leaders as less qualified; this is due to a more masculine construal of leadership by men and a more androgynous view of leadership by females. As explained by the tokenism theory, men are considered the majority, while women are the minority. Due to the majority of masculinity characteristics, female leadership is deemed less qualified. Similarly, social communities still view masculinity in business as normal, which results in any deviating type of leadership as less qualified; in this case, female leadership.

Guzman and Kacperczyk (2019) found similar results on the gender gap in entrepreneurship. In fact, they found that the gender gap is already apparent in the early stages of funding; female-led firms are up to 63% less likely to obtain Venture Capital funding than male-led firms. According to Guzman and Kacperczyk (2019),

this investor bias against female entrepreneurship is based on gender differences in risk-taking and individual characteristics. Women are considered to be more risk-averse, hence avoiding more high-risk-high-reward opportunities. Finally, individual characteristics such as weaker networks, a lower drive for growth, and many other unobserved dimensions could lie at the centre of the observed gender gap. Hence, based on the research of Bigelow et al. (2012) and Guzman and Kacperczyk (2019), the first three hypotheses are formulated to investigate the relationship between gender and IPO valuation:

H₁: Firms with a female CEO receive a lower pre-IPO valuation than firms with a male CEO

H₂: Firms with a female CEO receive a lower post-IPO valuation than firms with a male CEO

H₃: Firms with a female CEO achieve lower IPO valuation than firms with a male CEO

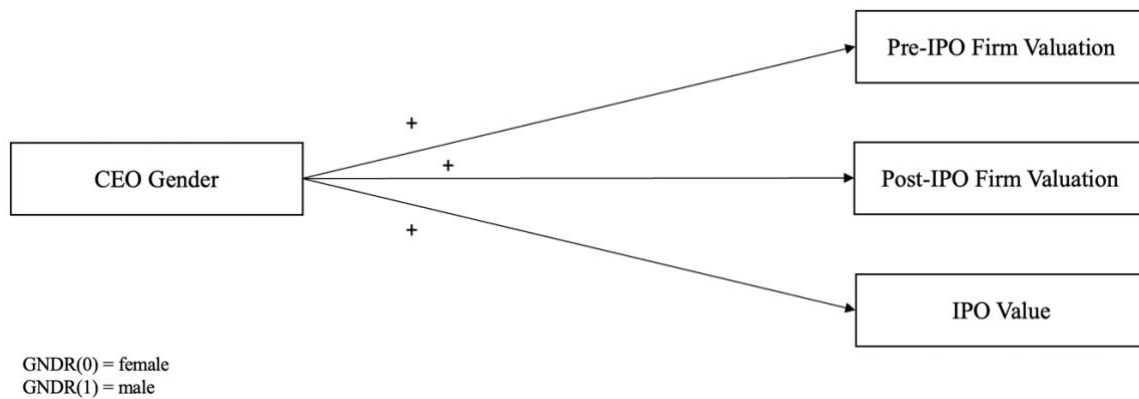


Figure 1 The Effect of CEO Gender on IPO Valuations

2.4.2 Board gender diversity and IPO performance

Reutzel and Belsito (2015) have investigated the relationship between board gender diversity and underpricing of IPOs. They found that investors have often relied on female stereotypes when evaluating female board presence. In addition, they found that this reliance on stereotypes has decreased after the Sarbanes-Oxley Act in 2002. Based on the signalling theory and the role congruity theory, Reutzel and Belsito (2015) suggest that investor perceptions of a firm also rely on board characteristics. They reflect the role congruity theory onto the board room, suggesting that female board representation leads to higher underpricing due to female stereotyping and director role archetypes. The fourth hypothesis will test whether female CEOs also experience higher underpricing. This will be an elaboration on the findings of Reutzel and Belsito (2015) on female board representation.

In contrast, Rau et al. (2022) find that IPOs with at least one female board member are significantly more underpriced than IPOs with an all-male board of directors. Rau et al. (2022) rely on institutional investor demand, arguing that investors have a strong preference for diverse boards and hence require lower rates

of return. To investigate the relationship between gender, board gender diversity, and IPO performance, the following hypotheses are tested:

H₄: Firms with a female CEO experience higher IPO underpricing than firms with a male CEO

H₅: Higher female board representation leads to higher underpricing

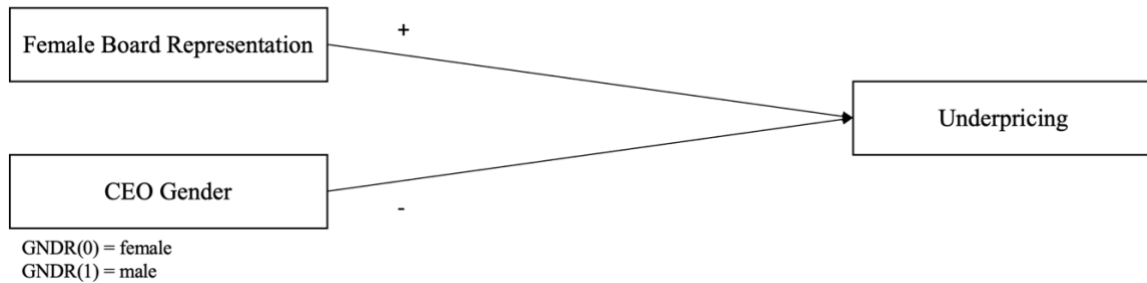


Figure 2 The Effect of CEO Gender and Female Board Representation on Underpricing

2.4.3 Gender and firm performance

Many studies have investigated the influence of gender on firm performance and IPO performance. In fact, there are many different methods to measure firm performance and IPO performance. For instance, Liu et al. (2014) have investigated the effect of board gender diversity on firm performance in China. They find that the percentage of female directors had a significantly positive effect on firm performance. More specifically, boards with three or more women have a stronger impact on firm performance than boards with fewer women. Liu et al. (2014) measure this firm performance through the return on sales and the return on assets. Another profitability measure is the Earnings Per Share (EPS). The EPS can be calculated by dividing a company’s net profit by the number of common shares outstanding (McLaney & Attrill, 2018, p. 267)

Huang and Kisgen (2013) find that female executives are less likely to issue debt or to make acquisitions, and female board presence leads to higher announcement returns and debt offerings. These findings are also based on variables such as profitability and market-to-book ratio. Based on these studies, the following two hypotheses are constructed and tested:

H₆: Higher female board representation leads to higher EPS

H₇: Firms with a female CEO have higher EPS than firms with a male CEO

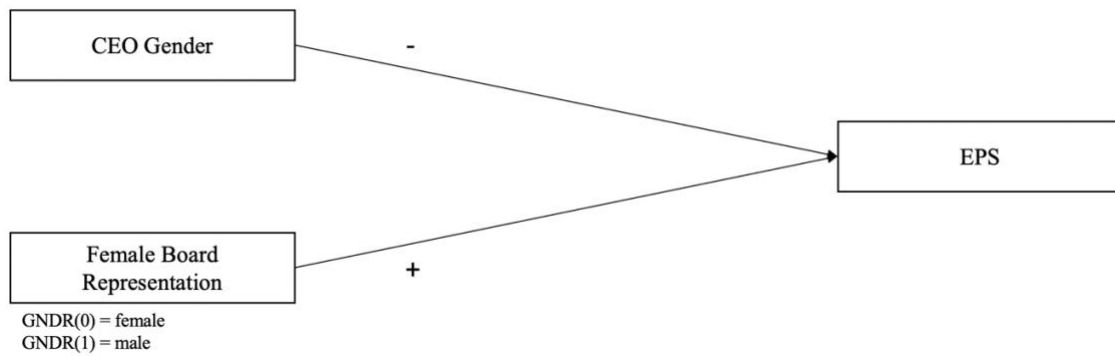


Figure 3 The effect of CEO Gender and Female Board Representation on EPS

However, there are more methods to test IPO performance. This research also investigates an IPO’s short-term and long-term performance through two ratios. The short-term performance ratio compares a company’s pre-IPO valuation to its post-IPO valuation, while the long-term performance ratio correlates the announced IPO share price to the current share price; also referred to as the offer-to-current return measure (Bellin & Ethridge, 2022; Mortensen, 2020). The current share price was taken on the 5th of januari, 2023.

As already elaborated on, many studies have investigated the gender gap in IPO performance by firms with female CEOs and male CEOs. For instance, Bigelow et al. (2012) have studied gender bias in IPO prospectus evaluations. They asked their respondents about the strategic and financial attractiveness of an IPO offer. More specifically, they assess IPOs based on a firm’s strategic positioning, the uniqueness of a product, how much percent a respondent would invest in the IPO, and the anticipated share price in three years. They found that the percentage of investment was up to four times as high for firms with male CEOs compared to firms with female CEOs.

Similarly, Guzman and Kacperczyk (2019) found that female entrepreneurs are up to three times less likely than male entrepreneurs to receive funding in the early stages of their entrepreneurship. This gender bias in entrepreneurship is based on essentialism and gender typing; men stereotype women, and there are individual characteristics such as women being more risk averse. This gender bias can be translated into two hypotheses that investigate the relationship between gender and IPO performance both in the short run and the long run.

H₈: *Firms with a female CEO experience lower short-term IPO performance than firms with a male CEO*

H₉: *Firms with a female CEO experience lower long-term IPO performance than firms with a male CEO*

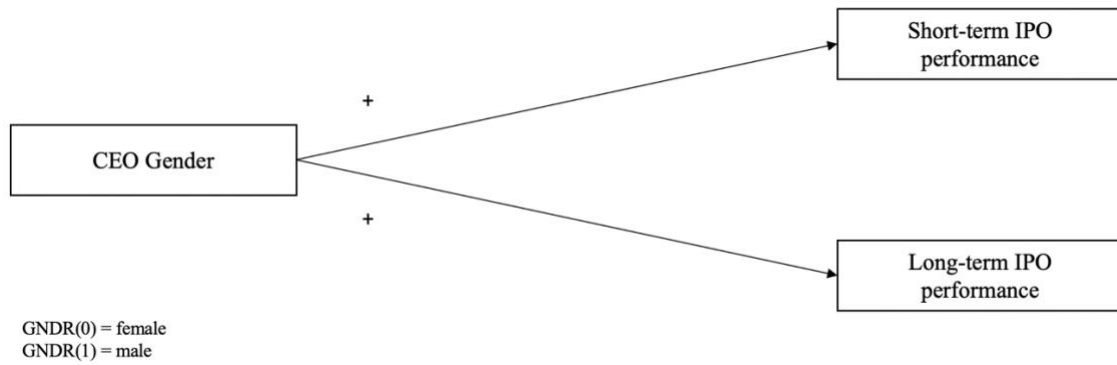


Figure 4 The Effect of CEO Gender on Short-term and Long-term IPO Performance

2.4.4 Gender and industries

Marlow and McAdam (2013) have investigated the gender gap in entrepreneurship. One of the subjects they have investigated is gender bias in specific industries. They found that women within their research are concentrated in either the lower levels of higher-status occupations or in occupations defined by poor rewards and skill affiliations. The latter group includes forms of caring and cleaning, which are considered to be women’s nature and do not require any learned skills or competencies.

More specifically, Guzman and Kacperczyk (2019) found that women are less likely to found companies in biotechnology, IT, or semiconductors. Rather, they are more likely to start their business in industries that are related to local business activity. Similarly, research on the gender gap by the World Economic Forum shows that female leadership is most present in non-governmental and membership organizations, education, healthcare, the public sector, and media and communications (World Economic Forum, 2022). In the Netherlands, Techleap found that a significant number of Dutch companies with male CEOs operate in software, fintech, marketing, or media. Dutch companies with female CEOs operate mostly in health, marketing, fashion, and education.

In fact, 47% of the leaders within non-governmental and membership organizations are female; within education, 46% of the leaders are female; 45% of leaders within healthcare are female; 40% of today’s leaders in the public sector are female; and finally, 37% of leaders in media and communications are female (World Economic Forum, 2022, p. 37). But why these industries? Based on feminist theory these types of organizations can be considered feminine rather than muscular. In accordance with the social learning theory and the gender schema theory, it is thus natural for women to stand out in such organizations. With these findings, the final hypothesis can be constructed.

H₁₀: *There are more female CEOs in non-governmental and membership organizations, education, healthcare, media and communications, and the public sector*



Figure 5 The Effect of CEO Gender on Type of Industry

2.4.5 Hypotheses overview

This final subsection proposes a listed overview of the hypotheses to be tested. A total of ten hypotheses were tested in this research. All hypotheses except for H5 and H6 tested the effect of CEO gender on various dependent variables. On the other hand, hypotheses H5 and H6 tested a potential relationship between female board representation and either underpricing or EPS.

H₁: Firms with a female CEO receive a lower pre-IPO valuation than firms with a male CEO

H₂: Firms with a female CEO receive a lower post-IPO valuation than firms with a male CEO

H₃: Firms with a female CEO achieve lower IPO valuation than firms with a male CEO

H₄: Firms with a female CEO experience higher IPO underpricing than firms with a male CEO

H₅: Higher female board representation leads to higher underpricing

H₆: Higher female board representation leads to higher EPS

H₇: Firms with a female CEO have higher EPS than firms with a male CEO

H₈: Firms with a female CEO experience lower short-term IPO performance than firms with a male CEO

H₉: Firms with a female CEO experience lower long-term IPO performance than firms with a male CEO

H₁₀: There are more female CEOs in non-governmental and membership organizations, education, healthcare, media and communications, and the public sector

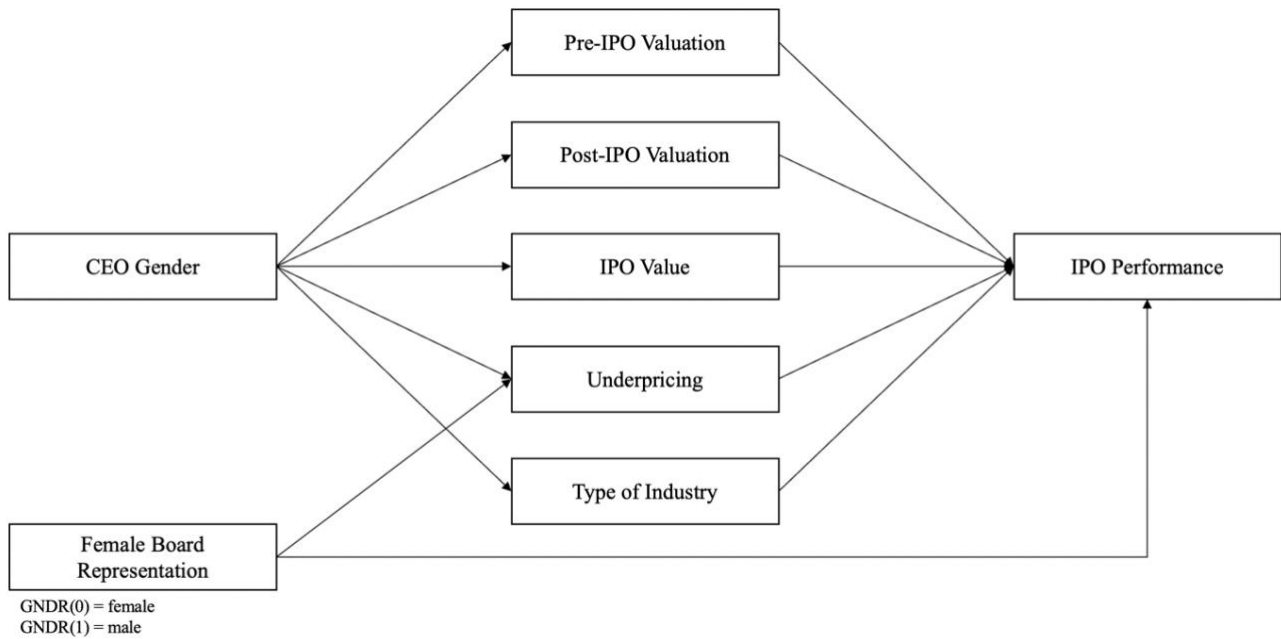


Figure 6 Visualisation of all Hypotheses

3. METHODOLOGY

3.1 Research design

This research is based on seven theories and nine prominent studies. To investigate the effect of gender on IPO performance, ten hypotheses were formulated in the previous chapter. The effect of gender on the IPO performance of NASDAQ-listed firms will be analysed at the hand of observations of company statistics from companies that went public in the period from 2000 until 2021 on the NASDAQ stock market. Through methods like the Independent Samples T-Test, ANOVA, and Fisher’s Exact Test, the hypothesis will be tested. Thus, this research qualifies as quantitative research (Tashakkori & Teddlie, 2009). This research will be deductive since it aims to confirm hypotheses based on previous research (Rennie, 2006, p. 61).

3.2 Methods used in other studies

There is a broad base of studies that have investigated the relationship between gender and firm performance. Based on a survey sample of 222 MBA students, Bigelow et al. (2012) investigated gender bias in IPO prospectus evaluations at the hand of methods such as ANOVA. More generally, Marlow and McAdam (2013) have critically evaluated the relationship between gender and business performance. First, they review the evidence on the performance of female-led firms, after which they compare this performance to the general performance of small firms. Then, Marlow and McAdam consider the implications of this comparison and how they illustrate current limitations and gender biases. Huang and Kisgen (2013) investigate the relationship between gender bias and firm performance by comparing corporate and financial decisions made by female executives to those of male executives. Based on a framework of independent

variables, Huang and Kisgen (2013) construct four regressions. Based on a sample of 128 Italian IPOs, Reutzel and Belsito (2015) have investigated the impact of corporate governance on underpricing in Italy. They constructed two regression models which included corporate governance characteristics.

Further, several studies have investigated the relationship between board gender diversity or leadership characteristics and firm performance. Skaggs et al. (2012) have researched how female presence at top-level influences female managerial representation at lower levels. Based on a dataset of 5679 establishments, they constructed a two-level hierarchical linear model. The study of Liu et al. (2014) investigates the effect of board gender diversity on firm performance in China. They construct a regression model to test their hypotheses related to gender and firm performance. Similarly, Rau et al. (2022) researched the effect of board gender diversity on IPO underpricing through Ordinary Least Squares (OLS) regression.

Finally, many studies have researched the relationship between gender and entrepreneurship. Caliendo et al. (2014) create a logit model to estimate the probability of becoming self-employed for men and women separately. The model is based on data from the German Socio-Economic Panel, which collects information on more than 22.000 German individuals. Yang and Aldrich (2014) have studied the gender gap within entrepreneurial teams in the US by using conditional logistic regression. Dheer et al. (2019) investigated the gender gap in entrepreneurship by constructing a cross-cultural cognitive model for new venture creation. They use hierarchical linear modeling for their research. Guzman and Kacperczyk (2019) have studied the gender gap in entrepreneurship and use relative assessment of investor assessments to investigate the imbalance between male and female founders, and they examine start-up attributes to investigate a start-up's access to external funding. Guzman and Kacperczyk (2019) constructed a dataset that includes all US California and Massachusetts for-profit start-up corporations, limited liability companies, and partnerships in the years 1995 to 2011. They estimated a formula for growth orientation, which included start-up characteristics. Table 1 gives an overview of all other studies mentioned in this thesis.

3.3 Sample and selection

The initial sample contains 29 NASDAQ IPOs led by a female CEO, from 1971 until 2021. However, there is insufficient data on the two IPOs before 2000, so the IPOs from Siebert Financial in 1972 and Urban One in 1999 are excluded. To even this out and to maintain both reliability and validity, the number of firms with male CEOs that have gone public will also be 27. Thus, the total sample size will consist of 54 companies. Firms led by male CEOs will be randomly selected from the NASDAQ annual IPOs to improve reliability and avoid bias. One drawback of random sampling compared to purposeful sampling is that purposeful sampling can provide information-rich cases (Patton, 1990). Yet, purposeful sampling might result in skewed results

for this research, since the number of IPOs by firms with a female CEO is a given. In addition, random selection increases generalizability; with a random selection of the cases, the findings of this research can be applied to the population, instead of only this specific sample (Patton, 1990).

Table 1 Other studies and their findings

Who	What	How	Findings
<i>Bigelow et al. (2012)</i>	Gender Bias in Prospectus Evaluations	ANOVA, ANCOVA, MANOVA	<ul style="list-style-type: none"> Female entrepreneurs are less likely to attract IPO investors Female entrepreneurs rely more on informal forms of financing Female entrepreneurs experience lower IPO evaluations women are viewed as less qualified leaders due to a more masculine construal of leadership by men
<i>Skaggs et al. (2012)</i>	Influence of Female Presence at Top-Level on Female Managerial Representation at Lower Levels	Hierarchical Linear Model	<ul style="list-style-type: none"> Women need to gain stronger numerical presence in top positions before being able to create more equal leadership in lower ranks
<i>Marlow & McAdam (2013)</i>	The effect of Gender Bias on Firm Performance	Relative Assessment	<ul style="list-style-type: none"> There are still more male CEOs in sectors with scope for market expansion Female CEOs and their firms are constrained rather than underperforming due to women participating more in household Women are concentrated in either lower levels of higher-status occupations or in occupations defined by poor rewards and skill affiliations
<i>Huang & Kisgen (2013)</i>	Relationship between Gender Bias and Firm Performance	Regression Models	<ul style="list-style-type: none"> Female executives are more risk averse in their decisions Female executives are less likely to issue debt or make acquisitions Female board presence leads to higher announcement returns and debt offerings
<i>Caliendo et al. (2014)</i>	Effect of Gender on Entrepreneurship	Logit Model	<ul style="list-style-type: none"> Women are more risk averse Women are less likely to switch to entrepreneurship
<i>Liu et al. (2014)</i>	Effect of Board Gender Diversity on Firm Performance	Regression Model	<ul style="list-style-type: none"> Boards with three or more women have a stronger positive impact on firm performance Board gender diversity has a positive impact on firm performance
<i>Yang & Aldrich (2014)</i>	Gender Gap in Entrepreneurial Teams	Conditional Logistic Regression	<ul style="list-style-type: none"> Men are expected to be the main breadwinners and women compromise for the sake of the family Men have more entrepreneurial and job-related tasks and few household-related tasks, whereas women have more household tasks. Women often work in healthcare and education or in 'inferior' jobs such as administration and secretary
<i>Reutzel & Belsito (2015)</i>	Impact of Corporate Governance on Underpricing	Regression Models	<ul style="list-style-type: none"> There is a positive relationship between board gender diversity and IPO underpricing Investors often rely on female stereotypes when evaluation female board presence
<i>Dheer et al. (2019)</i>	Gender Gap in Entrepreneurship	Cognitive Model	<ul style="list-style-type: none"> Women are 30% less likely than men to start a business
<i>Guzman & Kacperczyk (2019)</i>	Gender Gap in Entrepreneurship	Relative Assessment	<ul style="list-style-type: none"> Female-led ventures are up to 63% less likely to obtain funding in beginning stages of entrepreneurship Women are more likely to start firms in industries associated with local business activities and care, rather than differentiated technologies Women are more risk-averse, resulting in investor bias against female entrepreneurs
<i>Rau et al. (2022)</i>	Effect of Board Gender Diversity on IPO Underpricing	OLS Regression	<ul style="list-style-type: none"> Firms with board gender diversity experience 8.6% more underpricing, resulting in approximately \$20.96 million unrealized IPO proceeds Board gender diversity leads to higher underpricing

As already mentioned, there have been 5.753 IPOs in the US in the years 2000-2021. Of these IPOs, only a meagre 0,5% have been led by a female CEO. This is extremely surprising since approximately 40% of the total US companies is female-led or female-owned. Figure 2 shows a summary of the number of firms per industry for both the female CEO and male CEO samples. The samples consist of a very diverse set of companies, including software and cyber security, pharmaceuticals and bioscience, entertainment, food services, communication services, social services, financial services, and fashion and beauty. Of the combined samples, fourteen companies are in pharmaceuticals and bioscience, thirteen companies operate in software business, six companies offer social services, five companies are entertainment industry, five firms are active in fashion and beauty, four companies operate in communication services, three companies are in the food industry, and only one company offers financial services.

The sample of firms with a female CEO is mostly pharmaceutical and bioscience companies, as shown in figure 2. In percentages, this industry accounts for 44.44% of the female sample; the fashion and beauty industry contribute 18.52%; software companies account for 14.81% of the sample; finally, the entertainment industry and social services each account for 11.11%. No companies operate in the food industry, communication services, cyber security, or financial services.

As figure 2 shows, most firms with male CEOs operate in software. In percentages, 33.33% of the male sample consists of software companies; 14.81% is contributed by communication services; the food industry, social services, and cyber security each contribute 11.11%; the entertainment industry and the pharmaceuticals and bioscience industry each account for 7.41%; and finally, one company provides financial services, thus accounting for 3.70%. No companies are active in the fashion and beauty industry.

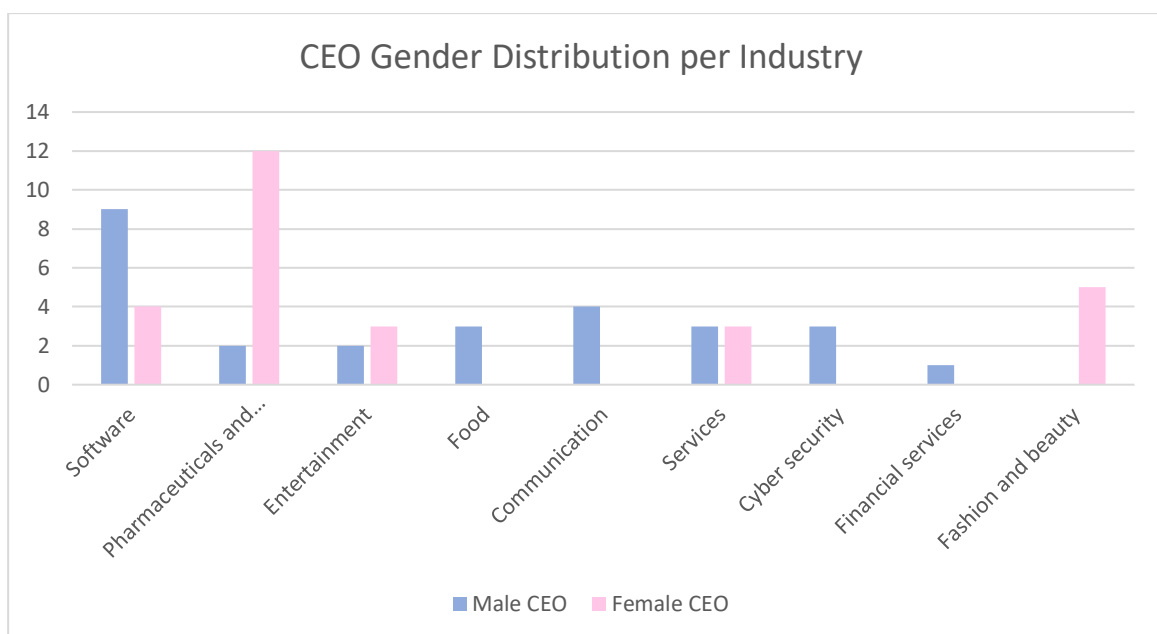


Figure 7 Histogram of the CEO Gender Distribution per Industry

3.4 Measurement

This subsection elaborates on the variables that have been used in this study. Both the dependent and independent variables, along with their code, definition, and sources can be found in table 2.

3.4.1 *Dependent variables*

The aim of this research is to analyse the effect of gender on IPO performance; hence IPO performance is the dependent variable in this study. To measure IPO performance, we use several methods that will be constructed into dependent variables: the IPO value, the first-day pop, and the offer-to-current return for each company. IPO value is a ratio variable that is measured in US dollars. The first-day pop will be measured through underpricing. The amount of underpricing is measured in both US dollars and percentages. More specifically, the variable 'underpriced' is a nominal variable for which an IPO can either be underpriced (1) or not (0). Consequently, the variable 'underpricing' is a ratio variable that measures the percentage of underpricing by dividing the closing share price on the first day of trading minus the announced IPO share price, divided by the announced IPO share price, then multiply by 100. Next, the offer-to-current return is measured by two ratios. The first ratio is constructed by dividing the post-IPO value of a company by its pre-IPO value, and it measures short-term IPO performance. The second ratio is constructed by dividing the current share price by the IPO share price. This ratio measures the long-term IPO performance of a company. Both share prices are measured in US dollars. The current share price was taken on the 5th of January 2023.

Further, the EPS measures the profitability of the IPO in the long run. The EPS is taken over the first year after the IPO and it is measured in US dollars. Besides the announced IPO share price, the opening share price and closing share price are also dependent ratio variables. Finally, the variable 'Industry' is a nominal variable that will show what industry the company operates in: software (1), pharmaceuticals and bioscience (2), entertainment (3), food (4), communication (5), services (6), cyber security (7), financial services (8), or fashion and beauty (9).

3.4.2 *Independent variables*

This study analyses the effect of gender on IPO performance. Hence, the independent variable is gender. CEO gender is an independent nominal variable with only two values; CEOs can either be female (0) or male (1). Further, board gender diversity is another independent variable. It is measured by the number of female directors on the Board of Directors, both numerically and in percentages. Hence, board gender diversity is measured through two variables. At first, the date of IPO was included to analyse whether a 'hot issue' period could be identified, but this hypothesis was not included in the final research. No control variables were required for the statistical tests within this research.

Table 2 Variable Coding and Definitions

Dependent variable	Code	Definition	Type of Variable	Measurement	Sources
<i>IPO value</i>	IPOV	Value of the IPO	Ratio	In millions of US dollars	Rau et al. (2022);
<i>Pre-IPO value</i>	PREV	Company value before IPO	Ratio	In millions of US dollars	Rau et al. (2022);
<i>Post-IPO value</i>	POSTV	Company value after IPO	Ratio	In millions of US dollars	Rau et al. (2022);
<i>Firm valuation ratio</i>	STP	Ratio of pre/post valuation		Post-IPO firm valuation divided by the pre-IPO firm valuation	Rau et al. (2022);
<i>Share price ratio</i>	LTP	Ratio of initial IPO price and current share price on 5 th of January 2023		Current share price (January 5 th , 2023) divided by the announced IPO share price	Bigelow et al. (2012); Rau et al. (2022);
<i>IPO share price</i>	IPOP	Announced IPO share price	Ratio	In US dollars	Bigelow et al. (2012);
<i>Opening Price</i>	OP	Opening share price of IPO	Ratio	In US dollars	Bigelow et al. (2012);
<i>Closing Price</i>	CP	Closing share price at first day of IPO	Ratio	In US dollars	Bigelow et al. (2012);
<i>Underpriced</i>	UPD	Whether the company was underpriced at the IPO	Nominal	(0) No; (1) yes	Reutzel and Belsito (2015); Rau et al. (2022);
<i>Underpricing</i>	UPC	Percentage of underpricing at IPO	Ratio	(Closing price - IPO share price)/IPO share price *100	Reutzel and Belsito (2015); Rau et al. (2022);
<i>Earnings per Share</i>	EPS1	Earnings per Share.	Ratio	Net profit divided by the number of outstanding shares	Huang and Kisgen (2013); Rau et al. (2022);
<i>Industry</i>	IND	Type of industry that the company operates in	Nominal	(1) Software; (2) pharmaceuticals and bioscience; (3) entertainment; (4) food; (5) communication; (6) public services; (7) cyber security; (8) financial services; (9) fashion and beauty	Skaggs et al. (2012); Huang and Kisgen (2013); Reutzel and Belsito (2015); Guzman and Kacperczyk (2019);
Independent variable	Code	Definition			Sources
<i>CEO gender</i>	GNDR	Gender of the CEO at the time of IPO	Nominal	(0) Female; (1) Male	Kanter (1977); Bigelow et al. (2012); Marlow and McAdam (2013); Huang and Kisgen (2013); Caliendo et al. (2014); Yang and Aldrich (2014); Dheer et al. (2019); Guzman and Kacperczyk (2019); Rau et al. (2022);
<i>Board gender diversity number</i>	BGDNR	Number of female directors on the Board of Directors at the time of IPO	Nominal	Number of female directors on the Board of Directors	Skaggs et al. (2012); Huang and Kisgen (2013); Liu et al. (2014); Reutzel and Belsito (2015); Rau et al. (2022);
<i>Board gender diversity percentage</i>	BGDPRC	Percentage of female directors on the Board of Directors at the time of IPO	Ratio	Number of female directors divided by the total number of directors on the Board of Directors	Skaggs et al. (2012); Liu et al. (2014); Huang and Kisgen (2013); Reutzel and Belsito (2015); Rau et al. (2022);
<i>IPO date</i>	DATE	Date of the IPO. The first day IPO shares started trading	Interval	Day – Month - Year	Guzman and Kacperczyk (2019); Rau et al. (2022);

3.5 Data collection

All studies and theories discussed in the literature review are collected through Scopus. To find relevant literature, the keywords include [("IPO" OR "Initial Public Offering" OR "IPO performance" OR "Firm performance") AND ("Female entrepreneurship" OR "Female board representation" OR "Board gender diversity" OR "Gender bias" OR "Gender gap" OR "Female CEO")]. This results in 185 relevant documents. These results are further refined to 'open access only' in the subject areas 'Business, Management and Accounting', 'Economics, Econometrics and Finance', and 'Social Sciences'; this limits the relevant papers to 52 documents. All abstracts are read and either accepted or rejected, based on their relevance related to this study. This results in the various studies included in this research.

All IPO data for the SPSS dataset is gathered through observation of the NASDAQ, and Crunchbase, a platform that provides information on both public and private businesses. If pre-IPO value and post-IPO value cannot be found on either website, news articles are used to complete the dataset. The opening price, closing price, EPS, and stock return of each IPO are retrieved from Yahoo! Finance, which provides a reliable database for historical data on stocks. Further, underpricing is calculated by subtracting the closing price from the initial IPO price and dividing this number by the initial IPO price. Positive results are 'underpriced', and negative results are 'not underpriced'. The number of females on the board can be found in the annual report from the corresponding IPO year. Subsequently, the percentage of female board members is calculated by dividing the number of female board members by the total number of board members.

3.6 Data analysis

3.6.1 Testing hypotheses

Within this research, three statistical tests are used for the ten hypotheses: the Independent Samples T-test, ANOVA, and Fisher's Exact test. In addition, a correlation matrix can be found in table 4, which serves as a summarized overview of the correlations between the variables.

First, the correlation matrix is discussed. To interpret this correlation matrix correctly, two significance levels are considered: both the 5% level and the 1% level. This decreases the chance of a Type I error: rejecting a true null hypothesis. In addition, the smaller the significance level, the smaller the probability of a Type II error: not rejecting a false hypothesis (De Veaux, Velleman, & Bock, 2016, p. 576).

The most-used test within this study is the Independent Samples T-test, which tests the difference between two means (De Veaux, Velleman, & Bock, 2016, p. 616). The independent variable should be a dummy, and the dependent variable should be a scale or ratio variable. In addition, a significance level of 5% is assumed,

thus maintaining a confidence interval of 95%. When comparing the critical T-value and the observed T-value, negative T-values are ignored; rather, they turn positive. The null hypothesis can be rejected when the observed T-value is bigger than the critical T-value. The Independent Samples T-test is used for all hypotheses except H5, H6, and H10.

The second statistical test, ANOVA, also determines whether there are significant differences between the means of two or more groups (van den Berg, sd). It stands for the Analysis of Variance. For this test, the independent variable should be either nominal or ordinal, and the dependent variable should be an interval or ratio variable. Based on Levene’s test, equal variances are either assumed or not, which gives the corresponding F-value. Based on a significance level of 5%, the null hypothesis is accepted or rejected. This test is used for hypotheses H5 and H6 because there is an independent nominal variable and dependent ratio variables.

Finally, Fisher’s Exact test is used for H10. The independent variable ‘CEO gender’ is a dummy variable and the dependent variable ‘Type of Industry’ is a nominal variable. Hence, neither an Independent Samples T-test nor ANOVA can be used. To test an association or relationship between these variables, a Chi-Square test of Independence could be used. However, to perform a Chi-Square test of Independence, 80% or more of the cells should be at least five. In other words, at least five firms should be operating in each industry. If more than 20% of the cells have a value lower than five, Fisher’s Exact test can be used (De Veaux, Velleman, & Bock, 2016).

This research does not include linear regression, because statistical tests like the Independent Samples T-test and ANOVA provide more suitable results when looking at the hypotheses. Table 3 presents an overview of the data analysis per hypothesis.

Table 3 Overview of Hypotheses and their Statistical Tests

	Independent variable	Dependent variable	Relationship	Statistical test
H1	GNDR	PREV	Positive	Independent Samples T-Test
H2	GNDR	POSTV	Positive	Independent Samples T-Test
H3	GNDR	IPOV	Positive	Independent Samples T-Test
H4	GNDR	UPC	Negative	Independent Samples T-Test
	GNDR	UPD	Negative	Independent Samples T-Test
H5	BGDNR	UPD	Positive	ANOVA
	BGDNR	UPC	Positive	ANOVA
	BGDPRC	UPD	Positive	ANOVA
	PGDPRC	UPC	Positive	ANOVA
H6	BGDNR	EPS1	Positive	ANOVA
	BGDPRC	EPS1	Positive	ANOVA
H7	GNDR	EPS1	Negative	Independent Samples T-Test
H8	GNDR	STP	Positive	Independent Samples T-Test
H9	GNDR	LTP	Positive	Independent Samples T-Test
H10	GNDR	IND	Not independent	Fisher’s Exact Test

3.6.2 Assumptions before data analysis

Multiple hypotheses are constructed for this research. However, before these hypotheses can be tested, the sample must be in accordance with various statistical assumptions. To test the difference between two sample means through Independent Samples T-test or ANOVA, the sample should be randomly selected to ensure independence. This meant that the values in each group should be independent, and the groups should be independent as well, which is ensured through randomization (De Veaux, Velleman, & Bock, 2016, p. 614) The samples should also be bigger than five firms (De Veaux, Velleman, & Bock, 2016, p. 614). Both the male CEO sample and the female CEO sample contain more than five firms, so the nearly normal condition is also fulfilled. Hence, both the male CEO sample and the female CEO sample can be used to perform Independent Samples T-tests and ANOVA. Finally, and as already mentioned in the previous subsection, Fisher’s Exact test is used for H10, since only two bars from figure 7 show a higher value than 5.

4. RESULTS

In this chapter, the results are shown. First, the descriptive statistics are analysed at the hand of table 4. Then, the correlation table in table 5 is analysed to determine significant relationships at a 5% significance level and a 1% significance level. Then, various tests are conducted between different variables to test the hypotheses that have been formulated within this research. In the discussion, these results are compared to previous studies and the theoretical framework that was constructed earlier on in this paper.

Table 4 Descriptives per Variable for each Gender

		IPOV	PREV	POSTV	STP	LTP	IPOP
Female	<i>Mean</i>	\$399,62	\$1.899,98	\$2.650,03	1.338	1.048	\$17,33
	<i>Standard Deviation</i>	\$655,24	\$2.911,14	\$4.170,09	.213	1.352	\$10,73
Male	<i>Mean</i>	\$865,87	\$8.812,43	\$12.945,51	1.666	2.265	\$29,39
	<i>Standard Deviation</i>	\$1.133,89	\$11.739,38	\$20.902,98	.696	3.049	\$22,65
Total	<i>Mean</i>	\$632,74	\$5.356,20	\$7.898,71	1.509	1.657	\$23,36
	<i>Standard Deviation</i>	\$946,95	\$9.161,59	\$15.932,14	.544	2.415	\$18,58

		OP	CP	EPS1	UPD	UPC	BGDNR	BGDPRC
Female	<i>Mean</i>	\$20,64	\$21,51	-\$170,95	.78	22,01%	3,00	34,73%
	<i>Standard Deviation</i>	\$16,24	\$15,07	\$849,09	.424	30,40%	1.468	13,98%
Male	<i>Mean</i>	\$40,35	\$42,27	-\$1,52	.85	43,19%	2,26	26,84%
	<i>Standard Deviation</i>	\$35,02	\$33,90	\$3,32	.362	37,06%	1,583	19,74%
Total	<i>Mean</i>	\$30,50	\$31,89	-\$86,23	.81	32,60%	2,63	30,78%
	<i>Standard Deviation</i>	\$28,12	\$28,02	\$600,37	.392	35,24%	1,558	17,40%

4.1 Descriptive statistics

Table 4 shows the statistics for both the male CEO and female CEO sample, as well as an average of the samples combined. The statistics already show that men score higher on all variables, except for 'BGDNR' and 'BGDPRC'. However, for the male CEO sample, standard deviation is also higher for almost all variables. Only for 'EPS1' and 'UPD', the

Female CEO sample has higher standard deviations. A higher standard deviation indicates that the data is more spread out around the mean. The results from table 4 already indicate that firms with male CEOs experience higher IPO valuations, have higher short-term and long-term IPO performance, have higher IPO pricing and higher underpricing, but have lower female board representation. Yet, these statistics should not be used to draw conclusions, since the samples could be skewed or not representative for their population.

4.2 Variable measurement significance

The correlation matrix in table 5 shows the strength and direction of the linear relationship between a pair of variables. For this research, the extent of the effect of gender on IPO performance is investigated. For this correlation matrix, Pearson's R is used to determine the strength of a linear relationship between two variables, and the correlation will be portrayed with an 'r'. The findings are divided into two categories: correlations with significance at the 5% level and correlations with significance at the 1% level.

To interpret this correlation matrix, four correlation strengths are considered: a correlation below 0.3 indicates no relationship, or a very weak one; if Pearson's R is between 0.3 and 0.5 this indicates a weak relationship; if the correlation lies between 0.5 and 0.7, there is a moderate relationship; finally, if Pearson's R is higher than 0.7 this indicates a strong relationship (De Veaux, Velleman, & Bock, Scatterplots, Association, and Correlation, 2016, p. 177) In this subsection the correlation table will be analysed and discussed.

4.2.1 Significant variables at 5% level

The first column of table 5 shows the relationship between CEO gender and all other variables. There is a significantly weak and positive relationship between CEO gender and post-IPO firm valuation ($r=.326$), short-term performance ($r=.304$), the announced IPO share price ($r=.327$), the first day closing price ($r=.345$), and the percentage of underpricing ($r=.303$). This suggests that firms with male CEOs experience higher post-IPO valuations and higher short-term performance, set a higher IPO share price, have a lower closing price on the first day of the IPO, and experience a higher percentage of underpricing. Further, there is a significant and very weak negative relationship between CEO gender and the percentage of females on the Board of

Table 5 Correlation Matrix

		GNDR	IND	PREV	POSTV	IPOV	STP	LTP	IPOP	OP	CP	EPS1	UPD	UPC	BGDNR	BGDPRC
GNDR	<i>Pearson's R</i>	1														
	<i>Sig. (2-tail)</i>															
IND	<i>Pearson's R</i>	-.014	1													
	<i>Sig. (2-tail)</i>	.919														
PREV	<i>Pearson's R</i>	.381**	.203	1												
	<i>Sig. (2-tail)</i>	.005	.141													
POSTV	<i>Pearson's R</i>	.326*	.147	.926**	1											
	<i>Sig. (2-tail)</i>	.019	.303	<.001												
IPOV	<i>Pearson's R</i>	.249	.183	.891**	.771**	1										
	<i>Sig. (2-tail)</i>	.070	.185	<.001	<.001											
STP	<i>Pearson's R</i>	.304*	-.072	-.087	.076	-.104	1									
	<i>Sig. (2-tail)</i>	.019	.620	.550	.600	.473										
LTP	<i>Pearson's R</i>	.254	-.168	-.050	-.036	-.098	.509**	1								
	<i>Sig. (2-tail)</i>	.063	.226	.720	.802	.481	<.001									
IPOP	<i>Pearson's R</i>	.327*	.172	.536**	.481**	.475**	.042	-.116	1							
	<i>Sig. (2-tail)</i>	.016	.214	<.001	<.001	<.001	.774	.402								
OP	<i>Pearson's R</i>	.345*	.185	.569**	.629**	.468**	.120	-.082	.912**	1						
	<i>Sig. (2-tail)</i>	.011	.181	<.001	<.001	<.001	.406	.555	<.001							
CP	<i>Pearson's R</i>	.374**	.185	.553**	.623**	.444*	.198	-.037	.904**	.985**	1					
	<i>Sig. (2-tail)</i>	.005	.245	<.001	<.001	<.001	.168	.790	<.001	<.001						
EPS1	<i>Pearson's R</i>	.137	.087	.078	.067	.088	-.008	.095	.121	.111	.122	1				
	<i>Sig. (2-tail)</i>	.323	.532	.575	.641	.525	.956	.496	.385	.425	.379					
UPD	<i>Pearson's R</i>	.095	-.152	-.053	.061	-.065	.140	.078	-.070	.124	.171	.288*	1			
	<i>Sig. (2-tail)</i>	.493	.272	.704	.669	.642	.332	.573	.617	.370	.217	.035				
UPC	<i>Pearson's R</i>	.303*	.066	.136	.278*	.075	.443**	.298*	.096	.346*	.419**	.129	.588**	1		
	<i>Sig. (2-tail)</i>	.026	.636	.326	.048	.590	.001	.029	.492	.010	.002	.354	<.001			
BGDNR	<i>Pearson's R</i>	-.240	.268*	.140	.142	.308*	-.121	-.209	.185	.243	.192	.055	.040	.118	1	
	<i>Sig. (2-tail)</i>	0.80	.050	.312	.320	.024	.401	.130	.180	.077	.164	.691	.774	.395		
BGDPRC	<i>Pearson's R</i>	-.229*	.291*	.267	.372**	.306*	-.027	-.174	.225	.343*	.303*	-.022	.073	.205	.864**	1
	<i>Sig. (2-tail)</i>	.096	.032	.051	.007	.025	.853	.208	.102	.011	.026	.875	.602	.138	<.001	

Blue cell = significance at 1% level

Grey cell = significance at 5% level

Directors ($r=.229$). This indicates that the percentage of females on the Board of Directors is higher for firms with a female CEO.

In the second column of table 5 the relationship between the industry that a firm operates in and all other variables. From this column, it can be derived that there is a significant, yet very weak positive relationship between the type of industry that a firm operates in and female board representation ($r=.268$; $r=.291$). Further, a significant and very weak positive relationship can be identified between post-IPO firm valuation and the percentage of underpricing ($r=.278$) in the fourth column.

In the second column of table 5 the relationship between the industry that a firm operates in and all other variables. From this column, it can be derived that there is a significant, yet very weak positive relationship between the type of industry that a firm operates in and female board representation ($r=.268$; $r=.291$). Further, a significant and very weak positive relationship can be identified between post-IPO firm valuation and the percentage of underpricing ($r=.278$) in the fourth column.

The fifth column portrays the relationship between the IPO value and all other variables. This column shows that there is a significant weak positive relationship between the IPO value and the closing price on the first day ($r=.444$) and female board representation ($r=.308$; $r=.306$). Then, in the seventh column a very weak positive relationship can be identified between the long-term performance and the percentage of underpricing ($r=.298$). The ninth column shows a significantly weak positive relationship between the opening price and the percentage of underpricing ($r=.346$), as well as a weak positive relationship between the opening price and the percentage of females on the Board of Directors ($r=.343$). Finally, there is a significant weak positive relationship between the closing price on the first day of the IPO and the percentage of females on the Board of Directors ($r=.303$).

4.2.2 Significant variables at 1% level

In the first column, one can identify a weak positive relationship between CEO gender and the pre-IPO firm valuation ($r=.381$), and between CEO gender and the closing price on the first day of the IPO ($r=.374$). Then, the third column shows a significant, very strong relationship between the pre-IPO firm valuation and the post-IPO firm valuation ($r=.926$), as well as between the pre-IPO firm valuation and the IPO value ($r=.891$). In addition, there is a moderate positive relationship between pre-IPO firm valuation and the variables IPO share price ($r=.536$), the IPO opening price ($r=.569$), and the closing price on the first day of the IPO ($r=.553$).

Similarly, the fourth column shows that there is a strong relationship between the post-IPO firm valuation and the IPO valuation ($r=.771$), as well as a moderate relationship between post-IPO firm valuation and the variables IPO share price ($r=.481$), IPO opening price ($r=.629$), and the closing price on the first day of the IPO ($r=.623$). Further, there is a significant and weak, positive relationship between the post-IPO firm valuation and the percentage of females on the Board of Directors ($r=.372$). The fifth column also shows a weak and positive relationship between IPO value and the variables IPO share price ($r=.475$), IPO opening price ($r=.468$), and the closing price on the first day of the IPO ($r=.444$).

The sixth column portrays a moderately positive relationship between short-term performance and long-term performance ($r=.509$), as well as a weak positive relationship between short-term performance and the percentage of underpricing ($r=.443$). Then, the eighth column shows a significantly strong positive relationship between the IPO price and both the opening price ($r=.912$) and the closing price on the first day of the IPO ($r=.904$). Similarly, the ninth column shows another significantly strong and positive relationship between the opening price and the closing price on the first day of the IPO ($r=.985$). There is also a weak positive relationship between the closing price on the first day of the IPO and the percentage of underpricing ($r=.419$).

As can be seen in the twelfth column, there is a moderately positive relationship between the number of firms that experience underpricing and the percentage of underpricing per IPO ($r=.588$). Finally, the fourteenth column shows a significantly strong and positive relationship between the number of females on a Board of Directors and the percentage of females on a Board of Directors ($r=.864$).

4.3 Firms with a female CEO experience lower IPO valuations

To test the first hypothesis, the effect of CEO gender on pre-IPO valuation is analysed. The null hypothesis is that there is no relationship between CEO gender and pre-IPO firm valuation, whereas the alternative hypothesis states that firms with a female CEO receive lower pre-IPO valuation than firms with a male CEO. This hypothesis is based on the research of both Bigelow et al. (2012) and Guzman and Kacperczyk (2019). To analyse this hypothesis, an Independent Samples T-test is conducted.

The results of this Independent Samples T-test shows a significant effect of CEO gender on pre-IPO value. Based on a significant Levene's test ($p<.001$), equal variance is not assumed. The difference in pre-IPO value for firms with a female CEO ($M=1,899.98$; $SD=2,911.14$) and firms with a male CEO ($M=8.812,43$; $SD=11,739,38$) is strongly significant ($t(29,186)=-2,970$; $p=.003$). With a significance level of 5% and 29 degrees of freedom, the critical t-value for this hypothesis is 1.699. Since the absolute value is bigger than the critical t-value ($-2,970>1.699$), there is enough evidence to reject the null hypothesis. A positive

relationship between the variables 'GNDR' and 'PREV' is observed. Hence, it can be confirmed that firms with a female CEO receive a lower pre-IPO valuation than firms with a male CEO.

For the second hypothesis, the Independent Samples T-test shows that the post-IPO value also lies significantly lower for firms with a female CEO. Based on a significant Levene's test ($p=.006$), equal variances are not assumed. Firms with a female CEO ($M=2.650,03$; $SD=4170,09$) have a lower post-IPO value than firms with a male CEO ($M=12.945,51$; $SD=20.902,98$). Based on a significance level of 5% and the Independent Samples T-test results ($t(27,064)=-2.461$; $p=.010$) which show 27 degrees of freedom, the critical t-value for this hypothesis is 1.703. Since the absolute t-value is larger than the critical t-value ($-2.461 > 1.703$), there is enough evidence to reject the null hypothesis and confirm a positive relationship between the variables 'GNDR' and 'POSTV'. Thus, this additional Independent Samples T-test shows that CEO gender also has a significant effect on the post-IPO firm value.

Similarly, the third hypothesis investigates the effect of CEO gender on IPO valuation. The null hypothesis is that there is no relationship between CEO gender and IPO valuation. The alternative hypothesis is then that firms with a female CEO achieve a lower IPO valuation than firms with a male CEO. Similar to the first hypothesis, this hypothesis is based on the findings of Bigelow et al. (2012) and Guzman and Kacperczyk (2019), who find that women are up to three times less likely to receive initial funding from external investors.

Based on a significant Levene's Test ($p=.017$), equal variances are not assumed for an Independent Samples T-test. On average, the IPO value for firms with a female CEO ($M=399.62$; $SD=655.24$) lies much lower than for firms with a male CEO ($M=865.87$; $SD=1133.89$). Considering the 5% significance level and the Independent Samples T-test results ($t(41.622)=-1.85$; $p=.036$) it can be seen that the 'degrees of freedom' is 42. The critical t-value for this hypothesis is thus 1.684. Since the absolute t-value is larger than the critical t-value ($-1.85 > 1.684$), there is enough evidence to reject the null hypothesis, and a positive relationship between the variables 'GNDR' and 'IPOV' is observed. It can thus be stated that firms with a female CEO ($GNDR=0$) experience lower IPO valuation than firms with male CEOs ($GNDR=1$).

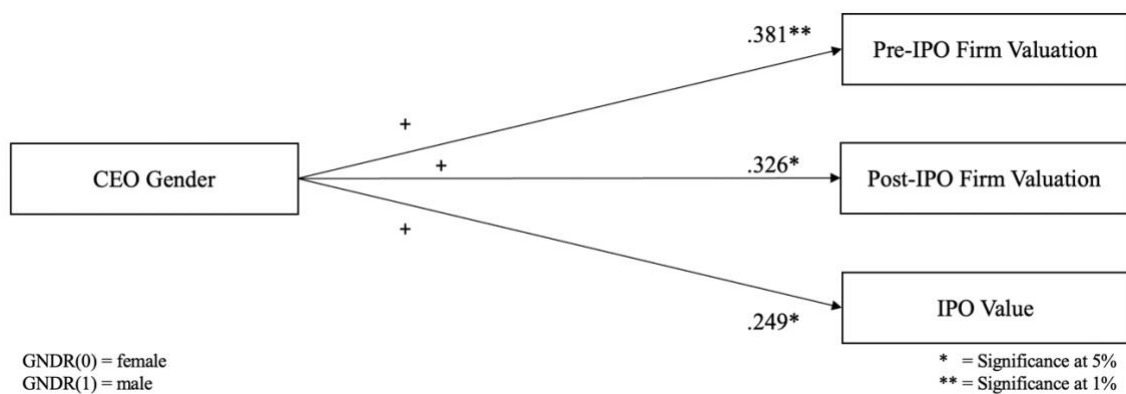


Figure 8 Relationships between CEO Gender and IPO Valuations

4.4 Firms with a female CEO experience higher IPO underpricing, but not more often

With the fourth hypothesis, the relationship between CEO gender and underpricing is tested at the hand of an Independent Samples T-test. The null hypothesis states that there is no relationship between the variables CEO gender and underpricing, whereas the alternative hypothesis is that firms with a female CEO experience higher IPO underpricing than firms with a male CEO. This hypothesis is based on research by Reutzel and Belsito (2015), as well as the findings of Rau et al. (2022).

The Independent Samples T-test shows that the underpricing of IPOs led by female CEOs ($M=22.01$; $SD=30.40$) lies lower than that of male CEOs ($M=43.19$; $SD=37.06$). Levene's test is not significant ($p=.416$), so equal variances are assumed. The difference in underpricing between female CEOs and male CEOs ($t(52)=-2.296$; $p=.013$) indicates a critical t-value of 1.676. Since the absolute t-value is larger than the critical t-value ($-2.296 > 1.676$), there is enough evidence to reject the null hypothesis. This means that there is a negative relationship between the variables 'GNDR' and 'UPC'. It can thus be stated that firms with female CEOs ($GNDR=0$) experience higher IPO underpricing than firms with male CEOs ($GNDR=1$).

In addition to this hypothesis, one could also test whether firms with a female CEO also experience underpricing more often. The null hypothesis would state no relationship between the independent variable 'GNDR' and the dependent variable 'UPD'. Based on the findings of both Reutzel and Belsito (2015) and Rau et al. (2022), the alternative hypothesis would then be that there is a negative relationship between 'GNDR' and 'UPD'. An Independent Samples T-test showed that, based on an insignificant Levene's test ($p=.168$), there is no significant relationship between 'GNDR' and 'UPD' ($t(52)=-.691$; $p=.246$). Based on 52 degrees of freedom and a significance level of 5%, the critical t-value is 1.676. Since the observed value is smaller than the critical value ($-.691 < 1.676$) there is not enough evidence to reject the null hypothesis; no significant relationship can be identified between CEO gender and the occurrence of underpricing.

Then, the fifth hypothesis investigates the relationship between female board representation and underpricing through an ANOVA test. For the null hypothesis, no relationship is assumed between female board representation and underpricing. The alternative hypothesis states that higher female board representation leads to higher underpricing. This hypothesis has been formulated at the hand of research by Reutzel and Belsito (2015) and Rau et al. (2022). However, to test this hypothesis, two tests need to be conducted. First, the ANOVA is done with the variable 'BGDNR' as the independent variable, and then the ANOVA is tested with 'BGDPRC' as the variable. This way, both the absolute number and the percentage of women on the Board of Directors are considered.

The first ANOVA test thus considers the number of females on the Board of Directors. This test shows no significant results for the relationship between the independent variable 'BGDNR' and the dependent variables 'UPD' ($F(7)=.862; p=.543$) and 'UPC' ($F(7)=.900; p=.515$). At the significance level of 5%, the null hypothesis is rejected for both dependent variables since the observed p-value is larger than the significance level. Hence, there is no significant relationship between female board representation and the amount of underpricing per IPO.

The second ANOVA test considers the percentage of females on the Board of Directors as an independent variable and both 'UPD' and 'UPC' as dependent variables. Again, based on the ANOVA test results, there is no significant relationship between the independent variable 'BGDPRC' and the dependent variables 'UPD' ($F(21)=.727; p=.776$) and 'UPC' ($F(21)=.964; p=.526$). At a significance level of 5%, the null hypothesis is not rejected for both dependent variables and there is thus no significant relationship found between female board representation and the occurrence of underpricing.

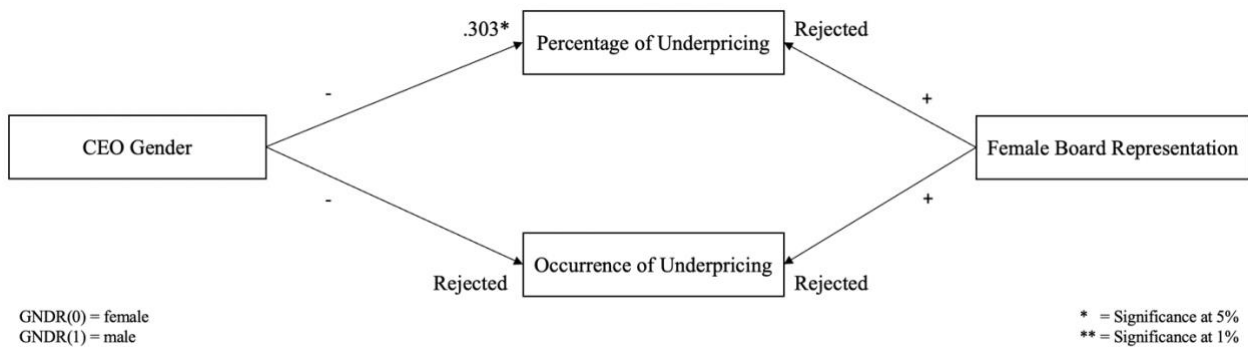


Figure 9 Relationships between CEO Gender or Female Board Representation and Underpricing

4.5 There is no relationship between gender or female board representation and EPS

The sixth hypothesis is based on the findings of both Huang and Kisgen (2013) and Liu et al. (2014). With this hypothesis, the relationship between female board representation and the EPS is tested. The null hypothesis is that there is no relationship between female board representation and EPS. The alternative hypothesis is that female board representation leads to higher EPS. There are two independent variables that relate to the board gender diversity; 'BGDNR' measures the number of women on a Board of Directors, while 'BGDPRC' measures the percentage of women on a Board of Directors.

In the first ANOVA test, 'BGDNR' will be used as the independent variable. Hence, the relationship between the independent variable 'BGDNR' and the dependent variable 'EPS' is tested. Based on the ANOVA results ($F(7)=.339; p=.932$) and a significance level of 5%, there is not enough evidence to reject the null hypothesis. In other words, there is no significant relationship between the number of women on the Board of Directors and EPS.

The second ANOVA test uses 'BGDPRC' as the independent variable, thus investigating a relationship between the percentage of women on the Board of Directors and the EPS. The ANOVA results ($F(21)=.185$; $p=1.000$). Based on a significance level of 5%, there is not enough evidence to reject the null hypothesis. Thus, no significant relationship can be identified between the percentage of women on the Board of Directors and the EPS.

More generally, hypothesis seven tests whether there is a significant relationship between the independent variable 'GNDR' and the dependent variable 'EPS'. This hypothesis is based on the findings of both Huang and Kisgen (2013) and Liu et al. (2014). The null hypothesis is that there is no relationship between these two variables. The alternative hypothesis states firms with a female CEO have higher EPS than firms with a male CEO.

An insignificant Levene's test ($p=.044$) and the Independent Samples T-test ($t(26.001)=-.997$; $p=.162$) indicate 26 degrees of freedom. Along with a significance level of 5%, this indicates a critical t-value of 1.721. Since the critical t-value is bigger than the observed value ($-.997 < 1.721$), there is insufficient evidence to reject the null hypothesis. In other words, no significant relationship could be identified between the independent variable 'GNDR' and the dependent variable 'EPS'.

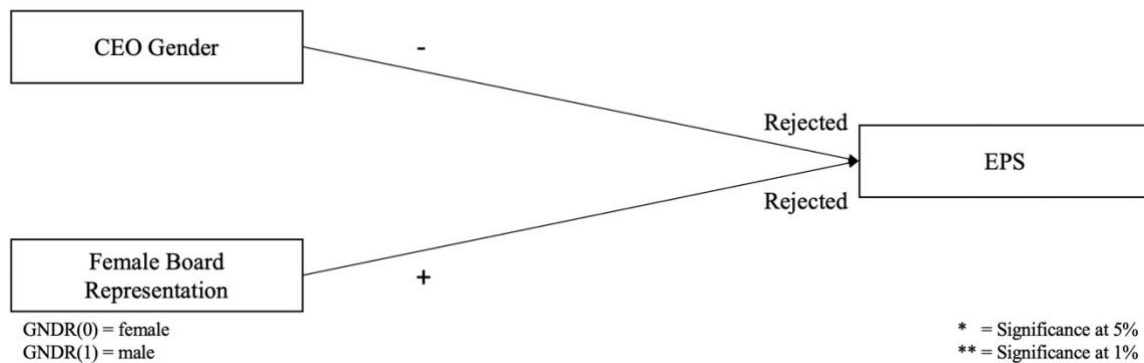


Figure 10 Relationship between CEO Gender or Female Board Representation and EPS

4.6 There is a negative relationship between CEO gender and both IPO performance ratios

The eighth hypothesis focuses on the potential relationship between CEO gender and short-term IPO performance. The short-term IPO performance is a ratio that is measured through a firm's pre-IPO valuation and its post-IPO valuation. This hypothesis is based on the research of various studies such as those of both Liu et al. (2014) and Huang and Kisgen (2013), but mostly on the findings of Guzman and Kacperczyk (2019). For the null hypothesis, no relationship is assumed between gender and short-term IPO performance. The alternative hypothesis is that firms with a female CEO experience lower short-term IPO performance than firms with a male CEO.

Once again, the independent variable is a dummy variable. This means that an Independent Samples T-test can be conducted. According to Levene’s test ($p < .001$) equal variances are not assumed. Further, based on the results of the Independent Samples T-test ($t(30,014) = -2.285$; $p = .015$) the ‘degrees of freedom’ is then equal to 30. With a significance level of 5%, this indicates a critical t-value of 1.697. Since the observed value is larger than the critical value ($-2.285 > 1.697$), there is enough evidence to reject the null hypothesis and accept the alternative hypothesis. It can thus be stated that there is a positive relationship between CEO gender and short-term IPO performance. Or, in other words, firms with female CEOs (GNDR=0) experience lower short-term IPO performance than firms with male CEOs (GNDR=1).

In contrast to the eighth hypothesis, the ninth hypothesis focuses on long-term IPO performance. Again, the null hypothesis assumes no relationship between the independent variable ‘GNDR’ and the dependent variable ‘LTP’. The alternative hypothesis is that firms with a female CEO experience lower long-term IPO performance than firms with a male CEO. Similar to hypothesis eight, this hypothesis is mainly based on research by Guzman and Kacperczyk (2019).

Based on Levene’s test ($p = .015$) equal variances are not assumed for this Independent Samples T-test. The Independent Samples T-test ($t(35,846) = -1.898$; $p = .032$) does thus indicate that the ‘degrees of freedom’ is equal to 36. Combined with a significance level of 5%, this indicates a critical t-value of 1.684. The observed value is larger than the critical value ($1.898 > 1.684$), so there is enough evidence to reject the null hypothesis and accept the alternative hypothesis. A positive relationship can be identified between CEO gender and long-term IPO performance, meaning that firms with female CEOs (GNDR=0) experience lower long-term performance than firms with male CEOs (GNDR=1).

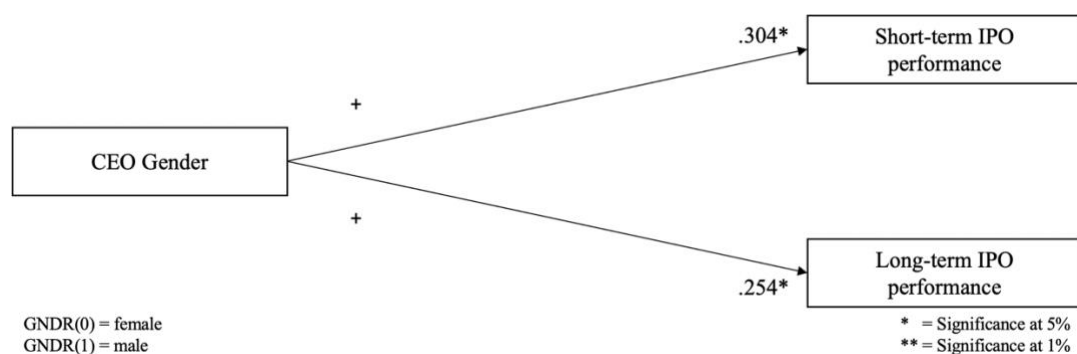


Figure 11 Relationship between CEO Gender and Short-term and Long-term IPO performance

4.7 There are significantly more female CEOs in various industries

The final hypothesis investigates the relationship between CEO gender and the type of industry a firm operates in. This tenth hypothesis is based on the research of Guzman and Kacperczyk (2019). The null

hypothesis assumes no significant association between the variables gender and industry. The alternative hypothesis states that the variables CEO gender and industry are not independent.

Based on Fisher’s Exact test in SPSS ($P < .001$) and a significance level of 5%, there is enough evidence to reject the null hypothesis ($.001 > 0.05$). In line with this result, the correlation table in table 5 shows that the strength of this relationship is $-.014$. Hence, there is enough evidence to state that there are more firms with female CEOs than male CEOs in non-governmental and membership organizations, education, healthcare, media and communications, and the public sector.



Figure 12 Relationship between CEO Gender and Type of Industry

5. DISCUSSION

Based on the various studies and theories discussed in the literature review, the effect of CEO gender is subdivided into ten hypotheses. The results indicate a significant relationship between CEO gender and IPO performance. Female leaders experience a lower pre-IPO valuation, as well as a lower post-IPO valuation. This is in line with the findings of Bigelow et al. (2012), who found that women are often viewed as less qualified leaders due to a more masculine construal of leadership by men. In addition, Guzman and Kacperczyk (2019) found that female-led firms are three times less likely to obtain early-stage financial funding. These studies already suggest reasons for lower pre-IPO firm valuation for female-led firms. This could be because women are more risk-averse or because they have different individual characteristics, as posed by Guzman and Kacperczyk (2019), but it could also be because there is a strong presence of the gender schema theory; business ideas by women could be dismissed more easily due to the cognitive structure in which femininity and masculinity cultures are applied to each decision in one’s mind. If the gender schema theory applies, women would always be at a disadvantage in business.

This study also confirms that firms with female CEOs experience higher underpricing during their IPO. As indicated by Reutzler and Belsito (2015), investment decisions are often based on female stereotypes. Hence, the expectations for IPOs by firms with a female CEO lie lower. Moreover, due to risk-aversion and cultural definitions of femininity and masculinity, women could also underestimate their own IPO, resulting in lower announced IPO prices for IPOs led by female CEOs. Similarly, investors could also underestimate IPOs led by female CEOs. As a result, the percentage of underpricing could be higher for these IPOs. As explained by Jay and Chen (2000) and Brealey et al. (2020), this could be to improve firm liquidity, make the IPO more attractive to a bank and investors, or serve as compensation for investors’ risk-taking and trust.

Further, firms with female CEOs experience lower short-term performance, as well as lower long-term performance than firms with male CEOs. This could be for a number of reasons. First, as explained by Bigelow et al. (2012) and in line with the cultural definitions of femininity and masculinity within the gender schema theory, women could be viewed as unqualified leaders, resulting in less trust and support for decisions. Women could also be more risk-averse and opt for stable financial decisions with lower risks and lower returns rather than high-risk-high-return decisions. These explanations can all be categorized as gender-typing, which finds its origins in the social learning theory. Yet, the long-term underperformance theory by Ritter (1991) could play a substantial part in the IPO performance of all IPO firms. Moreover, Ritter (1991) mentions three explanations for long-term underperformance. On the one hand, it could also be that over-optimistic investors overestimate the profitability of IPO shares from firms with female CEOs and overpay (Alemany & Andreoli, 2018, p. 552; Ritter, 1991). However, since female entrepreneurship, the gender gap, and gender bias are becoming more prominent subjects globally, it makes sense that there is a divergence in investor opinions. Over time, these diverging opinions narrow, and the stock rates become more realistic (Alemany & Andreoli, 2018, p. 553; Ritter, 1991). On another note, Marlow and McAdam (2013) argue that female-led firms do not underperform, but that they are constrained due to participating more within the household rather than acting as the dominant breadwinner (Marlow & McAdam, 2013). Again, this refers to the cultural definitions of femininity and masculinity within the gender schema theory. The reason for the significant difference in both short-term and long-term IPO performance for firms with female CEOs and male CEOs firms remains unclear and should be further investigated.

Finally, there is a significant difference in the type of industry that men and women operate in. This study confirms that there are more firms with female CEOs than male CEOs in non-governmental and membership organizations, education, healthcare, media and communications, and the public sector. Sectors such as education, healthcare, and the public sector are considered to have occupations defined by poor rewards and skill affiliations, as explained by Marlow and McAdam (2013). Such skills and qualities are considered to be women's nature and would not require any learned skills. This is also in accordance with the essentialism related to feminist theory, as well as gender typing and the gender schema theory. These theories imply that women do not fit in business or science. In contrast to Guzman and Kacperczyk (2019), who argue that women are less likely to start companies in biotechnology, IT, or semiconductors, this research implies that there are more significantly female CEOs than male CEOs in pharmaceuticals and bioscience. On the other hand, figure 1 shows that there are significantly more male CEOs in software and cyber security, as argued by Guzman and Kacperczyk (2019). Moreover, assuming that this research's samples are representative, pharmaceuticals and bioscience are already 44% of the female CEO sample, but only 7% of the male CEO sample. While the female CEO sample already contains all but 2 IPOs ever since the NASDAQ was founded,

the male CEO sample only portrays a small proportion of the total 5.726 US IPOs led by male CEOs. 7% of the total US IPOs led by male CEOs would still equal 401 male CEOs in pharmaceuticals and bioscience.

Overall, these findings indicate the presence of gender bias, which results in a gender gap in IPO performance. While Caliendo et al. (2014) find that women are more risk-averse and are thus less likely to switch to entrepreneurship, Skaggs et al. (2012) argue that there need to be more women in top positions before equal leadership can be empowered in lower ranks (Skaggs, Stainback, & Duncan, 2012, p. 945). Table 6 gives an overview of the key findings per hypothesis.

Table 6 Overview of the Hypotheses and their Key Findings

	Independent variable	Dependent variable	Relationship	Statistical test	Correlation	Significance	Conclusion
H1	GNDR	PREV	Positive	Independent Samples T-Test	$r = .381^{**}$	$p = .003$	There is a strongly significant, moderate positive relationship between CEO Gender and pre-IPO firm valuation
H2	GNDR	POSTV	Positive	Independent Samples T-Test	$r = .326^{**}$	$p = .010$	There is a strongly significant, moderate positive relationship between CEO Gender and post-IPO firm valuation
H3	GNDR	IPOV	Positive	Independent Samples T-Test	$r = .249^*$	$p = .036$	There is a significant, small positive relationship between CEO Gender and IPO Valuation
H4	GNDR	UPC	Negative	Independent Samples T-Test	$r = .303^*$	$p = .013$	There is a significant, moderate negative relationship between CEO Gender and the percentage of underpricing at IPO
	GNDR	UPD	Positive	Independent Samples T-Test	$r = .095$	$p = .246$	Rejected
H5	BGDNR	UPD	Positive	ANOVA	$r = .040$	$p = .543$	Rejected
	BGDNR	UPC	Positive	ANOVA	$r = .118$	$p = .515$	Rejected
	BGDPRC	UPD	Positive	ANOVA	$r = .073$	$p = .776$	Rejected
	PGDPRC	UPC	Positive	ANOVA	$r = .205$	$p = .526$	Rejected
H6	BGDNR	EPS1	Positive	ANOVA	$r = .055$	$p = .932$	Rejected
	BGDPRC	EPS1	Positive	ANOVA	$r = -.022$	$p = 1.000$	Rejected
H7	GNDR	EPS1	Positive	Independent Samples T-Test	$r = .137$	$p = .162$	Rejected
H8	GNDR	STP	Positive	Independent Samples T-Test	$r = .304^*$	$p = .015$	There is a significant, moderate positive relationship between CEO Gender and Short-term IPO Performance (ratio of pre/post IPO firm valuation)
H9	GNDR	LTP	Positive	Independent Samples T-Test	$r = .254^*$	$p = .032$	There is a significant, moderate positive relationship between CEO Gender and Long-term IPO Performance (ratio of initial IPO price and current share price on the 5 th of January 2023)
H10	GNDR	IND	Not independent	Fisher's Exact Test	$r = -.014^{**}$	$p < .001$	CEO Gender and Type of Industry are not independent

6. CONCLUSION

6.1 Key findings

This research studied the extent of the effect of CEO gender on IPO performance. CEO gender has a significantly positive effect on both pre-IPO firm valuation and post-IPO firm valuation, in favour of male CEOs. For CEO gender and both firm valuations, a moderate positive relationship was found. Female CEOs also experience lower IPO valuations; a small positive relationship was identified between CEO gender and

IPO value. Further, female CEOs experience significantly higher underpricing in their IPOs; a moderate negative relationship is found between CEO gender and the amount of underpricing. Female CEOs also experience lower short-term performance and long-term performance than male CEOs; for CEO gender and both IPO performance ratios there is a moderate positive relationship. Finally, there are more female CEOs in industries like non-governmental and membership organizations, education, healthcare, media and communications, and the public sector, but this is up for discussion. No evidence has been found for a relationship between female board representation and firm performance or underpricing.

Based on the results of this research, it can be stated that masculinity and essentialism still play a significant role in business. More specifically, CEO gender has a high impact on IPO performance. Male CEOs experience higher IPO valuations like pre-IPO and post-IPO firm valuations, as well as higher IPO value. IPOs led by male CEOs experience lower underpricing. Finally, firms with male CEOs experience higher short-term and long-term IPO performance.

6.2 Limitations

One limitation to consider when using ANOVA is that the test can identify at least one pair of means that is significantly different, but it cannot say which pair when using more than three groups (All Things Statistics, 2022). An alternative could be to test for significant differences in CEO gender for each industry separately.

Further, regression analysis is an alternative statistical method to analyse the relationship between two or more variables. However, to provide a reliable and representative regression for the extent of the effect of CEO gender on IPO performance, gender should have been measured by more independent variables. Yet, such simple linear regression would have also come with limitations. For one, linear regression is sensitive to outliers, so the data should be carefully tested on assumptions; the data must be independent, and outliers should be considered. However, in this research, outliers may provide very important information, thus they should not be removed (Flom, 2018).

There are also many studies and theories on the gender gap, gender bias, or the relationship between gender and IPO performance. For this study, the most relevant studies have been selected, along with several of the most cited theories on the gender gap, gender bias, and the effect of gender on IPO performance. As these subjects are becoming more prominent in society, more studies will follow, which may provide more valid, representative, and recent findings.

IPOs are often considered the most successful exit for investors and founders (Alemany & Andreoli, 2018; Brealey, Myers, & Allen, 2020). This research is thus not generalizable to other entrepreneurial firms that have not gone public, or that have exited via other ways. In fact, this study cannot be generalized to other countries since the Sarbanes-Oxley Act of 2002 has little impact on firms and investors outside the US.

Finally, as already mentioned, the results for the tenth hypothesis can be questioned. While this research already considers the complete set of female CEOs for US IPOs on the NASDAQ, the male CEO sample is only a small proportion of the total 5.126 US IPOs led by male CEOs. This hypothesis was not formulated accordingly and does not fit within the borders of this research.

6.3 Practical implications

One implication to decrease the gender gap and diminish gender bias is equal pay for jobs and positions. This could include that women will not be at a disadvantage when taking maternity leave. Women should be able to receive the same promotions, pay raises, and career opportunities as men, whether they take maternity leave or not; whether they choose to take care of their family or not. Further, gender equality could be promoted by stimulating men to take care of the household, eventually shifting the work-life balance for both men and women. Marlow and McAdam (2013) find that women participate in the household up to three times more often than men do, rather than acting as the dominant breadwinner. Yet, this could be because women still earn significantly less than men in the exact same position.

Women should also gain more top positions before equal leadership on lower levels can be targeted. For instance, board gender diversity should gain more attention, perhaps through setting quotas for female executives. Moreover, many studies already provide evidence that female board presence improves financial decisions, operational decisions and overall firm performance (Huang & Kisgen, 2013; Liu, Wei, & Xie, 2014; Reutzler & Belsito, 2015; Rau, Sandvik, & Vermaelen, 2022).

Women could also mentor male colleagues. This allows people to learn about leadership styles, techniques, and approaches and it will contribute to the application and acceptance of more femininity in business. This would not only contribute to more women in leadership positions, but it could also motivate young women to break barriers and set higher goals and standards. Such an implication would add to the findings posed by Skaggs et al. (2012) on more women in top positions.

Finally, to avoid gender bias in job application processes, skill-based assessments could be promoted. Assessing people on their skills and competencies could assist firms in finding the best suitable candidate,

regardless of gender, and it improves the fairness of the job application system. Another option to avoid gender bias in recruitment could be to use structured job interviews in which each candidate should answer the same set of questions. This reduces the risk of unconscious bias.

6.4 Future research

While this study sheds new light on the relationship between CEO gender and IPO performance, there are still many unexplored aspects of gender bias and the gender gap in IPO performance and firm performance. While this research focused on US IPOs, specifically on the NASDAQ, future research should investigate the effect of CEO Gender on IPO performance in other countries and across other indexes. Yet, as also stated in this study, some indexes like the Dutch AEX only have three firms with female CEOs. It would then also be interesting to investigate and compare the effect of CEO gender on IPO performance more in-depth for specific firms; this can be based on firm size, IPO value, industry, or other characteristics. Further, it is interesting to study the effect of CEO gender on IPO performance or firm performance within specific industries such as pharmaceuticals and bioscience, which proved to have a significant number of female CEOs. One could test whether this is also the case for private firms in pharmaceuticals and bioscience, or if this is just sample-based. Further research could investigate the effect of CEO gender on the decision of exit strategies, or another specific exit strategy like mergers and acquisitions or a buyout. This would add to the existing literature on exit strategies. IPO timing and potential 'hot issue periods' can be studied to investigate whether IPO timing affects IPO performance, or to identify potential 'hot issue periods'. Such research would broaden the existing literature on this anomaly and IPO performance.

All such suggestions for future research focus on IPOs. However, there are also several aspects of the gender gap and gender bias to focus on. Future research could focus on the gender gap in various industries to give insight per industry and potentially provide a better balance of CEO gender. Female leadership should be tested against male leadership to identify strengths and weaknesses of both genders. Such research would expand the literature on the gender gap and provide better insights to diminish this gap effectively.

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