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A study on CEO experience and its effect as a signalling mechanism on IPO underpricing

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Abstract

We examine if CEO experience functions as a signalling mechanism in initial public offerings (IPOs), reducing information asymmetry and consequently, IPO underpricing. To investigate this, we perform a multiple OLS regression on a hand-collected sample of 220 IPOs on Nasdaq Stockholm between 1 January 2010 and 15 March 2021. Four variables are used as a proxy for the broader concept of CEO experience, namely prior CEO experience, network, tenure, and age. First, we find that prior CEO experience is associated with lower IPO underpricing, suggesting that it successfully functions as a signal of the firm's quality at the time of the IPO. Second, in contrast to what we proposed, we find that both CEOs with stronger network and longer tenure leads to more IPO underpricing. Third, our results do not evidence a statistically significant relationship between CEO age and IPO underpricing. Our study confirms existing academic research that demonstrates the importance of the CEO in an IPO process, albeit our findings are unique in a Swedish context.

Tutor: Katerina Hellström **Keywords:** CEO experience, IPO underpricing, information asymmetry, signalling theory, corporate governance

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Table of contents

1 Introduction	2
2 Theory and literature review	4
2.1 IPO underpricing	5
2.2 Prior research on CEO experience	6
2.3 CEO experience in relation to IPO underpricing	8
2.4 Hypotheses	8
3 Methodology	
3.1 Data collection process and sample construction	11
3.2 Research design and research model	15
3.3 Dependent variable	16
3.4 Independent variables	17
3.5 Control variables	17
4 Results	21
4.1 Descriptive statistics	21
4.2 Correlation matrix	22
4.3 Regression results	25
4.4 Robustness tests	27
5 Discussion	
6 Conclusions	34
7 Suggestions for future research	
References	
Appendix	45

1 Introduction

The reasons for firms engaging in an initial public offering (IPO) are many and differ depending on the type of firm and situation. One of the most common reasons is access to capital which the public market domain offers both in the IPO and in future debt and equity offerings (Cressy & Olofsson, 1997; Martin, 2001; Ou & Haynes, 2006; Thorsell & Isaksson, 2014). Other common reasons include attracting talented employees, providing liquidity for shareholders, changing the shareholder structure, and enhancing company reputation (PwC, 2017). Between 2010 and 2020, a total of 322 firms decided to list their shares on the Stockholm Stock Exchange, compared to only 111 initial listings between 2000 and 2010 (Nasdaq, 2021). Due to modern technology and brokerage firms providing retail investors with easier access to the capital markets, interest from this group to participate in IPOs has spiked during the last decade, compared to the downturn in 2000 to 2010. With the growing number of offerings, capital raised, and retail investors' participation, initial public offerings become increasingly important to research.

One of the more researched subjects within the area of IPOs is the phenomenon of systematic underpricing. Underpricing is most commonly defined as the percentage change between the IPO offer price and the first-day closing price (Ritter, 1991). Research has shown convincing evidence that IPOs are on average underpriced throughout different markets and time periods (Loughran et al., 1994; Loughran & Ritter, 2004). Due to the broad set of factors impacting the outcome of an IPO, existing academic research has not been able to come to a definitive conclusion about which factors are driving underpricing. However, the underlying reason as to why underpricing occurs is most commonly argued to be information asymmetry among the issuing firm, informed investors, and uninformed investors (Rock, 1986; Ritter & Welch, 2002; Sundaramurthy et al., 2013). There are two main perspectives on the incentives to underprice. Some scholars view underpricing positively, as a signal of the firm's quality, meaning that only firms of high quality will be able to recoup "the money left on the table" through future seasoned equity offerings (Leland & Pyle, 1977). On the contrary, underpricing can be viewed negatively since the discount reduces the possible amount of capital that could have been raised, thus obstructing the firm's ability to raise capital efficiently (Deeds et al., 1997; Sundaramurthy et al., 2013). Most recent studies conducted on underpricing in relation to top management or directorship experience assume that firms of high quality should be able to sell

their shares with less underpricing through signalling mechanisms (Filatotchev & Bishop, 2002; Cohen & Dean, 2005; Sundaramurthy et al., 2013; Thorsell & Isaksson, 2014).

The transition from private to public ownership is an important strategic decision involving the entire body of corporate governance. Prior research evidence that the board of directors, top management team, and the CEO are an integral part of the completion and success of an IPO (Filatotchev & Bishop, 2002; Zimmerman, 2008). The IPO process is often associated with extensive efforts to meet the requirements and expectations of external stakeholders, such as investors, underwriters, and regulatory bodies (Filatotchev & Bishop, 2002; Certo et al., 2009; Thorsell & Isaksson, 2014). Furthermore, it requires the firm to focus on tasks that they often are unfamiliar with. Due to this, a high-quality board of directors, top management team, and CEO may help convince investors of the firm's quality and reduce information asymmetry, and in turn, underpricing (Thorsell & Isaksson, 2014; Certo et al., 2001a; Certo et al., 2001b). One credible way for the company to signal this is through each individual's professional experience (Cohen & Dean, 2005). The CEO is responsible for executing the operational aspects of a business and becomes a central agent in the IPO process, although the formal decision of going public lay in the hands of the shareholders. Due to the evident importance of the top management team in the outcome of an IPO, combined with the limited amount of research specifically focusing on the CEO, we find it pertinent to extend the research on how a CEO's experience serves as a signalling mechanism in relation to IPOs.

The purpose of this thesis is to study if a CEO's experience, measured as prior CEO experience, CEO age, CEO tenure, and CEO network, serves as a signalling mechanism in an IPO context, reducing underpricing. From a broader perspective, our findings are of interest to those who seek to increase their understanding and knowledge about IPO underpricing in general and its link to CEO experience specifically. The results and conclusions of our study are relevant for several company stakeholders, including the board of directors, shareholders, top management team, and the investor community. Furthermore, the knowledge of how CEO experience impacts IPO underpricing can be used in multiple contexts, including but not limited to IPO preparation and investment evaluations. More specifically, it can be taken into consideration when determining the pre-money valuation, IPO discount, and what CEO to hire for the purpose of a public listing. Consequently, our research question is as follows: *Does CEO experience impact IPO underpricing?*

We limit our study to companies that have undergone an initial public offering in Sweden during the period 1 January 2010 to 15 March 2021. The study excludes companies listed on exchanges with limited trading liquidity and with different listing requirements. Hence, the chosen exchange for our study is Nasdaq Stockholm. Moreover, since CEO experience is a broad concept that lacks a universal academic definition, we have chosen to limit our definition of CEO experience to four variables that will serve as a proxy for the broader concept.

Our study aims to contribute to the existing body of literature on corporate governance and CEO experience related to information asymmetry, signalling, and IPO underpricing. We demonstrate if CEO experience can serve as a credible signalling mechanism that reduces information asymmetry and enables IPO firms to sell their shares at a higher price. To the best of our knowledge, the variables that constitute CEO experience in our study have not been tested before in relation to IPO underpricing during the chosen time period or in the specific market. Hence, we advance the research on the topic and demonstrate the importance of the CEO's prior experience, network, tenure, and age when a firm intends to go public. Furthermore, we extend the research on the role of the CEO in corporate governance-related matters where information asymmetry occurs between two or more stakeholders.

Our study consists of seven sections with the following structure: Section 2 contains a review of previous literature and relevant theories used to support and provide background to the development of our hypotheses. Section 3 presents the data collection process, our research methodology, the regression model, and a definition of the variables. In sections 4 and 5, we present the results of our empirical study along with a detailed discussion and analysis. Lastly, in section 6, we present the conclusions of our study, followed by section 7, providing suggestions for future research.

2 Theory and literature review

In this section, we provide an overview of previous related literature upon which our hypotheses are based. We begin by reviewing the phenomenon of IPO underpricing and the most common theories used to explain it. Subsequently, we provide an overview of previous research on CEO experience in general and how scholars have measured it. We also review previous literature on CEO experience in relation to IPO underpricing. Lastly, we present our hypotheses.

2.1 IPO underpricing

IPO underpricing has, since it was first studied and found to be a systematic phenomenon in the early 1970s, become a widely researched subject in the finance and accounting academia (Reilly & Hatfield, 1969; Stoll & Curley, 1970; Ibbotson, 1975). Most studies on IPOs find positive average underpricing, although to varying degrees. For instance, Ritter and Welch's (2002) study on US companies found an average underpricing of 18.8%, while Fischer and Pollock (2004) presented an average underpricing of 12.5%. Studies conducted on Swedish IPOs also show consistently positive average underpricing. Schuster (2003) presented an average first-day return of 18.5%, Bodnaruk et al. (2008) of 14.2%, Thorsell and Isaksson (2014) of 15.0%, and Abrahamson and de Ridder (2015) of 7.7%.

IPO underpricing can be seen as a direct wealth transfer from pre-IPO owners to new investors. From a pre-IPO owner perspective, low underpricing is preferable since less money is "left on the table" (Tully, 1999; Certo et al., 2001a). From a firm perspective, low underpricing is also preferred since this leads to more capital raised in the IPO, which is a key source of funding for pursuing growth opportunities (Ritter, 1991; Daily et al., 2005).

The key parties involved in an IPO, namely the issuing firm, underwriter, and investors, possess unequal information about the offering, i.e. information asymmetry occurs. Based on information asymmetry, theories about why underpricing occurs have been developed. In 1986, Kevin Rock introduced the "winner's curse" theory, where he argued that information asymmetry between informed and uninformed investors is a reason for IPO underpricing. In high-quality IPOs, the informed investors will crowd out the uninformed investors, and the opposite happens in low-quality IPOs. This means that uninformed investors' allocation of shares will be unevenly distributed towards low-quality issues, leading to average negative returns. Due to this dilemma, uninformed investors are exposed to the "winner's curse". To motivate this group of investors to participate in IPOs, which issuers generally need in order to attract enough capital, IPOs will have to be underpriced.

Moreover, previous literature has also argued that underpricing is caused by investors' level of uncertainty. As Beatty and Ritter (1986) evidenced, investors' level of uncertainty is directly correlated to the magnitude of the IPO discount. To limit the IPO discount and attract new investors, firms take different approaches to reduce uncertainty and information asymmetry

(Ritter & Welch, 2002). For instance, firms try to assure investors of the firm's quality and future potential (Leland & Pyle, 1977; Sundaramurthy et al., 2013). The broader concept for such approaches is commonly referred to as signalling, which has been extensively researched by scholars and can be performed both directly and indirectly through market actions and communication (Connelly et al., 2011).

Prior research on signalling theory in relation to IPO underpricing has mainly focused on corporate governance mechanisms (Connelly et al., 2011), retained ownership (Leland & Pyle, 1977; Downes & Heinkel, 1982), pre-IPO capital investment, debt levels (Ross, 1977), and the reputation of the underwriter (Carter & Manaster, 1990). With regards to corporate governance mechanisms as a signalling method, scholars have researched the characteristics of the governing body, most commonly the board of directors. Certo et al. (2001a) studied board structure and characteristics in relation to IPO underpricing through a sample of 748 US firms and found, consistent with signalling theory, a significant correlation between underpricing and board size as well as board independence. In their paper from 2002, Filatotchev and Bishop evidenced that interlinks between executive and non-executive characteristics influence IPO underpricing. However, there exists less research focusing specifically on CEO characteristics as a signalling method to limit underpricing.

2.2 Prior research on CEO experience

The concept of CEO experience has most commonly been researched in conjunction with other market concepts and phenomena, such as financial leverage (Ting et al., 2015), SG&A signals (Berends, 2017), time to IPO (Yang et al., 2011), IPO firm failure (Fischer & Pollock, 2004), and firm performance (Zhang & Wiersema, 2009; Hamori & Koyuncu, 2015). There is no universal definition of CEO experience, and the underlying parameters differ depending on what is researched. Hence, we have explored prior research to determine which variables are the most important with regard to the topic.

Previously mentioned researchers, Filatotchev and Bishop (2002), performed their study on IPOs in the United Kingdom. They used CEO experience as part of their control variables and defined it as management positions and board directorships held over the last five years prior to the IPO. This definition of executive experience did not show any correlation with underpricing, indicating that a broader definition might be necessary. Instead, they found,

among other things, that CEO experience is of significant importance in the process of selecting the board.

Ting et al. (2015) studied the relationship between CEO characteristics and decision making related to financial leverage on Malaysian IPOs between 2002 and 2011. CEO characteristics consisted of the CEO's overconfidence, age, network, prior experience, education, tenure, gender, and if the CEO was the founder of the firm. They found that the first four variables were negatively related to leverage, while the rest showed a positive correlation. All but gender, network, and founder were statistically significant.

Yang et al. (2011) studied the relation between CEO characteristics and the firm's time to IPO on 237 US software IPOs between 1993 and 1999. They measured CEO characteristics with the variables prior CEO experience, network, age, founder-CEO, education, and CEO duality. They found that prior CEO experience and network were significantly negatively related to the time to IPO while age was significantly positively related to the time to IPO.

Furthermore, Fischer and Pollock (2004) included CEO experience when researching IPO firm survival. They argued that CEO experience could affect organisational efficiency, customer attraction, and a firm's possibilities to raise capital. CEO experience was divided into prior experience, measured as a dummy variable, and age. They found several factors that decrease the likelihood of IPO firm failures, such as average management team tenure, network embeddedness, founder-CEO presence, and CEO ownership. However, they found limited support that their definition of CEO experience would affect the possibility of IPO firm failure, indicating that other variables than prior experience and age may be relevant.

Hamori and Koyuncu (2015) confirmed previous findings on the negative relationship between prior CEO experience and post succession firm performance (Zhang, 2008). While they tested different hypotheses to explain this, they only found that negative transfer of learning was a significantly contributing factor. Also, they extended one of the most commonly used variables in this area, prior CEO experience, by including job-specific experience consisting of both industry experience and firm size. Prior research on CEO experience and firm performance has mainly focused on long-term performance, leaving short-term implications such as underpricing largely unexplored.

2.3 CEO experience in relation to IPO underpricing

Several research articles argue that the management team, including the CEO, functions as an important signal for the issuer's potential value to investors (Cohen & Dean, 2005; Sundaramurthy et al., 2013; Thorsell & Isaksson, 2014). Additionally, the IPO firm's amassed network of social ties can also serve as a quality and legitimacy signal to investors (D'Aveni, 1990; Hoang & Antoncic, 2003; Fischer & Pollock, 2004; Ting et al., 2015; Yang et al., 2011; Sundaramurthy et al., 2013). Furthermore, Lawless et al. (1998) declared that a firm's management is the most important source of information regarding the firm's future performance potential. Previous research on top management and directorship experience in relation to IPO underpricing has been conducted primarily in the United States and the United Kingdom, while studies specifically focusing on CEO experience in relation to IPO underpricing are very limited.

Sundaramurthy et al. (2013) studied synergies between CEO experience and the board of directors' experience in relation to IPO underpricing on 360 US biotechnology firms between 1995 and 2010. Even though they found both positive and negative synergies between CEO and directorship experience, they concluded that experience generally helps to reduce IPO underpricing. Cohen and Dean (2005) argued that the legitimacy of the issuer's top management is directly linked to investors' evaluation of the offering and finds that top management experience successfully functions as a signalling mechanism, reducing IPO underpricing. Daily et al. (2005) found that the CEO's and the board of directors' human and social capital serves as an effective signal of the firm's quality since their profiles are covered in the IPO prospectus. This increases the firm's ability to efficiently raise capital by reducing information asymmetry and underpricing. Moreover, to the best of our knowledge, the only similar research conducted on the Swedish market is Thorsell and Isaksson's (2014) study on director experience and IPO performance. They found some support for their hypothesis that more experience leads to less IPO underpricing, but with limited statistical significance, possibly due to their small sample size and selected time period. Our study has been conducted on a larger sample with the aim to present more reliable and generalisable conclusions.

2.4 Hypotheses

As a result of the asymmetric information at the time of the IPO, investors will not be able to judge the company's quality solely from economic disclosure, e.g. financial reporting.

Investors will also look for social indicators and credible signals validating firm value (Podolny, 1994). Prior research suggests that an experienced top management team can serve as a credible signal of the firm's ability to compete in the public domain and convey legitimacy to the organisation (D'Aveni, 1990; Zimmerman & Zeitz, 2002; Cohen & Dean, 2005; Sundaramurthy et al., 2013). A company's CEO is an important decision-maker in corporate governance-related decisions. IPO processes are not an exception even though the board of directors and company shareholders make the formal decision of going public. In fact, the CEO is a key actor in the IPO process. The CEO is the front figure of the roadshow leading up to the IPO, and the CEO's ability to convey trust and assure investors of the firm's quality will impact the possibilities for the firm to raise capital. Furthermore, research shows that the quality of the CEO has implications for the future firm performance and affects factors that have a direct impact on the company valuation, e.g. the ability to improve organisational efficiency and attract customers (Fischer & Pollock, 2004; Zimmerman, 2008). Moreover, experienced and legitimate CEOs will avoid assignments at firms with deficient business models and limited potential (Cohen & Dean, 2005). Hence, based on previous research, we suggest that the CEO serves as an important signalling mechanism that reduces underpricing.

One of the most common variables used to define CEO experience in previous literature is prior CEO experience. A CEO that has held the same position before in another company will have a superior track record and an adequate understanding of what the role of a CEO implies (Khurana, 2001). Research in the domain also argues that CEOs with prior CEO experience have developed human capital, contributing to the firm operating more efficiently (Fischer & Pollock, 2004). Although some research has evidenced prior CEO experience to be negatively related to long-term firm performance, which at first glance contradicts our arguments, they have been found to establish credibility and legitimacy to potential investors, shareholders, and the press, thus reducing information asymmetry (Khurana, 2002; Bragaw, 2013). Given the above discussion, we hypothesise a negative relationship between prior CEO experience and IPO underpricing:

H1: Firms that have a CEO with prior CEO experience are associated with lower IPO underpricing

However, prior CEO experience does not capture all relevant professional experience of a CEO, which indicates that more variables are needed to measure the broader term of CEO experience. Based on previous findings, we have chosen three variables complementing prior CEO experience, namely CEO network, CEO tenure, and CEO age.

Previous research has shown that a CEO's network can provide a firm with unique access to resources and information about market conditions, contacts to stakeholders, and strengthen the firm's ability to perform in IPOs and other transformational events (Ting et al., 2015). This allows the CEO to recognise superior business opportunities and prepare the organisation for an IPO process (Hoang & Antoncic, 2003). A CEO's strong network has also been evidenced to provide increased firm legitimacy, contributing to decreased information asymmetry between the firm and investors (D'Aveni, 1990; Fischer & Pollock, 2004; Yang et al., 2011). We follow Yang et al.'s (2011) method and measure the strength of the CEO's network by the number of external board positions the CEO holds. Against this background, we suggest that the link between network and experience is twofold. Firstly, being assigned a board position often requires experience and knowledge, implying that a strong network means strong professional experience. Secondly, the board position itself provides valuable experience and legitimacy that the CEO experience and hypothesise a negative relationship between a strong CEO network and IPO underpricing:

H2: Stronger CEO network is associated with lower IPO underpricing

CEO tenure has been covered in previous literature related to both strategic management and signalling theory. Research related to management has concluded that it can serve as a proxy for aspects affecting organisational outcomes (Hambrick & Fukutomi, 1991; Zhang & Wiersema, 2009), strategic persistence (Finkelstein & Hambrick, 1990), innovation, firm performance (Miller & Shamise, 2001), and effective decision making (Hambrick & Fukutomi, 1991; Zhang & Wiersema, 2009). These aspects include a CEO's cognitive ability, interest in tasks, and influence. Moreover, if the CEO has served at a specific company for a longer time, the company becomes increasingly shaped by the CEO's visions, skills, and decision making (Hambrick & Fukutomi, 1991; Zhang & Wiersema, 2009). With longer tenure, the CEO will also accrue more expertise and knowledge about the industry and the specific company. Consequently, research related to signalling theory has found that CEO tenure successfully

serves as a signal of higher credibility (Zhang & Wiersema, 2009). Finally, other research on the topic of IPOs has found that longer management team tenure significantly increases the likelihood of IPO firm survival (Fischer & Pollock, 2004) and that CEO tenure indicates an IPO of higher quality (Cohen & Dean, 2005; Zhang & Wiersema, 2009). Thus, tenure is viewed as a complementing variable to measure CEO experience, which leads to the third hypothesis that:

H3: Longer CEO tenure is associated with lower IPO underpricing

Age is also used extensively in previous literature to measure experience. Scholars have evidenced that the age of chief executives serves as an important component of human capital and shows a consistent positive relationship with firm performance (Fischer & Pollock, 2004). Furthermore, research suggests that investors value older CEOs in IPO firms due to an assumed higher level of experience, maturity, and wisdom (Certo et al., 2001b; Cohen & Dean, 2005). Although some scholars claim that age may have negative effects (Bantel & Jackson, 1989), we find more compelling arguments and evidence for age being a legitimate quality signal to investors, contributing to the measure of CEO experience:

H4: Older CEOs are associated with lower IPO underpricing

3 Methodology

In this section, we start with presenting a detailed description of the data collection process and how we have constructed our sample data. Subsequently, we present the regression model used to test our hypotheses. Lastly, we define all variables, divided into three sections: the dependent variable, independent variables, and control variables.

3.1 Data collection process and sample construction

The IPO data¹ has been collected from Capital IQ's database and the main variables constituting underpricing, namely offer price and first-day closing price, have been checked against IPO prospectuses and Thomson Reuters Eikon respectively. We have also adjusted the data for stock splits and dividends to ensure an accurate first-day return for all observations.

¹ The IPO data refers to the IPO date, company industry, offer price, dividends, stock splits, first-day closing price, industry index return at IPO date, firm age, market capitalisation, issuing proceeds, lead underwriter, and underwriter market share.

The initial sample consisted of 457 IPOs on all of the Swedish markets between 1 January 2010 and 15 March 2021. To safeguard for comparability, we have restricted our sample to the largest Swedish exchange, namely Nasdaq Stockholm. This limitation, combined with some observations that lacked sufficient data, reduced the sample to 250 IPOs.

There are four main reasons why we have chosen to geographically restrict our sample to the Swedish market. First, the Swedish market provides homogeneity in regulations and market conditions over the selected sample period. Second, the Swedish market provides a high level of transparency in company disclosures, facilitating the data collection process and allowing us to study more variables than in other markets. It also provides future researchers with the possibility to reproduce our data which ensures statistical and academic reliability. Third, Swedish corporate governance, encompassed by initiatives from both the government and the Stockholm Stock Exchange, differs from many other countries' governance practices since it consists of less voluntary elements (Thorsell & Isaksson, 2014). For example, the Swedish Companies Act from 2005, requires an independent board, meaning that the CEO of a publicly listed company cannot possess the chairmanship of the board in the same company (8:49 ABL). Fourth, due to the limited amount of previous research on corporate governance-related signalling mechanisms in relation to IPO underpricing conducted on the Swedish market, our thesis aims to contribute to this field of study and generate new insights into the complex phenomenon of underpricing.

The specific time interval has been chosen for two reasons. Firstly, to secure the most recent data on IPOs, improving the chance of presenting more relevant conclusions. Thus, the chosen time period starts in 2010, purposely excluding the global financial crisis which was directly related to the capital markets and may distort the analysis. Secondly, to ensure a sufficient sample size in order to be able to draw statistically significant conclusions. Our sample includes observations affected by the COVID-19 pandemic and we recognise that this time period does not reflect a normal state. However, we still find it relevant to include these observations to ensure a recent and sufficient sample size, especially since previous literature has commented on this being a specific issue with their research (Thorsell & Isaksson, 2014). Moreover, we include year fixed effects in our regression model to control for time-specific differences in our sample. Table 1 displays the number of observations and average underpricing in each year.

Table 1: IPOs and average underpricing per year

This table shows the number of observations in our sample per year, and the corresponding average underpricin	g.
Note that these figures are not winsorized, meaning that the underpricing differs from the regression model.	

Year	# of IPOs	Average underpricing
2021 (1 January - 15 March)	5	58.0%
2020	19	7.8%
2019	18	13.6%
2018	21	2.4%
2017	46	13.4%
2016	32	16.2%
2015	38	12.6%
2014	22	3.2%
2013	4	17.4%
2012	1	-33.2%
2011	9	-0.4%
2010	5	3.6%
Total	220	11.2%

The data has been further limited by excluding IPOs consisting of a combination of stocks and warrants, i.e. units. The reason for this limitation is that the difference in offering structure among unit offerings and between unit and ordinary offerings makes them hard to compare to one another. In particular, the warrant characteristics tend to differ between offerings. When analysing the unit observations in our data set, it becomes apparent that they differ significantly compared to the rest of the sample in terms of underpricing (-18% vs +11%). The exclusion of unit IPOs further reduces the sample size from 250 to 220 observations, which is the final sample used in our analysis.

The CEO-specific data has been gathered manually from the IPO prospectuses, which have been collected from the Swedish Financial Supervisory Authority's prospectus register. The information not found in the above main source has been collected from publicly available company information (e.g. company websites and press releases) as well as from the database Valu8.

Table 2. Sample collection and cleaning

This table presents an overview of the sample collection and cleaning process, with "Total initial sample" being the original data set and "Final sample size" being the sample used in the regression model. "Other markets" refer to companies that were listed on other exchanges than Nasdaq Stockholm. "UNIT offerings" refer to bundles of common stock and warrants.

Source	# of IPOs
Capital IQ	457
Total initial sample	457
Data cleaning criteria	# of IPOs
i. Other markets	165
ii. Lacked sufficient data	42
iii. UNIT offerings	30
Total observations excluded	237
Final sample size	220

The industry split of our sample can be viewed in table 3 and shows the number of observations and the average underpricing for each industry based on non-winsorized data. Two industries stand out in this context, namely Information Technology and Energy. Information Technology shows relatively high average underpricing and is controlled for in our regression model, further elaborated in section 3.5. Energy has a remarkably high underpricing compared to the other industries and contains only one observation. In the original model, this is controlled for by limiting outliers (winsorizing), further discussed in section 3.2. When interpreting the results from the robustness test in section 4.3, where we control for all industries, we account for the fact that this industry only contains one observation.

Table 3. Sector split of IPOs

This table shows the number of observations for each industry in the final data set as well as the average underpricing for these. Note that the underpricing numbers are based on non-winsorized data, which is why the total average differs from the regression model.

Industry - GICS classification	# of IPOs	Average underpricing
Materials	8	7.7%
Energy	1	115.4%
Information Technology	35	18.3%
Consumer Discretionary	29	11.8%
Health Care	56	10.3%
Industrials	45	11.5%
Financials	7	5.6%
Real Estate	17	7.6%
Consumer Staples	6	-3.3%
Communication Services	14	5.2%
Utilities	2	-8.8%
Total	220	11.2%

3.2 Research design and research model

This study is designed to test if there is a statistically significant relationship between CEO experience and lower underpricing as hypothesised. We have chosen a quantitative research strategy as it is preferable and more reliable when handling a large number of observations (Bryman & Bell, 2013). We will use a multiple ordinary least squares (OLS) regression model with robust standard errors to test our hypotheses. This type of regression model estimates the relationship between a dependent variable and one or several independent variables by minimising the sum of the squared deviations between predicted and observed values of the dependent variable (Aiken et al., 1991).

To control for potential heteroscedasticity, we perform the Breusch-Pagan test for heteroscedasticity. A standard OLS regression model assumes homoscedasticity, which means that the variance of a predicted variable in a regression is constant. However, since many models suffer from heteroscedasticity, we have to control for this in our model to reduce the probability of wrongly announced statistical significances (Johnston, 1972). Based on the Breusch-Pagan test shown in appendix 1, we can reject the null hypothesis that

homoscedasticity is present on a 1% significance level, meaning that our data suffers from heteroscedasticity. To control for this issue, we winsorize the dependent variable by replacing the top and bottom 5% with the adjacent value which normalises the data, and include robust standard errors in the regression model. Furthermore, we control for time effects by including year fixed effects in our regression model (*fe*) for year t.

The following model will be used to test our hypotheses:

$$\begin{split} BHAR_{i} &= \beta_{0} + \beta_{1}CEOpriorexp_{i} + \beta_{2}lnCEOnetwork_{i} + \beta_{3}lnCEOtenure_{i} + \beta_{4}lnCEOage_{i} + \\ \beta_{5}lnFirmAge_{i} + \beta_{6}lnFirmSize_{i} + \beta_{7}Tech_{i} + \beta_{8}UndRep_{i} + \beta_{9}lnProceeds_{i} + \beta_{10}Founder_{i} + \\ fe_{t} + \mu_{i} \end{split}$$

We test the dependent variable *BHAR* for stock *i*, as a model of the independent variables measuring CEO experience (*CEOpriorexp, CEOnetwork, CEOtenure, CEOage*) as well as the control variables. β_0 denotes a constant and μ_i the residual. All variables used in the regression model are detailed in sections 3.3, 3.4, and 3.5.

3.3 Dependent variable

IPO underpricing is defined as the percentage change between the first-day closing price and the offer price (Ritter, 1991). For comparability reasons, we have adjusted the level of underpricing for industry market returns at the IPO day in line with Carter et al. (1998) and Certo et al. (2001b). This approach was also used by Thorsell and Isaksson (2014) when researching the relationship between directorship experience and underpricing. The industry market returns are based on the OMX Global Industry Classification Standard (GICS) industry indices. We have chosen to adjust the underpricing level for industry-specific indices instead of using firm-specific benchmarks as described in Loughran and Ritter's (1995) paper. By doing this, we manage to avoid the possible bias that company-specific events might cause and instead consider events that affect the industry's returns as a whole, as argued by Brav and Gompers (1997). Thus, the level of underpricing for stock *i* for period *t*, *BHAR*_{*i*,*t*}, is calculated as follows:

$$BHAR_{i,t} = R_{i,t} - R_{s(i),t},$$

where

$$R_{i,t} = \frac{P_{i,t}}{P_{i,t-1}} - 1$$
 and $R_{s(i),t} = \frac{S_{i,t}}{S_{i,t-1}} - 1$.

 $R_{i,t}$ is the first-day return for stock i, period t, and $R_{s(i),t}$ is the industry index return for the same period. $P_{i,t}$ is the first-day closing price of the stock, and $P_{i,t-1}$ is the offer price. $S_{i,t}$ is the closing index for the stock i's industry at the IPO day, and $S_{i,t-1}$ is the opening index for the same day.

3.4 Independent variables

As described in section 2.4, we have chosen to measure CEO experience through four different variables to capture both direct and indirect experience. The variables will not be constructed as an index, rather tested independent of the others in order to analyse if each specific variable is negatively correlated to IPO underpricing as hypothesised. This method is in line with most previous research covering experience and IPO underpricing.

Prior CEO experience – To measure prior CEO experience, we follow the method used by Ting et al. (2015) and code the variable as a dummy. The value 1 is assigned if the CEO has been a CEO of at least one other company before, and 0 otherwise.

CEO network – To measure the strength of a CEO's network, we follow Yang et al.'s (2011) method and take the natural logarithm of the number of assigned external board positions the CEO has at the time of the IPO. We exclude board positions in group corporations as we believe it does not contribute to the network effect we aim to isolate and hence skew the data set.

CEO tenure – CEO tenure is defined as the number of years the CEO has held the position at the time of the IPO, in line with Fischer & Pollock's method used in 2004. We calculate the variable as the natural logarithm of the difference between the fiscal year of the IPO and the appointment year of the CEO.

CEO age – We will measure CEO age as the natural logarithm of the difference between the fiscal year of the IPO and the year in which the CEO was born.

3.5 Control variables

The literature on IPOs presents a number of variables that might influence IPO underpricing. We have chosen to include the variables we find most relevant in our regression model. We have divided the control variables into three main categories: CEO characteristics, firm characteristics, and others. As the dependent variable already includes adjustments for market conditions from the industry indices, we do not include such a factor as a control variable. Table 4 presents a summary of the variables used in the regression model.

CEO characteristics

Founder – The company founder has a specific type of insight into the firm he or she has founded and can provide valuable input on how to operate the firm (Cowling, 2003; Thorsell & Isaksson, 2014). Furthermore, previous research suggests that having a CEO as a founder will positively affect firm performance (Howton, 2006). We control for this effect by constructing a dummy variable assigned 1 if the CEO is the founder of the company and 0 otherwise. Due to the varying results in previous research with regard to how the variable is associated with underpricing, we do not anticipate if the relationship is positive or negative.

Firm characteristics

Firm age – There are two main reasons as to why we include firm age as a control variable. Firstly, previous research reports that the variable has an effect on information asymmetry as the uncertainty surrounding a firm diminishes when the firm becomes older. If the period between the date of founding and the IPO date is longer, more information about the firm generally becomes available to the market (Guthrie & Datta, 1997; Cohen & Dean, 2005). Secondly, scholars argue that young firms have, on average, poorer IPO performance compared to old firms and that there is a proven relationship between firm age and firm performance (Bhabra & Pettway, 2003; Thorsell & Isaksson, 2014). We calculate firm age as the natural logarithm of the difference between the fiscal year of the IPO and the company founding year, consistent with previous scholars (Guthrie & Datta, 1997; Thorsell & Isaksson, 2014). Given the above, we expect a negative relationship between firm age and IPO underpricing.

Firm size – Similar to firm age, this variable has also been included in much previous research on the topic of IPOs. Larger firms have shown to be superior compared to small firms with regard to IPO performance (Bhabra & Pettway, 2003). Previous research also suggests that firm size is a proxy for firm complexity and managerial talent (Guthrie & Datta, 1997). Thus, to control for these possible effects, we include firm size in our regression model and expect larger firms to be able to sell their shares with less underpricing. We calculate it as the natural logarithm of the annual sales from the IPO year. We add the value 1 to the observations that have no revenue in the IPO year, consistent with the method used by Fischer and Pollock (2004).

Tech – In line with previous scholars such as Loughran and Ritter (2004) and Lowry et al. (2010), we include a control variable for companies that belong to the technology sector. The reason for this is that tech IPOs have, on average, consistently higher first-day returns than companies in other sectors. Hence, we apply the method used by the above-mentioned researchers and create a dummy variable equal to 1 if the company belongs to the GICS classification of Information Technology and 0 otherwise. In line with previous research, we expect *Tech* to be positively associated with IPO underpricing.

Others

Underwriter reputation – Prior literature has demonstrated that IPO underpricing is negatively related to underwriter reputation, as the underwriter can function as a signal of the firm's quality. (Beatty & Ritter, 1986; Megginson & Weiss, 1991; Carter et al., 1998). We control for this effect in our regression model and expect reputable underwriters to be associated with lower underpricing. We follow Megginson & Weiss' (1991, p.890) method, which is based on the assumption that "the greater the average market share of the lead underwriters, the higher is the quality". The market share is calculated by taking each investment bank's cumulative transaction value divided by the total transaction value for the period.

Proceeds – This variable is calculated as the natural logarithm of the total amount raised in the IPO, excluding the exercise of greenshoe. Proceeds is frequently controlled for in previous academic literature on the topic of IPOs. Furthermore, researchers have evidenced a positive relationship between proceeds and IPO underpricing (Beatty & Ritter, 1986; Loughran & Ritter, 2004; Yüksel & Yüksel, 2006). Hence, we expect to observe the same in our study.

Table 4. Summary of variables

This table shows a summary of all variables used in the regression model, including the variable name, a short description, and the expected sign of correlation.

Dependent variable	Variable name	Description	
IPO underpricing	BHAR	Abnormal buy-and-hold return first day of trading	
Independent variables	Variable name	Description	Exp. sign
Prior CEO experience	CEOpriorexp	Dummy variable coded 1 if the CEO has held the same position in another company and 0 otherwise	-
CEO network	<i>lnCEOnetwork</i>	Natural logarithm of the number of external board positions the CEO holds at the time of the IPO	-
CEO tenure	lnCEOtenure	Natural logarithm of the number of years the CEO has held the position at the time of the IPO	-
CEO age	lnCEOage	Natural logarithm of the CEO's age, calculated as the IPO year less the CEO's birthdate	-
Control variables	Variable name	Description	Exp. sign
Firm age	lnFirmAge	Natural logarithm of the IPO firm's age, calculated as the IPO year less the founding year	-
Firm size	lnFirmSize	Natural logarithm of the IPO firm's annual sales in SEK millions for the last financial year	-
Tech	Tech	Dummy variable coded 1 if the firm is categorised as "Information Technology" according to GICS	+
Underwriter reputation	UndRep	Market share calculated based on each underwriter's cumulative transaction value during the period	-
Proceeds	InProceeds	Natural logarithm of the total amount raised in the IPO, excluding the exercise of greenshoe (SEKm)	+
Founder	Founder	Dummy variable coded 1 if the CEO is also the founder of the company	?

4 Results

This section provides an overview of our results. We start by presenting the descriptive statistics for the data set that we used to perform our analyses on. Further on, we present the correlation matrix and discuss the pairwise correlations between the variables. This is followed by the results of our regression model, and finally, the robustness tests are reviewed.

4.1 Descriptive statistics

The descriptive statistics for our variables are shown in tables 5 and 6. The mean and median value for the dependent variable *BHAR*, i.e. underpricing, is 10.0% and 6.3%, respectively. Ritter & Welch (2002), Fischer & Pollock (2004), and Sundaramurthy (2013) all found average underpricing to be higher than the one presented in our study, with a mean underpricing of 13.0%, 12.5%, and 18.8%, respectively. They conducted their research on the US market, which is inherently different from the Swedish market, and in a different time period, resulting in a dissimilar sample. When compared to studies conducted on the Swedish market, the average underpricing varies more. For instance, Schuster (2003) presented an average first-day return of 18.5%, Bodnaruk et al. (2008) of 14.2%, Thorsell and Isaksson (2014) of 15.0%, and Abrahamson and de Ridder (2015) of 7.7%. Furthermore, it is important to note that our method for calculating underpricing differs from many other studies as we reduce underpricing with industry index returns at the IPO date, in line with Carter et al. (1998), Certo et al. (2001b), and Thorsell & Isaksson (2014). However, because industry indices have very low volatility, the adjusted method results in indistinguishable mean differences of -0.02% in our sample.

As displayed in tables 5 and 6, close to half of the CEOs in our data set have prior CEO experience, and the average CEO is 48 years, has held the position for 6 years, and holds 3 external board positions. The CEO age is quite centred around the mean, with a standard deviation of 8 years, while CEO tenure and CEO network vary more with standard deviations of 5 and 2 years respectively. Age and tenure are consistent with previous literature (Fischer & Pollock, 2004), while the average CEO network in Yang et al.'s (2011) study on the US market between 1993 and 1999 was smaller than ours. Other notable statistics are that 30% of the IPO firms were founder-led, and 16% were classified as technology companies. Firm age, firm size, and proceeds all display high standard deviations, indicating that Swedish IPO firms have very different characteristics.

Table 5: Descriptive statistics

This table shows descriptive statistics for all variables used in the regression model. Note that some of the variables have been log-transformed.

Variable	Ν	Mean	Median	Std. Dev.	Min	Max
BHAR	220	0.10	0.06	0.21	-0.24	0.57
CEOpriorexp	220	0.47	0.00	0.50	0.00	1.00
InCEOnetwork	220	0.81	0.69	0.72	0.00	2.64
InCEOtenure	220	1.44	1.61	0.87	0.00	3.18
InCEOage	220	3.86	3.87	0.17	3.33	4.20
lnFirmAge	220	2.54	2.48	0.99	0.00	5.31
lnFirmSize	220	4.59	5.00	2.86	0.00	10.11
Tech	220	0.16	0.00	0.37	0.00	1.00
UndRep	220	0.05	0.01	0.06	0.00	0.18
InProceeds	220	5.29	3.83	1.72	2.30	9.45
Founder	220	0.30	0.00	0.46	0.00	1.00

Table 6: Descriptive statistics - Non-logarithmic variables

This table shows descriptive statistics without log-transformation for the variables that have been log-transformed in the regression model.

in the regression model.						
Variable	Ν	Mean	Median	Std. Dev.	Min	Max
CEOnetwork	220	2.95	2.00	2.34	1.00	14.00
CEOtenure	220	5.98	5.00	5.04	1.00	24.00
CEOage	220	48.26	48.00	7.82	28.00	67.00
FirmAge	220	21.22	12.00	27.64	1.00	203.00
FirmSize	220	1,316.95	147.81	2,963.61	1.00	24,606.00
Proceeds	220	759.29	195.50	1,486.59	10.00	12,769.98

4.2 Correlation matrix

We display a Pairwise Pearson correlation matrix in table 7 in order to identify any potential multicollinearity between the explanatory variables. A correlation above 0.8 between two or more variables might imply multicollinearity problems, which risks distorting the model in several ways (Grewal et al., 2004). For instance, it becomes difficult to interpret to what degree the variables contribute to the results (Brooks, 2014). However, some correlation between the

variables is generally accepted (Farrar and Glauber, 1967). As can be viewed in table 7, no risk for multicollinearity is identified in the correlation matrix. Despite that, we test all variables' variance inflation factor (VIF) to ensure that multicollinearity problems do not affect our model. Table 8 displays that the highest VIF is 2.77, which is well below any threshold value of 5 or 10 used in previous literature. Hence, we conclude that there does not exist any multicollinearity between the explanatory variables. As can be viewed in the correlation matrix, 25 correlations are statistically significant on a 5% level or lower. We will discuss some of these variables below.

CEOpriorexp is negatively correlated with *BHAR*, in line with H1. *lnCEOtenure* and *lnCEOnetwork* are both positively correlated with *BHAR*, which contradicts our prediction in section 2.4. This will be further discussed in section 4.3 and 5. *CEOpriorexp* is negatively correlated with *lnCEOtenure*, which can be logically explained by the complexity of an IPO process and the need to hire new and more experienced managers. In line with our expectation, *lnCEOage* is positively correlated with *CEOpriorexp* as an older CEO has had more time to accrue experience. *lnCEOnetwork* is not significantly correlated with any explanatory variable.

Moreover, *CEOpriorexp* is negatively correlated with *lnFirmAge*. We argue that younger IPO firms are in greater need of a CEO with prior experience since it is generally more challenging for young firms to raise capital, due to the higher level of information asymmetry surrounding young firms (Guthrie & Datta, 1997; Cohen & Dean, 2005). *Founder* is positively correlated with *lnCEOtenure* and negatively with *CEOpriorexp*, in line with our expectation. *lnFirmAge*, *lnFirmSize*, and *lnProceeds* are all positively correlated which is reasonable since it typically takes time to build larger firms, and they often issue more capital in absolute values. All of these variables are positively correlated with *lnCEOage*. A reasonable explanation for this is that more established firms require internal promotion or external recruits with high experience of the firm and industry. Additionally, *UndRep* is positively correlated with *lnFirmSize* and *lnProceeds*, which is in line with our expectation that prestigious underwriters target large transactions.

X
2

This table shows the	e pairwise correlations	between all variables	used in the regression model	

Variables	(1)	(2)	(3)	(4)	(5)	(6)
(1) BHAR	1.000					
(2) CEOpriorexp	-0.246*	1.000				
(3) InCEOnetwork	0.169*	0.105	1.000			
(4) InCEOtenure	0.204*	-0.232*	0.109	1.000		
(5) lnCEOage	0.005	0.265*	0.032	-0.033	1.000	
(6) lnFirmAge	0.019	-0.145*	0.018	0.282*	0.191*	1.000
(7) lnFirmSize	0.051	0.019	-0.007	0.116	0.187*	0.414*
(8) Tech	0.105	-0.059	-0.053	0.185*	-0.089	-0.018
(9) UndRep	0.080	-0.071	0.038	0.162*	0.174*	0.316*
(10) InProceeds	0.105	0.021	0.060	0.067	0.210*	0.369*
(11) Founder	0.103	-0.148*	0.079	0.331*	-0.271*	-0.199*
Variables	(7)	(8)	(9)	(10)	(11)	
(7) InFirmSize	1.000					
(8) Tech	-0.088	1.000				
(9) UndRep	0.534*	-0.093	1.000			
(10) InProceeds	0.619*	-0.149*	0.734*	1.000		
(11) Founder	-0.120	0.100	-0.034	-0.190*	1.000	

*p<0.05

Table 8: Variance inflation factor (VIF)

This table shows the multicollinearity tests for each variable used in the regression model. VIF-tests are calculated for each of the listed variables by regressing the variable in question against all the other variables listed in the table and taking $1 / (1 - R^2)$. A value close to 10 indicates potential multicollinearity.

Variable	VIF	\mathbb{R}^2
InProceeds	2.77	0.64
UndRep	2.34	0.57
InFirmSize	1.78	0.44
lnFirmAge	1.48	0.32
InCEOtenure	1.41	0.29
Founder	1.36	0.27
InCEOage	1.22	0.18
CEOpriorexp	1.20	0.17
Tech	1.07	0.07
InCEOnetwork	1.05	0.05
Mean VIF	1.57	

4.3 Regression results

The regression results are displayed in table 9. As described in section 3.1, we control for year fixed effects in our original regression model. However, we also test the model without including these effects. This critically lowers the model's adjusted R^2 from 18.9% to 10.9%, suggesting that time is of importance in explaining the variance in IPO underpricing. Nonetheless, the significance of the independent variables stays the same in both models. The variation in first-day returns during different time periods has been subject to extensive research, and it has been documented that periods of "hot markets" result in higher IPO underpricing (Thorsell & Isaksson, 2014). The difference in the two models' explanatory power indicates that the year fixed effects adjustment is an effective way to control for the "hot markets" issue.

It is worth noting that the adjusted R^2 , i.e. the model's explanatory power, of 18.9% and 10.9% is low, consistent with previous studies conducted on the topic of IPO underpricing. According to Beatty & Ritter (1986), a low R^2 is reasonable since it would otherwise imply that it is possible to accurately predict first-day returns. However, in comparison to studies conducted

on the Swedish market, the adjusted R^2 in our original model is relatively high, indicating that the variables we have studied are relevant. For instance, Thorsell and Isaksson (2014) studied directorship experience in relation to underpricing and presented an adjusted R^2 of 10.0%. Some explanations for our adjusted R^2 being higher may be that we have conducted the study on a larger sample, on a different time period, and used other variables with stronger explanatory power. Furthermore, the F-test indicates that both our models are significant at a 1% level. This means that our regression models fit the sample data better compared to if none of the independent variables were included in the model. Put differently, the independent variables jointly improve the fit of the models. This is further supported by the adjusted R^2 being only 7.0% (vs. 18.9%) when running the original regression without the independent variables (appendix 2).

We use the p-value of the variables' coefficients to confirm or reject our hypotheses. As can be viewed in the regression results, *CEOpriorexp*, *lnCEOnetwork*, and *lnCEOtenure* are significantly associated with IPO underpricing. *CEOpriorexp* has a negative coefficient, meaning that CEOs with prior CEO experience are associated with lower IPO underpricing, confirming H1. This result indicates that a CEO with prior CEO experience successfully serves as a signal of the firm's quality to investors, reducing information asymmetry in the IPO process. In contrast, *lnCEOnetwork* and *lnCEOtenure* are positively related to IPO underpricing on a significant level, whereas *lnCEOage* is not significant, rejecting H2, H3, and H4. This means that CEOs with a strong network and longer tenure contribute to higher IPO underpricing. Although these findings are contrary to what we hypothesised, we believe that these relationships can be explained, which will be further discussed in section 5.

Furthermore, in the original model, three control variables are significantly associated with IPO underpricing, namely *lnFirmAge*, *lnFirmSize*, and *UndRep*. *lnFirmAge* is negatively related to IPO underpricing. This means that older firms leave less "money on the table", which is reasonable since information asymmetry reduces with time as more information becomes public. Contrary to what we expected, *lnFirmSize* is positively associated with IPO underpricing. Moreover, in line with our prediction and previous findings, the variable *UndRep* is negatively associated with IPO underpricing, which implies that using an underwriter with strong reputation leads to less underpricing.

Table 9: Regression results

BHAR	Original model	Excl. year fixed effects
CEOpriorexp	-0.136***	-0.117***
InCEOnetwork	0.051***	0.053***
InCEOtenure	0.029*	0.031*
InCEOage	0.146	0.110
lnFirmAge	-0.040***	-0.026
InFirmSize	0.017**	0.001
Tech	0.032	0.058
UndRep	-0.525*	-0.297
InProceeds	0.011	0.023*
Founder	0.011	0.014
Constant	-0.497	-0.421
N	220	220
Mean BHAR	0.100	0.100
R ²	0.267	0.150
Adjusted R ²	0.189	0.109
Prob > F	0.000	0.000

This table shows the results from the multiple OLS regression model with robust standard errors. The original model to the left includes year fixed effects, while the model to the right does not.

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

4.4 Robustness tests

We have performed several robustness tests to validate the results from our regression model. The robustness tests include testing only the independent variables to the dependent variable, testing each independent variable separately, winsorizing on a different level, including new variables, adding industry fixed effects, and changing the definition for some of the control variables. Table 10 displays the results of some of the robustness tests.

Test 1 in table 10 shows the regression results when excluding all control variables. The results are similar to the original model, although *lnCEOnetwork* is somewhat less significant. Further on, when testing each independent variable separately, *CEOpriorexp*, *lnCEOnetwork*, and

lnCEOtenure all stay statistically significant, while *lnCEOage* stay insignificant, so far indicating robust results.

Due to the unexpected results of CEO network, tenure, and age, we test the model by adding new variables to check for possible omitted variable bias. Firstly, we add gender and CEO duality² since previous research has identified them to be associated with underpricing (test 2). However, when including these variables in the model, none of them are significant, and do not correlate with any of the independent variables. Furthermore, they adversely affect the explanatory power of the regression model as the adjusted R² decreases. One possible explanation for *Gender* not being significant is the unequally distributed data, including only 18 female CEOs (~8% of the sample), with zero observations before 2014. Secondly, some previous researchers have used profitability measures in their models (Ritter & Welch, 2002; Sundaramurthy et al., 2013). Hence, as can be viewed in test 3, we add Earnings Per Share and a dummy variable with the value 1 if the firm is profitability. The added variables do not contribute to the model as they are not significantly related to underpricing, or any of the independent variables. Thus, neither the sign nor the significance level of the independent variables changes.

To further test the robustness of the model, we keep a higher degree of outliers by winsorizing the data on a 1% level instead of 5%. The results can be viewed in test 4. *lnCEOpriorexp* and *lnCEOnetwork* stay significant while *lnCEOtenure* becomes insignificant and *lnCEOage* becomes significant. This indicates that the findings in our original regression model on how prior CEO experience and network are associated with IPO underpricing are strong. At the same time, it is difficult to draw any such conclusions for CEO tenure and age.

Moreover, we test the robustness of our results by adjusting the model for industry fixed effects to examine if other sectors than *Tech*, which is used as a control variable in the original model, explain the variance in underpricing. As shown in test 5, the model's adjusted R^2 increases from 18.9% to 22.7%, indicating that industry fixed effects improve the model's explanatory power. Out of the 11 industries, *Energy* and *Utilities* are significant, with p-values of 0.0% and

 $^{^{2}}$ CEO duality is defined as a CEO being a board member in the same company. In international studies, CEO duality is usually defined as the CEO also being the chairman of the board. Since this is not legal for public companies in Sweden (8:49 ABL), we define it as being a member of the board.

1.2%, respectively, where *Energy* is positively, and *Utilities* negatively associated with underpricing. However, as can be seen in table 3, these industries only have 1 and 2 observations respectively, making the statistical results less meaningful. Similar to when adjusting the level of winsorizing, only *CEOpriorexp* and *lnCEOnetwork* stays significant while *lnCEOage*, which previously did not explain the variance in underpricing, becomes significant. This again confirms that the results on *CEOpriorexp* and *lnCEOnetwork* are strong, while *lnCEOtenure* and *lnCEOage* are not very robust.

Finally, due to UndRep's noteworthy high coefficient of -0.525, we apply two other methods for calculating underwriter reputation. We start by applying the method used by Bodnaruk et al. (2008) and Thorsell and Isaksson (2014), calculating the market share by the number of IPOs an underwriter has brought to the market (appendix 3 and 4). When using this method, the variable becomes insignificant and the model's explanatory power decreases. We argue that this method does not fairly mirror the reputation of the investment bank. It would imply that underwriters targeting small companies are more prestigious since these transactions are more frequent. In reality, prestigious investment banks target large transactions (Johnson & Miller, 1988). Furthermore, when conducting research on a small market like Sweden, the method of using market share can be argued to not accurately reflect the underwriter's reputation since the world's most prestigious investment banks are domiciled outside Sweden, hence do not have Sweden as its main market. Given this reasoning, we present a new method (appendix 3 and 4) where we rank the underwriters by their average transaction value on the Swedish market, with the most prestigious underwriter being assigned the value 1. When applying the new method, the results are similar to the original model, with prestigious underwriters being associated with lower underpricing on a 10% significance level, however, with a substantially smaller coefficient (0.003 vs. 0.525). It also increases the model's adjusted R² from 18.9% to 19.3%. Hence, we argue that the new method more accurately reflects the reality than the methods applied by Megginson and Weiss (1991), Bodnaruk et al. (2008), and Thorsell and Isaksson (2014). It also indicates that the coefficient for underwriter reputation in the original model might be inflated.

After performing several tests to ensure the robustness of our regression model, we can conclude that the results for *CEOpriorexp* and *lnCEOnetwork* are strong. In contrast, the opposite is true for *lnCEOtenure* and *lnCEOage*. The F-value is consistently significant through all robustness tests, except when regressing *lnCEOage* separately from the other

independent variables. This can be viewed in appendix 5. Hence, the robustness tests confirm an overall significant regression model.

Table 10: Robustness tests

This table shows the results for some of the robustness tests, with the original model for reference to the left. The model for each test is identical to the original model apart from the changes described below. Test 1: Only independent variables. Test 2: Add gender and CEO duality dummy variables. Test 3: Add EBIT dummy variable and Earnings Per Share (EPS). Test 4: Winsorize at 1/99% level. Test 5: Include industry fixed effects.

BHAR	Original	Test 1	Test 2	Test 3	Test 4	Test 5
CEOpriorexp	-0.136***	-0.117***	-0.138***	-0.135***	-0.165***	-0.148***
InCEOnetwork	0.051***	0.049**	0.053***	0.054***	0.071***	0.053***
InCEOtenure	0.029*	0.027*	0.032*	0.028*	0.028	0.022
InCEOage	0.146	0.107	0.147	0.142	0.183*	0.148*
lnFirmAge	-0.040***	Omitted	-0.041***	-0.040***	-0.051***	-0.043***
lnFirmSize	0.017**	Omitted	0.018**	0.023**	0.017*	0.018*
Tech	0.032	Omitted	0.026	0.035	0.049	Omitted
UndRep	-0.525*	Omitted	-0.520*	-0.508*	-0.799**	-0.621**
InProceeds	0.011	Omitted	0.010	0.010	0.013	0.018
Founder	0.011	Omitted	0.019	0.010	0.004	0.043
Gender	Omitted	Omitted	-0.010	Omitted	Omitted	Omitted
CEOdual	Omitted	Omitted	-0.028	Omitted	Omitted	Omitted
EBIT_dummy	Omitted	Omitted	Omitted	-0.051	Omitted	Omitted
EPS	Omitted	Omitted	Omitted	0.002	Omitted	Omitted
Constant	-0.497	-0.337	-0.484	-0.486	-0.606	-0.517
N	220	220	220	220	220	220
Mean BHAR	0.100	0.100	0.100	0.100	0.112	0.100
R ²	0.267	0.219	0.270	0.272	0.252	0.333
Adjusted R ²	0.189	0.162	0.185	0.186	0.173	0.227
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000

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

5 Discussion

In this section, we will discuss the findings from our empirical study and examine the hypotheses developed in section 2.4. Given the results from our study presented in section 4.3, we set forth several interesting findings that advance the academic research on the topic of CEO experience in relation to IPO underpricing.

The study provides strong support for our theoretical prediction that prior CEO experience reduces IPO underpricing, thus confirming H1 on a 1% significance level. This result also holds throughout all robustness tests performed. The result implies that a CEO that has held the position before, ceteris paribus, will better position a company for an IPO process since their professional experience will serve as a quality certificate that reduces information asymmetry between investors and the firm. To the best of our knowledge, this finding is unique, however, it should be noted that the study is conducted solely on the Swedish market. Moreover, the measurement of this variable is limited to if the CEO has held the position before or not. Including other considerations that specify the type of experience, such as the size of the previous firm, if the firm was public or private, and the type of industry, could provide further conclusions about the importance of the CEO's prior experience in an IPO context.

Moreover, the network of a CEO, measured as the number of external board positions, is found to be associated with higher IPO underpricing on a 1% significance level, rejecting H2. This relationship holds on at least a 5% significance level throughout all robustness tests. It contradicts our initial prediction that a strong network, similar to prior CEO experience, would serve as a signalling mechanism that reduces IPO underpricing. The hypothesis is based on extensive previous research arguing that a strong network provides access to critical information and resources, social ties that can be viewed as a signal of quality and legitimacy, and findings that a stronger network leads to better firm performance (D'Aveni, 1990; Fischer & Pollock, 2004; Yang et al., 2011; Ting et al. 2015). However, even though the argument that strong networks help reduce information asymmetry is valid, it may still lead to higher IPO underpricing due to the *underreaction hypothesis* (Feng et al., 2019). This hypothesis suggests that well-connected directors and executives reach out to a different type of investors than what the underwriters focus on (e.g. individual investors). This can lead to the underwriters underestimating the mitigating effect on information asymmetry that well-connected directors and executives have, resulting in the underwriters setting a lower offer price than what investors are willing to pay. Even though scholars suggest that underwriters eventually adjust the offer price to the unexpected higher demand, the *information revelation theory* implies that the price is only partially revised to the equilibrium, resulting in higher underpricing (Benveniste & Spindt, 1989; Benveniste & Wilhelm, 1990; Spatt & Srivastava, 1991). These arguments are supported by Feng et al.'s (2019) paper, finding that directors with strong networks are positively related to underpricing, which we argue can be extended to the network of CEOs. Further on, even though we have used the method by Yang et al. (2011) for measuring network, it is important to note that this definition does not capture a person's entire nexus of social and professional contacts and relationships. As further discussed in section 7, CEO network in relation to IPO underpricing becomes relevant for future research due to our unexpected results.

Like the results on CEO network, longer CEO tenure is associated with increased IPO underpricing, rejecting H3. Although this relationship is significant at a 10% level in the original regression model, the robustness tests indicate that the result is not very strong. The hypothesis that longer CEO tenure would lead to less underpricing was built on three main arguments. Firstly, previous research has shown that CEO tenure can serve as a proxy for aspects affecting firm performance, such as cognitive ability, interest in tasks, and influence. Secondly, a CEO who has served at a specific company for a long time has been able to accrue more expertise and knowledge about the company and the industry. Lastly, previous research suggests that longer management team tenure significantly increases the likelihood of IPO firm survival and is an indicator of IPO quality. However, contrary to what we hypothesised, longer CEO tenure is associated with higher underpricing. One explanation for the positive relationship between tenure and underpricing, which has also been discussed in previous research (Thorsell & Isaksson, 2014), is that new board directors and managers are hired to "professionalise" the governing body in order to signal the firm's quality prior to an IPO. One way of doing this is to hire a new CEO with prior experience, leading to lower tenure at the time of the IPO. This is supported by our data showing that CEOs with prior experience have held the position for a shorter time when the firm goes public, further confirming H1.

In contrast to the other independent variables, CEO age was not found to be significantly associated with underpricing, except for when treating outliers differently and adjusting for industry fixed effects. The positive coefficient implies that underpricing increases with CEO age, which contradicts our fourth hypothesis. This relationship is further supported by Fischer and Pollock's (2004) study, who found CEO age to be positively correlated with underpricing,

although like in our study, their results were not significant. The regression model used to test the relationship between age and IPO underpricing assumes a linear relationship. The insignificant result could be a consequence of this relationship in fact being non-linear, meaning that the benefits of higher age are counteracted by other factors, such as lower energy and worsened adaptability. We find some support for this in previous literature. For instance, Bantel & Jackson (1989) argued that higher age may imply less capability to adapt to situations and adopt modern ways of working.

The results on CEO network, tenure, and age showed to be the opposite of what we hypothesised. Even though we find some arguments from previous literature supporting our results, we cannot completely disregard the possibility that these variables capture the effect of other variables not included in our models, i.e. omitted variable bias. In section 4.4, we added new variables to further test if omitted variables could explain our unexpected results. Although these specific variables did not have any significant explanatory power, further research on other potential omitted variables becomes relevant to study.

To deepen the discussion, it is important to note that first-day returns are evaluated differently depending on the type of stakeholder. For example, a negative/low first-day return is not preferable from a subscribing investor's point of view, as their shares lose in value. When lowering the IPO discount or overvaluing the shares, the company also risks that the offer becomes undersubscribed. This could potentially result in the company failing to raise their desired amount of capital as well as poor publicity, leading to a worsened long-term reputation in the capital markets. Moreover, the various incentives for underpricing among IPO stakeholders may also affect the first-day return. For instance, the CEO and the board of directors' incentives may vary depending on different factors not accounted for in this study, such as pre-IPO ownership and if they sell or subscribe for more shares in the IPO. Also, the underwriter is highly involved in the pricing of the shares where they balance the interest of the firm and their investor network. Further on, the study is conducted on the Swedish market, and the results might differ if the study was conducted elsewhere. As an example, CEO age or CEO tenure may better serve as a signalling mechanism under different socio-political, economic, and governance-related conditions (Ho & Williams, 2003; Bruton et al., 2010; Thorsell & Isaksson, 2014).

In summary, this study has found that CEO experience impacts IPO underpricing in various ways, depending on the type of experience. This conclusion is interesting as we, based on theory and previous literature, hypothesised that all variables we used as a proxy for CEO experience would contribute to less information asymmetry and thus less underpricing. The variable measuring prior CEO experience was the only one found to be negatively related to IPO underpricing. We argue that *CEOpriorexp* is the variable that most accurately reflects CEO experience since it directly measures if the CEO has held the position before or not. Given the lack of previous research on this subject as well as the strong results for this variable, we believe that our findings can contribute to increased understanding of the complex phenomenon of IPO underpricing and signalling theory.

6 Conclusions

This thesis' objective is to research if CEO experience impacts IPO underpricing. More specifically, if it functions as a signalling mechanism of firm quality, which reduces information asymmetry and results in firms being able to sell their shares with less underpricing. Prior CEO experience, network, tenure, and age, are used as a proxy for the broader concept of CEO experience. We hypothesise that each of these will impact IPO underpricing, arguing that more experience results in less underpricing. To test our hypotheses, we examine a hand-collected sample of 220 IPOs on Nasdaq Stockholm between 1 January 2010 and 15 March 2021 and conduct a multiple OLS regression.

Three main conclusions from the study can be drawn. First, we found evidence that supports our first hypothesis, suggesting that prior CEO experience successfully serves as a signalling mechanism that reduces IPO underpricing. This finding indicates that a CEO with prior experience contributes to reduced information asymmetry between the IPO stakeholders, resulting in "less money left on the table" by the IPO firm. Second, in contrast to what we hypothesised, we found that a stronger CEO network and longer CEO tenure leads to more underpricing. Although this contradicts our hypotheses, we have presented possible explanations for these statistically significant results. For instance, a CEO with a stronger network may cause an unexpected investor demand, leading the underwriter to set a lower offer price than what investors are willing to pay, resulting in higher IPO underpricing. Moreover, firms tend to professionalise the governing body before an IPO, leading to more experienced CEOs having shorter tenure at the time of the IPO. Third, our study cannot confirm that CEO

age impacts underpricing. This suggests that in an IPO context, the CEO's age does not serve as a signalling mechanism of the firm's quality and does not contribute to reduced information asymmetry.

To the best of our knowledge, our findings are unique, further marking the importance of the CEO in an IPO process. Although no previous research has specifically studied CEO experience in relation to IPO underpricing on the Swedish market, there have been similar studies conducted. Compared to these, we have found stronger results. This may be explained by our study including a larger sample size as well as using a different set of variables to explain IPO underpricing. However, the insignificant results on CEO age and the relatively weak results on CEO tenure may indicate that further research on the concept of CEO experience is required.

7 Suggestions for future research

Several interesting ideas for further developing our research have arisen during the process of conducting this study. To replicate this study on other markets with similar socio-political, economic, and governance-related conditions would allow for more legitimate and generalised results on how CEO experience impacts IPO underpricing. It is also interesting to conduct the study on markets with dissimilar conditions, to analyse how CEO experience serves as a signalling mechanism in different institutional contexts. More specifically, the insignificant results on CEO age suggest that further research on other markets may be required as the perception of age differs between cultures. Furthermore, in contrast to our prediction, the relationship between age and IPO underpricing could be non-linear and becomes relevant for future research. Additionally, the experience and expertise required differ substantially between industries, indicating that future research on CEO experience and IPO underpricing for different industries may contribute to a deepened analysis.

Moreover, since the variables we used to measure CEO experience showed contradictory results, we suggest that further research on the definition of CEO experience is needed. For example, the inclusion of other variables such as prior public experience, C-suite level experience, industry-specific experience, and education may yield stronger results. Furthermore, a different definition of CEO network that more accurately reflects and captures

a CEO's entire nexus of professional contacts might show different results than the one used in our study.

Additionally, as discussed in section 5, our study does not account for IPO stakeholders' different incentives for underpricing. For instance, a CEO subscribing for more shares in an IPO, ceteris paribus, would benefit if the shares are underpriced, while the opposite holds for a CEO selling their shares. Considering these factors in future studies on CEO experience in relation to IPO underpricing may extend the understanding of the research area.

Finally, we have created a new method for underwriter reputation which resulted in stronger results, presented in section 4.4. To further validate this method and increase the understanding of how underwriter reputation impacts IPO underpricing in markets with similar conditions, we suggest that future research apply and compare this method to other conventional measures.

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Appendix

Appendix 1: Breusch-Pagan test for heteroscedasticity

This test is performed to find out if heteroscedasticity is present in the data. The null hypothesis states that there is constant variance among the residuals. The p-value is then used to confirm or reject the null hypothesis. If it is rejected, it can be concluded that heteroscedasticity is present. As can be seen in the table, heteroscedasticity is present before we winsorize the data, but not after.

 H_0 : Constant variance; Response variable used in regression model: BHAR

	Non-winsorized	Winsorized
Chi-squared test statistic	18.68	1.61
P-value	0.000	0.205

Appendix 2: Regression without independent variables

This table shows the regression results when excluding all independent variables, with the original model to the left for reference.

BHAR	Original	No independent variables
CEOpriorexp	-0.136***	Omitted
InCEOnetwork	0.051***	Omitted
InCEOtenure	0.029*	Omitted
InCEOage	0.146	Omitted
lnFirmAge	-0.040***	-0.011
InFirmSize	0.017**	0.013
Tech	0.032	0.043
UndRep	-0.525*	-0.257
InProceeds	0.011	0.009
Founder	0.011	0.055
Constant	-0.497	0.013
N	220	220
Mean BHAR	0.100	0.100
R ²	0.267	0.142
Adjusted R ²	0.189	0.070
Prob > F	0.000	0.197

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

Appendix 3: Underwriter reputation

This table shows an overview of the underwriter reputation variable, *UndRep*, used in the regression model as well as the two other methods tested in the robustness tests. Original method: Calculated as the market share based on the underwriter's cumulative transaction value as a lead underwriter. Method 2: Calculated as the market share based on the number of IPOs the underwriter has been a lead underwriter in. Method 3: Rank from 1 to 51 based on each underwriter's average transaction size.

Original method		Method 2		Method 3	
Underwriter	Market share	Underwriter	Market share	Underwriter	Rank
Carnegie	18.1%	Carnegie	17.2%	J.P. Morgan	1
SEB	14.0%	SEB	8.6%	Goldman Sachs	2
Nordea	9.6%	ABG Sundal Collier	8.1%	UBS	3
ABG Sundal Collier	8.7%	Nordea	5.2%	Morgan Stanley	4
Morgan Stanley	7.5%	Svenska Handelsbanken	4.4%	Citigroup Global Markets	5
J.P. Morgan	5.7%	Erik Penser Bank AB	4.4%	Joh. Berenberg, Gossler	6
Danske Bank	5.1%	Pareto Securities AB	4.2%	Jefferies	7
Goldman Sachs	4.5%	DNB Bank ASA	3.9%	Deutsche Bank	8
UBS	4.2%	Avanza Bank	3.6%	Nordea	9
Svenska Handelsbanken	3.7%	Danske Bank	3.4%	SEB	10
DNB Bank ASA	3.6%	Redeye	3.1%	BNP Paribas SA	11
Citigroup Global Markets	2.6%	Morgan Stanley	2.9%	OP Yrityspankki Oyj	12
Jefferies	2.5%	Swedbank	2.6%	Danske Bank	13
Deutsche Bank	2.3%	Vator Securities	2.1%	ABG Sundal Collier	14
Joh. Berenberg, Gossler	1.9%	Eminova	2.1%	Carnegie	15
Swedbank	1.9%	Mangold Fondkommission	1.8%	DNB Bank ASA	16
Pareto Securities AB	1.0%	Västra Hamnen Corp. Fin.	1.8%	CLSA (UK) Limited	17
BNP Paribas SA	0.4%	J.P. Morgan	1.3%	Svenska Handelsbanken	18
OP Yrityspankki Oyj	0.4%	Goldman Sachs	1.3%	Swedbank	19
Redeye	0.3%	UBS	1.3%	Merrill Lynch International	20
Avanza Bank	0.3%	G&W Corporate Finance	1.3%	Stifel Nicolaus Europe	21
CLSA (UK) Limited	0.2%	Remium	1.3%	EFG Bank AB	22
Erik Penser Bank AB	0.2%	Sedermera	1.3%	Kempen & Co N.V.	23
Vator Securities	0.1%	Citigroup Global Markets	1.0%	Nplus1 Singer Advisory	24

Merrill Lynch International	0.1%	Jefferies	1.0%	Pareto Securities AB	25
Stifel Nicolaus Europe	0.1%	Deutsche Bank	1.0%	Catella Bank S.A.	26
EFG Bank AB	0.1%	Stockholm Corp. Fin.	1.0%	Redeye	27
Kempen & Co N.V.	0.1%	Joh. Berenberg, Gossler	0.8%	EVLI	28
Nplus1 Singer Advisory	0.1%	Thenberg Fondkommission	0.8%	Avanza Bank	29
Stockholm Corp. Fin.	0.1%	Catella Bank S.A.	0.5%	Vator Securities	30
Eminova	0.1%	Naventus Corp. Fin.	0.5%	Stockholm Corp. Fin.	31
Catella Bank S.A.	0.1%	Arctic	0.5%	HQ Bank AB	32
Mangold Fondkommission	0.1%	Partner Fondkommission	0.5%	Naventus Corp. Fin.	33
Västra Hamnen Corp. Fin.	0.0%	GCP	0.5%	Arctic	34
Naventus Corp. Fin.	0.0%	BNP Paribas SA	0.3%	Öhman	35
EVLI	0.0%	OP Yrityspankki Oyj	0.3%	Erik Penser Bank AB	36
G&W Corporate Finance	0.0%	CLSA (UK) Limited	0.3%	HDR Partners	37
Remium	0.0%	Merrill Lynch International	0.3%	Eminova	38
Arctic	0.0%	Stifel Nicolaus Europe	0.3%	Partner Fondkommission	39
Sedermera	0.0%	EFG Bank AB	0.3%	Mangold Fondkommission	40
Partner Fondkommission	0.0%	Kempen & Co N.V.	0.3%	Västra Hamnen Corp. Fin.	41
HQ Bank AB	0.0%	Nplus1 Singer Advisory	0.3%	G&W Corporate Finance	42
Thenberg Fondkommission	0.0%	EVLI	0.3%	Remium	43
Öhman	0.0%	HQ Bank AB	0.3%	Birger Jarl Fondkommission	44
HDR Partners	0.0%	Öhman	0.3%	Thenberg Fondkommission	45
GCP	0.0%	HDR Partners	0.3%	Törngren Magnell	46
Birger Jarl Fondkommission	0.0%	Birger Jarl Fondkommission	0.3%	Söderlind & Co AB	47
Törngren Magnell	0.0%	Törngren Magnell	0.3%	Sedermera	48
Söderlind & Co AB	0.0%	Söderlind & Co AB	0.3%	GCP	49
Augment partners	0.0%	Augment partners	0.3%	Augment partners	50
Invesdor	0.0%	Invesdor	0.3%	Invesdor	51

Appendix 4: Robustness tests, underwriter reputation

This table shows the robustness tests when using two other methods for underwriter reputation, with the original model to the left for reference. Test 1: UndRep using number of IPOs as the basis for market share. Test 2: UndRep using average transaction value as the basis for rank.

BHAR	Original	Test 1	Test 2
CEOpriorexp	-0.136***	-0.133***	-0.130***
InCEOnetwork	0.051***	0.052***	0.053***
InCEOtenure	0.029*	0.028*	0.027*
InCEOage	0.146	0.139	0.154*
lnFirmAge	-0.040***	-0.040***	-0.043***
lnFirmSize	0.017**	0.016*	0.017**
Tech	0.032	0.033	0.036
UndRep	-0.525*	-0.218	0.003*
InProceeds	0.011	0.003	0.016
Founder	0.011	0.008	0.011
Constant	-0.497	-0.440	-0.656*
N	220	220	220
Mean BHAR	0.100	0.100	0.100
R ²	0.267	0.260	0.270
Adjusted R ²	0.189	0.182	0.193
Prob > F	0.000	0.000	0.000

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

Appendix 5: Robustness tests, independent variables tested separately

BHAR	Original	Prior exp	Network	Tenure	Age
CEOpriorexp	-0.136***	-0.122***	Omitted	Omitted	Omitted
lnCEOnetwork	0.051***	Omitted	0.045**	Omitted	Omitted
InCEOtenure	0.029*	Omitted	Omitted	0.045**	Omitted
InCEOage	0.146	Omitted	Omitted	Omitted	0.039
lnFirmAge	-0.040***	-0.026*	-0.012	-0.025*	-0.012
lnFirmSize	0.017**	0.017**	0.013	0.012	0.013
Tech	0.032	0.029	0.051	0.027	0.045
UndRep	-0.525*	-0.441	-0.234	-0.340	-0.266
InProceeds	0.011	0.011	0.007	0.011	0.009
Founder	0.011	0.033	0.046	0.021	0.058
Constant	-0.497	0.094	-0.014	-0.010	-0.137
N	220	220	220	220	220
Mean BHAR	0.100	0.100	0.100	0.100	0.100
\mathbb{R}^2	0.267	0.215	0.164	0.167	0.143
Adjusted R ²	0.189	0.145	0.089	0.092	0.066
Prob > F	0.000	0.001	0.015	0.051	0.208

This table shows the results from the robustness tests where we test each independent variable separately, with the original model for reference to the left.

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