# The impact of certification on the reduction of information asymmetry, during and post-IPO

Private Equity and Venture Capitalist firms' influence on Initial Return and Post Financing in the Swedish Market

**Authors:**

Sinaj, Paulina

Uka, Rina

**Supervisor:**

Marco Bianco

# Abstract

**Title:** The impact of certification on the reduction of information asymmetry, during and post-IPO

**Seminar date:** 2023-05-31

**Course:** BUSN79, Master Thesis in Corporate Finance, Second Cycle, 15 credits

**Authors:** Paulina Sinaj, Rina Uka

**Advisor:** Marco Bianco

**Key words:** Initial Public Offering, initial return, information asymmetry, Venture Capital, Private Equity, net change in equity

**Purpose:** The purpose of this study is to investigate the existence of information asymmetry displayed in the initial return, and post-IPO financing. Additionally, how sponsor certification influences IPOs and in the post-IPO financing as a means to reduce information asymmetry.

**Methodology:** The study was conducted based on a quantitative research method, followed by a deductive approach, which includes the collection and evaluation of secondary data and testing the hypothesis that emerges from it.

**Theoretical perspective:** Research studies and theories regarding the information asymmetry, initial returns and the impact of sponsor certification during and post-IPO financing are presented in the theoretical framework section.

**Empirical foundation:** The empirical material has been collected from the Bloomberg database which consisted of 222 IPOs conducted between 2010-2019 in the Swedish financial market. The data has been filtered out for; offer size, offer price, firm age, industry, debt to equity ratio, net change in equity, Venture Capital backed, Private equity backed.

**Conclusion:** The study indicates that asymmetric information influences the initial return of the IPO and the post-IPO financing decisions. Also there is a positive relationship between PE funds and initial return, which is a contradictory outcome to former research. Moreover, there is a positive significant relationship of PE sponsorship to the net change in equity. Extended discussion about the conclusions will be conducted in the following sections.

# Definitions and Concepts

---

**EBITDA**: Earnings before interest, taxes, depreciation and amortization

**Ex ante uncertainty:** Measurement of uncertainty before an economic event happens

**Information asymmetry:** Refers to when one party that participates in a transaction is more informed than the other.

**Initial return:** The return on the first day of trading stocks in the public financial market

**Intrinsic value:** The real value of an asset or company

**IPO:** Initial Public Offer, a company being present in the public market

**M&A:** Refers to Merger and Acquisition

**PE-backed:** A firm that is financed by a private equity firm, which is defined as a partnership that acquires and manages firms before selling them

**Primary listing:** When stocks issued by the firm are listed for the first time on a public financial market

**Proxy:** A variable that is insignificant but contains valuable information based on another variable difficult to observe and measure

**Secondary listing:** Any  listing in the stock exchange other than the exchange where it was primarily listed

**SIC code:** Categorizes the businesses to the industry it belongs to

**VC-backed:** A company that is financed by venture capital firm, which usually owns 10% of the shares

## Acknowledgements

We would like to extend our sincere thankfulness to our supervisor, Marco Bianco, for his valuable guidance and suggestions for improvement during the process of writing our thesis.

Paulina Sinaj        Rina Uka

# Table Of Contents

## Research Disposition

---

## 1 Introduction

The introduction includes a background of the study followed by a main problem discussion regarding initial returns, post-IPO financing and the role of VC and PE contribution in reducing information asymmetry. Furthermore, the main research questions are presented along with the contributions and limitations of the study.

## 2 Theoretical Review

In the theoretical review, the selected theoretical and empirical review is presented, with a main focus on initial returns, VC and PE backing, information asymmetry and post-IPO financing.

## 3 Hypothesis Development

In this section the main hypotheses of the study have been formulated in accordance with previous similar research as well as the main purpose of this study.

## 4 Methodology

In the methodology section the scientific approach, research method and the selection process are introduced. In addition the section consists of an introduction of selected variables and statistical tests.

## 5 Empirical Results

This section contains the empirical results of the statistical tests conducted.

## 6 Analysis

This following section gives an in-depth analysis of the empirical results produced, relating it to previous research and theory selected.

## 7 Conclusion

The main conclusions retrieved from the study are presented in this section together with a discussion, limitations and suggestions for further studies.

**References**

In this section can be found the main sources used throughout this study to enable the investigation.

**Tables**

This is the final section, which contains tables with data and statistical results.

# 1. Introduction

*This chapter covers an introductory background related to the subject of the study. The background is followed by the problem formulation together with the research questions and the main purpose of this study. Finally, the contribution and limitations of the study are mentioned.*

## 1.1 Background

IPOs (Initial Public Offers) are one of the most discussed topics in the financial literature with emphasis on their valuation, pricing, potential costs and conflict of interest between parties participating in the IPO. An IPO takes place when a firm sells its stock to the public for the first time creating a liquid market for their shares. Becoming a public firm is one of the most important stages in the life of a new firm because it not only grants accessibility to public funds, but also lowers the costs of securing funding for the firm's operational activities. Going public also gives the opportunity to the existing shareholders to diversify their portfolio (Ljungqvist, 2007). One of the most known patterns related to the conduction of IPOs is underpricing, which occurs when the price of the stocks on the first day of trading is lower than the intrinsic value. The closing price on the first day, which will correspond to the market value, will cause larger initial returns (Ritter, 1998). Underpricing can also be defined as the "money left on the table" by shareholders, which is the difference between the aftermarket trading price and the offer price multiplied by the number of shares offered at the IPO (Ljungqvist, 2007).

Information asymmetry is one of the most important factors that causes the phenomenon of underpricing in the IPOs. The information asymmetry issue occurs as a result of the fact that the securities traded belong to closely-held firms and the existing shareholders may own unique information that is not publicly known (Ritter, 1998). Under the condition of uncertainty and the lack of publicly available information about the firm's value, it is difficult for private firms to raise funds. In order to provide credibility to the investors about the value of the stocks, firms often cooperate with third-party specialists that have the ability to certify the value of securities that firms, which are relatively unknown to the public, issue (Megginson and Weiss, 1991). These specialists could be Venture Capitalists (VC) or Private Equity (PE) funds, which contribute to the firms their knowledge, set of skills, capital and

information, resulting in the declining of information asymmetry between the issuer and outside agents.

VC backed firms are able to certify the quality of the issue by investing in financial and reputational capital, attract prestigious underwriters and auditors and also larger institutional investors post- IPO. Moreover, VC funds help in reducing the information asymmetry and as a result lower the costs of going public (Megginson and Weiss, 1991). PE certification brings to the firm that issues the IPO certain advantages such as; higher market capitalization, sales, assets and a lower underpricing in the short-term, compared to non-sponsored IPOs (Levis, 2011).

The main focus of this study is seeking the differences in the market performance after conducting an IPO between sponsored IPOs and non-sponsored IPOs. In this thesis, the short term market performance will be measured by the initial return. The data collected contains information only about the participation of sponsors during the process of going public, however their influence might also be reflected in post-IPO activities. The authors will also look into the financing alternatives that take place after going public for sponsored and non-sponsored IPO firms. After the conduction of the IPO, the company, which is now public, needs to seek financing alternatives in order to continue their operating activities. Even at this stage, the role of sponsors is vital to raise capital in the secondary market. Once again, information asymmetry has a significant influence in the financial decisions of the firm. Information asymmetry hypothesis presumes that the involvement of sponsors in the post-IPO financing would be an efficient way to solve the issue of information asymmetry, which would condition the firm´s alternatives to invest in value-adding projects. Sponsors provide the firms with the advantage to overcome the information asymmetry and identify value-increasing investments due to the knowledge, skills and experience they own (Iliev and Lowry, 2020).

1.2 Problem Discussion

The general performance of an IPO is a very commonly discussed topic among studies with focus on different anomalies such as underpricing in the short-term performance, the influence of third party certification on the reduction of information asymmetry and also post-IPO financing alternatives. The analysis conducted in this study aims to investigate the persistence of information asymmetry during an IPO as well as in the post-IPO issuances.

Additionally, the focus will be on the initial return to examine the presence of information asymmetry reflected on the first-day returns. If information asymmetry patterns are discovered by analyzing initial returns, then the focus will be shifted on the impact that VC and PE sponsors have regarding a possible reduction on the information asymmetry. Moreover, the authors study the role of VC and PE in post-IPO equity financing and how its certification affects the information asymmetry that might continue to be persistent even after going public.

It is known that many young companies choose to get third-party certification in order to certify the quality of their stocks before conducting an IPO. This is due to the advantages these sponsors bring to the firms with regard to the reduction in information asymmetry. These sponsors are known to help the firms in the decline of information asymmetry, underpricing and financing post- IPO. However, with the rise in information technology in recent years the flow of information has significantly improved in the financial market. According to Gajewski and Li (2015), internet technology can gather a huge amount of information that exceeds the traditional media and through the web rumors circulate fast. The results of the study by Gajewski and Li (2015) demonstrate a positive effect of these developments on the reduction of information asymmetry. These advancements could affect the importance of the role VC and PE sponsors play in the process of going public. Since firms could access information faster and easier, they might decide to conduct the IPO on their own, without seeking the support of the sponsors. Moreover, after going public companies need funding in order to secure the continuity of their operational activities. The role of VC and PE in this case is important because they have advantageous information that helps the firms discover efficient ways to finance activities. However, the increased access to valuable information within markets could help the firms succeed in the post-IPO financing process without the assistance of sponsors.

Additionally, financial markets today differ in many aspects from the past and this could also be due to several events that have taken place throughout the years and have left their mark on the developments of financial markets. These changes also alter between industries and countries. Therefore it would be interesting to investigate how the role of sponsors has changed during years within different industries and limit this study to the Nordic market with the Swedish market on the front. The motivation behind that is the fact that the Swedish market is not much explored compared to the UK and USA, and in these regions the most

common pattern is the high maturity of the PE industry so it would be intriguing to discover if the Swedish market matches the same patterns. In addition, very few studies within Europe conduct an analysis that distinguishes the influence of VC and PE separately.

1.3 Purpose and Research Question

The main purpose of this study is to analyze the existence of information asymmetry displayed in the initial return and if this presence continues to be persistent even in the post-IPO financing. Furthermore, the aim is to examine the influence VC and PE firms have on the success of an IPO, and in the post-IPO financing alternatives by reducing information asymmetry. All in regards to today's environment, where information technology development has reached its peak and the access to valuable information is unlimited for firms.

- ❖ Does PE and VC sponsoring mitigate information asymmetry in the IPO market and in turn affect the initial returns of IPOs?
- ❖ Has PE and VC certification an effect on the choice of issuing new equity after the first year following the IPO?

1.4 Main Findings

Firstly, the authors have found that information asymmetry is present and affects both the initial performance of the IPO and the post-IPO financing decisions. The main findings of this study are connected to the positive relationship between PE funds and underpricing, therefore initial return, which is a contradictory outcome to former research. Additionally, there is a positive significant relationship of PE sponsorship to the new additional equity issued, measured by net change in equity. Further analysis regarding the findings will be conducted in the following sections.

1.5 Contribution

The main contribution of this study is the in-depth analysis regarding the role of VC and PE during the IPO and in the post-IPO equity financing. In addition, the authors contribute in the current literature with an updated study of the role of sponsors considering the changed macroeconomic condition due to the developments in technology. These developments might make sponsorship less valuable since according to Gajewski and Li (2015) technology development contributes to the reduction of information asymmetry.

Moreover, this study contributes to the limited research on the aftermarket performance of IPOs in the Nordic Market in the recent year and expanding the analysis with the inclusion of the VC and PE sponsors in the model. Also, previous researchers do not differentiate VC firms from PE in the European market. This kind of differentiation is done by studies in the American market, however the identification of VC and PE in Europe remains a challenge due to the limited information about private firms and the involvement of sponsors in both VC and PE transactions (Levis, 2011). The study conducted by Levis has been one of the first studies in Europe to distinguish between these two groups, however the author's focus remains mainly in the PE backed firms. The analysis performed in this present research gives a broader insight to the differences between the two groups from different perspectives.

1.6 Limitations

The authors have limited the data collection to OMX Nasdaq Stockholm and First North from 2010.01.01 to 2019.12.31. This is considered as an optimal time frame since it is relatively a long period taken into consideration that can generate an insightful study with a good comparability to previous research. Also the reason why the time period has been stopped to 2019 is to avoid capturing the effect that the recent macroeconomic events such as COVID-19, and war in Ukraine, could have on the results. These are events that might have a strong temporary effect, thus the analysis might not reflect the normal behavior of the variables taken into consideration. Furthermore the time period limit does not allow to expand the focus to many geographical areas so the study is concentrated in the Nordic Market. In the data gathering process, preference shares and secondary listing have been excluded. The authors have decided to analyze only primary listing and ordinary share, and this is related to the value of primary listing in the financial markets.

## 2. Literature Review

*The following chapter gives an overview of the main theoretical and empirical research conducted previously with regard to initial return, information asymmetry, VC, PE and post-IPO financing. In addition, the chapter covers theoretical review of the ex-ante uncertainty.*

2.1 Theoretical literature

*2.1.1 Initial Public Offers - Initial Return*

Going public is an important phase of the life of a young company. IPOs provide access to public equity capital and by doing so can lower the costs of funding for the firm's operations and investments. It provides a venue for the trading of the firm's shares and the opportunity for its existing shareholders to diversify their investments (Ljungqvist, 2007). There are several reasons that make firms go public. One of the most obvious factors is raising capital but as most studies conclude, this is not the most important determinant (Lowry et. al, 2017).

According to Buchner et al. (2018), PE and VC backed firms play a very important role in the creation of public corporations, since they possess the adequate skills, networking and understanding of the market conditions. The process of going public is not directly controlled by the PE and VC firms but rather by investment bankers or underwriters. The main purpose of these intermediaries is helping the firm to achieve the highest valuation at the IPO date and possibly better post issue performance. The level of expertise and reputation gives PE and VC funds the opportunity to influence the intermediaries such as institutional investors, investment bankers and analysts whose actions have a major role on the success of going public (Buchner et al., 2018)

Megginson and Weiss (1991) argue that certification has value whenever securities are being issued in capital markets where insiders of the firm and outside investors have different information sets regarding the value of the firm offering. The credibility of the PE and VC backed firms consist of their investments in reputational capital as well as their financial holdings in the firm. PE and VC partners contribute in reducing the asymmetry of information between the issuing firm and investors and financial specialists such as underwriters and

auditors. As a result, PE and VC firms are able to lower the costs of going public, which is translated into a better post IPO performance (Megginson and Weiss, 1991).

One of the most important topics about IPOs is the performance of the market on the first day after the company has become public. The pricing of IPOs is a very complex process that is affected by certain factors such as; information asymmetry, the uncertain aggregate demand for the firm´s shares etc (Lowery et al., 2010). Underpricing is one of the most common phenomena that the firms face when going public. IPO underpricing occurs when the introductory price of the share is below its market value and as a result the share`s return after the first trading date will be positive (Ritter, 1998). One of the roots of underpricing is considered to be asymmetric information between the different participants involved in an IPO. The greater the level of uncertainty related to the actual price of the shares, the greater will be the discount offered to uninformed investors in order to persuade them to participate in the market and the greater would be the advantage of the informed investors (Rock, 1986).

Several studies such as Megginson and Weiss (1991) have concluded that VC backed IPOs had significantly lower underpricing compared to non-sponsored IPOs. The authors conclusion is quite relevant since the PE and VC role is to be aware of the firm's true value, contribute in reducing information asymmetry and as a result, underpricing. VC certification increases credibility which allows the firm to hire underwriters that have a good reputation, who will help the firm sell their shares at a higher price. As a result, underpricing will be reduced, which also translates into a decline in initial return. Another study by Loughran and Ritter (2004) argues that in all the periods of time observed, the first day returns for VC-backed firms are higher compared to non sponsored ones.

*2.1.2 Private Equity*

PE may be defined as a group of different investment strategies, which are extended over diverse asset classes (Baker et al., 2015). According to the author, two main strategies are traditional PE, also known as buy-outs, and VC. The main difference between the two is that PE tends to invest in more established companies that are in a later stage of their life cycle, while VC has their focus on companies in early stages that are not as mature (Baker et al., 2015). PE firms will raise capital from investors, to be able to further invest in their selected portfolio companies. Sweden has one of the most innovative economies in the world

regarding PE firms. Further, Sweden has one of the largest markets for PE funds in Europe, and also seems to expand to other parts of the financial industry. The sponsors can do this via VC, IPO and M&A market, which is where the funds exit their investments (SVCA, 2020). PE firms usually use high leverage to acquire the firm, in order to acquire a great stake. This will also increase the risk, and may at the same time increase the return (Næss-Schmidt et al., 2017). Since traditional PE funds involve debt, the management needs to implement tools to increase operational performance, and become more efficient. This is needed in order to generate cash flows for reducing the large amount of debt the PE firm took on by acquiring the firm (Jensen, 1989).

The PE fund can be divided into two different investment stages, growth PE and buyout PE. The first one targets new established companies which have potential to grow. (SVCA, 2020). Growth PE funds tend to focus on innovative sectors such as life science, financial services, and information and communications technology. The purpose is to expand to new markets, and create new products, in order to grow. The latter targets established and more mature companies, where the focus is to improve competitiveness and efficiency via e.g. new technologies, R&D and digitalisation, since the company is already steady (SVCA, 2020). The VC firms target high-growth and high-risk companies with the purpose of developing and bringing them to the market.

Since VC firms tend to focus on companies with high growth potential, but also high risk, it becomes a risky investment for investors (SVCA, 2019). Therefore, the VC reputation and past performance will become extremely important (SVCA, 2020). One important contribution of the VC firms is the expertise and guidance they bring to the table along the capital. Since VC sponsors invest early in the life cycle, the growth in the sponsored companies does not take off until five years after the initial investment. The main difference between PE- and VC firms is that the latter will exit once the invested company has matured, and then start seeking for potential buyers of equity markets. Furthermore, VC funds tend to focus on high-tech sectors which are dependent on equity finance (SVCA, 2019).

*2.1.3 Information Asymmetry*

There are many theories explaining the phenomenon of underpricing, which affects the first day performance, when a public goes public (Cheung and Krinsk, 1994). Most of them indicate that information asymmetry has a crucial role in an IPO. Furthermore, Megginson and Weiss (1991) mentions the relationship between company age and the phenomena of information asymmetry. Younger companies tend to have higher information asymmetry than more established firms. Cheung and Krinsky (1994) discuss an alternative reason for the importance of the relationship between uncertainty and underpricing mentioned by Rock (1988), and Beatty and Ritter (1986). The theory indicates that investors with greater knowledge will bid on underpriced offers, while less informed investors will be assigned a higher portion of over priced shares. In order to attract investors with less information, it requires the initial return to be higher (Beatty and Ritter, 1986; Cheung and Krinsky, 1994; Rock, 1986). Several hypotheses are connected to the phenomenon of underpricing related to an IPO, which eventually causes a higher initial return on the first day of the IPO.

*Ex-ante uncertainty* is considered a disadvantage regarding the underpricing of an IPO. The majority of theories approve that firms that are surrounded by a greater amount of uncertainty tend to be more underpriced, thus have higher first-day return. In addition, after the conduction of the IPO, the price of the shares is influenced by the market conditions, which includes the industry the firm operates in and the operating performance of the company itself (Loughran and Ritter, 2004). A study by Ang and Boyer (2009) examines possible differences in performance between IPOs that belong to firms which operate in new industries and IPOs issued in established industries. Firms that conduct IPOs in established industries tend to face greater entry barriers compared to firms that conduct IPOs in new industries. Regarding underpricing, IPOs in new industries are prone to be more underpriced relative to IPOs in established industries which is due to the fact that there is a lack of information for the profitability of the industry which increases the uncertainty and results in a higher degree of underpricing (Ang and Boyer, 2009).

Another study by Karalis (2008) argues that companies within the tech industry are more likely to be underpriced due to its characteristics as a young industry, and therefore more difficult to forecast. Lastly, according to a study by Zider (1998), PE firms tend to invest in firms within healthcare, while VC firms tend to invest in firms within the high-tech industry,

which is in coordination with the SVCA (2020) report. A research conducted by Bergström et al. (2006) examines the relationship between PE sponsored firms and underpricing in the European market. The authors argue that PE firms can signal high quality due to several measures such as professional management and experience within industries. Due to greater clarity and publicity before a company goes public, the information asymmetry will eventually reduce, and therefore lowering the ex ante uncertainty regarding the firm's true value.

Baron (1982) is one author who discusses *The principal and agent theory* in relation to an IPO. According to the author, the underwriter has greater information regarding the market than the issuing company. The company will allow some level of underpricing in order to increase necessary actions from the agent for the market shares (Baron, 1982; Ritter and Welch, 2002). An underpricing during an IPO will reward the agent since the contract between the two parties includes compensation for the agent's valuable information. The greater uncertainty on the demand, the higher the underpricing will be, which will increase the value of the agent's service (Baron, 1982).

An additionally well-known theory named *The Winner's curse* attempts to explain the underpricing of IPOs studied by Ritter (1998). If the IPO performs well, there will be an increased demand for the firm's shares, which means that the demand will be higher than the offer so the allocation of the shares will be rationed. On the other hand, when an IPO does not go well, the demand for the firm's shares will be lower, which indicates that all initial orders will be fulfilled. As a result, the investments in "good" IPOs will be rationed, while fully investing in "bad" IPOs. Uninformed investors would feel like winning in the second scenario where they are actually obtaining shares of an overpriced IPO (Ritter, 1998).

Furthermore, *The Signalling hypothesis* mentioned by Allen and Faulhaber (1989), argues that different companies listed on the stock market develop different strategies which could affect the market in a positive way. One reason for the positive market development is underpricing, which is done mainly by the firm itself. The authors believe that the companies have important information about the share's value and this increases the possibility to influence the market's conditions. Allen and Faulhaber (1989) conclude that underpricing is a way to give possible positive signals to the market and shareholders themselves.

Moreover, an additional hypothesis related to an IPO and its underpricing is *The bandwagon effect* (Ritter, 1998). When investors are acknowledging other investors' purchase choices, beyond their own information regarding a possible issue, will eventually trigger the effect. If one investor notices that no one will invest in a firm despite good performance, the investor will step back and possibly change investment strategy. In order to avoid the possible situation, the company will be underpriced to potential investors. This way, the bandwagon effect will not be accurate, and the investors will instead want to purchase shares despite current information since they will be compensated by the initial return (Ritter, 1998).

Additionally*, The Certification hypothesis* refers to the PE-funds functions as a third party in the PE-backed companies who "certificate" a real value for the underlying share (Megginson and Weiss, 1991). The following become active when there is information asymmetry on the capital market between the issuing company, and the investors. The insiders within the issuing firm tend to hide weak information in order to increase the share price. The rational investors are well aware of the purpose, which is why they may offer a lower price. Investors are highly likely to believe information, both from VC and PE, since it often is accurate due to their reputation, need of maintaining growth in wealth, and reputational value. Hence, it will result in reduced information asymmetry according to Megginson and Weiss (1991), due to the increased quality and credibility by sponsored PE firms, and less underpricing than non sponsored firms.

*The Grandstanding hypothesis* is an additional explanation to information asymmetry during an IPO. Research by Gompers (1996) indicates that companies sponsored by less established funds in less mature PE markets are on average more underpriced in comparison to firms sponsored by more established funds within more mature markets. According to several studies such as Coakley et al. (2006), Pommet (2017), and Chahine et al. (2007), the hypothesis is accepted when examining the role of underpricing in relation to PE-backed companies. PE sponsored firms within the PE industry in less developed countries tend to be more underpriced. Less established firms have higher pressure to obtain a good reputation. Therefore, the firms tend to grandstand through helping companies go public faster. However, by doing so, the less established funds receive less capital due to early IPOs.

*2.1.4 Post Initial Public Offers - Financing*

Soon after the IPO, a large number of firms head to the equity market. One of the most common explanations for the staged financing is related to the information asymmetry (Blomkvist et al., 2022). Their analysis suggests that the IPO and the available trading information that follows the IPO as a learning channel for the firms is enough to explain the equity financing behavior of the firms, even when there is information asymmetry. The authors pose that staging of equity offerings allow the firms to use initial stock market information to learn more about the firm's value. Afterwards, the firms decide on the size and the timing of a following equity offering based on this valuable information (Blomkvist et al., 2022).

Iliev and Lowry (2020) consider the IPO as the point at which public equity financing becomes cheaper compared to VC financing, however firms choose to use VC financing (Iliev and Lowry, 2020). Two main factors could cause the firms to choose VC financing, which are; the information asymmetry hypothesis and the agency hypothesis. The first hypothesis suggests that the involvement of VC in post-IPO financing is an efficient solution to the problems that could rise as a result of the lack or limitation of information, which would restrict firms from utilizing value-adding investments.

On the other hand, the agency hypothesis relies on the idea that VCs are driven by other factors rather than the positive NPV of the projects. Typically, VCs obtain a 2% fee for their management services and a 20% as a carried interest. This motivates managers of funds that have a poor performance to undertake investments in companies that have a higher risk exposure. Alternately, managers of funds that have shown a positive high performance would be motivated to invest in firms that have a lower risk in order to lock in carried interest (Iliev and Lowry, 2020).

2.2 Empirical Literature

*2.2.1 Initial public offers - Initial Return*

Megginson and Weiss (1991) in their study analyze the effect that the certification of VC have on IPOs as well as a comparison between VC backed IPOs and non-VC backed IPOs. The sample consists of 320 VC backed IPOs and 320 non-VC backed IPOs that belong to firms in the same industry during January 1983 to September 1987. The results demonstrate that even

though the sample was intended to be matched as much as possible, there was still a difference in the offering size. IPOs that were VC backed had higher offering amounts compared to non-VC backed IPOs. Additionally, the results from the study by Megginson and Weiss (1991) indicate that VC backing reduces underpricing, the cost of underwriters, and attracts more prestigious auditors and underwriters.

Another study from Levis (2011) examines the effect that VC/PE funds have on the underperformance of the IPOs. The author collects data from the London Stock Exchange Markets from January 1992 to September 2005. The sample consists of 1595 IPOs, 1141 of which are non sponsored, 250 are VC backed and 204 are PE backed. In addition, the differences in the firm's characteristics such as; size, profitability, operational efficiencies and industry structure are investigated for the three groups mentioned above. The aftermarket performance of IPOs is examined in the short-term period (first-day returns) and in the long term using a three-year period after the IPO. The results of the study by Levis (2011) indicated that PE backed IPOs are in general larger than the other two groups in terms of amount raised, sales, assets and market capitalization. Additionally, PE backed firms are less underpriced than the VC backed and non sponsored IPOs. In the long term performance, PE backed IPOs perform significantly better than the two other types of IPOs since PE sponsored achieves higher positive cumulative abnormal returns and also higher aftermarket performance relative to leverage ratio.

Lastly, company specific measures may be an additional explanation for the underpricing during an IPO, and therefore affecting the initial return. One characteristic that has been examined by several authors is offer size. Bergström et al. (2006) argues that theory indicates a negative relationship between underpricing and offer size because of higher information available. The author's research is partially in line with the theory where the relationship between the two variables were statistically significant with a negative relationship on the London stock exchange, in contrast to the Paris stock exchange. In the latter market, the variables were not statistically significant, however positively correlated. One additionally characteristic is leverage within companies. Habib and Ljungqvist (2001), among others, argue that firms with high degree of leverage may signal greater quality because of their ability to obtain debt. Further, by securing leverage before an IPO, may reduce the uncertainty amongst investors, and therefore increase the proceeds of an IPO. Beyond offer size and leverage, Purnanadam and Swaminathan (2004) examined the difference between over- and

undervalued companies. The authors find that companies which are overvalued on an IPO, tend to have higher initial return and share turnover, as higher growth in earnings. Hence, several characteristics may impact the initial return in different ways.

*2.2.2 Post Initial Public Offers - Financing*

Blomkvist et.al (2022) conduct an empirical study regarding staged equity financing. The authors have collected data on IPOs from 1980 to 2018. The dependent variables are IPO size and independent variables taken into consideration include; R&D expenses, firm age, price and earnings. The results of the study show that firms that are surrounded with a higher degree of uncertainty tend to conduct smaller IPOs and a majority part of them turn to the equity market shortly after their IPOs. Additional explanations for this choice include; asymmetric information, selection bias and other alternative explanations of the consecutive equity financing. Evidence in the study indicates that insiders do not take advantage of the asymmetric information to maximize their profits; they postpone the issuing of their shares, avoiding the participation in the IPO. Other explanations include signaling hypothesis, which means firms signal their quality through underpricing and then issue equity at a much higher valuation, as well as long term cash flow deficit. The latest is related to the fact that some companies that are R&D intensive raise funds through frequent equity issues, however based on the study there is no evidence of a negative correlation between negative cash flows and the conduction of an SEO.

Furthermore, Iliev and Lowry (2020) are two authors who provide empirical evidence on the financing of newly public firms that are VC backed. Their sample consists of 2459 VC backed IPOs between 1985-2010. The findings of several empirical tests in the study indicate that the VC financing of firms post IPO is connected to the information asymmetry, which often causes problems for firms in the process of raising external funding. In this aspect VC backed firms have a significant advantage in reducing information asymmetry and making investments that will create value for both the VC fund and the firm. The findings also suggest that firms that were VC funded even prior to the IPO were more likely to provide for the firm funding even post-IPO.

# 3. Hypothesis Development

*This chapter presents the main hypothesis derived from the literature review and adjusted to the main purpose of the study.*

The influence that VC and PE funds have on IPO underpricing and in securing financing for newly public firms is a very debatable topic among studies. Megginson and Weiss (1991) came to the conclusion that VC-backed IPOs experience less information asymmetry. As a result, the underpricing in the short term performance of the IPO is lower. Furthermore, Levis (2011) reaches a similar result, however the author differentiates VC backed IPOs from PE backed. Additionally, the market chosen is limited to the UK financial market.

This study has not a specific industry focus, as the sample chosen falls in several different industries presented in the sections below. The market chosen is the Nordic market represented by Sweden, which takes up the largest part of IPOs. Additionally, as mentioned by Levis (2011), research in the European market lacks differentiation of PE and VC. The time period in which the current study is being conducted illustrates a better picture of the current circumstances and developments in the financial markets. Moreover, the study puts emphasis on the information asymmetry, and how today's facilitated flow of information could reduce the influence of VC and PE funds on the initial return of the IPO. Therefore, the following hypothesis has been developed to be tested in this study.

*H0: VC and PE sponsoring mitigates information asymmetry and therefore, is associated with smaller initial returns.*

In addition, the analysis is extended to the post-IPO stage, where firms seek financing alternatives for their activity while being part of the public market. Blomkvist et.al (2022) focuses on IPO size, uncertainty and asymmetric information, and concludes that firms conducting smaller IPOs will shortly return to the equity market to issue more equity. However this study does not refer to the issue of IPOs backed by VC- and PE funds. Iliev and Lowry (2020) concentrate on VC backed IPOs, and that VC funds help reduce the information asymmetry and identify profitable investment opportunities as well financing alternatives for firms they support. It would be interesting to run an analysis that would be more extensive

and specific by including both VC and PE sponsored IPO firms, and investigate if these sponsors would be an influence for the firms to issue more equity in the year following the IPO. Additionally, to examine if the information asymmetry stays post financing. Hence, the hypothesis presented below will be tested.

*H0: VC and PE sponsoring effect (positively) impacts post-IPO equity financing.*

# 4. Methodology

---

*In the following chapter, the authors present the scientific approach conducted in this study, the selected method of collecting and processing the data. In addition it covers a description of the main variables chosen and statistical tests performed as well a the motivations behind it.*

---

## 4.1 Introduction and Scientific Approach

This study analyzes the initial return of the IPO classified as; VC-backed IPOs and PE-backed IPOs within the Swedish Market. In order to properly conduct the research the authors have followed a three steps process as described by Lundahl & Skärvad's (2016). Firstly, the theoretical and empirical material has been collected by looking into past similar research for the phenomenon. Secondly, the quantity data has been gathered ensuring that the sample is large enough to read the trends and be converted to decent conclusions and discussion. Finally, the authors carefully evaluate the effect the quantity of data has on producing indicative results. (Lundahl & Skärvad, 2016). The authors conduct a quantitative study following a deductive approach, which implies the collection and evaluation of selected literature and theory, and testing the hypothesis that emerges from it by using the data collected.

## 4.2 Collection and sample selection

The data for this research has been collected from Bloomberg Terminal. Further, it has been filtered through country and stock exchange, time period, primary listing, common stocks, and PE/VC-backed companies. The sample used includes companies listed on stock exchange markets in Sweden, such as OMX Nasdaq Stockholm and First North. Why, and how these criterias were selected will be discussed further in the upcoming sections. It resulted in a sample consisting of 222 companies that went through with an IPO in Sweden.

In order to complete current research with an acceptable result, it is necessary to include an extensive amount of data. The implementation of the data analysis was done with the help of an extensive population to satisfy the study with considerable statistics from the sample. The following approach was considered reasonable due to the literature and research that the authors of this study have interpreted.

*4.2.1 Time period*

In order to succeed, the chosen time period was set to ten years since data is only collected from the Swedish market, and therefore limits the quantity. Hence, the time period is set from 2010-01-01 to 2019-12-31. A factor related to the decision regarding the time period was to avoid cyclical movements on the market since IPOs might be sensitive. According to Levis (2011), the Dotcom-bubble crisis had a significant influence on IPO's. Therefore, different crises such as the global financial crisis, which occurred before the chosen time period, and the Covid-19 crisis, which started after the chosen time period, were avoided. This way, the original sample will not be influenced by market fluctuations such as a crisis.

*4.2.2 Geographical area and stock market exchange.*

As mentioned previously, the chosen country for this study is only Sweden. The reason behind this selection is because Sweden dominates the Nordic market, and including the other countries as well did not influence the quantity to a certain extent. Therefore, the decision was made to exclude all other countries and only include IPOs in Sweden. Also, as mentioned in the theoretical section, there are many studies regarding the initial return and long performance on different markets, where Sweden is quite absent, which is another reason for the chosen sample. Furthermore, in order to increase the sample size, two stock exchange markets in Sweden were included, such as Nasdaq Stockholm and First North.

*4.2.3 Primarylisting and selection of offer*

This following study will solely focus on companies listed on the primary market, and not on the secondary market. Ritter (1998) has conducted a similar study where the same sample selection was made. Firms that have been listed on another exchange market another time, and choose to move to another exchange market, are less suitable.

As a company becomes listed, existing shares and new shares are issued for sale. Therefore, another limitation for this study was to exclude *units* that have been offered during listing, which is a combination of a warrant and a share. The emission is not processed the same day as the subscription rights, which complicates the study during different tests. Furthermore, another limitation has been to only include common shares. The reason behind this limitation is that preferred shares can be interpreted as a hybrid, a combination of a share and an

obligation. Since preferred shares are priced in connection with the required return, which is not corrigible, it will limit the return. Following that, this study's main focus is the initial return and only common shares will be included. Further, according to the author Benson (2018), a firm's real value reflects solely on the company's common shares, and not on outstanding preferred shares.

4.3 Multiple Regression Model

In accordance with previous studies reviewed in this thesis, the authors use OLS (Ordinary Least Squares) regression as the main method used to test the hypothesis and answer the research question. This regression uses a linear equation in order to estimate the unknown variables included. According to Brooks (2014) there are several criterias mentioned below that must be fulfilled.

Firstly, the expected value of the error term must be equal to zero ($E(e_i) = 0$). The error term in the model represents the variation in the dependent variable that is not explained by the independent variables. This condition is met when a y-intercept is found within the model, which reveals that no testing needs to be conducted (Brook, 2014). Secondly, the error terms should be normally distributed. Furthermore, the variance of the error term for all the independent variables must be constant in order to avoid the presence of heteroscedasticity. If the variance of the error term is constant, then there is homoscedasticity in the model, otherwise if the variance is non-constant a problem of heteroscedasticity may occur. As a result, the authors have carried out a White test to investigate if the issue of heteroscedasticity is present. Additionally, the sum based on the covariance between error terms related to the independent variables must be equal to zero. This indicates that there is no autocorrelation, the error terms do not correlate with each other and the OLS regression is an applicable model for the study (Brook, 2014).

 *4.3.1 Robustness*

Robustness tests are important because they help to increase the validity of the results deducted from the model. In this study, an ordinary robust test has been conducted on the first regression model. Further, in order to strengthen the results, several multiple regressions have been performed where different variables that resulted to be significant in the main linear regression, have been excluded. Therefore, the authors have primarily tested if the significance of the model as a whole would remain unchanged. The results of the tests have

proven that, even when these variables are excluded one by one, the significance of the model does not change. Therefore, the reliability of the analysis and the results of the study increases.

Additionally, several of the variables included have been winsorized since their standard deviations are quite high, which means that there are extreme values that worsen the normal distribution. After winsorizing, the normal distribution of the variables has improved, reducing the outliers. The regressions have been repeated using the winsorized variables and the results of both cases do not differentiate much from each other. Consequently, the results can be considered robust.

## 4.4 Statistical Tests

### 4.4.1 White Test

The White Test is a statistical method used to investigate the presence of heteroscedasticity in the model. One key assumption of the regression is that the variance of the error terms should be constant across the observations in the sample chosen. If this assumption is violated, then the error terms are considered heteroscedastic, which indicates that the variance of error terms are non-constant. According to Brooks (2014), the null hypothesis is accepted if the p-value is above 0.05.

In this study, the authors have conducted a White Test using data that has not been winsorized including all explanatory variables. Referring to the results shown in table 10, the p-value shows no significance, which means that according to the White Test, there is no heteroscedasticity in the model and the assumption of the constant variance of the error terms is satisfied. As a result the method can be considered effective and the analysis is relevant.

### 4.4.2 Ramsey Test

A Ramsey test was performed to examine the linearity of the model. Linearity means that the dependent variable of the model is a linear function of the explanatory variables (Brooks, 2014). The null hypothesis is accepted, and the model is considered to have linearity if the p-value exceeds a 5 percent significance level.

In the Ramsey test performed in this study, the results of which are displayed in table 6, it is concluded that there is a non-linear relationship between variables, therefore the model overall is considered to be linear. If the null hypothesis was to be rejected, than the solution would be to identify the variable causing non-linearity and include a higher order variable of that variable (Brooks, 2014)

*4.4.3 VIF Test (Multicollinearity)*

Multicollinearity is an issue which occurs when the control variables of a multiple regression are highly correlated with each other. It is common that the variables of a regression are correlated to a certain degree with each other, however this correlation would become an issue to measure the individual effect of each of the variables, when it is too high. (Brooks, 2014)
In this study, the authors have conducted several multiple regressions, and as a result this opens the possibility for the presence of multicollinearity among the variables. Therefore, a Variable Inflation Factor (VIF) test has been performed (see table 4) to investigate multicollinearity. From the correlation matrix, where all VIF values are below 5, it can be concluded that the correlation that exists between variables is not problematic for the regression model.

4.5 Dependent Variable

One of the dependent variables of this study is the Initial Return, which represents the return of stocks during the first day of trading. According to Lowery et.al (2010) initial return is calculated as the percent difference between the closing price of trading and the offer price. This could be a means to create a measure for the underpricing of the stocks. Initial return is calculated by:

$$\text{Initial Return (\%)} = \frac{\text{(Closing price - Offer price)}}{\text{Offer price}}$$

The aim of investigating the short term performance of the IPO is to avoid the influence that macroeconomic events could have on the Nordic Stock Market. Many previous articles such as; Megginson and Weiss (1991), Levis (2011), Lowery et al., (2010) etc., implement initial return as their dependent variable in order to investigate the relationship between the short term performance of the IPO, and the ownership of the firm conducting the IPO. The values generated for the initial return contain extreme values that affect the normal distribution, therefore the authors have used the winsorized values of initial return in the regressions

conducted for the models. Initial return has also been used in the second model of this study as a control variable, in accordance with the study by Iliev and Lowry (2020). In the second model initial return is implemented as a dummy variable that is assigned the number one when positive and 0 when negative.

**Figure 1**
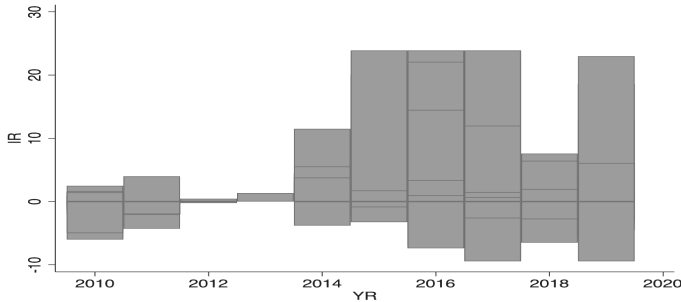


*Figure 1: Initial return for IPOs on chosen platforms in the Swedish market during year 2010 to 2019*

The dependent variable for the second model is net change in total equity, which is calculated as the difference between total equity in the year taken into consideration and the previous year. Total equity is the difference between total assets and total liabilities of the firm.

$$\text{Net Change In Total Equity (\%)} = \frac{\text{(Total equity 1- Total equity 0)}}{\text{Total equity 0}}$$

In this study, net change in equity is used as a measure for the additional equity issued by firms a year after going public. Since the main aim of the second model is to investigate if new public firms that are VC backed or PE backed issue new equity, it would be relevant to use a dependent variable as the net change in total equity. Due to the presence of outliers, the values generated for net change in total equity have been winsorized.

4.6 Explanatory variables

*PE firms provide* young firms with financing, experience, knowledge and skills. However, in contrast to VC, PE funds invest in young companies in a later stage of development. According to Levis (2011), their management and financial practices do not completely terminate when the firm becomes public. This continuing involvement of PE funds contributes in closer monitoring, reduction of information asymmetry as well as potential conflicts with other stakeholders. In the study the author has conducted for differences between sponsored and non-sponsored IPOs in the UK, and reached the conclusion that

PE-backed IPOs are larger in terms of assets, sales, profitability and modest first-day returns. Additionally, the study by Levis (2011) shows that in the next three years after the IPO, PE-backed IPOs demonstrate better operating and market performance compared to other IPOs and the market. Based on all these differences that PE has in performance during and after the IPO, it is essential to differentiate PE from VC and other types of IPOs.

Furthermore, the certification of PE sponsors is also advantageous to obtain financing after the process of becoming public, given the fact that they provide a reliable source of valuing the intrinsic value of firms and profitable investment opportunities and therefore, attracting investors that provide more alternatives of financing. The explanatory variables are chosen in accordance with other similar studies stated previously. For example; Iliev and Lowry (2020), Buchner et.al (2018), Blomkvist et al., (2022) etc., have examined the influence of VC and PE certification on the IPO performance, and furthermore on the post-IPO financing alternatives. Lastly, PE is a dummy-variable, and will be classified as 1 if PE backed, and 0 if not.

*VC* are companies that provide financing to young private firms and their primary goal is to maximize their financial returns by exiting investments through a sale or IPO (Iliev and Lowry, 2020). The authors also reach the conclusion that VC firms reduce IPO underpricing and underwriting spread by reducing information asymmetry, which attract more prestigious underwriters and auditors. Additionally, VC backed firms obtain greater interest from institutional investors throughout the IPO.  Besides offering their support during the initial public offer, VC firms, as proven by the study of Iliev and Lowry, fund companies after the IPO as well. Many firms, even post IPO, when the public equity becomes cheaper than VC financing, prefer the latest. This happens for two main reasons that are; reduction in information asymmetry due to their set of skills, knowledge and ability to better assess the true value of the firm.  The second motive is related to the Agency Hypothesis, which indicates that VC funds will prioritize risk over NPV depending on the structure of compensation contracts. (Iliev and Lowry, 2020). The background above provides the necessary motivation to include VC-backing as one of the  main explanatory variables of this study. Lastly, VC is a dummy-variable, and will be classified as 1 if VC backed, and 0 if not.

4.7 Control variables

*4.7.1 Offer size*

Offer size is defined as the number of shares offered at the time of the IPO. Oftentimes, the offer size in different studies is used as an alternative for firm size. Firm size could also be considered as a proxy for ex-ante uncertainty. According to Beatty and Ritter (1986), firms that are considered to be riskier, issue smaller offers and have higher initial returns. In addition, Ljungqvist (1997), in his study concluded that there is a negative and statistically significant relationship between underpricing and offer size, and the reason behind it is uncertainty.

Uncertainty is tightly correlated to information asymmetry, which in turn is related to the pricing of the shares of the firm and consequently related to initial returns. Therefore, the authors consider offer size as a variable that can contribute to the first model constructed, to answer the research question related to information asymmetry. In this study, the authors have used natural logarithm for the offer size values since it improves the level of skewness and kurtosis as well as standard deviation.

*4.7.2 Offer price*

Offer price is a factor that affects underpricing to a certain degree. Offer price is used to calculate the money left on the table, which is the change between the offer price and the first closing market price multiplied by the number of shares sold (Loughran and Ritter, 2004). Another study by Fernando, Krishnamurthy and Spindt (1999) relates a low offering price to a higher degree of underpricing, which comes as a result of the irrational investor's behavior. Additionally, underwriters are often incentivized to set a much lower offer price, and consequently increase the level of underpricing due to the greater possible compensation. It indicates that the greater the underpricing the greater the initial return. As a result, it would be interesting to add the offer price to the first model and further examine the effect it would have on the initial return. There is no significant difference when using winsorizing or logarithm, meaning that it will be better to use the raw data and reduce the bias that may come along with winzoring.

### 4.7.3 Company age

The decision to go public can happen at different stages of the life of a firm. The uncertainty regarding the value of a firm is greater when the firm is young since their historical data availability is limited, therefore they tend to be riskier. On the other hand, investors face greater uncertainty for these types of firms since they can not predict the future performance, and as a result they will demand a higher return, thus higher discount on the price of new issues of younger companies. Ritter (1984)

Various studies such as; Megginson and Weiss (1991), Ritter (1984), Iliev and Lowry (2020) etc, in the literature review, implement firm age as a control variable for information asymmetry since it affects the pricing of IPOs and as a result it affects initial returns as well. Additionally, since firm age can be related to information asymmetry, it also affects the financing decisions of the firms after going public. Consequently, this variable can offer a great contribution to both models carried out in this thesis. The authors of this study control for firm age in both models, and the firm age formula is illustrated as below.

$$\text{Company age} = \text{IPO year-Registration year}$$

### 4.7.4 Asset turnover

Asset turnover is a financial ratio that measures how efficiently the firm uses its assets to generate revenue in terms of sales (Levis, 2011). The author further implements asset turnover as a control variable and reports differences between PE backed IPOs and other types of IPOs. PE backed IPOs according to Levis (2011) are more effective than VC backed IPOs in terms of asset turnover. Since this study aims to produce an analysis that reports distinguished results between VC and PE in terms of initial performance, it would be interesting to include asset turnover in the first model as a ratio that measures performance. This ratio is calculated as followed:

$$\text{Asset turnover} = \text{Net sales/Total Assets}$$

### 4.7.5 Debt/equity ratio

Debt to equity ratio is used to measure the financial leverage of the firm. It indicates the level to which the firm is financing its activities with debt rather than its own internal sources. In accordance with Buchner et. al (2018), which have implemented leverage to test differences between VC backed IPOs and other types of IPOs, the authors of this study have chosen to

include leverage as a control variable. Purpose is to report the difference that might exist between PE  and VC  in terms of financial leverage.  Debt to equity ratio is calculated as:

$$D/E = \text{Total liabilities/Total shareholder's equity}$$

*4.7.6 Year- and industry dummy*

Many previous studies such as; Loughran and Ritter (2004), Buchner et.al (2018) and others control for fixed effects in terms of year and industry. A dummy variable is implemented to differentiate the industries in which the firms that conduct the IPOs belong to. For example, the dummy variable takes a value of one if the firm belongs to a certain industry and zero otherwise. This has been applied for all the industries involved in the data sample and classified by SIC codes (see table 9). Additionally, another dummy variable approach is used to distinguish the years in which the IPOs take place. For instance, the dummy variable takes a value of one if the IPO occurs in a specific year and 0 otherwise.

First regression:   **Initial Return** $=$ $\beta0 + \beta1$ PE-backed $+ \beta2$ VC-backed $+ \beta3$ Offer size $+ \beta4$ Offer Price $+ \beta5$ Firm age $+ \beta6$ Asset turnover $+ \beta7$ D/E ratio

Second regression:  **Net Change In Total Equity** $= \beta0 + \beta1$ PE-backed $+ \beta2$ VC-backed $+\beta3$ IR-dummy   $+ \beta4$ Firm age

4.6 Reliability and Validity

The reliability of a research is related to the degree the conclusions reached by a specific study are relevant to other studies conducted for the same topic. The results should be similar when the study is carried out under the same assumptions however changing the data sample. Reliability is also connected to avoidance of potential errors that might occur during the process of data gathering from different sources, which should also be trustworthy. In this study all the data from the sample was collected from Bloomberg Terminal, however there might still be a possibility for errors to occur since after being downloaded the data has been filtered manually, and there is a risk of human error and also some of the IPOs were excluded due to the missing information. However, the authors have carefully collected and revised the data in order to minimize the possibility of errors.

Research validity is defined as the extent to which a concept is accurately measured in a study by Heale and Twycross (2015). Validity connects to the entire scientific model, and whether the assumptions of creating a model have been met. In addition, in order to obtain valid results the authors have to deal with some factors that may not be included in the model but affect the results. All calculations and assumptions made in this study are based on previous reputable academic literature. Initial returns are calculated as the difference between offer price and the closing price after the first day of trading divided by the offer price. The authors have carefully examined and ensured the statistical conclusions. Lastly, the study has been presented by conducting an OLS regression which has also been tested for robustness.

# 5. Empirical Results

*This chapter provides the main empirical results for the statistical tests conducted. These results will be further analyzed in the following chapters.*

5.1 Descriptive statistics

The empirical testing initiates by conducting a descriptive analysis for all the IPOs observed on First North and Nasdaq Stockholm within the time period January 1, 2010 to December 31, 2019. The table below illustrates the descriptive statistics for the dependent, independent and control variables included in the study. The number of observations in the sample is 222 IPOs. The mean value for the dependent variable, initial return, is 1.68 with a minimum value of -52.3 and a maximum value of 60.75. The mean value of the offer price as illustrated is 23.7 with a minimum value of 0.5 and a maximum value of 176.5. Additionally the offer size has an average of 50.18, a minimum of 0.29 and a maximum of 1371.15. The average age of the companies conducting an IPO is 19.4 years.

**Table 1**

|  | Mean | Median | SD | Min | Max | N |
|---|---|---|---|---|---|---|
| IR | 1.68 | 0 | 8.10 | -52.3 | 60.75 | 222 |
| PEbacked | .3 | 0 | 2.29 | 0 | 34 | 222 |
| VCbacked | .31 | 0 | 2.36 | 0 | 35 | 222 |
| OfferPrice | 23.71 | 12.95 | 25.69 | .5 | 176.5 | 222 |
| OfferSizeM | 50.18 | 3.93 | 145.60 | .29 | 1371.15 | 222 |
| CompanyAge | 19.44 | 16 | 14.69 | 5 | 125 | 222 |
| AssetTurnover | .67 | .4 | 0.70 | 0 | 4.1 | 222 |
| TotalDebtTotalEquity | 90.59 | 29 | 211.49 | .04 | 1893 | 222 |

*Table 1: The table above illustrates the descriptive statistical raw data of the variables, and number of observations during the time period 2010 to 2019. The mean, median, standard deviation, minimum and maximum of the variables are demonstrated.*

It is notable that the variables of this study are quite spread, and it is illustrated by the large difference between the minimum and maximum values and the high standard deviations for each variable. An exception from this trend is asset turnover which has a low standard deviation of 0.7 with a minimum value of 0 and a maximum value of 4.1. In order to lower the spread of the values, reduce the outliers and reach a more symmetrical result, the descriptive statistics have been winsorized. As mentioned in section 4.5 to 4.7, the variables

initial return and offer size have been chosen to keep as winsorized or logarithmic due to enchanted symmetrical result, as illustrated in table 2.

**Table 2**

|  | Mean | Median | SD | Min | Max | N |
|---|---|---|---|---|---|---|
| IR win | 1.7 | 0 | 6.09 | -9.45 | 23.9 | 222 |
| OfferPrice win | 23.23 | 12.95 | 23.44 | .54 | 110 | 222 |
| OfferSizeM win | 45.48 | 3.93 | 113.09 | .38 | 633.37 | 222 |
| logOfferSizeM | 1.88 | 1.37 | 1.89 | -.96 | 6.45 | 222 |
| AssetTurnover win | .66 | .4 | 0.69 | 0 | 3.6 | 222 |
| TotalDebtTotalEqui~n | 86.75 | 29 | 181.84 | .2 | 1306.5 | 222 |

*Table 2: The table above illustrates the descriptive statistics of variables that have been winsorized or logarithmic in order to compare to the raw data. The main purpose was to remove outliers, and enhance the normal distribution.*

5.2 Correlation tables

Table 2 illustrates the correlation between chosen variables, and also whether this correlation is statistically significant. The testing of the correlation is done in order to verify if multicollinearity is affected. This would be likely to happen in case of a possible correlation between the variables included in the study. The authors have selected variables that are believed to explain the research questions in the most relevant and easiest way.

**Table 3**

| Variables | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| (1) IR_win | 1.000 | | | | | | | |
| (2) PEbacked | 0.148** | 1.000 | | | | | | |
| (3) VCbacked | -0.080 | 0.975*** | 1.000 | | | | | |
| (4) OfferPrice | 0.196*** | 0.330*** | -0.002 | 1.000 | | | | |
| (5) logOfferSizeM | 0.297*** | 0.581*** | 0.094 | 0.678*** | 1.000 | | | |
| (6) CompanyAge | 0.212*** | 0.252*** | -0.074 | 0.258*** | 0.373*** | 1.000 | | |
| (7) AssetTurnover | -0.043 | 0.023 | -0.127* | 0.051 | -0.020 | 0.039 | 1.000 | |
| (8) TotalDebtTotal~y | -0.022 | 0.176** | -0.086 | 0.084 | 0.174** | 0.212*** | 0.019 | 1.000 |

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

*Table 3: The matrix examines the correlation between the following variables (Initial Return, PEBacked, VCbacked, Offer Price, Offer Size, Company Age, Asset turnover, and D/E-ratio). The number of observations is 222.*

The correlation matrix indicates that the dependent variable is positively correlated with PE dummy, however negatively correlated with VC dummy. In both cases, the correlation is not statistically significant. The matrix for correlation demonstrates a statistically significant and positive correlation between the initial return and the offer price, the offer size and company age, which is statistically significant at the level of 1%. Regarding the independent variables taken into consideration, the table of correlations indicates that there is a positive correlation between PE dummy and offer price, offer size and company age, and this correlation is

statistically significant at 1% level of significance. On the other hand, the VC dummy is negatively correlated with all the other independent variables, however the correlations are statistically insignificant, except for asset turnover. VC dummy has a statistically significant correlation with asset turnover at a level of significance of 10%.

When a multiple regression is performed there might be a possibility for the presence of multicollinearity which happens when the variables demonstrate a high degree of correlation. In order to investigate the presence of multicollinearity in the model a Variable Inflation Factor (VIF) test was conducted. Table 3 demonstrates the results of the test and according to the VIF values, which are lower than 5, it may be concluded that there is no multicollinearity. The problem of multicollinearity could disappear if certain control variables are excluded. In this empirical study there is no need for any exclusion since the problem is not present.

**Table 4**

| Variance Inflation Factor | |
|---|---|
| | VIF |
| logOfferSizeM | 2.963 |
| OfferPrice | 1.856 |
| PEbacked | 1.716 |
| CompanyAge | 1.242 |
| TotalDebtTotalEquity | 1.161 |
| AssetTurnover | 1.096 |
| VCbacked | 1.071 |
| **Mean VIF** | **1.586** |

*Table 4: The following table examines the multicollinearity for the main regression model. All variables are included, and the VIF-values are below 5, therefore no multicollinearity problem exists. The number of observations is 222.*

5.3 Two-sample Test

A two sample test is conducted in order to test if there are significant differences between two populations. A t-test is implemented to test a possible difference between the two main variables of interest, which are PE dummy and VC dummy. In this case the following hypothesis has been tested:

$$H0 : ß\ PE = ß\ VC$$

The results indicate that there is a statistically significant difference between the two variables, which argues that the differentiation between VC and PE is a better approach for the study.

**Table 5**

| Test in Difference |
| :---: |
| Test; VC-backed + PE-backed = 0 |
| Prob > F = 0.0616 |

*Table 5: A two-samle test between the explanatory variables, PEbacked and VCbacked, has been conducted. Since the p-value of 0.06 is below significance level, the null hypothesis is accepted.*

5.4 White- and Ramsey test

White test was performed in order to test for heteroskedasticity, which is an issue related to the residuals of the regression. From the results (see table 10) of the test it can be deducted that there is no presence of a heteroskedastic error term in the model. Therefore all p-values for the variables are above 0.05, which indicates no statistical significance and the test is considered homoscedastic.

Additionally, the table below demonstrates a Ramsey test which was conducted in order to determine if the regression performed has a nonlinear relationship. The results of the test indicate a p-value of 0.6572, which is above 5 percent, therefore the model is considered to have linearity.

**Table 6**

| Ramsey RESET |
| :---: |
| Ramsey RESET test for omitted variables |
| Omitted: Powers of fitted values of IR_win |
| *H0: Model has no omitted variables* |
| Prob > F = 0.6572 |

*Table 6: Following table illustrates the Ramsey test for linearity. The p-value of 0.6572 is higher than the significance level, therefore the null hypothesis is rejected.*

5.5 OLS Regression

*5.5.1 Initial return*

The OLS regression is executed in order to investigate possible relationships between the dependent variable, independent variables and the control variables of the model through the report of p-values, coefficients and standard errors as shown in table 9.

In the first model, a linear regression has been performed in order to test the relationship between the dependent variable, and the independent variable chosen by the authors. Also, in this model, the industry and year fixed effects are included. Table 9 illustrates the results of the regression, and it can be deducted that the entire OLS regression is considered significant, which indicates that the whole model is considered better than the intercept for the initial return. On the other hand, PE-dummy and VC-dummy resulted to be insignificant in relation to the initial return. Given the two results above, we fail to reject the null hypothesis. The variables that are significant in the model at the 5 percent level of significance are company age and offer size,whereas total debt to equity is significant at the 10 percent level of significance.

*5.5.2 Post Financing*

The second model is performed in order to test the possibility that the issuing of new equity, represented by the net change in total equity, in post-IPO is related to the firm's ownership, whether they are VC or PE sponsored, or not. Table 12 illustrates the results of the OLS regression for the second model and it is notable that even in this case the whole model is significant. In addition, PE is significant at the 5 percent level of significance, however when time fixed effects are added the results change. Time fixed effects make PE insignificant, which is due to the fact that PE is highly correlated to time effects. On the other hand, VC is not significant in relation to the net change in total equity. As a result, we reject the null hypothesis for the second model. The meaning of these results economically will be discussed in the sections below.

5.6 Robustness Test - Inclusion of Gradual Control Variables

In order to test the validity of the results of the regressions conducted to test the models several changes have been made. First the authors have excluded the variables that were significant in each of the models to test if there will be any significant difference in the results of the regressions. Firstly, by excluding company age the model remains significant, and there are no significant changes in the results except that D/E-ratio becomes insignificant. Secondly, the ratio is excluded, and even in this case the significance of the model as a whole remains unchanged. However, company age becomes insignificant whereas offer size continues to be significant at the 1 percent level of significance. Finally, by excluding offer size the results remained unchanged as for previous variables excluded, where the whole model continues to be significant, and company age is significant at the 1 percent level of

significance, however D/E-ratio is insignificant. Additionally, the regressions have been repeated using initially raw data and then winsorized variables. The results in both cases are not much different from each other. Lastly, table 11 illustrates a robust test on the first regression model where the results remained consistent, indicating that the results of the regression are robust in any case taken into consideration. This increases the validity and credibility of the results of this study.

# 6. Analysis

---

*This chapter presents an in-depth analysis of the empirical results produced in the previous chapter, relating it to the research and theory framework selected.*

---

6.1 Initial Return

*6.1.1 Private equity sponsored*

PE firms play an important role in the creation of public corporations as they help the firm achieve greater performance (Baker at al., 2015; Levis, 2011; SVCA, 2020). In this current study, the PE backed IPO companies were negatively correlated with initial return, and also no significance was found in the main regression. However, in the correlation table (see table 3), PE backed IPO companies were positively correlated with initial return. The result of the regression may come from the influence of other variables included. In addition, it may indicate that there exists a correlation between PE sponsored IPOs and initial return. As mentioned in the theoretical episode, the PE funds have an increased risk, therefore the return and aftermarket performance may increase, which could be another reason for the positive relationship. Furthermore, according to table 7, the PE backed IPOs had a higher average initial return than the non sponsored IPOs and VC sponsored IPOs, which contradicts the empirical literature by (Levis, 2011; Kaplan, 1989; Bergström et al., 2007). As previously explained, the growth PE funds tend to focus on less established firms, and sometimes are too quick to make a firm go public. Hence, it will lead to an overvalued offer, and therefore a higher initial return, which goes in line with the study of Purnanadam and Swaminathan (2004). This may be the case for the PE backed IPOs in Sweden during the chosen time period. The summary statistics (see table 1), provides support for the statement above since over 60 percent of the PE funds were within the life science sector, which was the growth PE funds' main focus. Another factor as to why the stocks of a company may be overvalued is the information asymmetry that exists for less established companies in the PE-market. Since PE funds take on greater debt for acquiring the firm, their purpose is to increase operational performance, and also the cash flow. Additionally, growth PE funds want to maintain a good reputation, which can be difficult when investing in companies that imply greater levels of uncertainty. Moreover, the sponsors also want to improve performance and become more efficient by implementing different tools to keep the owners satisfied (Jensen, 1989). An additional explanation behind the findings of this study is that the growth PE funds want to

create a higher underpricing in order to achieve high initial return to attract the investors and keep the underwriters satisfied. The purpose of this is to enhance the financial position of the company. Even though PE backed IPOs and initial return had no statistically significant results in this current study, it does not indicate that the variables do not influence each other.

*6.1.2 Venture capital sponsored*

VC firms also play an essential role in the creation of public corporations and in their performance. In this present study, the VC backed IPOs were negatively correlated with initial return, and also no significance was found in the main regression. It goes in coordination with the correlations table where VC backed IPOs were negatively correlated with initial return. This finding is in accordance with the research paper of Megginson and Weiss (1991) since the VC backed IPOs were less underpriced than the non-sponsored ones, and therefore had a lower initial return. The VC sponsored IPOs also had lower initial return than the PE backed IPOs, which goes in coordination with Levis (2011). Since VC firms tend to focus on high growth companies in the early stages, mainly in the tech sector, they face greater risk. It is important for them to maintain their reputation, and constantly improve their performance. The VC firms have high expertise, and knowledge and this may reduce the uncertainty as well as the information asymmetry and as a result, lower the underpricing. Also, the VC certification improves the credibility, which will allow the firm to hire underwriters with good reputation. Therefore, the firm will sell their shares at a higher price, lowering their initial return. By doing so, the VC maintains good terms with the owners, and therefore preserves its reputation. The majority of VC backed IPOs in this study belong to the tech industry, which is in line with previous research. This industry has been seen as a younger industry, which contributes to higher uncertainty and an increase in underpricing. However, this is not the case for this study, which may be due to the high competence the VC firms bring. Since information technology has improved even more in recent years, information is more accessible. Also, the technology firms may have matured in Sweden, and therefore forced the funds to adapt.

6.2 Control variables

*6.2.1 Offer price and size*

Offer price and initial return do not have a significant relationship according to the results deducted from the main regression for the first model. In contrast, a study by Fernando,

Krishnamurthy and Spindt (1999) illustrates a connection between underpricing and offering prices. A low offering price leads to a higher degree of underpricing, and comes as a result of the irrational investor's behavior. The result of this present study could possibly reflect a change in investors behavior, who have become more rational.

On the other hand, offer size has a statistically significant relationship with initial return. This result goes in line with earlier research. For example, Beatty and Ritter (1986) and Ljungqvist (1997) argue that there is a significant relationship between offer size and initial return. It indicates that the firms, which are considered riskier tend to issue smaller offers and have higher initial returns due to uncertainty. One explanation for the result deducted from this study could be the fact that the sample might be dominated by small firms that include a higher degree of uncertainty, thus higher initial returns.

### 6.2.2 Company age

In the empirical material presented above, it has been concluded that company age has a significant relationship with initial return. This is in accordance with several previous studies that have reached the same results. For instance, Ang and Boyer (2009) and Loughran and Ritter (2004) argue that this significant connection reflects the fact that younger firms tend to have greater uncertainty, which leads to a higher level of underpricing, thus higher initial returns. In addition, Meggison and Weiss (1991) conclude in their study that information asymmetry is greater in less established firms which strengthens the results reached by the previous authors mentioned. Therefore, the results generated in this study regarding firm age can be explained as the majority of the sample consisting of less mature firms.

### 6.2.3 Asset turnover

Based on the empirical results, assets turnover has a non significant relationship with initial return. Assets turnover which is an indicator for the firm's performance could reflect the firm's quality up to a certain degree, which might contribute in the reduction of information asymmetry. However, the results do not support this argument, and could be due to the other results the authors of this current study have deducted, which reflect that the sample might consist of young and small firms with low asset turnover.

*6.2.4 Debt/equity ratio*

Initial return has a significant relationship with D/E ratio. The ratio reflects the level of financial leverage, which can be an indication for the firm's quality. A high level of leverage pre-IPO can be reflected in the pricing of the stocks resulting in more underpricing since the firm can be considered risky.

6.3 Information asymmetry

The initial return of the IPO is closely related to underpricing. Several hypotheses are connected to the phenomena and information asymmetry is one of the most crucial. The findings of this study indicate that VC backed IPOs are less underpriced with less initial return than the PE backed IPOs. One reason may be the decline in *the principal and agent problem.* VC firms have high expertise, and a strong position in the information technology sector. Hence, the information asymmetry between the principal and agent declines. This is not the case for PE sponsored IPOs. One possible explanation is that the funds in this sample may be within the growth PE category, which results in higher uncertainty, and indicates higher information asymmetry. Since firms within this category tend to conduct IPOs too early, investors may lack information. Therefore, in order to attract  investors, it requires the initial return to be higher, and compensate them for the risk, which goes in coordination with the statement of Cheung and Krinsky (1994). Additionally, the findings for the PE backed IPOs goes in line with Baron's (1982) principal theory.

Underpricing and initial return of an IPO is linked to the interest and demand of the potential investor, which can be connected to *The winner's curse theory* explained by Ritter (1998). According to SVCA (2020), Sweden's PE firms and the whole market have had a significant increase within the life science sector. On the other hand, VCs have grown and continue to do so within the tech sector. The companies choose to follow the demand curve, which increases the number of listings. Additionally, when growth PE lists a company too early, the demand may go down due to the fear of possible failure. This decrease in demand could happen as a result of asymmetric information. In order to reduce the issue, the PE funds may underprice the shares to achieve higher initial return, which goes in line with the findings of this research.

 The findings above may also go in coordination with Ritter's (1998) *Bandwagon hypothesis.* Firms could avoid the effect of investors' purchase choices, using underpricing in order to

compensate them with higher initial returns. Therefore, the effect may influence the IPOs that are PE-backed or VC-backed. This may be the case for the PE-backed IPOs in this present study as the market keeps growing. The results may also be linked to the *Signaling hypothesis* by Allen and Faulhaber (1989). The authors argue that underpricing is a way to signal positive signals to the markets. The PE backed IPOs sample in this study might also use underpricing as a means to send positive signals to the market and attract investors. In contrast, the VC backed IPOs do not practice this since the information asymmetry is not an equal issue, which could indicate that the expertise the VC firms bring is highly valuable in comparison to growth PE. The sponsors have different purposes for signaling, PE may focus on financing in order to enhance the performance, while VC have shifted focus on maintaining a good reputation since it is beneficial for them.

According to former research, the PE-industry may differ depending on the country. Coakley et al. (2006), Pommet (2017), and Chahine et al. (2007) have examined the role of underpricing in relation to PE-backed IPOs, where the *Grandstanding hypothesis* is accepted. As mentioned, countries like France may be less developed in comparison to the USA, which may lead to different results. PE backed IPOs within less developed countries tend to have higher underpricing. The reason is that they were willing to grandstand, which results in an increase in underpricing due to information issues. PE backed IPOs in more developed markets had lower underpricing due to their strong certificated role on the market. Since the PE market in Sweden is strong (SVCA, 2020), it may be considered as an established market. The PE backed IPO firms in this study had an higher average initial return than VC backed, which indicates higher underpricing. However, the findings are not in accordance with several researchers (Gompers, 1996; Coakley et al. (2006); Pommet (2017); Chahine et al., 2007). The conclusion of this current study indicates that the PE backed IPOs are within the growth PE category, hence less established, which may explain why the results differ even  though Sweden may have a strong PE-market.

The arguments above are also supported by the *Certification hypothesis* by Megginson and Weiss (1991). Investors are well aware of the issuing firm increasing the share price intentionally by hiding information, and consequently, the investors offer a lower price. In order to reduce the asymmetric information, issuing firms hire sponsors due to its reputation, and high credibility. The hypothesis is accurate for the VC-backed IPOs in this research paper. As stated previously, the VCs possess high credibility and a good reputation for their

expertise, among others. The PE consists of growth PE, consequently less established and lower credibility.

6.4 Post IPO

Previous hypothesis discussed, focus on the first day performance after an IPO. It can be concluded that information asymmetry may be a driving force behind PE and VC backed IPOs performance. The remaining question is the sponsor's choice of post financing, and if information asymmetry still plays a crucial role. Blomkvist et al. (2022) argues that information asymmetry is a common explanation for staged financing. As mentioned, VC financing is preferable in post- IPO compared to public equity financing (Iliev and Lowry, 2020). As mentioned, the VC has high competence and skills, which reduces the lack or limitation of information. Some VCs are driven by positive NPV projects. It will motivate managers of funds with poor performance to undertake investments in companies with higher risk exposure. Hence, VCs have the ability to distinguish investment opportunities, which are beneficial for the VC sponsors.

The findings of this study indicate that PE backed IPOs have a significant relationship with net change in total equity. As previously stated, the PE firms have a higher initial return, and has been concluded that it may be due to growth PE funds, which implies more uncertainty and information asymmetry. As Blomkvist et al. (2022) argues, firms with higher uncertainty tend to turn to equity financing post IPO. Further, as mentioned by the author, firms signal their quality via underpricing, and then issue equity at a much higher valuation. Blomqvist et al. (2022) also states that R&D intensive firms raise funds through equity issues. The results of this current research are in favor of the study of Blomkvist (2022). The majority of the PE firms in this current study were within the life science sector, which is considered innovative, with high R&D expenses. Therefore, it can be concluded that information asymmetry may still exist in post-IPO financing, in accordance with these results.

In contrast to the PE firms in this study, no statistical significance was found between VC firms and equity. Illiev and Lowry (2020) argues that due to increased information asymmetry among VC financing, which causes problems of raising public equity, will be an advantage for VC backed firms. The firms with VC sponsors may reduce the information asymmetry, and make valuable investments for both parties. Also, Illiev and Lowry (2020) states that

firms who are VC funded prior IPO, are more likely to provide for the firm funding even post IPO. The results from the main model indicated that the VC backed IPO firms have less information asymmetry, and uncertainty. Therefore, the result that VC and net change in total equity have no significant relationship, is in accordance with Illiev and Lowry (2020). As previously mentioned, VC funds tend to maintain their investment in companies at least a year after the IPO since the growth takes time, while PE tends to exit via a public raising. In conclusion, PE firms are more likely to issue new equity than VC firms, and information asymmetry tends to stay even post financing.

## 7. Conclusion

---

*In the following chapter the main conclusions retrieved from the study are presented followed by a discussion, limitations and suggestions for further studies.*

---

7.1 Discussion

The main purpose of this study was to analyze the presence of information asymmetry through its reflection on the level of initial returns after the IPO. Additionally, to examine if this information asymmetry would be persistence in the process of equity issuing in the post-IPO financing. After detecting information asymmetry in these two stages, the analysis was concentrated on the impact that VC and PE has on reducing the level of information asymmetry and if this impact has decreased due to the improvement in internet technology, however we do not explicitly test for this. First hypothesis of this study was to examine if sponsoring mitigates the information asymmetry leading to smaller initial returns. The authors failed to reject the null hypothesis both for VC and PE. In addition, the authors investigated whether certification has any impact on post-IPO equity financing. The second hypothesis was accepted for PE-backed IPOs, on the contrary of VC-backed IPOs.

PE backed IPOs were positively correlated with initial return, however the relationship between the two was insignificant. In contrast, the VC backed IPOs were negatively correlated with initial return, hence not significantly. Furthermore, PE backed IPO firms have a higher average initial return than VC backed companies, which indicates that PE backed IPO firms are more underpriced. This conclusion is contradictory to the majority of current research, however there are a few studies that reach the same results. There are several explanations for this result. Firstly, it can be explained with the fact that PE funds in the sample tend to focus on companies with high growth, within the life science sector, that imply a greater level of uncertainty that leads to higher underpricing, hence higher initial return. In contrast, VC firms focus on the tech industry, which might be considered more mature than in the past, when former research was conducted. As a result, VC backed IPO firms may be considered as more secure and credible compared to PE counterparts, which in turn explains the lower underpricing and initial returns. In conclusion, VC sponsoring may mitigate information asymmetry in the IPO market, and therefore affect the initial return, in comparison to PE sponsoring.

The findings regarding post-IPO financing indicate that PE backed IPO firms have a significant relationship with net change in total equity, when year fixed effects are excluded. As previously stated, PE growth funds, which supposingly dominate this current sample, involve a higher degree of uncertainty. Firms with higher uncertainty after the IPO turn to the equity market for financing. Additionally, firms using underpricing as a signal of their quality, tend to issue more equity post-IPO, when the value of the shares is higher. On the other hand, no statistical significance was found between VC firms and net change in equity. One possible explanation is related to the fact that VC backed IPO firms tend to rely on VC financing even after the IPO. This is due to their credibility, knowledge and skills to identify valuable investments and reduce the information asymmetry, which seems to be persistent even after the IPO. In conclusion, PE certification has an effect on the choice of issuing new equity post-IPO. Hence, it may be concluded that information asymmetry remains from an IPO to post financing for PE backed firms.

7.2 Future Research Recommendations

There may be many research recommendations for future authors. One suggestion would be to expand the investigation by including all markets that are part of Nasdaq and First North, and analyze all IPOs conducted in Stockholm, Helsinki, Copenhagen and Iceland. Additionally, future researchers could expand the time period by including IPOs conducted before and after the time horizon taken into consideration in this current study. Expanding the time horizon would give the opportunity to test if different macroeconomic events such as COVID-19 pandemic have any additional effect on the initial return and the financing alternatives after the IPO.

Moreover, studies in the future could implement new independent variables such as the governance structure of new public firms and examine how it affects the performance of the firm during and post-IPO. Also, other variables such as EBITDA, earnings per share or cash flows could be included in the model to test if there is any significant relationship between these variables and initial returns.

# References

Allen, F. & Faulhaber, GR (1989). Signaling by underpricing in the IPO market. *Journal of Financial Economics, Vol. 23*. pp. 303-323, Available online: https://eds-s-ebscohost-com.ludwig.lub.lu.se/eds/detail/detail?vid=4&sid=142a97ab-63f8-4edf-8222-c46b3f73d0d0%40redis&bdata=JnNpdGU9ZWRzLWxpdmUmc2NvcGU9c2l0ZQ%3d%3d#AN=0304405X89900603&db=edselp [Accessed 22 April 2023]

Baker, K., Filbeck, G., Kiymaz, H. (2015): Private Equity: Opportunities and Risks. 1st edition., New York: Oxford University Press. Available online: https://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=cat07147a&AN=lub.5631737&site=eds-live&scope=site [Accessed 4 May 2023].

Baron, P. (1982). A Model of the Demand for Investment Banking Advising and Distribution Services for New Issues. *The Journal of Finance, vol. 37*, no.4, pp. 955-976. Available online: https://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edsjsr&AN=edsjsr.10.2307.2327760&site=eds-live&scope=site [Accessed 10 May 2023].

Beatty, R. & Ritter, JR (1986). Investment Banking, Reputation and the Underpricing of Initial Public Offerings, *Journal of Financial Economics, Vol 15*. pp. 213-232, Available online:https://eds.p.ebscohost.com/eds/detail/detail?vid=2&sid=d4307015-4e49-4a3b-8893-886de275b797%40redis&bdata=JnNpdGU9ZWRzLWxpdmUmc2NvcGU9c2l0ZQ%3d%3d#AN=12154545&db=bth [Accessed 3 May 2023].

Benson, P. (2018). Guide till rätt preferensaktier, *Svenska Dagbladet*, 30 september, Available online: https://www.svd.se/kronika-guide-till-ratt-preferensaktier [Accessed 25 April 2023].

Bergström, C., Nilsson, D., Wahlberg, M. (2006): Underpricing and Long-Run Performance Patterns of European Private-Equity-Backed and Non-Private-Equity-Backed IPOs. *The Journal of Private Equity, vol. 9 No. 4*, pp. 16-47. Euromoney Institutional Investor PLC. Available online: https://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edsjsr&AN=edsjsr.43503484&site=eds-live&scope=site [Accessed 4 May 2023].

Blomkvist, M., Korkeamäki, T. and Takalo, T. (2022). Learning and staged equity financing. *Journal of Corporate Finance*, *74.* Available online: https://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edswss&AN=000814024600007&site=eds-live&scope=site [Accessed 22 April 2023]

Brooks, C. (2014). Introductory Econometrics for Finance, 3rd ed. Cambridge University Press

Buchner A., Mohamed. A., Wagner N. (2018). Are venture capital and buyout backed IPOs any different?, pp. 1-11. Elsevier. Available online: https://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edselp&AN=S1042443118302488&site=eds-live&scope=site [Accessed 22 April 2023].

Chahine, S., Filatotchev, I. & Wright, M. (2007). Venture Capitalists, Business Angels, and Performance of Entrepreneurial IPOs in the UK and France. *Journal of Business Finance & Accounting, Vol. 34.* pp, 505-528, Available online: https://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edselc&AN=edselc.2-52.0-34249807054&site=eds-live&scope=site [Accessed 8 May 2023]

Cheung, C. S. & Krinsky, I. (1994). Information Asymmetry and the Underpricing of Initial Public Offerings: Further Empirical Evidence. *Journal of Business Finance & Accounting , Vol. 21.* pp. 739-747, Available online: https://eds.p.ebscohost.com/eds/detail/detail?vid=2&sid=2ebf26a5-5643-4a5f-a85d-3b08fe9bb6bc%40redis&bdata=JnNpdGU9ZWRzLWxpdmUmc2NvcGU9c2l0ZQ%3d%3d#AN=9412152341&db=bth [Accessed 3 May 2023].

Coakley, J., Hadass, L. & Wood, A. (2009). UK IPO underpricing and venture capitalists. *European Journal of Finance, Vol. 15.* s. 421-435. Available online: https://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edselc&AN=edselc.2-52.0-67650941724&site=eds-live&scope=site [Accessed 5 May 2023]

Copenhagen Economics. (2019). Economic Footprint Of Swedish Venture Capital - Swedish Private Equity & Venture Capital Association (SVCA).

Copenhagen Economics. (2020). Economic Footprint Of Swedish Venture Capital - Swedish Private Equity & Venture Capital Association (SVCA).

Fernando, CS, Krishnamurthy, S. & Spindt, PA. (1999). Offer Price, Target Ownership, Structure and IPO Performance. University of Pennsylvania, Available online: https://www.researchgate.net/publication/23739574_Offer_Price_Target_Ownership_Structure_and_IPO_Performance [Accessed 28 April 2023].

Gajewski, J.F. and Li, L. (2015). Can Internet-based disclosure reduce information asymmetry? Advances in accounting, 31(1), pp.115-124. Available online: https://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edselp&AN=S0882611015000140&site=eds-live&scope=site [Accessed 10 May 2023].

Gompers, P.A. (1996). Grandstanding in the venture capital industry. *Journal of Financial Economics, vol. 41, no. 1,* s. 133-156, Available online: https://www.sciencedirect.com/science/article/pii/0304405X96008744 [Accessed 2 May 2023]

Habib, M.A., Ljungqvist, A.P. (2001): Underpricing and entrepreneurial wealth losses in IPOs: Theory and evidence. Review of Financial Studies, vol. 14, No.2, pp. 433-458. Available online: https://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edsjsr&AN=edsjsr.2696747&site=eds-live&scope=site [Accessed 8 May 2023].

Heale, R. and Twycross, A., (2015). Validity and reliability in quantitative studies. *Evidence-based nursing, 18*(3), pp.66-67.

Iliev, P. and Lowry, M. (2020). Venturing beyond the IPO: Financing of Newly Public Firms by Venture Capitalists. *Journal of Finance, 75(3),* pp. 1527–1577. Available online: https://search-ebscohost-com.ludwig.lub.lu.se/login.aspx?direct=true&AuthType=ip,uid&db=ecn&AN=1849725&site=eds-live&scope=site  (Accessed 1 May 2023)

J. Ang, C. Boyer. (2009).Performance differences between IPOs in new industries and IPOs in established industries. Managerial Finance, pp 606-623. Available online: https://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edsemr&AN=edsemr.10.1108.03074350910960346&site=eds-live&scope=site [Accessed 24 April 2023].

Jensen, M.C. (1989). Eclipse of the Public Corporation. *Harvard Business Review, vol. 67, no. 5*, pp. 61-74. Available online: http://dx.doi.org/10.2139/ssrn.146149 [Accessed 2 May 2023].

Karlis, PL. (2008). IPO Underpricing, The Park Place Economist, vol 8. pp. 81-93, Available online: https://digitalcommons.iwu.edu/cgi/viewcontent.cgi?article=1010&context=parkplace [Accessed 28 April 2023].

Levis, M. (2011). The Performance of Private Equity-Backed IPOs. Financial Management, Spring, pp 253-277. Available online: https://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edsjsr&AN=edsjsr.41237903&site=eds-live&scope=site [Accessed 2 May 2023].

Ljungqvist, A. (2007). "IPO underpricing." In: Handbook of Empirical Corporate Finance, pp.375-422. Elsevier


Lowery M., Officer Micah S., and Schwert G. William, "The Variability of IPO Initial Returns", pp. 425-465. Wiley, 2010. Available online: https://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=cat02271a&AN=atoz.ebs14212683e&site=eds-live&scope=site [Accessed 26 April 2023].

Lowry M., Michaely R., Volkova E. (2017). Initial Public Offerings: A synthesis of the literature and directions for future research, pp. 1-185. Available online: http://dx.doi.org/10.1561/0500000050 [Accessed 22 April 2023].

Lundahl, U. & Skärvad, PH. (2016). Investigation methodology, 4th edition. Lund: Studentlitteratur

Megginson W., Weiss K. (1991). Venture Capitalist Certification in Initial Public Offerings. *The Journal of Finance*, pp 1-25. Available online:

https://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edsjsr&AN=edsjsr.10.2307.2328547&site=eds-live&scope=site  [Accessed 26 April 2023].

Næss-Schmidt, S., Heebøll, C. and Karlsson. H. (2017): Swedish Private Equity Market - A footprint analysis, Swedish Venture Capital and Private Equity Association, pp. 1-77.

Pommet, S. (2017). The impact of the quality of VC financing and monitoring on the survival of IPO firms. Managerial Finance, vol. 43, no. 4, s. 440-451. Available online: https://www.emeraldinsight.com/doi/full/10.1108/MF-06-2016-0178 [Accessed 2 May 2023]

Purnanandam, A. K., Swaminathan, B. (2004).  Are IPOs Really Underpriced? *The Review of Financial Studies, 17(3),* 811–848. Available online: https://doi-org.ludwig.lub.lu.se/10.1093/rfs/hhg055 [Accessed 2 May 2023].

Ritter, JR & Loughran, T. (2004). Why Has IPO Underpricing Changed Over Time?. Financial Management , Vol. 22. pp. 5-37,  Available online: https://eds-s-ebscohost-com.ludwig.lub.lu.se/eds/detail/detail?vid=7&sid=db5ff430-1a34-4401-a87c-6713894fe616%40redis&bdata=JnNpdGU9ZWRzLWxpdmUmc2NvcGU9c2l0ZQ%3d%3d#AN=edsjsr.3666262&db=edsjsr  [Accessed 2 May 2023].

Ritter, JR (1998). Initial Public Offerings. University of Florida, Vol. pp. 5-30, Available online: https://www.researchgate.net/publication/284772074_Initial_public_offerings [Accessed 28 April 2023].

Rock, K. (1986). Why new issues are underpriced. J Finance Econ 15:187–212. Available online: https://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edselc&AN=edselc.2-52.0-0000423667&site=eds-live&scope=site [Accessed 28 April 2023]

Welch, Ivo; Ritter, Jay R. (2002). A Review of IPO Activity, Pricing and Allocations. *Journal of Finance*, iss 4. Available online: https://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edsjsr&AN=edsjsr.3094524&site=eds-live&scope=site [Accessed 25 April 2023].

Zider, B. (1998). How Venture Capital Works. *Harvard Business Review, 76(6),* 131-139.

Available online:

http://mengwong.com/school/HarvardBusinessReview/how_venture_works.pdf  [Accessed 10

May 2023].

# Tables

## Table 7 - Summary statistics by (PEbacked )

**PE-backed: 0**

|  | Mean | Median | SD | Min | Max | N |
|---|---|---|---|---|---|---|
| InitialReturn win | 1.316 | 0 | 5.816 | -9.45 | 23.9 | 188 |
| OfferPrice | 20.111 | 9 | 25.108 | .5 | 176.5 | 188 |
| logOfferSizeM | 1.413 | 1.033 | 1.537 | -.964 | 6.451 | 188 |
| CompanyAge | 17.872 | 15.5 | 12.376 | 5 | 120 | 188 |
| AssetTurnover | .66 | .3 | 0.735 | 0 | 4.1 | 188 |
| TotalDebtTotalEquity | 71.845 | 25.9 | 160.582 | .044 | 1306.5 | 188 |

**1**

|  | Mean | Median | SD | Min | Max | N |
|---|---|---|---|---|---|---|
| InitialReturn win | 3.82 | .975 | 7.182 | -7.4 | 20 | 34 |
| OfferPrice | 43.618 | 46.75 | 19.153 | 4 | 93 | 34 |
| OfferSizeM win | 4.46 | 4.771 | 1.583 | .953 | 6.451 | 34 |
| CompanyAge | 28.118 | 23 | 22.022 | 6 | 125 | 34 |
| AssetTurnover | .703 | .7 | 0.489 | 0 | 1.6 | 34 |
| TotalDebtTotalEquity | 164.339 | 81.8 | 339.939 | .8 | 1893 | 34 |

*Table 7: The following table demonstrates the summary descriptive of PE-backed firms, and non PE-backed firms. The mean, median, standard deviation, minimum and maximum of the variables are illustrated.*

## Table 8 - Summary statistics by (VCbacked )

**VC-backed: 0**

|  | Mean | Median | SD | Min | Max | N |
|---|---|---|---|---|---|---|
| InitialReturn win | 1.911 | 0 | 6.293 | -9.45 | 23.9 | 187 |
| OfferPrice | 23.731 | 10 | 26.674 | .5 | 176.5 | 187 |
| OfferSizeM win | 1.803 | 1.113 | 1.949 | -.964 | 6.451 | 187 |
| CompanyAge | 19.909 | 16 | 15.770 | 5 | 125 | 187 |
| AssetTurnover | .705 | .5 | 0.739 | 0 | 4.1 | 187 |
| TotalDebtTotalEquity | 98.412 | 35.1 | 222.459 | .044 | 1893 | 187 |

**1**

|  | Mean | Median | SD | Min | Max | N |
|---|---|---|---|---|---|---|
| InitialReturn win | .573 | .2 | 4.824 | -9.45 | 15.5 | 35 |
| OfferPrice | 23.606 | 20.5 | 19.970 | 2 | 100 | 35 |
| OfferSizeM win | 2.289 | 2.016 | 1.517 | -.327 | 5.346 | 35 |
| CompanyAge | 16.943 | 16 | 5.826 | 7 | 36 | 35 |
| AssetTurnover | .459 | .4 | 0.370 | .007 | 1.2 | 35 |
| TotalDebtTotalEquity | 48.521 | 6.9 | 134.094 | .4 | 663 | 35 |

*Table 8: The following table demonstrates the summary descriptive of VC-backed firms, and non VC-backed firms. The mean, median, standard deviation, minimum and maximum of the variables are illustrated.*

Table 9 - First regression model

| VARIABLES | (1)<br>A<br>IR | (2)<br>B<br>IR | (3)<br>C<br>IR | (4)<br>D<br>IR |
|---|---|---|---|---|
| PE-backed | -0.178 | -0.515 | -0.407 | -0.695 |
| | (1.621) | (1.684) | (1.607) | (1.676) |
| VC-backed | -1.213 | -1.454 | -0.822 | -0.958 |
| | (1.468) | (1.511) | (1.513) | (1.561) |
| Offer Price | -0.003 | 0.000 | -0.008 | -0.005 |
| | (0.024) | (0.024) | (0.024) | (0.025) |
| logOfferSizeM | 1.071** | 1.108** | 1.005** | 0.973** |
| | (0.417) | (0.429) | (0.434) | (0.450) |
| Company Age | 0.072** | 0.063* | 0.083** | 0.076** |
| | (0.032) | (0.033) | (0.033) | (0.034) |
| Asset Turnover | -0.945 | -0.873 | -1.294 | -1.295 |
| | (0.916) | (0.986) | (0.919) | (1.005) |
| Total Debt/Total Equity | -0.005* | -0.005* | -0.007** | -0.007** |
| | (0.003) | (0.003) | (0.003) | (0.003) |
| YR== 2010 | | | -3.750 | -3.163 |
| | | | (4.017) | (4.115) |
| YR== 2011 | | | -2.311 | -1.205 |
| | | | (4.165) | (4.322) |
| YR== 2012 | | | - | - |
| YR== 2013 | | | 1.135 | 1.316 |
| | | | (6.772) | (8.183) |
| YR== 2014 | | | -0.328 | 0.887 |
| | | | (4.443) | (4.615) |
| YR== 2015 | | | 1.685 | 2.991 |
| | | | (3.835) | (4.007) |
| YR== 2016 | | | 0.383 | 1.029 |
| | | | (3.596) | (3.690) |
| YR== 2017 | | | -0.564 | -0.071 |
| | | | (3.628) | (3.697) |
| YR== 2018 | | | -3.278 | -2.334 |
| | | | (3.725) | (3.846) |
| YR== 2019 | | | 2.169 | 2.612 |
| | | | (4.036) | (4.117) |
| SICcode== 1010 Technology | | -2.311 | | -1.124 |
| | | (3.768) | | (4.594) |
| SICcode== 1510 Communications | | -2.582 | | -2.091 |
| | | (3.921) | | (4.655) |
| SICcode== 3020 Financial | | -3.032 | | -2.724 |
| | | (4.233) | | (4.975) |
| SICcode== 4010 Consumer | | -0.733 | | 0.061 |
| | | (3.579) | | (4.460) |
| SICcode== 5010 Industrial | | -0.368 | | 0.494 |

| | | | | |
|---|---|---|---|---|
| | | (3.758) | | (4.606) |
| SICcode== 5510 Basic Materials | | - | | - |
| SICcode== 6010 Energy | | -2.173 | | -0.747 |
| | | (4.035) | | (4.891) |
| Constant | -0.531 | 0.815 | 0.381 | 0.284 |
| | (1.108) | (3.611) | (3.515) | (5.732) |
| Observations | 138 | 138 | 138 | 138 |
| Adjusted R-squared | 0.137 | 0.116 | 0.158 | 0.135 |

Standard errors in parentheses

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

*Table 9: The table above illustrates the main regression model of this study, and is divided into four sections. First category excludes all effects, the second category includes time effects and the third category includes year effects. Lastly, the fourth category includes all fixed effects at the same time.*

Table 10- White's test on first regression model, category one

| H0: Homoskedasticity | chi2 | df | p |
|---|---|---|---|
| Ha: Unrestricted heteroskedasticity | | | |
| chi2(42) = 43.13 | | | |
| **Prob > chi2 = 0.4229** | | | |
| | 43.130 | 42 | 0.423 |
| | 12.800 | 8 | 0.119 |
| | 4.420 | 1 | 0.035 |
| | 60.350 | 51 | 0.174 |

*Table 10: The White's test has been conducted on the first regression model in category one in order to check for heteroskedasticity. As presented in the results, the model indicates no heteroskedasticity since the p-value of 0.42 exceeds all significant levels, and therefore the null hypothesis regarding homoscedasticity is accepted.*

Table 11 - First regression model, robust

| IR_win | Coef. | St.Err. | t-value | p-value | [95% Conf | Interval] | Sig |
|---|---|---|---|---|---|---|---|
| PEbacked | -.107 | 1.869 | -0.06 | .955 | -3.806 | 3.593 | |
| VCbacked | -1.219 | 1.256 | -0.97 | .334 | -3.705 | 1.267 | |
| OfferPrice | -.004 | .033 | -0.12 | .901 | -.07 | .062 | |
| logOfferSizeM | 1.054 | .498 | 2.12 | .036 | .068 | 2.04 | ** |
| CompanyAge | .073 | .031 | 2.32 | .022 | .011 | .135 | ** |
| AssetTurnover | -1.11 | .811 | -1.37 | .174 | -2.716 | .496 | |
| TotalDebtTotalEquity | -.006 | .002 | -3.17 | .002 | -.009 | -.002 | *** |
| Constant | -.35 | 1.127 | -0.31 | .757 | -2.581 | 1.881 | |

| | | | | | |
|---|---|---|---|---|---|
| Mean dependent var | | 2.270 | SD dependent var | | 6.466 |
| R-squared | | 0.182 | Number of obs | | 222 |
| F-test | | 4.135 | Prob > F | | 0.000 |
| Akaike crit. (AIC) | | 870.612 | Bayesian crit. (BIC) | | 896.692 |

*** p<.01, ** p<.05, * p<.1

*Table 11: The following table demonstrates a robustness test which includes all variables from the first main regression in category one. The results indicate that the main model is robust, as presented in 5.6., and the methodology choice is presented in 4.3.1.*

Table 12 - Second regression model

| VARIABLES | (1)<br>E<br>NetChangeinTotalEquity_win | (2)<br>F<br>NetChangeinTotalEquity_win | (3)<br>G<br>NetChangeinTotalEquity_win | (4)<br>H<br>NetChangeinTotalEquity_win |
|---|---|---|---|---|
| VCbacked | -17.13 | -17.51 | -12.29 | -12.91 |
|  | (13.49) | (13.62) | (14.09) | (14.27) |
| PEbacked | 28.53** | 31.30** | 17.49 | 20.07 |
|  | (13.95) | (14.13) | (14.79) | (15.14) |
| CompanyAge | 0.352 | 0.410 | 0.378 | 0.415 |
|  | (0.346) | (0.352) | (0.352) | (0.360) |
| IR_win | 16.18 | 15.35 | 13.77 | 13.79 |
|  | (10.00) | (10.19) | (10.28) | (10.49) |
| period_1 |  |  | 5.717 | 4.758 |
|  |  |  | (37.21) | (37.69) |
| period_2 |  |  | 1.963 | -4.578 |
|  |  |  | (39.41) | (40.15) |
| o.period_3 |  |  | - | - |
| period_4 |  |  | -8.677 | 9.381 |
|  |  |  | (79.08) | (90.47) |
| period_5 |  |  | 71.30 | 63.23 |
|  |  |  | (44.34) | (45.85) |
| period_6 |  |  | 29.46 | 27.29 |
|  |  |  | (35.96) | (36.83) |
| period_7 |  |  | 6.763 | 5.400 |
|  |  |  | (33.83) | (34.39) |
| period_8 |  |  | 1.998 | -0.742 |
|  |  |  | (33.81) | (34.30) |
| period_9 |  |  | 17.94 | 17.35 |
|  |  |  | (35.10) | (35.68) |
| period_10 |  |  | 37.28 | 34.13 |
|  |  |  | (38.00) | (38.42) |
| icb_1 1010 Technology |  | 15.62 |  | 16.86 |
|  |  | (25.16) |  | (25.69) |
| icb_2 Communications |  | -8.425 |  | -12.93 |
|  |  | (27.96) |  | (28.69) |
| icb_3 Financial |  | 37.81 |  | 27.15 |
|  |  | (28.74) |  | (30.42) |
| icb_4 Consumer |  | 2.022 |  | 2.931 |
|  |  | (22.88) |  | (23.38) |
| icb_5 Industrial |  | 9.993 |  | 10.17 |
|  |  | (25.36) |  | (26.06) |
| icb_6 Basic Materials |  | -7.056 |  | -13.54 |
|  |  | (42.26) |  | (48.29) |
| o.icb_7 |  | - |  | - |

| | | | | |
|---|---|---|---|---|
| Constant | -1.269 | -9.070 | -12.26 | -17.35 |
| | (9.409) | (23.21) | (33.00) | (40.54) |
| | | | | |
| Observations | 215 | 215 | 215 | 215 |
| R-squared | 0.058 | 0.079 | 0.096 | 0.112 |

Standard errors in parentheses

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

*Table 12: The table above illustrates the second regression model of this study, and is divided into four sections. First category excludes all effects, the second category includes time effects and the third category includes year effects. Lastly, the fourth category includes all fixed effects at the same time.*