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Sponsor Credibility and Post-IPO Performances: Evidence from Private Equity & Venture Capital backed IPOs

A Study Examining the Effect of Financial Sponsor type and Credibility on Post-IPO Performance of PE- and VC-backed Firms

Authors

Alex Lundvall

Gabriel Danielsson Mitkas

Supervisor

Jens Forssbaeck

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Abstract

As private equity (PE) and venture capital (VC) firms have become more active in taking companies public, questions around the credibility of these sponsors and their effect on post-IPO performance have grown in relevance. This study explores how different types of financial sponsors and their associated credibility influence stock returns following initial public offerings (IPOs). Using a sample of 797 IPOs recorded between 2009-01-01 and 2019-12-31 across seven European countries, we conduct multivariate OLS regressions with fixed effects to evaluate abnormal stock returns in relation to different sponsor types and their underlying credibility. Our findings show that PE-backed IPOs underperform relative to non-sponsored-backed IPOs in the short-run, whereas the long-run performance remains inconclusive. VC-backed IPOs also show signs of underperformance in both periods, although the results are statistically insignificant. No significant differences in performance is found when directly comparing PE- and VC-backed IPOs. However, when incorporating sponsor credibility, we find that higher credibility is associated with lower long-run abnormal returns among all sponsored-backed IPOs. The negative effect of credibility is less pronounced for PE sponsors in comparison to VC sponsors, but only in the short-term period.

Key words: *Initial Public Offerings, Private Equity, Venture Capital, Financial Sponsor Credibility, Abnormal Returns, Multivariate Ordinary Least Squares.*

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1. Introduction

During the beginning of the 1980s, stock markets around the world and particularly in the U.S. experienced rapid growth in several different sectors. The development was primarily driven by the easing of certain regulations and restrictions in various industries and the simultaneous rise of tech companies. This progress created a rapid boom of initial public offerings (IPOs) in which companies were determined to finance their future progress and innovations by going public and offering shares to external investors (Persson, 2024). While the IPO market appeared to be expanding rapidly, the private equity and venture capital market as a way of funding operations was fairly new and modest during this time period. The first expansion of the PE and VC market started to take place in the mid 1980s as a consequence of the earlier growth in Silicon Valley. At this time, the entire private equity and venture capital market was estimated to have a pooled value of approximately $10 billion. In 2023, the broader private market encompassing both PE and VC funds were estimated to have a total assets under management valued at approximately $11.87 trillion globally (S&P Global, n.d.). As a result of the development in recent years, the entire industry has become more globalised. While the U.S. remains one of the largest markets, other European countries such as Germany, France and the United Kingdom have increased rapidly in popularity and in the total amount of PE and VC funds currently active in those markets (Caselli & Negri, 2010; Metrick & Yasuda, 2011).

Regardless of the prominent growth since the 1980s, the private equity and venture capital market remains an unresolved topic open for further discussion. Although the understanding of PE and VC have been improved in recent years in terms of how they operate, the debate on how their funds improve and contribute to the value creation of a firm is divided (Lerner et al., 2012). As a result, firms that are backed by a financial institution are putting more emphasis on the reputation of PE and VC firms in order to evaluate their trustworthiness and general credibility (Krishnan et al., 2011; Private Equity International, 2024). Building upon this reasoning, the credibility of a financial sponsor plays a key role in shaping IPO outcomes of firms that are backed by private equity or venture capital (Nahata, 2008; Krishnan et al., 2011; Wong et al., 2013; Tong & Wong, 2020). While most firms go public with the help of investment banks, some firms choose to be backed by other financial institutions before being

listed (Gulati & Higgins, 2003). Among those that are backed by private equity or venture capital, the reputation of the sponsor can send important signals to the market. As a result, sponsor credibility has become a critical factor in how IPOs are priced, perceived, and how they perform over time (Reuer et al., 2012). Following this suggestion, alongside the increased presence of PE and VC funds in Europe, this study will examine if sponsors' credibility affect the post-IPO performance of PE- and VC-backed IPOs in 7 European countries.

1.1 Problem

While much of the existing research has focused on underwriter reputation and its role in shaping IPO outcomes, the credibility of private equity and venture capital sponsors has received far less attention. The type of funding a firm is backed by does actually play an important role in understanding both short- and long-term investor opportunities of a firm. (Tong & Wong, 2020). Sponsor involvement could act as a potential signal to investors, helping to reduce uncertainty about firm quality and potential barriers of information asymmetry. Despite its importance, the extent to which sponsor credibility influences IPO outcomes, especially after the initial trading period, remains underexplored. Most studies have concentrated on venture capital sponsors without accounting for private equity sponsors, regardless of their different investment strategies (Aizenman & Kendall, 2008; Breuer & Pinkwart, 2018).

Previous studies evaluating post-IPO performance in relation to sponsored-backed IPOs have yielded mixed results depending on the return measure and time horizon used. Brav and Gompers (1997) showed that VC-backed IPOs outperform IPOs without sponsoring funds using equal-weighted returns but not when applying value-weighted metrics. Similarly, Ritter (2015) demonstrated that the choice of return specification, such as raw return against abnormal returns can alter the conclusion drawn about sponsor-backed IPOs. It is evident that different measures of post-IPO performance can vary extensively depending on the chosen return measurement. This raises an important question about how to appropriately measure post-IPO performance and which role sponsor credibility plays in shaping these outcomes. This paper addresses these gaps by examining how sponsor credibility affects both short- and long-run stock performance using arithmetic buy-and-hold abnormal returns. By separately

analyzing private equity- and venture capital-backed IPOs, we aim to provide a clearer understanding of how different types of sponsor credibility influence IPO outcomes over time.

1.2 Purpose & Research Question

When looking at the existing research, there are primarily two observations that can be seen from IPO firms that are sponsored-backed. First, the evidence as to whether sponsored-backed IPOs perform better or worse than non sponsored-backed IPOs are either consistent or inconclusive. Previous research (see e.g. Ball et al,. 2011; Cao, 2011; Que & Zhang, 2019) suggested that the post-IPO performance of sponsored-backed IPOs are generally lower relative to those that are not backed by a financial sponsor. In addition, some scholars argued that the underperformance is present but at an insignificant level (Hamao et al., 2000; Rindermann, 2004) thereby providing inconclusive evidence. Secondly, the number of prior research that evaluates how a sponsoring firm's credibility affects the performance of their portfolio company post-IPO is relatively small. While the majority of the existing research has focused on underwriter reputation (Bradley et al,. 2011; Wong et al,. 2013; Tong & Wong, 2020) some have attempted to quantify VC-backed firms in relation to sponsor reputation, with secondary or less attention to PE firms (Nahata, 2008; Krishnan et al,. 2011). Given the mixed findings in the existing research of sponsored-backed IPO performances, alongside the limited prior initiatives that evaluates how PE and VC firms credibility affect post-IPO outcomes of their portfolio firms, we aim to answer the following research question:

Does financial sponsor credibility influence the short- and long-run stock performance of PE- and VC-backed IPOs?

Building on the constructed research question, the main purpose of this study is to examine how sponsor credibility affects the post-IPO stock performance of sponsor-backed IPO firms. We focus on performance both in the short- and long-run as measured by the lock-up period of 180 days and 3 years after the closing of the first trading day. To assess the IPO-performance, we use arithmetic buy-and-hold abnormal returns (BHARs). The reason we choose to use arithmetic BHARs is because it measures how much shareholder value that has been created or destroyed for the entire period. That said, the start-to-end approach

removes the immediate impact of extreme gains or losses at certain trading days that may introduce noise in the data. To conduct the analysis, we apply a multivariate OLS regression with fixed effects for year and industry. This study focuses on both sponsor types and credibility, while also separating short- and long-term performance in order to provide a clearer view of how financial sponsors shape IPO outcomes. In doing so, we also aim to identify whether there are meaningful differences in performance between VC-backed and PE-backed IPOs.

1.3 Results

The results from the multivariate OLS regressions, shows that PE-backed IPOs tend to underperform relative to non-sponsored-backed IPOs in the short-run, while the long-run relationship is inconclusive. VC-backed IPOs also show weaker performance compared to non-sponsored-backed IPOs in both time windows, but the estimates are statistically insignificant. When directly comparing performance of PE-backed against VC-backed IPOs, no significant differences in abnormal returns are found across the two time periods. Although, the estimates lean towards underperformance among PE-backed firms. For the credibility measurement, we observe that higher sponsor credibility is associated with lower long-term abnormal returns among all sponsor-backed IPOs. However, this effect is only significant in the long-term. When comparing sponsor types, VC-backed IPOs are more negatively impacted by credibility than PE-backed IPOs, although the results are only statistically conclusive in the short-run.

1.4 Main Contribution

This paper contributes to the existing literature in several different ways. First, it provides an analysis of post-IPO performance among sponsored-backed IPOs, with a specific focus on distinguishing between private equity and venture capital sponsors. Earlier researchers have mainly grouped all sponsor-backed IPOs together to compare them to non-sponsored firms (see e.g. Brav & Gompers, 1997; Rindermann, 2004; Que & Zhang, 2019). As a result of this, we extend the previous attempts by separating PE- and VC-backed IPOs. The reason behind this is to explore how their distinctive investment strategies affect both short- and long-term performances.

The second contribution is built upon the fact that sponsor credibility plays a key role in shaping how IPOs backed by PE- or VC funds are performing in the market (see e.g. Nahata, 2008; Krishnan et al., 2011; Wong et al., 2013; Tong & Wong, 2020). In order to investigate this relationship, we incorporate a credibility measurement based on the sponsoring firm's assets under management. To furthermore test the robustness of this credibility metric, we follow earlier studies and use sponsor age as an alternative proxy. By doing so, we add to the understanding of how sponsor type and reputation impact post-IPO performances. This will be examined with the aim to clarify the mixed and relatively few results already conducted in the previous literature. Moreover, we also include an additional return metric based on return on assets (ROA) in order to assess the long-term performance. By using ROA as a supplementary measure for returns, we hope to capture the potential noise associated with choosing the appropriate measure for abnormal returns.

We believe that our findings offer practical value for companies considering going public, particular when evaluating the benefits and drawbacks of involving a financial sponsor. Our results also provide relevant insights for investors looking to assess the short- and long-term potential of newly listed firms. Finally, this paper offers an interesting angle of the role of sponsor credibility by exploring whether it influences how firms perform after going public.

1.5 Outline

The remaining parts of this paper are outlined in the following way. Section 2 reviews the existing literature and discusses what has been conducted prior to this study. In section 3, we present the relevant theoretical framework which is used in section 4 to build our hypotheses. Following the proposed hypotheses, we present our methodological framework in section 5, including a detailed variable specification, the regression models and the chosen robustness test. Section 6 evaluates the data sample, and demonstrates the descriptive statistics and pairwise correlation tables. In section 7, we present and discuss the empirical results obtained in this paper. To finalize this paper, section 8 concludes our main findings, evaluates the limitations present in this study and proposes ideas for future scholars to pursue.

2. Literature Review

The literature review starts with evaluating the differences between private equity and venture capital firms and how they fund portfolio companies going public. It then covers previous research on sponsor-backed IPOs and the role of sponsor credibility. Finally, it highlights this paper´s contributions by separating PE and VC effects and introducing a credibility measure to explain differences in post-IPO performance.

2.1 Background

2.1.1 Private Equity & Venture Capital

Private equity (PE) and venture capital (VC) are two different, but yet similar, ways of financing a corporation. Both investments require the financial party to buy an ownership position in a company but there are certain attributes exclusively to PE and VC that separates them. Private equity does not have a unilateral definition, however, one usual perception is that it is the equity resources used by a financial institution (PE firm) to take majority or full ownership of a private or public company (see e.g. Caselli & Negri, 2010; Tykvová, 2018). Private equity firms usually target mature and established firms that are operating or have been previously functioning but lack performance or are in need of restructuring. The PE firms often use leverage to buyout and gain control over a firm with the aim to turnaround the company and improve efficiency and operations (Aizenman & Kendall, 2008; Michala, 2019). On the other hand, venture capital is commonly referred to as investments used to finance companies that are in the early stage of their business cycle but shows a solid future growth potential (Aizenman & Kendall, 2008; Breuer & Pinkwart, 2018). These companies are usually start-ups within tech or innovations where the VC firm takes a minority equity position in the target company and acts as advisor to the management team rather than gaining full control over the firm as in the PE case (Michala, 2019).

Although private equity and venture capital have been studied in different contexts by previous scholars, the area is not as well studied as publicly traded instruments such as stocks

or bonds (Wright Robbie, 1998; Sullivan, 2017; Tykvová, 2018). Aizenman and Kendall (2008) noted that private equity often has been used as an umbrella term by financial practitioners, consisting of both private and venture financing without a clear distinction. The issue with using such a holistic approach to PE is that we cannot distinguish between the different types of fundings. Based on this, private equity encompasses all kinds of deals such as buyouts, rescues, turnaround, mergers, acquisitions, and other transactions that are not classified as venture capital (Aizenman & Kendall, 2008; Metrick & Yasuda, 2011). Following the implication suggested by Aizenman and Kendall (2008) alongside the previous definitions for PE and VC firms, this study will utilize the proposed classification and thus distinguish between private equity and venture respectively.

Building upon the discussion from previous scholars (see e.g. Aizenman & Kendall, 2008; Metrick & Yasuda, 2011; Michala, 2019), it is evident that PE and VC firms act with different strategies but yet similar targets. That is, to obtain a positive and high financial return on their investment for a specific holding period. These holding periods can differ substantially between industries, countries and even due to current capital market conditions. Regardless of the individual holding period, there are several different exit routes available for PE- and VC firms to undertake (Metrick & Yasuda, 2011; Rajan Annamalai & Deshmukh, 2011; Michala, 2019). Michala (2019) argued that the three most successful exits are through an (*i*) secondary sale to another financial buyer such as a PE firm, (*ii*) a trade sale where the strategic buyer is not a PE or VC company and acquires the target company or (*iii*) through an initial public offering (IPO) of the portfolio firm. All three exit strategies have been studied by previous scholars in several different settings. However, out of the three exits, earlier studies (see e.g. Chemmanur & Fulghieri, 1999; Bayar & Chemmanur, 2011; Michala, 2019) argued that when a PE or VC company decides to exit their portfolio company through an IPO, the process involves greater information asymmetry compared to other exit routes primarily due the sponsors insider status pre-IPO. Building upon these findings, this study will specifically focus on IPOs as an exit strategy for PE and VC firms.

2.1.2 Initial Public Offering (IPO)

An initial public offering is when a company decides to go public and trade on the open market. The firm becomes listed on a stock exchange and offers third-party investors to buy

and take a position in the stock of the company (Espinasse, 2011). Initial public offerings is a well studied field in the current literature, particularly the underpricing mechanism of IPOs and the associated performance of the underlying firm (Ritter, 1991).

One of the first discoveries found when investigating the stock performance of IPOs was related to non-sponsored-backed IPOs. Several scholars (Ritter, 1991; Jain & Kini, 1994; Loughran & Ritter, 1995) concluded that stocks of IPO firms tend to underperform relative to their publicly trading peers with similar characteristics in the long-run. This suggests that there is a certain IPO effect of obtaining a lower long-run stock return in comparison to firms that are already listed. At first glance and as noted by Schöber (2008), this result contradicts the theory on efficient capital markets proposed by Fama (1970) which suggested that a market is considered to be efficient when prices fully reflect all the available information in the market. However, other scholars (Brav & Gompers, 1997; Brav et al., 2000; Eckbo & Norli, 2005) have argued that the underperformance of IPO companies is related to certain IPO-specific firm characteristics such as a small market capitalization and an uncertainty of no historical IPO performance. Given these suggestions, previous scholars (Brav et al., 2000; Eckbo & Norli, 2005) have found that the IPO effect tends to disappear when the IPO-specific attributes are accounted for because the performance across the IPO firms and the already trading peers then shows similar long-run performances.

In contrast to the earlier studies evaluating IPO performance, IPO as an exit strategy for a financial institution such as a PE or VC firm is not as well investigated. Nevertheless, some scholars have attempted to evaluate their respective role and potential aim of taking a portfolio company public. Although both PE- and VC firms have a common interest of returning a positive financial return on their portfolio companies, they can have different motives when deciding to initiate their exit strategy and thus take a company public through an IPO (Cao, 2011; Michala, 2019). Buyout sponsors (BO), which is a form of private equity, usually exit earlier than venture capital sponsors because their deals are larger and incur high potential risks. As a result, a PE-firm may decide to take a portfolio company public too early and at a premature stage which can cause negative effects on the stock performance post-IPO and in the long-run (Cao, 2011; Michala, 2019). On the other hand, Michala (2019) further argued that VC firms may take on even larger risk because their equity position in the portfolio company is placed merely from a future high-potential investment prospect (Aizenman & Kendall, 2008). As a result, there is a high risk associated with a VC-backed

IPO because there is significant uncertainty as to whether the VC-backed company will survive post-IPO or not (Brav & Gompers, 1997; Cao, 2011). In addition to this uncertainty, Gompers (1996) found evidence that young venture capital sponsors may take their companies public early in order to establish a better reputation, but also to ensure the ability to raise new funds.

2.2 Sponsored-backed IPOs

When considering sponsored-backed IPOs, the previous literature has focused primarily on examining the underpricing mechanism of IPOs, yielding mixed results. Bergström et al. (2006) evaluated the performance of 152 private equity-backed firms against 1370 non private equity-backed firms across the UK and French markets between 1994 and 2004. Their findings suggested that private equity-backed IPOs tended to experience lower levels of underpricing, which the authors claimed could be linked to their typically large issue sizes which is usually accompanied by more information towards the IPO. Megginson & Weiss (1991) found that VC-backed IPOs in the same industry showed lower initial returns compared to non-sponsored-backed IPO firms, attributing this to the certifying role of venture capital in retaining a large equity position in the company after the listing. Lee & Wahal (2004), found opposite evidence in their analysis of venture capital-backed IPOs, showing that these firms exhibited higher levels of initial returns on their first day of trading compared to non-backed IPOs. Bradley & Jordan (2002) utilized an OLS regression by controlling venture capital backing with a dummy variable, and concluded that there is no difference in underpricing between venture capital-backed and non-venture-backed IPOs after controlling for issue characteristics. Further evidence from the UK market is provided by Levis (2011), who compared the post-IPO performance of private equity-backed, venture capital-backed, and non-sponsored firms listed on the London Stock Exchange between 1992 and 2005. Their study found evidence that private equity-backed IPOs tended to be more established at the time of listing and experience lower first-day returns.

In the prior empirical research examining the post-IPO performance of sponsored-backed firms, the limited number of studies conducted have found a diverse set of results. Rindermann (2004) examined venture capital involvement across the European market and reported mixed outcomes. While some negative trends were observed for VC-backed IPOs in

Germany and the UK, their findings were inconclusive and did not provide statistically evidence of underperformance. Similarly, Hamao et al. (2000) found no consistent long-run outperformance among VC-backed firms in relation to other IPOs when examining 355 Japanese IPOs from 1989 to 1994. The authors found one exception in cases where firms were supported by foreign or independent venture capitalists who appeared to bring added value. Que and Zhang (2019) investigated the effect of pre-IPO growth on the long-run performance of VC-backed IPOs. The authors found that while higher growth before listing generally supports better long-run performance, the effect weakens when venture capital firms support the IPO. They suggested that this may be due to some venture capitalists pushing firms to list too early, sometimes leading to inflated reporting and weaker outcomes after going public.

Other researchers highlight that the observed impact of financial sponsor involvement can vary depending on the method used to measure returns. Brav & Gompers (1997) found statistical evidence that venture-backed IPOs perform better than IPOs without sponsor-backing when using equal weighted returns. However, when switching to value-weighted returns, the performance gap between the two groups narrows significantly, with little difference in the long-run underperformance of non VC-backed IPOs. Additionally, when applying the Fama-French (1993) three-factor asset pricing model, the authors found no significant long-term underperformance among venture-backed IPOs, while firms with smaller size and without venture-sponsoring performed worse. Similarly, Ritter (2015) showed that performance outcomes for financial sponsor-backed IPOs also depend heavily on the return metric used. Growth capital-backed IPOs appear to outperform all other categories when measured using style adjusted buy and hold returns, however, this outperformance disappears under Fama-French regressions, where abnormal returns showed no clear difference from zero.

Timing also plays a crucial role in the IPO decision making process for sponsor-backed firms. Existing literature shows that private equity and venture capital sponsors tend to bring firms to the market when conditions are most favorable. Cao (2011) found that leveraged buyout sponsors are more likely to exit through an IPO when valuations are high, leading to shorter holding periods. However, these quicker exits are associated with weaker post-IPO performance and an increased risk of financial distress. Building upon this, Lerner (1994) found that venture capitalists tend to time IPOs close to market peaks. This pattern is also

supported by Ball et al. (2011) who provided evidence for the concept of pseudo market timing, indicating that sponsors may not directly aim for market peaks, but often end up listing during bullish phases due to their investment cycles and exit strategies. In more recent time, Michala (2019) used a data set between 1975 and 2013 for the U.S. market and found no significant differences in performance between PE- and VC-backed IPOs, nor IPOs of non-sponsored-backed character. In addition, PE-backed IPOs were found to not time their offerings in favorable market conditions any more than what non-sponsored-backed firms were able to do.

2.3 Credibility of PE- and VC Firms

In the context of initial public offerings, the reputation and credibility of private equity and venture capital sponsors have become increasingly influential. As the IPO market continues to evolve, companies are placing greater emphasis on aligning with reputable sponsors who not only provide capital but also signal quality to the market (Zhang, 2024). Despite the importance of sponsor credibility, much of the existing literature has traditionally focused on underwriter reputation and overlooked the role of financial sponsors in relation to IPO outcomes.

Bradley et al. (2011) found that underwriters are more likely to favor top-tier VC firms because of their ongoing deal potential. IPOs backed by these VCs often receive stronger analyst coverage, which helps to build momentum and allows the venture capitalists to exit at better prices, even if it means accepting more underpricing up front. Similarly, Tong and Wong (2020) studied the Hong Kong IPO market, where the roles of sponsors and underwriters are separated. Their results showed that sponsor reputation plays a more important role than underwriter reputation in describing initial returns and volatility of the IPO. The authors also found that sponsors and underwriters act as substitutes rather than complements in signaling quality to investors. Wong et al. (2013) looked at sponsor behavior in REIT IPOs. They found that when sponsors keep a large stake at the IPO, it signals confidence and reduces concerns about future behavior. The authors claimed that this behavior may be linked to better underpricing, which supports the idea that ownership signals quality. Krishnan et al. (2011) showed that VC reputation also matters for post-IPO performance. Firms backed by more reputable VCs perform better in the long-run and the

authors showed that VC firms tend to stay involved, especially in governance, which helps to support continued performance. Nahata (2008) develops a reputation measure based on the total market capitalization of IPOs backed by VC funds. The author found evidence supporting the idea that companies backed by highly regarded VC firms are more likely to successfully go public, do so faster, and perform better at the time of the IPO.

While much of the existing research has focused on underwriter reputation, fewer studies have looked at how the credibility of private equity and venture capital sponsors shape IPO outcomes. As highlighted above, sponsor reputation affects not only pricing and analyst coverage but also long-term firm performance and investor trust. To build on this, our analysis goes beyond traditional measures by considering how sponsor credibility impacts both short- and long-run stock performance of sponsor-backed IPO firms. While prior research has often treated sponsor involvement as a secondary topic or as a control variable, few studies have directly compared the effects of private equity- and venture capital-backing in relation to IPO performance. Most of the literature has focused on VC-backed firms (see e.g. Gompers, 1996; Brav & Gompers, 1997; Hamao et al., 2000; Rindermann, 2004; Que & Zhang, 2019) with less attention given to PE-backed firms or to the differences between the two. This gap is notable given that VC- and PE investors follow different investment strategies where VC firms typically back smaller and high-growth firms, while PE investors usually focus on more mature and cash-generating businesses (Aizenman & Kendall, 2008; Breuer & Pinkwart, 2018). Our study addresses this gap by evaluating differences in both sponsor types in relation to post-IPO performance.

2.4 Contribution to Existing Literature

This study contributes to the existing literature in several ways. First, while sponsor-backed IPOs have been widely studied, the results are mixed, both in regards of underperformance (see e.g. Bradley et al., 2001; Rindermann, 2004; Bergström et al., 2006;) and first-day returns (see e.g. Megginson & Weiss, 1991; Bradley & Jordan, 2002; Lee & Wahal, 2004; Levis, 2011). We aim to contribute by focusing on the credibility and reputation of private equity and venture capital sponsors, an area that has not received nearly as much attention as underwriter reputation. We address this gap by examining how sponsor credibility influences IPO outcomes, not only in terms of long-run stock performance but also in short-term

developments during the lock-up period after listing. By looking at the development of stock performance during the lock-up period, we provide new insight into the early trading phase after an IPO. This period offers a clean setting to study sponsor credibility because insiders, including PE- and VC sponsors, are restricted from selling their shares at this time (Bradley et al., 2001; Field & Hanka, 2001). This means that short-term stock performance during this phase should mainly reflect external factors such as sponsor reputation and market conditions, rather than insider selling pressure.

Secondly, we contribute to the literature on signaling theory by exploring how sponsor credibility could act as a signal mechanism towards information asymmetries between firms and investors. By expanding on the research conducted earlier (see e.g. Nahata, 2008; Bradley et al., 2011; Krishnan et al., 2011; Wong et al., 2013), we bring the underlying credibility of sponsored-backed IPOs into focus in order to understand its impact on post-IPO performance. Finally, we extend prior research by comparing the effects of private equity and venture capital backing separately. Most existing scholars have focused on VC-backed IPOs, often overlooking PE-backed offerings or treating all sponsor types as one group (see e.g. Brav & Gompers, 1997; Rindermann, 2004; Que & Zhang, 2019). Our study fills this gap by examining whether sponsor type matters for the short- and long-run stock performance after the IPO.

3. Theoretical Framework

In this section, the theoretical framework used in this paper will be presented. Based on the empirical evidence provided by existing literature, three theoretical frameworks will be used in order to build our hypotheses. The theories applied will be the signaling theory and adverse selection theory alongside the pseudo market timing theory.

3.1 Signaling Theory

The signaling theory explains how one party can reduce uncertainty by sending credible signals to another party with less information. The theory was first outlined by Spencer M. (1973), who showed how job applicants use education to signal ability to employers. Since employers cannot directly observe a candidate's productivity, the applicants use education as a signal. The idea is that the education is easier for high-ability individuals to obtain, making it a reliable signal that separates two different parties. For a signal to work, it must be costly to pretend, making it harder for low-ability individuals to imitate (Spencer M., 1973). In IPOs, sponsor involvement can serve as a similar function. A sponsor with a strong track record signals firm quality to investors and could help reduce uncertainty in a market where information is often limited (Reuer et al., 2012). Given this, informational barriers between the financial sponsor and the market may be reduced if the sponsoring firm is associated with a solid history of transactions and successful IPOs.

As mentioned previously, sponsors' primary target is to create a positive return on their portfolio investments. As a result, firms that are backed when introduced to the public should signal a certain level of confidence to the outside investors, given the underlying reputation of the sponsoring firm. Sponsors that are more reputable are usually more involved in the corporate governance of their portfolio firms even after the IPO, which increases the shareholder value even further post-IPO (Krishnan et al., 2011). With this in mind, the historical reputation of the sponsoring firm should signal credibility or lack of credibility to the market and external investors, which may affect the post-IPO performance of their portfolio firms.

3.2 Adverse Selection Theory

The second theoretical framework that is used in this paper is the adverse selection theory, which can be used to explain information asymmetries between inside and outside investors in relation to post-IPO performance. Rock (1986) highlighted how more informed investors can identify which IPOs are likely to perform well, while uninformed investors often cannot. As a result, uninformed investors may buy into firms that underperformed in the long-run, leading to negative returns for these investors.

When looking at sponsor-backed IPOs, information asymmetries can also arise between fund managers and their investors. Balboa & Marti (2007) claims that private equity operators often hold more information than their fund providers, creating a space for adverse selection and moral hazard (see also Eisenhardt, 1989; Amit et al., 1998). While contracts and performance based incentives are designed to mitigate barriers (Fama & Jensen, 1983), these mechanisms are not always solid. To manage these risks, investors often rely on reputation as a signal of quality. A strong track record makes it costly for low-quality sponsor firms to mimic high performers. In this way, sponsor reputation serves as a credible signal that helps reduce the information gap and adverse selection risk, both between the sponsor and the market, but also between the sponsor and their own investors (Balboa & Marti, 2007).

3.3 Pseudo Market Timing Theory

The Pseudo Market Timing theory was first established by Schultz (2003) as a consequence of the apparent long-run underperformance of IPOs. The author noted from several earlier studies (see e.g. Ritter, 1991; Loughran & Ritter, 1995; Gompers & Lerner, 2003) that IPOs tended to lack performance on the initial 3 to 5 years of trading in comparison to market indices and peer relatives. Schultz (2003) based his reasoning from the theory of efficient capital markets proposed by Fama (1970) and argued that individual firms are unable to time their IPOs in the market because future returns cannot be predicted. Nevertheless, he claimed that the likelihood of firms going public becomes higher when stock prices increase. As a result, IPOs will be clustered during market peaks when equity valuations are high, although managers and companies cannot directly predict or determine market peaks. Based on this reasoning, Schultz (2003) established a pseudo market timing theory for which he argued that

the majority of the cases where IPO firms underperform in the long-run, is primarily driven by the fact that these IPOs are concentrated in market peaks when valuations are at their highest.

In the case of financial sponsor-backed IPOs, other scholars (see e.g. Schöber, 2008; Ball et al., 2011) have applied the pseudo market timing theory and tested its validity on PE- and VC-backed IPOs. Their results are primarily in line with the theory suggested by Schultz (2003). Schöber (2008) found evidence that buyout-backed firms, which is a form of PE, are taken public when the stock market conditions are favorable with high equity valuations. As a result, PE firms do indirectly pseudo time the market because the IPOs become clustered at the high peaks, although the financial sponsors are directly unable to predict the market highs. Similarly to Schöber (2008), Ball et al. (2011) found evidence that VC firms do not directly target the market peaks when listing their portfolio companies, but indirectly manage to time and cluster their IPOs when equity valuations are high. As a result, Ball et al. (2011) argues that VC firms ability to pseudo time the market, can explain parts of their portfolio companies post-IPO underperformance.

4. Building the Hypotheses

In order to evaluate our research question, we have specified five main hypotheses for this paper using the result extracted from existing literature and the reasoning from the theoretical framework. Included in each main hypothesis, there are two sub-hypotheses intended to provide inference towards the short- and long-run post-IPO performance of the firms.

The first and second hypotheses, H1 and H2, are primarily built as a basepoint to quantify the results provided by previous scholars. As mentioned earlier, this paper will distinguish between PE and VC similarly to Aizenman and Kendall (2008) and Michala (2019) in order to be able to provide a valid inference towards the two kinds of funding. As a result, H1 and H2 are designed to evaluate whether there are any differences in post-IPO performance between PE- and VC-backed IPOs in relation to public offerings that are not sponsored by a financial institution. The definition for post-IPO performance is furthermore divided into short- and long-run as highlighted by the two sub-hypotheses.

From the existing literature that examines the aftermath of sponsored-backed IPOs, the general results is that sponsored-backed IPOs exhibits signs of underperformance (Rindermann, 2004, Que & Zhang, 2019), or that the results depend on which return metrics is used (Brav & Gompes, 1997, Ritter, 2015). Using the above reasoning together with the pseudo market timing theory, our first and second hypotheses test whether PE- and VC-backed offerings perform worse after the IPO compared to non-sponsored-backed offerings.

H1: *PE-backed IPOs exhibit inferior post-IPO performance compared to non-sponsored-backed IPOs.*

H1a: *PE-backed IPOs exhibit inferior short-term performance compared to non-sponsored-backed IPOs.*

H1b: *PE-backed IPOs exhibit inferior long-term performance compared to non-sponsored-backed IPOs.*

H2: *VC-backed IPOs exhibit inferior post-IPO performance compared to non-sponsored-backed IPOs.*

H2a: *VC-backed IPOs exhibit inferior short-term performance compared to non-sponsored-backed IPOs*

H2b: *VC-backed IPOs exhibit inferior long-term performance compared to non-sponsored-backed IPOs*

The third hypothesis used in this paper is constructed to assess whether PE- or VC-backed IPOs perform differently in the short- and long-run against each other. Previous studies often group these two types of financial sponsors together, despite clear differences in investment strategies (Aizenman & Kendall, 2008; Breuer & Pinkwart, 2018). The existing research on market timing suggested that private equity firms often aim for faster exits due to risk profiles, which can cause weaker long-term performance after the IPO (see e.g. Lerner, 1994; Ball et al,. 2011; Cao, 2011). Based on these differences and again applying the pseudo market timing theory, our third hypothesis tests whether venture capital-backed IPOs, outperformance private equity-backed IPOs in both the short- and long-run.

H3: *VC-backed IPOs exhibit superior post-IPO performance compared to PE-backed IPOs.*

H3a: *VC-backed IPOs exhibit superior short-term performance compared to PE-backed IPOs.*

H3b: *VC-backed IPOs exhibit superior long-term performance compared to PE-backed IPOs.*

The fourth hypothesis in this study is provided in order to evaluate how the credibility of PE- and VC firms affect their portfolio companies' performances post-IPO. Building upon the signaling theory, if an IPO is backed by a financial sponsor, it can signal a certain type of quality to outside investors (Tong & Wong, 2020). This implies that if the signal works, it should be able to inform other investors in the market about the level of credibility or lack of credibility the IPO firm is sponsored by. Following the above suggestion, this may affect the

post-IPO performance of the firm going public in terms of how the company is perceived in the market by external investors.

Continuing on the potential information asymmetry, H4 is also constructed using the adverse selection theory. The underlying credibility of the sponsor firms does not only affect the information asymmetry between the financial sponsors and the market, as suggested by the signaling theory, but also between the sponsors and their own investors. As a result, higher credibility may induce better corporate transparency and reputation among the internal stakeholders of the sponsoring firm. This could in turn create positive synergies on their holding companies, potentially affecting the post-IPO performance. Based on this, H4 is built using both theoretical frameworks as the different levels of information asymmetry may induce various positive or negative externalities on the sponsored firms post-IPO performances. The effect is furthermore subject to the studied time frame, as highlighted by the two sub-hypotheses.

H4: *Superior credibility of the financial sponsors will improve the post-IPO performance of PE- and VC-backed IPOs.*

> H4a: *Superior credibility of the financial sponsors will improve the short-run performance of PE- and VC-backed IPOs.*
>
> H4b: *Superior credibility of the financial sponsors will improve the long-run performance of PE- and VC-backed IPOs.*

The fifth and last hypothesis in this paper is constructed on the same basis as H4, but aimed towards examining if sponsor credibility imposes different effects on post-IPO performance between PE- and VC-backed IPOs. That said, H5 and its sub-hypotheses is tested by including an interaction term and thus quantifies if the effect of sponsor credibility alters depending on whether the firm going public is funded with private equity or venture capital. In this hypothesis, we once more apply the theoretical framework of signaling and adverse selection theory and thus extend the analysis in order to evaluate if potential differences in PE and VC sponsors' credibility affect post-IPO performance of their portfolio firms.

H5: *Sponsor credibility imposes more positive effects on the post-IPO performance for PE-backed IPOs in comparison to VC-backed IPOs.*

H5a: *Sponsor credibility imposes more positive effects on the short-run performance for PE-backed IPOs in comparison to VC-backed IPOs.*

H5b: *Sponsor credibility imposes more positive effects on the long-run performance for PE-backed IPOs in comparison to VC-backed IPOs.*

5. Methodological Framework

In section 5, the methodology used to test the hypotheses and answer the research question will be presented. We start by describing all the relevant variables that will be used in the regressions and then proceed by specifying the chosen econometric model. In this section, we will also present two robustness tests that will be conducted in order to validate our primary model specification.

5.1 Variables

5.1.1 Dependent Variable

From the existing literature (see e.g. Loughran & Ritter, 1995**;** Brav & Gompers, 1997; Ritter, 2015), it is evident that the measurement for IPO performance can provide different results depending on how the returns are calculated. One of the most common approaches found in previous studies (see e.g. Ritter, 1991; Gompers & Lerner, 2003; Bergström et al., 2006; Que & Zhang, 2019) is to use cumulative abnormal returns, equally-weighted abnormal returns, buy-and-hold abnormal returns, CAPM alpha and Fama-French alpha to capture the performances of IPO firms. Following the proposed research question and hypotheses, the main dependent variable in this paper will be the buy-and-hold abnormal return (BHAR) of the underlying IPO firm, but in an arithmetic setting. That said, we are using a start-to-end approach in order to measure the pure arithmetic BHARs during the given event window.

The reason we choose arithmetic BHAR instead of other measurements is mainly driven by three arguments. First, the arithmetic setting enables us to avoid fluctuations that may introduce noise in the data because it purely measures the amount of value that was destroyed or created over the given period. Secondly, daily or monthly compounding BHARs can be sensitive to extreme gains or losses for specific days or periods in the market, especially when measuring short-run performance. Instead, the arithmetic BHARs reduce the risk of overvaluing extreme returns for the final value. The third argument is primarily driven by the lack of crucial information of certain PE- and VC-backing firms. If we were to use continuously compounded BHARs, we would also need to retrieve continuously compounded

data of the sponsor firms assets under management (AUM) in order to assess how the credibility of the PE- and VC firms affect the short- and long-run performance of the IPO firm. Although some data were available, the final data set would be too small for a sufficient and quality-based inference because the majority of the supporting firms AUM were not available to be continuously compounded. As a result, the absence of daily and monthly information about PE- and VC firms AUM caused us to choose arithmetic BHARs.

The definition for arithmetic buy-and-hold abnormal return is specified below in equation 1 and measures the difference between the arithmetic return of the IPO firm ($R_{i,\ t}$) and the arithmetic return of the benchmark country-specific market index ($R_{MarketIndex,\ t}$).

$$ABHAR_{i,\ t} = R_{i,\ t} - R_{MarketIndex,\ t} \quad (1)$$

In the equation above, *i* denotes the IPO firm and *t* explains the used time period. Similarly to previous scholars (Hamao et al., 2000; Bergström et al., 2006; Kumar, 2015), both the short- and long-run post-IPO performance will be assessed in this paper. We have chosen to use the lock-up period of 180 days post-IPO return as a measurement for the short-run performance and a 3 year post-IPO return for the long-run performance. The advantage of using the lock-up period as one time period is that the insiders of the IPO firm, such as the PE- or VC backing companies, are not allowed to change their equity stake during this time period (Bradley et al., 2001; Field & Hanka, 2001). As a result, the short-run stock performance should not be driven by sponsors selling their shares post-IPO and thus increasing downward pressure on the stock, but rather by other external factors such as sponsor reputation or current capital market conditions. Given this, the short-run arithmetic return will be calculated as the difference between the closing price of the lock-up trading date and the closing price of the first trading day, divided by the first day closing price. Similarly, the long-run arithmetic return is used on a 3 year period in accordance with previous scholars (see e.g. Ritter, 1991; Mian & Rosenfeld, 1993; Kumar, 2015; Que & Zhang, 2019) and is calculated as the difference between the closing price of the third year trading day and the first day closing price, divided by the first day closing price. The formal definition of the arithmetic return of IPO firm *i* is specified below in equation 2,

$$R_{i,\ t} = \frac{P_{i,\ end} - P_{i,\ start}}{P_{i,\ start}} \quad (2)$$

where $P_{i,end}$ is the closing price of the IPO firm at the end of the given event window and $P_{i,start}$ is the closing price of the IPO firm at the first trading day. The reason we choose to use the closing price of the first trading day and not the offer price as the starting point, is because we want to exclude any potential effects of under- or overpricing in the IPO (Hamao et al., 2000; Schöber, 2008). The definition for the arithmetic return of the benchmark market index for each country is calculated similarly to equation 2 above. In order to avoid a currency effect, the prices used for the IPO firm and the benchmark index are both reported in the same local currency where the IPO firm is listed. If the last trading day of the given event window is scheduled on a non-trading day, we have used the closing price of the nearest trading day. In addition, if the IPO firm were delisted within 3 years from the IPO date, we have used the closing price of the last trading day (Brav & Gompers, 1997; Schöber, 2008) to calculate the long-run firm arithmetic return.

5.1.2 Independent Variables

Based on the proposed research question and given that the main contribution of this study is linked to how PE- and VC firms' credibility affect the performance of sponsored-backed IPOs, the first independent variable in this study is the type of backing the IPO firm had when going public. This implies that each IPO firm will be categorized from having PE- or VC backed funds using dummy variables. This is a common approach found in the existing literature (see e.g. Brav & Gompers 1997; Hamao et al., 2000; Bradley & Jordan, 2002; Schöber, 2008; Michala, 2019; Que & Zhang, 2019) where the PE dummy takes the value of 1 if the IPO firm is backed by private equity and 0 otherwise. Similarly, the VC dummy takes the value 1 if the IPO firm is backed by venture capital and 0 otherwise. The classification is made using publicly available data from Bloomberg and S&P Capital IQ on the type of funds the IPO firm has been financed with prior to the IPO. Given this, observations with an unspecified type of funding have been withdrawn from the final sample in order to provide a valid reasoning.

The second independent variable, which is constructed to provide inference towards the fourth and fifth hypotheses, is the credibility of the sponsor-backing firm. Previous scholars (see e.g. Gompers, 1996; Brav & Gompers, 1997; Balboa & Martí, 2007; Krishnan et al.,

2011; Que & Zhang, 2019) have used different measures in order to test and quantify the reputation of VC- or PE firms. Among those that have been used, reputational measures have been constructed using the past market share of previous sponsor-backed IPOs, funds under management, age of the sponsoring firm, and operating performance of portfolio companies. Following a somewhat modified approach to Balboa & Martí (2007) which used funds under management to determine the reputation of PE managers, we will use each sponsoring firm's assets under management (AUM) reported on the closest day to the IPO date as a measure of credibility. The reason we choose this parameter is because it can reflect investor confidence and historical track records of PE- and VC firms, which may affect how the sponsored-backed IPO is perceived in the market when going public (Balboa & Martí, 2007). Building upon this, it is important to mention that the level of AUM can vary extensively between the backing firms. Some firms may be relatively new and less established in the market, while some are internationally recognized with larger funds. As a result, the AUM metric will be stored and reported in its natural logarithmic form (Hamao et al., 2000; Que & Zhang, 2019) in order to prevent a skewed distribution and potential outliers while still capturing heterogeneity properties within each sponsor type.

5.1.3 Control Variables

As part of investigating which types of sponsoring and how their equivalent credibility impacts the short- and long-run IPO performance, this study also aims to account for certain firm-specific control variables. Previous scholars (see e.g. Brav & Gompers, 1997; Hamao et al., 2000; Eckbo & Norli, 2005; Schöber, 2008; Ritter, 2015; Michala, 2019) have used different types of control variables that describe certain firm characteristics in the IPO process. Variables such as firm size, book-to-market equity ratio, return on assets, offerings proceeds and age are commonly used by previous researchers, but the results on their statistical significance towards IPO performance are mixed. In this study, we have decided to use IPO offer size, return on assets (ROA) and firm size of the underlying IPO firm as the main control variables of interest. The reason we choose to delimit the control variables solely towards the IPO firms is primarily driven by the fact that we want to retain the analysis of the performance at the IPO level similarly to previous scholars (Hamao et al., 2000; Ritter, 2015). By using IPO firm fundamentals as controls, we ensure that the control evaluation is based on comparable characteristics across all IPOs regardless of the backing type, while still

allowing for sponsor influence using PE- and VC dummies alongside the AUM independent measure.

When investigating post-IPO performance, the IPO offer size is a control variable that is frequently used in the existing literature (see e.g. Megginson & Weiss, 1991; Jain & Kini, 1994; Hamao et al., 2000; Schöber, 2008; Krishnan et al., 2011; Michala, 2019). It is defined as the total value of shares sold at the offer price in the pre-issue state of the IPO and is usually referred to as the gross proceeds. In this paper, the IPO offer size will be transformed into its natural logarithmic value in accordance with previous scholars (Megginson & Weiss, 1991; Hamao et al., 2000; Krishnan et al., 2011) in order to prevent a skewed distribution of potential outliers. The reason behind this decision is that the gross proceeds can vary extensively between IPO firms, primarily due to fundamentals such as age and the assessed firm valuation in the pre-IPO state. Return on assets is a financial ratio that measures the profitability of a firm in relation to its total assets. The ROA ratio has been used in more recent times as a control variable in the literature (see e.g. Michala, 2019; Que & Zhang, 2019) and is defined as the firm's net income, divided by the book value of total assets. The last control variable used in this paper is the firm size of the IPO company. Firm size is, similarly to the above mentioned control variables, commonly used by previous scholars (see e.g. Brav & Gompers, 1997; Hamao et al., 2000; Bradley et al., 2001; Schöber, 2008; Que & Zhang, 2019) and it is measured by the natural logarithmic value of the IPO firm's total assets.

5.2 Fixed effects Multivariate Ordinary Least Squares

In order to assess the arithmetic BHARs and evaluate post-IPO performance in both the short- and the long-run, we have decided to use the Fixed effects Multivariate Ordinary Least Squares model and accounting for robust standard errors. This method follows that of previous scholars, who evaluate similar dependent and control variables that are being used in this paper (see e.g Krishnan et al., 2011; Que & Zhang, 2019; Tong & Wong, 2020). The main reason for choosing this model is that it allows us to control for multiple firm-level factors while also accounting for unobserved factors that vary across time and industry. Since we include several explanatory and control variables, such as sponsor type, sponsor

credibility, firm size, return on assets and offer size, a multivariate setup is needed (Que & Zhang. 2019).

To improve the model-specification, we include fixed effects for both year and industry. This helps to control for factors that remain constant within a given year or industry but may still influence post-IPO performance. In order to provide consistency throughout this paper, we will also present a result when year- and industry fixed effects are excluded from the model. The reason behind this is that we want to be able to examine the R-squares for each estimation, and thus evaluate how well the estimated regressions fit the observation. More specifically, if a fraction of post-IPO performance is actually explained by year- and industry-specific fixed effects (Verbeek, 2017).

As our sample contains sponsor-backed IPOs where some sponsors appear multiple times, we also account for robust standard errors clustered at the sponsor level. Reason being that a repeated structure introduces potential correlation in the error term across IPOs linked to the same sponsor. As a result, clustering helps to control and adjust for heteroskedasticity and autocorrelation within the clusters (Petersen, 2008; Krishnan et al., 2011; Verbeek, 2017), ensuring that our statistical inferences are not biased by these issues. In order to furthermore validate our model selection, we will also include country-specific fixed effects to test the robustness of the initial framework. The reason behind this is because we want to see if the model estimation changes significantly when accounting for country fixed effects and if a fraction of post-IPO performance is explained by the country association.

In order to test our hypotheses, we run four separate fixed effects multivariate OLS regressions, labeled (1) through (4) below. Each regression is based on a specific reference group. Regression (1) focuses on the difference in post-IPO performance between sponsored-backed and non-sponsored-backed firms. In this setup, non-sponsored-backed IPOs are used as the reference group, allowing us to isolate the general effect of sponsor involvement on the post-IPO performances. For regression (2), we aim to investigate the difference between venture capital-backed IPOs and private equity-backed IPOs whereas in regression (3) and (4), the credibility of these sponsor-backed firms are also evaluated. In these regressions VC-backed IPOs serve as the references group. In addition to adding the credibility variable in regression (3), we include an interaction term in regression (4) between the private equity dummy and our credibility measure. That said, the interaction term is

constructed by multiplying the PE dummy variable with the natural logarithmic value of the AUM. The usage of an interaction term follows earlier studies (e.g. Bergström et al., 2006; Bradley et al,. 2011; Que & Zhang, 2019) and helps to test differences in the effect of credibility between PE- and VC sponsors in relation to post-IPO performances. By interacting this variable with the private equity dummy, we can assess which sponsor credibility matters more within the two specific sponsor types.

$$(1)\ ABHAR_{i,t} = a + B_1 PE\_dummy_{i,t} + B_2 VC\_Dummy_{i,t} + B_3 ROA_{i,t} + B_4 FirmSize_{i,t} + B_5 OfferSize_{i,t} + B_6 IndustryFE_i + B_7 YearFE_t + \varepsilon_{i,t}$$

$$(2)\ ABHAR_{i,t} = a + B_1 PE\_Dummy_{i,t} + B_2 ROA_{i,t} + B_3 FirmSize_{i,t} + B_4 OfferSize_{i,t} + B_5 IndustryFE_i + B_6 YearFE_t + \varepsilon_{i,t}$$

$$(3)\ ABHAR_{i,t} = a + B_1 PE\_Dummy_{i,t} + B_2 Credibility_{i,t} + B_3 ROA_{i,t} + B_4 FirmSize_{i,t} + B_5 OfferSize_{i,t} + B_6 IndustryFE_i + B_7 YearFE_t + \varepsilon_{i,t}$$

$$(4)\ ABHAR_{i,t} = a + B_1 PE\_Dummy_{i,t} + B_2 (PE\_Dummy * Credibility)_{i,t} + B_3 Credibility_{i,t} + B_4 ROA_{i,t} + B_5 FirmSize_{i,t} + B_6 OfferSize_{i,t} + B_7 IndustryFE_i + B_8 YearFE_t + \varepsilon_{i,t}$$

5.3 Robustness Tests

In order to assess the robustness of this paper, we have included two different robustness tests. One test is attributed towards the dependent variable of post-IPO performance, while the other test aims to examine the main independent variable of PE- and VC firms' credibility. Both robustness tests are constructed to evaluate the validity of the initial methodological framework in this paper and should therefore be interpreted as a complement to the main approach.

5.3.1 Age of Sponsoring Firm

Previous scholars have used the age of the sponsor-backing firm as a proxy for sponsor credibility or reputation (see e.g Barry et al,. 1990; Gompers, 1996: Wong et al,. 2013).

Although the findings vary on whether sponsor age is associated with higher or lower levels of underpricing, the literature generally agrees that the longer a financial sponsor has been in business, the more likely it is to signal quality and attract investor demand. While sponsor age is often discussed in the existing literature in relation to underpricing, the same underlying logic applies to post-IPO performance. A more established sponsor may bring greater experience and stronger networks, both which could positively influence a portfolio firm's performance after going public. Based on this reasoning, we use the age of the PE- and VC firms as a robustness test for our credibility measure. Sponsor age is measured as the number of years between the founding year of the sponsor firm and the IPO listing date of their portfolio firm. To assess the robustness of our credibility findings, we re-run regressions (3) and (4) using the age measure instead of the logarithmic value of assets under management.

5.3.2 Return on Assets Proxy

To furthermore provide robustness in this study, we will quantify a different dependent variable similarly to previous scholars. (see e.g. Jain & Kini, 1994; Krishnan et al., 2011; Que & Zhang, 2019). More specifically, we will use return on assets as a measurement of long-run post-IPO performance. Given that ROA is defined by the ratio of a firm's net income and book value of total assets, ROA as a dependent variable can be interpreted in several ways. Jain & Kini (1994) defines it as the post-IPO operating performance, while Que & Zhang (2019) argues that it measures the post-IPO profitability performance of the firm. Krishnan et al. (2011) uses it to measure pure post-IPO performance. Following the proposed hypotheses in this paper, we will utilize the definition of ROA similarly to Krishnan et al. (2011) and thus use the ROA metric as the dependent variable in regressions (1) to (4) in order to measure the long-run post-IPO performance. One distinction in this approach to the initial setup of arithmetic BHARs, is that only the 3 years post-IPO performance will be assessed. The reason behind this is that the short-run return, measured by the lock-up period, is not available to sufficiently calculate using the ROA. As a result, ROA as a proxy for post-IPO performance will be restricted to only examine long-run performance in accordance with Krishnan et al. (2011).

6. Data & Summary Statistics

Section 6 is constructed in order to describe our data set. In the first subsection, we will present the time frame used and perform an inspection of the sample in terms of countries and industries included, alongside other relevant screening. The section is then concluded by examining the descriptive statistics of the sample together with pairwise correlation tables.

6.1 The Sample

In this paper, the Bloomberg terminal has been used as the main source for the collection of our IPO data. In absence of crucial records on Bloomberg, other sources such as S&P Capital IQ and Refinitiv Eikon have been used to extract missing data when possible, but also for a screening purpose of the initial data. As part of the screening, we excluded all IPOs that did not contain information on all the relevant variables. In addition, those IPOs being backed by both private equity and venture capital were also excluded in order to prevent a duplicated dataset. The cross-sectional IPO sample used in this study is recorded between 2009-01-01 and 2019-12-31 and encompasses a total of 797 observations, divided over PE- and VC-backed IPOs, against non-sponsored-backed IPOs for seven European countries. Out of the total sample size, 178 observations are PE-backed IPOs and 88 are VC-backed IPOs, amounting to 266 sponsored-backed IPOs in total. The remaining 531 records are non-sponsored backed IPOs and the seven countries included in the dataset are Sweden, Denmark, Finland, Norway, Iceland, Germany and the United Kingdom.

In order to be able to calculate the abnormal returns of the IPOs, we furthermore extracted country-specific benchmark indices from investing.com for each of the seven countries included in the sample. The reason we choose individual indices instead of a global market index is because we want to avoid a potential currency effect or skewed results of using inefficient comparables. The used market indices are OMXS30 for Sweden, OBX for Norway, OMXH25 for Finland, OMXC20 for Denmark, OMXIPI for Iceland, DAX40 for Germany and FTSE100 for the United Kingdom. Following the methodology proposed for measuring short- and long-run performance of the underlying IPOs, the market indices are recorded on a daily basis between 2009-01-01 and 2023-01-01 and thus captures all listed

IPOs up until 2019-12-31 along with three additional trading years. Each IPO return is then matched to the equivalent market return for the desired date and country.

From the seven countries used in the data set, the United Kingdom, followed by Sweden and Germany represents the largest number of IPOs between 2009-01-01 and 2019-12-31 with approximately 44%, 29% and 10% respectively of the total offerings. This is highlighted in the appendix, table A1 and encompasses all IPO types. Table A2 through A4 showcases the total number of IPOs in each country, separated by the backing type. For PE-backed firms, the United Kingdom denotes the largest number of PE-backed IPOs at 45%, followed by Sweden at 26% and Germany at 12%. In the case of VC-backed IPOs, Sweden has the most number of VC-backed IPOs during the given period at 41%, followed by the United Kingdom at 35% and Denmark at 8%. Lastly, the largest number of non-sponsored-backed IPOs is found in the United Kingdom at 45% of the sample. In second place comes Sweden at 28%, followed by Germany at 10%. Notably, it is evident that most of the IPOs firms are listed in either the UK, Sweden or Germany, regardless if they are sponsored-backed or non-sponsored-backed. This is reasonable given that these countries have the largest financial markets among the countries included in this sample.

In table A5 in the appendix, the total number of IPOs are divided by the IPO-firm industry classification. As noted in table A5, *software* has the highest representation among the firms listed at approximately 8% out of the total sample. In second place comes *biotechnology* at 6%, followed by *commercial services* and *pharmaceuticals* at 5,9% each. Looking at the allocation of all the industries encompassed in the sample, it is clear that there is a large variety of industries included. As a result, we consider the allocation to be sufficient because all firms have a minority stake in the entire sample, preventing the distribution to be skewed towards one or several industries.

6.2 Descriptive Statistics

In tables 1 to 3 below, the descriptive statistic for our sample is presented. Table 1 and 2 reports the statistical results for PE- and VC-backed IPOs, while table 3 reports the statistics for non-sponsored-backed IPOs. Starting with table 1 and 2, the arithmetic BHAR for the PE-backed IPOs is relatively low for the first 180 days at 0.077 on average in comparison to

VC-backed IPOs at 0.128 on average for the same time period. This suggests that VC-backed IPOs perform better on average than PE-backed IPOs in the short-run. The 3 year ABHAR is significantly higher on average for VC-backed IPOs than PE-backed IPOs, as highlighted by the values of 0.226 and 0.407. The median ABHAR for PE-backed IPOs is 0.057 for the first 180 days and 0.023 for the long-run, while the median for VC-backed IPOs is -0.059 and -0.186 respectively. The independent variable measuring credibility has a mean of 9.097 for PE firms and 6.767 for VC firms, with medians of 8.745 and 6.421 respectively. This suggests that PE firms, on average, have higher credibility than VC firms, as measured by the natural logarithmic value of assets under management.

Moving on to the control variables in table 1 and 2, the mean natural logarithmic value of the offer size is 5.13 for PE-backed IPOs and 3.246 for VC-backed IPOs. Their respective medians are once more larger for PE firms at 5.364 than for VC firms at 3.306. The mean firm size is 6.13 with a median of 6.343 for PE-backed IPO companies, while VC-backed IPO firms have a mean of 3.874 and median amounting to 3.922. This statistical result provides a similar relationship to the offer size and should therefore be sufficient given that PE firms usually invest in larger and more mature firms, while VC firms target smaller start-up companies. As a result, it is reasonable that both offer- and firm size is smaller for VC-backed IPOs than for PE-backed IPOs. ROA has a mean of -0.076 and median of 0.017 for IPOs that are PE-backed, while the mean and median ROA for VC-backed IPOs are -0.35 and -0.203 respectively. The underlying age of the financial sponsors are somewhat similar across the PE- and VC firms. For PE firms, the average age is 24.472 years, while VC firms are on average 23.682 years old. Their medians are somewhat different at 22 years old for PE firms, and 15.5 years old for VC firms. Referring once more to the matter of size, total assets for PE-backed firms are significantly larger on average at 2607.726 with a median of 568.75, while VC-backed companies total assets amount to 858.524 on average with a median of 50.55.

Table 1: Descriptive Statistics - PE-backed IPOs

Variable	Obs	Mean	Median	Std. Dev.	Min	Max
ABHAR 180 days	178	0.077	0.057	0.28	-0.53	0.795
ABHAR 3 years	178	0.226	0.023	1.071	-1.667	5.726
Credibility	178	9.097	8.745	2.251	4.007	16.213
Offer size (ln)	178	5.13	5.364	1.457	.953	7.807
Firm size	178	6.13	6.343	2.138	-2.883	11.444
ROA	178	-0.076	0.017	0.374	-3.156	0.422

Age	178	24.472	22	15.205	1	103
Total assets	178	2607.726	568.75	8526.594	0.056	93385.5

Table 2: Descriptive Statistics - VC-backed IPOs

Variable	Obs	Mean	Median	Std. Dev.	Min	Max
ABHAR 180 days	88	0.128	-0.059	0.829	-0.646	5.721
ABHAR 3 years	88	0.407	-0.186	1.825	-1.264	11.059
Credibility	88	6.767	6.421	1.511	3.714	10.915
Offer size (ln)	88	3.246	3.306	1.869	-1.156	7.771
Firm size	88	3.874	3.922	2.516	-0.511	10.088
ROA	88	-0.35	-0.203	0.537	-3.156	0.408
Age	88	23.682	15.5	22.734	4	118
Total assets	88	858.524	50.55	3032.243	0.6	24059.8

Turning to table 3 below for non-sponsored IPOs, the average ABHAR over 180 days is 0.208 and the median is 0.0601. Over the 3 year period, the average ABHAR is 0.485 with a median of -0.1108. Both mean returns are higher than those reported for sponsor-backed IPOs. This suggests that IPOs without a financial sponsor may outperform sponsor-backed IPOs on average in both the short- and long-run, although the variations are high in both groups. These patterns are explored in more detail in the regression analysis that follows. The average offer size is 3,06 with a median of 3.02, and the average firm size is 4,42 with a median amounting to 4.36. ROA is -0,176 on average, with a median of -0.042.. Total assets has a mean of approximately 1771 and the median is 78.2. In general, the descriptive statistics in our sample are consistent with those found in the existing literature (see e.g. Hamao et al., 2000; Bradley et al., 2011; Krishnan et al., 2011; Que & Zhang 2019).

Table 3: Descriptive Statistics - non-sponsored backed IPOs

Variable	Obs	Mean	Median	Std. Dev.	Min	Max
ABHAR 180 days	531	0.208	0.0601	1.088	-1.031	21.391
ABHAR 3 years	531	0.485	-0.1108	2.537	-1.986	23.321
Offer size (ln)	531	3.063	3.0235	2.086	-2.103	8.513
Firm size	531	4.415	4.3593	2.704	-3.871	12.137
ROA	531	-0.176	-0.042	2.61	-24.59	49.909
Total assets	531	1771.21	78.2	9675.19	0.021	186716

In the appendix, table A6 we have extracted a table of descriptive statistics on sponsored-backed IPOs as a whole, including both PE- and VC-backing. The average of the arithmetic buy-and-hold abnormal return for the 180 days period is 0,094 and the median is

0,0261. The three year mean for the arithmetic BHAR is 0,286 with a median of -0,0185. When considering the control variables, the average for the credibility measurement is 8,26 with a median of 8.0358 , offer size has an average of 4,507 with a median of 4,5. Firm sizes has an average of -0,167 and the median is 5,7218, and lastly returns on assets has an average of -0.167 with a median of 0,0015. Looking at the age proxy, the average age of the sponsoring firm is 24,2 with a median of 20 years.

6.2.1 Pairwise Correlation Tables

As part of the descriptive statistics, we have also constructed two pairwise correlation tables, separating sponsored- and non-sponsored-backed IPOs. From table 4 below, we can observe that the credibility measurement is positively correlated with the short-run arithmetic BHAR, while the long-run ABHAR shares a negative correlation. It is however worth noting that the apparent correlation is weak, with relatively small correlation coefficients. Table 4 also suggests that the short- and long-run ABHARs are positively correlated although the relationship is moderate. Nevertheless, this may suggest that strong short-term post-IPO performance can induce better long-term post-IPO performance which is a reasonable assumption to suggest. Amongst the control variables, the highest correlation with the short-run arithmetic BHAR is found with the ROA metric, providing a positive correlation. At the same time, firm size shares the strongest positive correlation with the long-run arithmetic BHAR, although the correlation coefficient is relatively low. The highest correlation among the sponsored-backed IPOs is found between the credibility metric and firm size, which suggests that larger firms tend to be associated with higher credibility. Furthermore, both firm size and credibility are positively correlated with ROA, suggesting that better profitability is aligned with higher credibility and firm size.

Table 4: Pairwise correlations - sponsored-backed IPOs

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) ABHAR 180 days	1.000						
(2) ABHAR 3 years	0.316	1.000					
(3) Credibility	0.032	-0.076	1.000				
(4) Offer size (ln)	-0.020	0.028	0.317	1.000			
(5) Firm size	0.071	0.116	0.633	0.331	1.000		
(6) ROA	0.141	0.082	0.343	0.209	0.611	1.000	

(7) Age proxy	-0.007	-0.025	0.355	0.001	0.106	-0.003	1.000

In table 5 below, the results on the pairwise correlation of non-sponsored backed IPOs are presented. From the table, it is evident that the short- and long-run ABHARs are positively correlated, but with a relatively small correlation coefficient. This relationship is similar to that of sponsored-backed IPOs in table 4, although with a weaker association for IPOs not backed by a financial sponsor. The strongest correlation amongst the non-sponsored-backed IPOs is found between the control variables offer size and firm size. This is an expected result because it suggests that larger firms are more inclined to issue larger IPOs which is a reasonable assumption to make given that larger firms require more capital to be raised in an IPO. ROA is close to having no correlation with the arithmetic BHARs in both the short- and long-run. The general conclusion of table 4 and 5 suggests that sponsored-backed IPOs have stronger and more present relationships between the arithmetic BHARs and the underlying firm attributes.

Table 5: Pairwise correlations - non-sponsored backed IPOs

Variables	(1)	(2)	(3)	(4)	(5)
(1) ABHAR 180 days	1.000				
(2) ABHAR 3 years	0.085	1.000			
(3) Offer size (ln)	-0.065	-0.034	1.000		
(4) Firm size	0.008	0.053	0.763	1.000	
(5) ROA	-0.020	-0.011	0.064	0.151	1.000

7. Results & Empirical Discussion

This section presents the results from the methodological framework outlined in section 5 and provides an empirical discussion to address our hypotheses. First, we evaluate the fixed effects multivariate OLS results using non-sponsored-backed IPOs as the reference group to test hypotheses 1 and 2. Next we present the results using VC-backed IPOs as the reference group to assess hypotheses 3 through 5. Finally, we report the outcomes of the robustness test.

7.1 Fixed Effects Multivariate Ordinary Least Squares

7.1.1 VC- & PE-backed IPOs against non-sponsored-backed IPOs

To evaluate whether PE- and VC-backed IPOs underperform compared to non-sponsored IPOs, we analyze the result from table 6 using regression model 1 presented in 5.2. Column (1) shows the short-term performance (ABHAR 180 days) and column 2 demonstrates the results for the long-term performance (ABHAR 3 years). Column (3) and (4) have the same return matrix but without controlling for year- and industry fixed effects.

Table 6: Fixed Effects Multivariate OLS with non-sponsored-backed IPOs as reference group

	(1)	(2)	(3)	(4)
VARIABLES	ABHAR 180 days	ABHAR 3 years	ABHAR 180 days	ABHAR 3 years
PE Dummy	-0.189***	-0.217	-0.0792***	-0.225
	(0.0403)	(0.184)	(0.0333)	(0.176)
VC Dummy	-0.174	-0.125	-0.0537	0.00149
	(0.113)	(0.214)	(0.0956)	(0.248)
ROA	-0.00794	-0.0203	-0.00892	-0.0247***
	(0.00552)	(0.0297)	(0.00604)	(0.00865)
Firm size	0.0498***	0.153***	0.0341***	0.117***
	(0.0140)	(0.0408)	(0.0113)	(0.0314)
Offer Size (ln)	-0.0464**	-0.108*	-0.0531*	-0.112**
	(0.0219)	(0.0555)	(0.0288)	(0.0445)

Constant	0.160***	0.140	0.219*	0.307**
	(0.0478)	(0.220)	(0.119)	(0.128)
Observations	791	791	797	797
R-squared	0.075	0.085	0.012	0.014
Industry fixed effect	Yes	Yes	No	No
Year fixed effect	Yes	Yes	No	No

Robust standard errors in parentheses

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

Starting from the short-term results, the PE dummy shows a statistically significant negative coefficient of -0.189 at the 1% confidence level. This indicates that PE-backed IPOs underperform with -18.9 percentages points relative to non-sponsored backed IPOs during the first 180 days after the IPO. This result supports our first sub-hypothesis such that we fail to reject H1a, indicating that PE-backed IPOs exhibit inferior post-IPO performance in the short-run compared to IPOs that are not backed by a financial sponsor. For VC-backed IPOs, we find evidence of underperformance by -17,4 percentage points but this result is not statistically significant. This suggests that while VC-backed IPOs also show lower arithmetic BHARs compared to non-sponsored backed IPOs, the evidence is weaker and not conclusive in the short term. As a result, we reject H2a.

Moving to the long-term performance in column (2), the PE-dummy again has a negative coefficient of -0.217. However, this time the result is statistically insignificant, implying that the underperformance of PE-backed IPOs compared to non-sponsored IPOs does not have the same conclusive evidence in the long-run. Therefore, sub-hypothesis H1b is rejected. Taken all together, while PE-backed IPOs underperform relative to non-sponsored-backed IPOs in the short-run, the effect is present but not statistically significant over the long-run. As a result, the overall support for hypothesis H1 is mixed because there is significant support for failing to reject H1a, but not H1b. The VC dummy remains negative and statistically insignificant in the long run at -0.125. This result suggests that we reject H2b because the long-run performance of VC-backed IPOs cannot be proven to be statistically different from IPOs that are not backed by a financial sponsor.

These results match earlier studies that found evidence towards the fact that sponsored-backed IPOs tend to perform worse initially (Rindermann, 2004; Que & Zhang, 2019), even though the relationship is not statistically significant in the long-run

(Rindermann, 2004). The estimated coefficient for the VC dummy is supported from the findings drawn by Hamao et al. (2000). The authors, similarly to us, found no statistical long-run outperformance among VC-backed firms compared to other IPOs. One explanation to the short-run underperformance among the PE-backed IPOs could be found using the pseudo market timing theory. Schultz (2003) argued that IPO activity tends to cluster when valuations are high, not because firms can time the market, but rather that positive market conditions attract more firms to be listed. Schöber (2008) and Ball et al. (2011) found that PE firms often take companies public during such favourable periods which can lead to a high initial pricing mechanisms and lower returns post-IPO. Our short-run results fit this pattern, suggesting that PE-backed IPOs may be affected by timing and valuation pressures around the IPO event.

When comparing the regression results with the descriptive statistics in tables 1 through 3, the estimated coefficients for PE- and VC-backed IPOs appear to closely mirror the average differences in the ABHAR relative to non-sponsored-backed IPOs. For example, PE-backed IPOs have a mean 180-day ABHAR of 0.077 (table 1) compared to 0.208 for non-sponsored-backed IPOs (table 3), a gap of -0.13 which is somewhat similar in size to the -0.189 regression coefficient. This suggests that the observed performance gaps are not primarily driven by firm-level characteristics, as they persist even after including control variables and fixed effects. The lack of statistical significance in the long-run could be explained by the higher variance and extreme values in long-term ABHARs across all groups, as indicated by the descriptive statistics.

From column (3) and (4) in table 6, we compare the results when not including industry- and year fixed effects. The R-squares increase from 0.012 to 0.075 in the short-run and from 0.014 to 0.085 in the long-run when adding fixed effects. This shows that a portion of the variation in the post-IPO performance is explained by time-specific and industry-specific factors, which supports our initial framework of using a multivariate OLS with fixed effects. At the same time, the number of observations drops from 797 to 791. This happens because the model removes singleton observations when including fixed effects. Correia (2015) explains that dropping these are important in order to avoid biased inference in fixed effects models. Although the R-squares are relatively low across the two time periods, our significant coefficients still offer meaningful insights into how being backed by a financial sponsor can affect post-IPO returns (Verbeek, 2017).

7.1.1.1 Control Variables

When examining the estimated results for the used control variables, we receive statistical significance on firm size and offer size, but insignificant estimates for ROA. Starting with firm size which is statistically significant at the 1% level with a consistent and positive estimated coefficient across both time frames. These results are in line with the findings provided by previous scholars (see e.g. Brav & Gompers, 1997; Bradley et al., 2001; Schöber, 2008) where the effect is higher in the long-run model specification. Given these findings, firm size appears to be a significant predictor for positive abnormal returns such that larger IPO firms tend to outperform relative to smaller IPO firms in both the short- and long-run. One suggestion that can explain this pattern is the fact that the level of asymmetric information decreases when the firm size increases (Schöber, 2008), because larger firms are often associated with more available information. As a result, when large firms are offered to the public, it can create more investor attention such that the demand may increase and thus improve the liquidity of the offered shares. If such a situation occurs, this can potentially create positive synergies to the post-IPO performance (Schöber, 2008).

The estimated coefficients for offer size suggests that it shares a negative relationship with the arithmetic BHARs for both the short- and long-run. The association appears to be relatively small in the short-run (-0.0464) but statistically significant at the 5% level. The long-run relationship is proved to be even more negative (-0.108) and statistically significant at the 10% level. These results follow similar findings from approaches utilized by previous researchers (see e.g. Megginson & Weiss, 1991; Hamao et al., 2000), but is also inconsistent with reversed or insignificant results provided by other scholars (see e.g. Jain & Kini, 1994; Krishnan et al., 2011; Michala, 2019). In this paper, the significant relationship suggests that IPOs with larger offering sizes tend to underperform relative to their smaller peers both in the short- and long-run. As noted from the above-mentioned researchers, the existing empirical evidence on the relationship between offer size and post-IPO performance are mixed. However, in this paper, we find a consistent negative relationship through both time periods when using non-sponsored backed IPOs as the reference group.

The last control variable is ROA which is found to have an insignificant negative association with the arithmetic BHARs in both the short- and long-run. ROA is particularly small for the

short-run ABHAR (-0.0079) and somewhat more negative but still insufficient in the long-run (-0.0203). Given the low estimated coefficients, it is reasonable to assume that profitability is a weak signal for future short- and long-run abnormal returns. However, while the results are inconclusive, we argue that the low and negative coefficients can be related to pre-IPO expectations that may or may not already be priced in before the firm goes public which consequently could explain the weak association.

7.1.2 VC-backed IPOs against PE-backed IPOs

Table 7 presents the results from the multivariate fixed-effects OLS using regression model 2 specified in section 5.2, which aims to analyze the differences in post-IPO performance between PE-backed and VC-backed IPOs. The dependent variable is the arithmetic buy-and-hold abnormal return, calculated for the 180-day period in column (1) and for the three-year period in column (2). In this regression, venture capital-backed IPOs serve as the reference group. Similarly to the previous table, column (3) and (4) displays the results using the same regression model but without the adjustment for year- and industry fixed effects.

Table 7 - Fixed Effects Multivariate OLS with VC-backed IPOs as references group

	(1)	(2)	(3)	(4)
VARIABLES	ABHAR 180 days	ABHAR 3 years	ABHAR 180 days	ABHAR 3 years
PE Dummy	-0.136	-0.261	-0.102	-0.458
	(0.0829)	(0.350)	(0.103)	(0.313)
ROA	0.241***	0.334*	0.186***	0.0731
	(0.0433)	(0.171)	(0.0461)	(0.134)
Firm size	-0.00207	0.153**	0.00370	0.0831**
	(0.0123)	(0.0565)	(0.0149)	(0.0342)
Offer size (ln)	0.00720	0.114	-0.00434	0.0369
	(0.00782)	(0.130)	(0.0216)	(0.0970)
Constant	0.198	-0.807	0.193	-0.00907
	(0.131)	(0.595)	(0.127)	(0.401)
Observations	258	258	266	266
R-squared	0.164	0.222	0.028	0.031
Industry fixed effect	Yes	Yes	No	No
Year fixed effect	Yes	Yes	No	No

Robust standard errors in parentheses

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

The result from column (1), indicates that the coefficient for the PE-dummy is -0.136. Although the coefficient is negative, it is not statistically significant at any level. This suggests that PE-backed IPOs do not exhibit a statistically different performance from VC-backed IPOs during the lock-up period following the listing. In column (2), when examining the long-run returns, the coefficient for the PE dummy remains negative and statistically insignificant at -0.261. While this indicates that PE-backed IPOs underperform relative to VC-backed IPOs over both the three-months and three-year post-IPO period, the results are inconclusive and not empirically proven to be different from zero. This means that we are unable to confirm that there exists a significant performance gap between the two sponsor types based on our data. As such, we reject H3, and its two sub-hypotheses.

As mentioned previously, the existing literature that analyzes the differences between PE- and VC-backed IPOs is limited but also mixed, especially when it comes to comparing their post-IPO performance. Our findings do not fully support the conclusions of earlier studies, which usually points to a significant outperformance among VC-backed IPOs in relation to PE-backed IPOs. Levis (2011) and Que & Zhang (2019) suggested that PE-backed firms might perform worse over time due to premature exits or riskier structures. Furthermore, the estimated results do not fully confirm the pattern seen in Brav & Gompers (1997), where VC-backed IPOs showed stronger returns under certain conditions. Although our coefficients lean towards a stronger post-IPO performance for VC-backed IPOs in relation to PE-backed IPOs, the lack of statistical significance means that we cannot confidently say that VC-backed firms actually perform better, either in the short- or long-term.

One reason that could explain the lack of statistical significance is that PE- and VC sponsors offer different strategies but similar goals when taking companies public. PE-backed firms often benefit from stronger financial restructuring and operational improvements leading up to the IPO (Michala, 2019). On the other hand, VC-backed firms tend to bring innovative, high-growth potential companies to the market (Aizenman & Kendall, 2008; Breuer & Pinkwart, 2018). These differences may balance each other out in terms of investor expectations and valuation in the post-IPO state. What PE-backed firms gain in maturity and stability, VC-backed firms may match with high-growth expectations and long-term potential. This balancing effect could potentially explain the lack of statistical significance towards the

performance differences between the two groups post-IPO, and why the coefficient for the PE-dummy becomes more negative in the long-run. Another potential explanation is the timing of the IPO window itself. As discussed earlier, PE firms often list during periods of favorable market conditions, which can lead to elevated offering prices and lower returns afterward (Schultz, 2003; Schöber, 2008; Ball et al., 2011). Although the results are not statistically different from zero, the discussion is consistent with the pseudo market timing theory and thus suggests that the underperformance of PE-backed IPOs may be a consequence of clustered market peaks.

Column (3) and (4) shows the results from the same regressions, but without year- and industry fixed effects. The coefficient values and significant levels remain largely the same while the R-squares, similarly to before, increase when fixed effects are included. These results provide evidence that a fraction of the variation in post-IPO performance is explained by industry- and time-specific effects and thus validates our chosen methodological approach. In this regression model, the framework also drops eight singleton observations in order to mitigate a biased inference (Correia, 2015).

7.1.2.1 Control Variables

Moving on to the control variables, table 7 indicates that the return on assets variable shares a positive relationship with the arithmetic BHARs across both time periods. The association is significant at the 1% level in the short-run, while the level of significance is found at 10% for the long-run. This suggests that more profitable firms tend to deliver stronger abnormal returns after going public, both within 180 days and over a three-year period. This contradicts the findings from the previous regression when comparing PE- and VC-backed IPOs against non-sponsored-backed IPOs, where ROA was found to be insignificant and somewhat negative. As a result, profitability may have a more meaningful role when distinguishing between PE- and VC-backed IPOs, rather than evaluating the effect toward non-sponsored backed IPOs. One reason for these results could be the sample composition. Table 6 shows that non-sponsored-backed IPOs make up about two-thirds of the sample. These firms have higher variation in ROA while the correlation is almost non-existent as indicated by table 5. As a result, this weakens the overall link between profitability and returns when all firms are analyzed together. In contrast, when sponsor-backed IPOs are evaluated individually as in

table 7, ROA is somewhat positively correlated to ABHAR. A possible explanation for this pattern is that sponsored-backed firms may face lower information asymmetries. Investors may be better informed at the time of the IPO, which leads to fewer surprises later. As a result, returns may be more aligned with profitability in these firms.

Firm size has a negative and insignificant coefficient in the short-run, while the association turns positive at a 5% statistically significant level in the long-run. This suggests that larger firms tend to outperform over time whereas the relationship during the lock-up period of 180 days lacks conclusive evidence. In the previous regression model when comparing PE- and VC-backed IPOs against non-sponsored-backed IPOs, firm size was positive and statistically significant in both the short- and long-run, with a stronger effect present in the longer period. This result thus points to the idea that larger firms appear to benefit from reduced information asymmetry and higher investor attention, potentially boosting long-term performance. Building upon the same reasoning in accordance with previous scholars (see e.g. Brav & Gompers, 1997; Bradley et al., 2001; Schöber, 2008), the effect seems to once more be consistent in regression model 2. However, while we primarily see evidence of this dynamic among the two sponsor types, the pattern only holds in the long-run.

When considering offer size, the results from table 7 suggest that the variable is positive in both the short- and long-run, but statistically insignificant in both time periods. This differs from the previous regression, where offer size had a negative and significant relationship with post-IPO returns. In that case, larger offer sizes were more likely to underperform, whereas the relationship appears to be reversed in this regression model. This suggests that offer size may not play a distinct role in explaining differences in performance between PE- and VC-backed IPOs as highlighted by the lack of statistical significance.

7.1.3 Sponsor Credibility and Arithmetic BHARs

In this section, the fourth and fifth hypotheses will be evaluated from the estimated model specification. As part of the evaluation, we are interested in examining the individual relationship between arithmetic BHARs and credibility, but also the differences in the effect of credibility within PE- and VC sponsors against the arithmetic BHARs using an interaction term. That said, we utilize regression model 3 and 4 specified in section 5.2 and obtain the

results below in table 8. Note that column (1) and (2) is retrieved using regression model 3 without an interaction term, while column (3) and (4) estimates the model with the interaction term included using regression model 4. The dependent variable used is the arithmetic BHAR, specified for the short-run in column (1) and (3), while the long-run period is reported in column (2) and (4).

Table 8: Fixed Effects Multivariate OLS including credibility with VC-backed IPOs as a reference group.

Regression model	3	3	4	4
	(1)	(2)	(3)	(4)
VARIABLES	ABHAR 180 days	ABHAR 3 years	ABHAR 180 days	ABHAR 3 years
PE Dummy	-0.127	-0.120	-0.470*	-0.681
	(0.0937)	(0.209)	(0.197)	(0.917)
Credibility	-0.00984	-0.159**	-0.0512*	-0.224***
	(0.0159)	(0.0599)	(0.0224)	(0.0526)
PE*Credibility			0.0479*	0.0779
			(0.0199)	(0.101)
ROA	0.239***	0.304	0.246***	0.316
	(0.0422)	(0.350)	(0.0409)	(0.347)
Firm size	0.00329	0.239***	0.00672	0.244***
	(0.0184)	(0.0571)	(0.0194)	(0.0545)
Offer Size (ln)	0.00748	0.119***	0.00785	0.119**
	(0.00810)	(0.0286)	(0.00950)	(0.0300)
Constant	0.243**	0.000769	0.507**	0.333
	(0.0799)	(0.00319)	(0.133)	(0.462)
Observations	258	258	258	258
R-squared	0.165	0.254	0.169	0.256
Industry fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes

Robust standard errors in parentheses

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

Starting with the relationship between credibility and abnormal returns, table 8 suggests that there exists a negative association between a financial sponsor's credibility and the arithmetic BHARs. This is highlighted by column (1) and (2) with the estimated coefficients of -0.00984 for the short-run and -0.159 in the long-run. The relationship is statistically insignificant for the first 180 days of trading and significant on the 5% confidence level during the first 3

years of trading. Given the particularly low estimated coefficient for the short-run, the effect of sponsor credibility on abnormal returns is approximately zero. On the other hand, sponsor credibility is proved to be statistically different from zero in the long-run post-IPO performance, implying that higher credibility imposes lower arithmetic BHARs during the first 3 years of trading. These results, although somewhat inconclusive as a whole, suggest an opposite relationship between credibility and abnormal returns which requires us to reject H4 and its sub-hypotheses H4a, and H4b.

When considering the interaction term (PE*Credibility), we want to evaluate whether the relationship between one variable and its outcome is dependent on another variable. More specifically, we examine if the level of sponsor credibility on post-IPO performance is dependent on the type of financial backing the IPO firm had when going public. As highlighted in column (3) and (4) in table 8, the interaction term has positive coefficients across both time periods, taking the value of 0.0479 for the short-run and 0.0779 for the longer period. The result is statistically significant at the 10% level for the first 180 days, while the 3 year period is statistically insignificant. In addition, we can observe that the credibility term is statistically significant at the 10% level in the short-run and at the 1% level in the long-run as noted by the estimated coefficients of -0.0512 and -0.224. Given that venture capital is used as the reference group in regression 4, this implies that the short-run effect of credibility on VC-backed IPOs is -5.12 percentage points per 100% increase in credibility (AUM) while the long-run effect is -22.4 percentage points per 100% increase in credibility. For PE-backed IPOs, the short-run effect is -5.12+4.79 = -0,33 percentage points per 100% increase in credibility, while the long-run effect is estimated at -22.4+7.79 = -14.61 percentage points per 100% increase in credibility.

These results highlight the differences in sponsor credibility between PE- and VC firms across the two event windows. Based on the estimated coefficients, these findings suggest that IPOs backed by private equity experience somewhat lower negative effects from credibility in comparison to VC-backed IPOs, which is in line with hypothesis H5. Given the statistically significant result for the short-term, we can conclude that sponsor credibility does indeed have a more positive effect on the short-run performance for PE-backed IPOs in comparison to VC-backed IPOs. As a result, we fail to reject H5a. Due to the insignificant result of the estimated model in the long-run, we cannot conclude that sponsor credibility is

statistically different from zero between PE- and VC firms during the 3 year event window. As a result, sub-hypothesis H5b is rejected.

These results are both unexpected and anticipated to what we first projected to find, as highlighted by the rejection of H4 and the partial rejection of H5. While much of the existing literature has evaluated credibility and reputation of IPO underwriters, few studies have directly focused on the credibility of PE- and VC firms in relation to post-IPO performances. Therefore, these results using the assets under management as a measure for PE- and VC firms credibility should be seen as an initial step towards evaluating the effect of sponsor credibility on post-IPO performance. Nevertheless, we argue that the estimated results provide an interesting discussion towards a certain effect of having a credibility predictor for future performance.

The negative effect of sponsor credibility on general arithmetic BHARs suggests an opposite result to Krishnan et al. (2011) who used the IPO market share as a measure of reputation in the long-run. However, one reason that could explain the negative relationship is that the market has already priced in the effect of being backed by a financial sponsor. In such a case, this argument would suggest that the theory of efficient capital markets proposed by Fama (1970) would to a certain extent validate our sample because the effect of being backed by a sponsor is almost non-existent in the short-run. Building upon this discussion, the particularly small and insignificant result in the short-run may be derived from the fact that the external investors do not value credibility as a strong predictor for future performance. On the other hand, the somewhat more significant and negative association in the long-run could be as a result of model specification. While Krishnan et al. (2011) found a positive association between reputation and long-run performance, Que & Zhang (2019) found a negative relationship between reputation and abnormal returns when utilizing the fama-french alpha model to capture excess return. Given this, the association may be subject to the appropriate measure of returns for the individual sample.

Another interesting approach to this result is that the negative association can be linked to a potential overvaluation in the pre-IPO state of the sponsored-backed firm. More specifically, if an IPO firm is backed by a credible sponsor, then the selling PE- or VC firm would favor a stronger initial valuation in order to withhold their historical track records of taking firms public (Wong et al., 2013). However, such a behavior could be at the expense of future

long-run performance as highlighted in this study. This argument sheds light on the importance of sponsor reputation when taking a portfolio company public, which adds to the discussion provided by Tong & Wong (2020). The authors argued that sponsor reputation is more important than underwriter reputation in the initial phases of an IPO. In addition, this reasoning also supports the fact that pre-IPO valuation and expectations should not be a guarantee for future returns as noted by Jain & Kini (1994). They found that firms valued at high price-to-earnings and market-to-book multiples in the pre-IPO state appeared to underperform after the firm went public. Building upon these arguments, it is reasonable to assume that financial sponsors hold a certain level of excess information above what external investors have access to (Wong et al., 2013) which supports the theoretical framework of adverse selection. However, the fact that credibility is found to serve as a relatively weak signal towards post-IPO performance in the short-run suggests that the barriers of information asymmetry are not improved by using AUM as a measure for credibility. This contradicts the initial framework of signaling theory but nevertheless sheds light on the difficulties of identifying appropriate signals.

When considering the explicit differences in the effect of credibility between PE- and VC firms in relation to post-IPO performance of their portfolio companies, the interaction term suggests that PE sponsors are less negatively imposed by the effect of credibility in relation to VC sponsors. Given the traditional characteristics of PE- and VC firms as proposed by Aizenman & Kendall (2008) and Breuer & Pinkwart (2018), private equity sponsors are usually larger and more established in the market in relation to venture capital firms. In addition, PE firms often target more mature and cash-generating companies in recognizable industries while VC firms specialize in start-up companies with high growth potential in niche sectors. As a result, the somewhat less negative effect of credibility on PE sponsors in relation to post-IPO performances can be a result of investor confidence towards the two types of fundings and investment strategies. More specifically, credibility could be of greater importance for PE-backed IPOs than VC-backed IPOs because there may be larger expectations on PE firms which implies that these sponsors have more to gain from having a dependable reputation. This reasoning supports our previous findings in table 7. Although the results were statistically insignificant, PE-backed firms were pointed towards having inferior post-IPO performance in relation to VC-backed IPOs which makes it reasonable to assume that PE sponsors have more to gain from having a credible and solid reputation. However, it is important to note that while credibility may be more important for PE sponsors, the term is

found to have negative effects on post-IPO performance on both sponsor types, but the effects appears to be less negative on PE-backed IPOs.

In addition to the initial framework, the result of including country-specific fixed effects have also been evaluated. These findings are presented for each regression model in table A7 and A8. The estimated results are in line with our initial findings such that the signs and level of statistical significance are generally consistent. There are some minor exceptions, particularly for the control variables. However, the main findings and the fact that R-squares are consistently lower indicates that the results from the initial model specification are validated.

7.1.3.1 Control Variables

When examining the control variables for regression model 3 and 4 in table 8, we generally receive similar and consistent results as in table 6 and 7 with some minor deviations. ROA is found to have a positive association with the arithmetic BHARs across both regression models and time periods. The result is statistically significant at the 1% level for the short-run for both model specifications, while the relationship is statistically insignificant in the long-run. These results are similar to those provided in table 7, except for the level of statistical significance which is proved to be somewhat weaker in regression model 3 and 4. When comparing the results to table 6, the results are somewhat more dissimilar. However, given that ROA was found to be statistically insignificant across both time periods in table 6, the results provided in table 8 are stronger as highlighted by the level of statistical significance in the shorter time frame, but also due to the similarities with the estimations from table 7 in terms of coefficient signs.

The results for firm size suggest a positive relationship with the arithmetic BHARs. The association is statistically significant at the 1% level in the long-run across both regression models. When considering the short-run relationship, the results are statistically insignificant. These results are similar to those provided in table 6 and 7 with some minor exceptions. The positive association appears to be somewhat weaker in table 8 in comparison to table 6 due to the lack of statistical significance in the shorter time frame for regression model 3 and 4. However, the results in table 8 are proved to be marginally stronger than those reported in

table 7. Nevertheless, the general association is found to be consistent across all model specifications.

Offer size is found to have a positive relationship with the arithmetic BHARs across both regression models in the short- and long-run. Although the relationship is relatively small in the short-run and statistically insignificant, the association is stronger in the long-run as highlighted by the 1% level of significance for model 3 and 5% level of significance in model 4. These results are somewhat inconsistent with those reported in table 6 in terms of the sign of the relationship. Nevertheless, the estimated coefficients in table 8 are similar to those provided in table 7, and proved to be even stronger for regression models 3 and 4. As discussed earlier and furthermore supported by previous scholars (see e.g. Megginson & Weiss, 1991; Jain & Kini, 1994; Hamao et al., 2000; Krishnan et al., 2011; Michala, 2019), the relationship between offer size and abnormal return have historically been associated with mixed results, providing evidence of both positive and negative associations.

7.2 Robustness Tests

In order to further test the reliability of our main analysis, two robustness tests have been constructed. The first test uses regression model 3 and 4, but replaces assets under management with firm age as a proxy for sponsor credibility. The second test uses regression models 1 through 4, but instead of using arithmetic buy-and-hold abnormal returns, we use return on assets as the performance measurement. The results of the tests are presented in the appendix table A9 and A10.

7.2.1 Age Proxy

In the original model using AUM as a measure for sponsor credibility, the interaction term between PE sponsorship and credibility was positive across both time periods. Although the result suggested a significant relationship in the short-run, the long-run association was found to not be statistically different from zero. The main effect of credibility on general arithmetic BHARs was furthermore found to be negative and statistically insignificant in the short-run, but negatively significant in the long-run. As table A9 in the appendix shows, the results using age as a proxy, are similar in the short-run but somewhat different in the long-run. The

interaction term remains positive and insignificant in the short-run but turns negative and statistically significant at the 10% level in the long-run. This suggests that the negative effect of being backed by an older financial sponsor in relation to post-IPO performance is more pronounced for PE-backed IPOs in comparison to VC-backed IPOs over the long-run. Additionally, the age variable itself remains negative and statistically insignificant towards the whole period. The sign of age proxy is consistent with our main model, as the initial measurement of credibility was also proved to be negative. However, their level of statistical significance differs, suggesting that age is a weaker predictor for future abnormal returns than assets under management.

These findings provide partial support for our main model specification, which showed that sponsor credibility imposes different effects of post-IPO performance for PE-backed IPOs in comparison to VC-backed IPOs. However, the robustness test points towards that PE backed-IPOs tend to be more influenced by the age of the sponsoring firm than VC-backed IPOs. While the direction of the long-run effects differs from the main results, the test still supports the overall relevance of sponsor credibility. More specifically, it provides supporting evidence towards previous scholars (see e.g. Nahata, 2008; Krishnan et al., 2011; Tong & Wong, 2020) who argued that the impact of credibility is largely dependent on how it is measured. While AUM reflects financial capacity and current ability of scale, the level of age captures the sponsor's history and previous experiences. These proxies highlight different aspects of credibility, but both indicate that higher sponsor credibility is linked to weaker arithmetic BHARs. Since the estimated results for the robustness test to a large extent support our initial findings, we argue that the main model specification in this paper is robust although some estimates are insignificant.

7.2.2 Return on Assets Proxy

As earlier studies have noted (see e.g. Brav & Gompers, 1997; Ritter, 2015), post-IPO performance often varies depending on the abnormal return metric used. To see if the results changes when using a different way of calculating performances, we therefore follow the approaches used by previous researchers (see e.g. Jain & Kini, 1994; Krishnan et al., 2011; Que & Zhang, 2019) and use ROA as a measurement of long-term performance.

Looking at the results in table A10 in the appendix, we can examine our hypotheses towards long-term performance. Interestingly, when evaluating sponsored-backed IPOs compared to non-sponsored-backed IPOs for H1 and H2, we receive positive coefficients for both the PE-dummy and VC-dummy. This suggests that when using ROA as a measurement of long-term performance, sponsored-backed IPOs tend to perform better in the long-run. However, these estimates are not statistically significant and should therefore be interpreted with caution. When considering hypothesis H3, the results align with our main model, which is that PE-backed IPOs perform worse than VC-backed IPOs in the long-run, although the relationship is not statistically significant.

For hypotheses 4 and 5, the results are mixed. In the model where only sponsor credibility is included towards answering H4, the coefficient for credibility is negative but statistically insignificant. This suggests that sponsor credibility, in terms of AUM, does not have a clear relationship with long-term post-IPO performance when using ROA as the dependent variable. When adding the interaction term between PE sponsorship and credibility designed for H5, the relationship changes marginally. The interaction term is negative but remains statistically insignificant. This indicates that the negative effect of sponsor credibility on abnormal returns, as measured by ROA, is somewhat higher for PE-backed IPOs in comparison to VC-backed IPOs. However, given the statistically insignificant nature of the result, we cannot conclude that the effect is actually different from zero. The above reasoning is derived from the fact that the credibility variable itself suggests a negative relationship with post-IPO abnormal returns, but at a statistically insignificant level. These results are in line with Que & Zhang (2019) who argued that the VC reputation imposes negative post-IPO performance using ROA, although their results were statistically insignificant similarly to the findings in this robustness test. On the other hand, these findings are in contrast to those results provided by Krishnan et al. (2011) who found a positive association between VC reputation and long-run performance using ROA. The general findings for this robustness test is broadly consistent with our main results when using arithmetic BHARs. Credibility appears to be a somewhat weaker predictor for post-IPO performances in this setting in comparison to the primary model specification. However, the main difference appears to be in the effect of credibility which appears to be somewhat reversed in this robustness test, although statistically insignificant.

8. Conclusion and Further Investigation

The main purpose of this paper was to evaluate if and how credibility of financial sponsors influence the short- and long-run stock performance of PE- and VC-backed IPOs. To examine this, we utilized a multivariate OLS regression with industry- and year-specific fixed effects. In total, four regression models were applied with the aim of comparing abnormal returns of sponsored-backed IPOs with non-sponsored-backed IPOs, but also PE-backed IPOs against VC-backed IPOs. In addition, we evaluated the effects of sponsor credibility on abnormal returns and examined how the effect of credibility differs between PE and VC sponsors.

We find conclusive evidence that PE-backed offerings perform worse in the short-run in comparison to IPOs not backed by a financial sponsor, but not in the long-run. When considering the performance of VC-backed IPOs, the results point towards an inferior performance in relation to non-sponsored-backed offerings in both the short- and long-run. However, due to the insignificant estimates towards VC-backed IPOs, we cannot conclude that this relationship is statistically different from zero. As part of comparing the abnormal returns between PE- and VC-backed IPOs, the results are statistically insignificant during both time periods. Although we cannot conclude that IPOs backed by private equity perform worse than offerings sponsored by venture capital, the estimation results lean towards a certain underperformance among PE-backed firms in both event windows. When incorporating the measurement for credibility, we find that higher credibility imposes lower abnormal returns for all sponsored-backed IPOs in the long-run but not in the short-run. Upon evaluating the explicit difference, we find that PE sponsors are less negatively affected by credibility in comparison to VC sponsors. Although the relationship appears to be consistent across both time periods, it is only conclusive for the short-term time period.

Drawing upon the discussion presented in section 7, there could be several possible explanations associated with these results. Since credibility is found to be negatively related to abnormal returns, it is evident that credibility does not affect post-IPO performances in the way we first anticipated to find. However, we argue that one of the main reasons towards the general negative effect of sponsor credibility on abnormal returns could be a result of the expectation and valuation mechanisms in the pre-IPO state. More specifically and as argued earlier, the IPO market activity tends to increase and cluster during hot market periods,

enabling PE- and VC managers to indirectly time the market when equity valuations are high. As a result, credibility becomes a relatively poor predictor for future positive and excess returns because other external factors may influence the returns negatively. In light of this, it is important to remember that the results provided by previous researchers are not uniformed, similarly to this study. As a result, it is evident that choosing the appropriate measurement for abnormal returns and credibility is a complicated task to successfully conduct. Nevertheless, we argue that the proposed research question in this paper has been successfully answered because we have proven that there exists a negative association between credibility and post-IPO performance of all sponsored-backed IPOs in the long-run. Although both PE- and VC-backed firms generally underperform, we furthermore established that the effect of credibility is less harmful on PE-backed IPOs in the short-run, while VC-backed IPOs tend to be more negatively affected by credibility for the same time period.

As highlighted previously, the existing literature investigating PE- and VC-backed firms post-IPO performance in relation to credibility is limited with fairly mixed results. However, while this paper successfully established support for parts of the hypotheses, some limitations were present in this study. Although the Bloomberg terminal, S&P Capital IQ and Refinitiv Eikon are all credible and commonly used sources, we were constrained by the scope of their databases. Faced with this restriction, the most apparent limitation present upon conducting this research was the lack of publicly available data related to private equity and venture capital firms. More specifically, sponsor firms assets under management were not recorded on a daily or monthly basis which restricted us to use the AUM disclosed at the nearest date of the portfolio firm's IPO date. This limitation was the main reason as to why we decided to calculate arithmetic BHARs instead of continuously compounded BHARs. The second limitation arrives from the appropriate measurement of credibility. Although previous scholars have established AUM as a credible signal of a firm's reputation, our initial plan was to combine AUM with additional metrics to develop a more comprehensive measure of credibility. However, due to time constraints and limited access to public data, we relied solely on AUM and tested its robustness using age as a proxy. Based on these restrictions, there are opportunities for future scholars to pursue where an extended measurement for credibility would be an interesting approach to evaluate.

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Appendix

Table A1 - Total number of IPOs per country

Country	Freq.	Percent	Cum.
United Kingdom	351	44.04	44.04
Denmark	36	4.52	48.56
Finland	46	5.77	54.33
Germany	79	9.91	64.24
Iceland	6	0.75	64.99
Norway	46	5.77	70.77
Sweden	233	29.23	100.00
Total	797	100.00	

Table A2 - Total number of non-Sponsored-backed IPOs per country

Country/Region Full Name	Freq.	Percent	Cum.
United Kingdom	239	45.01	45.01
Denmark	21	3.95	48.96
Finland	29	5.46	54.43
Germany	51	9.60	64.03
Iceland	6	1.13	65.16
Norway	35	6.59	71.75
Sweden	150	28.25	100.00
Total	531	100.00	

Table A3 - Total number of VC-backed IPOs per country

Country/Region Full Name	Freq.	Percent	Cum.
United Kingdom	31	35.23	35.23
Denmark	7	7.95	43.18
Finland	6	6.82	50.00
Germany	6	6.82	56.82
Norway	2	2.27	59.09
Sweden	36	40.91	100.00
Total	88	100.00	

Table A4 - Total number of PE-backed IPOs per country

Country/Region Full Name	Freq.	Percent	Cum.
United Kingdom	81	45.51	45.51
Denmark	8	4.49	50.00
Finland	11	6.18	56.18
Germany	22	12.36	68.54
Norway	9	5.06	73.60
Sweden	47	26.40	100.00
Total	178	100.00	

Table A5 - Total number of IPOs per industry

Industry Group	Freq.	Percent	Cum.
Advertising	8	1.00	1.00
Aerospace/Defense	3	0.38	1.38
Agriculture	3	0.38	1.76
Airlines	1	0.13	1.88
Apparel	3	0.38	2.26
Auto Manufacturers	4	0.50	2.76
Auto Parts & Equipment	5	0.63	3.39
Banks	13	1.63	5.02
Beverages	3	0.38	5.40
Biotechnology	49	6.15	11.54
Building Materials	13	1.63	13.17
Chemicals	14	1.76	14.93
Closed-end Funds	1	0.13	15.06
Coal	2	0.25	15.31
Commercial Services	47	5.90	21.20
Computers	27	3.39	24.59
Cosmetics/Personal Care	5	0.63	25.22
Distribution/Wholesale	4	0.50	25.72
Diversified Finan Serv	31	3.89	29.61
Electric	6	0.75	30.36
Electrical Composition & Equipment	6	0.75	31.12
Electronics	16	2.01	33.12
Energy-Alternate Sources	19	2.38	35.51
Engineering & Construction	9	1.13	36.64
Entertainment	10	1.25	37.89
Environmental Control	8	1.00	38.90

Food	11	1.38	40.28
Forest Products & Paper	2	0.25	40.53
Gas	2	0.25	40.78
Hand/Machine Tools	3	0.38	41.15
Healthcare-Products	35	4.39	45.55
Healthcare-Services	16	2.01	47.55
Holding Companies-Divers	3	0.38	47.93
Home Builders	3	0.38	48.31
Home Furnishings	5	0.63	48.93
Household Products/Wares	4	0.50	49.44
Insurance	10	1.25	50.69
Internet	43	5.40	56.09
Investment Companies	15	1.88	57.97
Iron/Steel	2	0.25	58.22
Leisure Time	13	1.63	59.85
Lodging	2	0.25	60.10
Machinery-Diversified	9	1.13	61.23
Media	4	0.50	61.73
Metal Fabricate/Hardware	3	0.38	62.11
Mining	24	3.01	65.12
Miscellaneous Manufactured	13	1.63	66.75
Office/Business Equip	1	0.13	66.88
Oil & Gas	23	2.89	69.76
Oil & Gas Services	1	0.13	69.89
Pharmaceuticals	47	5.90	75.78
Pipelines	2	0.25	76.04
Private Equity	7	0.88	76.91
REITS	18	2.26	79.17
Real Estate	33	4.14	83.31
Retail	35	4.39	87.70
Semiconductors	5	0.63	88.33
Shipbuilding	2	0.25	88.58
Software	65	8.16	96.74
Storage/Warehousing	1	0.13	96.86
Telecommunications	16	2.01	98.87
Transportation	8	1.00	99.87
Trucking & Leasing	1	0.13	100.00
Total	797	100.00	

Table A6 Descriptive Statistics - sponsor-backed IPOs

Variable	Obs	Mean	Median	Std. Dev.	Min	Max
ABHAR 180 days	266	0.094	0.0261	0.528	-0.646	5.721
ABHAR 3 years	266	0.286	-0.0185	1.366	-1.667	11.059
Credibility	266	8.261	8.0358	2.34	2.996	16.213
Offer size (ln)	266	4.507	4.6894	1.831	-1.156	7.807
Firm size	266	5.384	5.7218	2.502	-2.883	11.444
ROA	266	-0.167	0.0015	.452	-3.156	.422
Age	266	24.211	20	18.007	1	118
Total assets	266	2029.04	305.45	7229	0.056	93385.5

Table A7 - Fixed Effects Multivariate OLS including country specific FE

Regression model	1	1	2	2
	(1)	(2)	(3)	(4)
VARIABLES	ABHAR 180 days	ABHAR 3 years	ABHAR 180 days	ABHAR 3 years
PE Dummy	-0.168***	-0.225	-0.132	-0.268
	(0.0131)	(0.140)		
VC Dummy	-0.154	-0.139		
	(0.0905)	(0.179)	(0.0790)	(0.184)
ROA	-0.0100**	-0.0152	0.227***	0.285
	(0.00335)	(0.0216)	(0.0430)	(0.372)
Firm size	0.0541*	0.166***	0.00306	0.166**
	(0.0275)	(0.0391)	(0.0136)	(0.0479)
Offer Size (ln)	-0.0486*	-0.119*	0.00215	0.118**
	(0.0247)	(0.0527)	(0.00620)	(0.0358)
Constant	0.140***	0.121	0.188	-0.900**
	(0.0374)	(0.157)	(0.120)	(0.264)
Observations	791	791	258	258
R-squared	0.070	0.080	0.161	0.219
Industry fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
Country fixed effect	Yes	Yes	Yes	Yes

Robust standard errors in parentheses

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

Table A8 - Fixed Effects Multivariate OLS including country specific FE.

Regression model	3	3	4	4
	(1)	(2)	(3)	(3)
VARIABLES	ABHAR 180 days	ABHAR 3 years	ABHAR 180 days	ABHAR 3 years
PE Dummy	-0.119	-0.123	-0.521*	-0.527
	(0.0880)	(0.189)	(0.243)	(1.053)
Credibility	-0.0148	-0.158**	-0.0640**	-0.207**
	(0.0143)	(0.0553)	(0.0221)	(0.0733)
PE*Credibility			0.0565*	0.0566
			(0.0253)	(0.123)
ROA	0.223***	0.242	0.231***	0.250
	(0.0391)	(0.344)	(0.0354)	(0.334)
Firm size	0.0113	0.254**	0.0140	0.257***
	(0.0195)	(0.0652)	(0.0200)	(0.0620)
Offer Size (ln)	0.00226	0.119**	0.00265	0.120**
	(0.00724)	(0.0298)	(0.00893)	(0.0310)
Constant	0.256**	-0.182	0.576**	0.139
	(0.0774)	(0.219)	(0.163)	(0.651)
Observations	258	258	258	258
R-squared	0.161	0.248	0.154	0.248
Industry fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
Country fixed effect	Yes	Yes	Yes	Yes

Robust standard errors in parentheses

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

Table A9: Robustness test using age as a proxy for credibility

Regression model	3	3	4	4
	(1)	(2)	(3)	(4)
VARIABLES	ABHAR 180 days	ABHAR 3 years	ABHAR 180 days	ABHAR 3 years
PE Dummy	-0.138	-0.278	-0.220	-0.0114
	(0.110)	(0.348)	(0.155)	(0.409)
PE*Age			0.00339	-0.0111*
			(0.00307)	(0.00631)
Age	-0.000670	-0.00536	-0.00204	-0.000902
	(0.00149)	(0.00423)	(0.00243)	(0.00553)
ROA	0.242***	0.343*	0.244***	0.335*
	(0.0736)	(0.168)	(0.0733)	(0.171)

Firm size	-0.00121	0.160**	-0.00207	0.163**
	(0.0169)	(0.0590)	(0.0167)	(0.0601)
Offer size (ln)	0.00708	0.113	0.00721	0.113
	(0.0317)	(0.127)	(0.0312)	(0.129)
Constant	0.212	-0.700	0.249	-0.822
	(0.205)	(0.517)	(0.224)	(0.518)
Observations	258	258	258	258
R-squared	0.164	0.226	0.167	0.230
Industry fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes

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

Table A10: Robustness test using ROA as a measurement for long-term performances.

Hypothesis	H1 & H2	H3	H4	H5
	(1)	(2)	(3)	(4)
VARIABLES	ROA	ROA	ROA	ROA
PE Dummy	0.164	-0.0233	-0.0169	0.178
	(0.191)	(0.0443)	(0.0439)	(0.178)
VC Dummy	0.0463			
	(0.0844)			
Credibility			-0.00732	-0.0162
			(0.00734)	(0.0188)
PE*Credibility				-0.0272
				(0.0229)
Firm size	0.158*	0.0923***	0.0962***	0.0939***
	(0.0901)	(0.0275)	(0.0283)	(0.0276)
Offer size (ln)	-0.0990***	0.0109	0.0111	0.0108
	(0.0369)	(0.0141)	(0.0144)	(0.0142)
Constant	-0.615	-0.696***	-0.662***	-0.809***
	(0.384)	(0.103)	(0.0977)	(0.178)
Observations	791	258	258	258
R-squared	0.283	0.487	0.488	0.490
Industry fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes

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

AI Statement:

In this thesis, ChatGPT has been used to check for spelling errors or improvements of the language in some small parts, for example in the literature review. It has provided us with examples of words to improve efficiency and fluency in the text.