Aalto University
School of Business

ARE PRIVATE EQUITY SPONSORS GUARANTEE OF IPO QUALITY?

Earnings management and long-run performance in PE-backed, VC-backed, and non-backed IPOs

Master's Thesis
Aleksi Kilpi
Aalto University School of Business
Finance
Spring 2022

Aalto University
School of Business

Aalto University, P.O. BOX 11000, 00076 AALTO
www.aalto.fi

Abstract of master's thesis

Author Aleksi Kilpi

Title of thesis Are private equity sponsors guarantee of IPO quality?

Degree Master of Science (Economics and Business Administration)

Degree programme Finance

Thesis advisor(s) Sami Torstila

Year of approval 2022 **Number of pages** 64 **Language** English

Abstract

I assess earnings management in the pre-IPO year in private equity (PE) backed, venture capital (VC) backed and non-backed initial public offerings. I examine, if the PE and VC sponsors limit the pre-IPO earnings management, and if the sponsors are related to higher long-run performance of the issuers. I hypothesize that PE and VC sponsors have motives to promote high corporate governance standards and to limit opportunistic behavior in issuing companies to preserve their reputation. I also address earnings management's effect on IPO underpricing and the long-run return of issuers. Finally, I explore the effect that interaction of pre-IPO earnings management and PE or VC sponsoring has on long-run performance of the issuer.

My sample consists of 681 IPOs in the US between 2004 and 2018. I use pre-IPO year abnormal accruals (AAC) from the modified Jones model as a measure of earnings management. As a measure of long-run performance, I use three-year after-IPO monthly average abnormal stock returns (AAR) and three-year buy-and-hold abnormal stock returns (BHAR), which I estimate in relation to industry benchmark portfolios and with the Fama-French three-factor model. The key statistical tests are three groups of multiple linear regression models in which the dependent variables are the AAC measure, first day return, and the three-year abnormal return measures. The primary independent variables are indicator variables of PE and VC sponsoring, abnormal accruals, and interaction variables of the PE and VC variables and the AAC measure.

I find evidence of PE sponsors reducing abnormal accruals of the issuers by approximately 4ppt, and PE-backed IPOs being related to 21% to 31% higher BHAR when comparing to non-backed IPOs. This is consistent with Cao & Lerner (2009), who report BHAR of 5% for RLBOs, and -7% for non-backed IPOs. However, I do not find statistically significant relation between venture capital sponsoring, and lower EM or higher long-run performance after controlling for IPO characteristics, even though VC sponsored IPOs have lower average abnormal accruals and higher average three-year abnormal returns than non-backed issuers. Ritter (1991) famously reports underperformance of IPOs, whereas I find no evidence of IPOs as a group underperforming, but link underperformance to non-backed IPOs. Also, I find pre-IPO EM having negative effect on long-run performance. My results imply that a 10ppt increase in AAC would decrease the average monthly abnormal return by 0.11 to 0.13ppt and BHAR by 4ppt to 10ppt. Similarly, Teoh et. al. (1998), find 20% weaker BHAR for IPOs in most aggressive quartile of EM compared to the most conservative quartile. I do not find significant difference in underpricing of PE, VC, and non-backed IPOs after controlling for IPO characteristics. Finally, I do not find evidence of difference in the effect that earnings management in PE or VC backed companies has on long-run performance of the issuer compared to earnings management in non-backed issuers, but this topic provides interesting setting for future research.

Keywords private equity, venture capital, earnings management, IPO, performance, underpricing

Aalto-yliopisto
Kauppakorkeakoulu

Aalto-yliopisto, PL 11000, 00076 AALTO
www.aalto.fi

Maisterintutkinnon tutkielman tiivistelmä

Tekijä Aleksi Kilpi

Työn nimi Ovatko pääomasijoittajat listautumisannin laadun tae?

Tutkinto Kauppatieteiden maisteri

Koulutusohjelma Rahoitus

Työn ohjaaja(t) Sami Torstila

Hyväksymisvuosi 2022 **Sivumäärä** 64 **Kieli** Englanti

Tiivistelmä

Tässä tutkielmassa käsittelen tuloksen ohjausta (earnings management) listautumisantia edeltävänä vuonna pääomasijoitusrahastojen tukemissa ja itsenäisissä listautumisanneissa. Jaan pääomasijoittajat myöhäisen vaiheen sijoittajiin (private equity) ja varhaisen vaiheen sijoittajiin (venture capital). Tutkin, rajoittaako pääomasijoitusrahastojen osallisuus tuloksen ohjausta, toisin sanoen tuloksen liioittelua, ja onko pääomasijoittajien tukemien listautumisantien pitkän aikavälin tuotto korkeampi itsenäisiin listautumisanteihin verrattuna. Hypoteesini on, että hyvä maine on tärkeässä asemassa pääomasijoittajien toiminnassa, mikä rajoittaa niiden kannustimia liioitella listautuvien yritysten kannattavuutta tai odotuksia. Käsittelen myös tuloksen ohjauksen yhteyttä listautumisannin alihinnoitteluun ja listautujan pitkän aikavälin tuottoon, sekä mahdollista yhteisvaikutusta, joka tuloksen ohjauksella ja pääomasijoittajien osallisuudella on listautujan pitkän aikavälin tuottoon.

Tutkielman otos koostuu 681 listautumisannista Yhdysvalloissa vuosien 2004 ja 2018 välillä. Mittaan tuloksen ohjausta listautumista edeltävän vuoden epänormaalien jaksotusten (abnormal accruals) perusteella, jotka määritän Jonesin mallin mukaisesti (Jones (1991)). Mittaan pitkän aikavälin tuottoa 36 kuukauden ajalta listautumisen jälkeen keskimääräisenä kuukausittaisena osakkeen ylituottona sekä epänormaalina kumulatiivisena tuottona (buy-and-hold abnormal return). Lineaariset regressioanalyysit, joissa selitettävä muuttuja on tuloksen ohjaus, alihinnoittelu, tai pitkän aikavälin tuotto, ovat tutkielman tärkeimmät kvantitatiiviset testit.

Tulosteni perusteella myöhäisen vaiheen pääomasijoittajien osallisuudella on yhteys noin 4 prosenttiyksikköä vähäisempään tuloksen ohjailuun, sekä listautujan 21%-31% korkeampaan kolmen vuoden epänormaaliin kumulatiiviseen tuottoon, kun vertailukohtana käytetään itsenäisiä listautumisanteja. Tulos on yhdenmukainen aiempien tutkimusten kanssa. Esimerkiksi, Cao & Lerner (2009) raportoivat pääomasijoittajien tukemien listautumisantien epänormaalin kolmen vuoden tuoton olevan 5%, kun vastaava epänormaali tuotto itsenäisille listautumisanneille on -7%. Tulokseni ovat tilastollisesti merkittäviä vain myöhäisen vaiheen pääomasijoittajien osalta, eivät varhaisen vaiheen sijoittajien osalta. Tutkimukseni perusteella listautumisantien pitkän aikavälin alituotto, jonka Ritter (1991) tunnetusti dokumentoi, ei koske kaikkia listautumisanteja, vaan liittyy itsenäisiin listautumisanteihin, joissa ei ole mukana pääomasijoitusrahastoja. Regressioanalyysit antavat viitteitä siitä, että tuloksen ohjauksella ennen listautumisantia on negatiivinen vaikutus listautujan pitkän aikavälin tuottoihin. En kuitenkaan löydä tukea sille, että pääomasijoittajien osallisuudella ja tuloksen ohjauksella olisi huomattavaa yhteisvaikutusta listautuvan yrityksen pitkän aikavälin tuottoihin tai listautumisannin alihinnoitteluun.

Avainsanat pääomasijoittajat, tuloksen ohjaus, listautumisanti, tuotto, alihinnoittelu

Table of contents

List of tables

List of figures

1. Introduction

1.1 Background of the study

Long run performance of initial public offerings (IPOs) has received extensive attention in academic literature and has been documented in different markets and time periods. Ritter (1991) famously documents significant three-year underperformance of issuing companies compared to matching non-IPO companies. Potential explanations for the evidence of persistent underperformance are the high information uncertainty related to issuing companies, inflated performance measures and prospects of the company, and the most optimistic investors ending up effectively pricing the issue.

IPOs are particularly vulnerable events to earnings management (EM) because due to the scarcity of information considering the issuing company, the investors are forced to rely heavily on accounting data. Furthermore, displaying higher-than-actual accounting performance has a potential to increase the proceeds to the pre-IPO owners, as Titman & Trueman (1986) point out. This opportunistic behaviour of artificially boosting the pre-IPO accounting performance is proposed by several academics, and the literature mostly supports this view. Indeed, positive abnormal accruals implicating upwards earnings management prior to IPOs are detected in several studies e.g., Teoh, Welch & Wong (1998) and Lee & Masulis (2011). Also, upwards earnings management in the pre-IPO period is linked to higher short-term aftermarket returns and to weaker long-term returns of the issuing companies by e.g., Teoh et al. (1998) and Chen et al. (2013). These findings suggest that issuing companies may manage earnings upwards to increase the IPO proceeds. In turn, investors at least partly fail to recognize the pre-IPO earnings management, and are thereby disappointed with the subsequent performance of the issuing company, resulting weaker long-run aftermarket returns.

Private equity (PE) and venture capital (VC) funds often exit their portfolio companies trough IPOs, which provides an interesting setting considering the effect those sponsors have on pre-IPO earnings quality and post-IPO performance of the issuing companies. In this paper, I separate the IPOs to PE sponsored (or backed), VC sponsored and non-sponsored issues. Previous literature often uses the term PE to refer to non-public equities as an asset class, not the private equity funds and the companies running them. However, in this paper I use PE to refer to the private equity sponsors including leveraged buy-out, buy-out and late-stage growth capital funds. Number of IPOs in the US has decreased since the peak in late 1990's, and

involvement of PE and VC sponsors is increasingly common and important. Ewens & Farre-Mensa (2020) assess this development and link it to regulatory changes such as NSMIA in 1996, which have removed obstacles from the PE and VC sponsoring, and thus enabled growing companies to stay private longer, as private capital can be used to fund growth instead of early IPOs. Thereby, it is crucial to understand, how these PE and VC sponsored IPOs differ from non-sponsored IPOs, as the sponsors have partly conflicting incentives to build and maintain reputation trough high-quality accurately priced issues, but also to maximize proceeds from the issues and potentially push the portfolio companies to market prematurely.

Michala (2019) hypothesizes that PE companies would have the proficiency and motives to practice opportunistic pre-IPO earnings management in their portfolio companies, and thereby PE-backed IPOs would be of lower quality and experience weaker long-run aftermarket performance but finds no evidence of such phenomenon. Cao & Lerner (2009) point out that negative media attention and claims of PE-backed IPOs being over leveraged and having inflated performance measures spun from a few failed reverse leveraged buyouts (RLBOs) in early 2000's. Gompers (1996) proposes that young VC companies have an incentive to take their portfolio companies public as early as possible in order to gain reputation and increase fund inflows. He finds IPOs backed by young VCs being more underpriced and younger than IPOs backed by more established VCs. Lee & Wahal (2004) find similar results in their study.

Reputation is an important asset for private equity and venture capital companies because they typically manage several different-stage funds holding a portfolio of companies and exiting these portfolio-companies trough IPOs or sales to financial or industrial buyers is a repeated game. Megginson & Weiss (1991) famously argue that VC sponsors do provide certification for the quality of the issuers they sponsor. Atanasov, Ivanov & Litvak (2012) provide evidence of importance of reputation and its opportunistic behavior decreasing effect, as they show that more reputable VCs have lower litigation risks, and that previously litigated VCs suffer lower fund inflows in the future. This supports view of PE and VC backed issuers having higher pre-IPO earnings quality and better corporate governance practices; Sponsoring an IPO with poor aftermarket performance, controversial accounting or inadequate corporate control systems would be a burden when later going public or selling another portfolio company. Consistent with this hypothesis, Tian, Udell & Yu (2016) find VCs having difficulties in taking their portfolio companies public after being involved in fraudulent IPOs and losing their reputation.

Superior corporate governance policies are also linked to both PE and VC backed companies by several researchers e.g., Baker & Wruck (1989) and Hochberg (2012).

Most research of PE or VC sponsor's relation to issuing companies' earnings quality conclude that PE and VC sponsors are related to lesser pre-IPO earnings management or are unrelated to pre-IPO EM, instead of PE and VC sponsors promoting aggressive EM. Katz (2009) finds PE sponsored issuers having higher earnings quality and lower pre-IPO EM, while Hochberg (2012) documents similar results with VC sponsored issues. However, Lee & Masulis (2011) find that significant reducing effect on EM is linked only to high-reputation VC sponsors, not VC sponsors as a group. Similarly, Goktan & Muslu (2018) report that publicly traded PE sponsors are related to higher earnings quality of their portfolio companies, but do not find such relation with private PE sponsors.

There is also evidence of superior long run returns of PE and VC backed IPOs compared to their unsponsored counterparts, while some publications find no significant differences in the returns of sponsored and non-sponsored issues. Cao & Lerner study reverse leveraged buyouts and find RLBOs outperforming other IPOs in the long run, whereas Holthausen & Larcker (1996) document no abnormal stock returns for RLBOs but do find higher accounting performance compared to the issuers' industries. In terms of VC sponsored IPOs, the results are similar: Brav & Gompers (1997) conclude that VC sponsored IPOs do not underperform the market but do outperform non-VC-backed IPOs. However, Krishnan, Ivanov & Masulis (2011) report that the significant positive effect of VC sponsoring on aftermarket returns of issuing companies is limited to high-reputation VC sponsors, while Teoh, Welch & Wong find no significant differences in the aftermarket performance.

Private equity and venture capital sponsored IPOs appear to perform, in terms of aftermarket long-run returns, at least as well, and in many cases better than non-sponsored IPOs. Pre-IPO earnings management of the sponsored IPOs is less or equally aggressive than with non-sponsored issuers and especially issues sponsored by high-reputation VC or PE sponsors are related with lower levels of pre-IPO earnings management. These empirical findings imply, that preserving and improving reputation encourages PE and VC sponsors to implement beneficial corporate governance procedures and discourages them to allow aggressive earnings management to inflate IPO valuations. The PE and VC companies do have motives for opportunistic behaviour and so-called window dressing of issuing companies, but the

importance of reputation in PE and VC industries seems to limit this behaviour effectively. Indeed, non-sponsored issuers have less to lose if the after-IPO performance of the company does not correspond the expectations of the investors and may thereby be more prone to opportunistic behaviour. Opportunistic PE and VC sponsors may well exist, but as Tian et.al. (2016) point out, reputation of these companies is negatively affected, and they most likely have difficulties with future growth, which could diminish their economic impact.

1.2 Research questions and focus of this paper

In this paper, I assess the pre-IPO earnings management of private equity sponsored, venture capital sponsored and non-sponsored issuers. I examine whether EM in PE and VC sponsored IPOs is less aggressive than in non-sponsored issues, and if the differences are explained by the different issuing company characteristics or are due to the sponsor involvement. I examine the PE and VC sponsors' relation to IPO underpricing and the three-year aftermarket return of the issuing companies, and how the level of earnings management is related to the underpricing and three-year returns of the IPOs. Furthermore, I strive to find, if earnings management in PE or VC backed IPOs affects the returns of these issues differently than EM in non-backed IPOs, i.e., if aggressive pre-IPO earnings management with PE or VC sponsored issuers affects the long-run performance of these issuers differently than EM in non-sponsored issues.

My focus is primarily on the differences in EM and long-run returns between the issuers backed by PE or VC sponsors compared to non-backed issuers, not on existence of IPO underperformance or the level of pre-IPO earnings management as such. I limit the scope of this study to PE and VC sponsors as groups, and I do not assess the internal differences in the groups of PE and VC sponsors.

Thereby, my research questions are the following;

1. Do private equity and venture capital sponsors have limiting effect on pre-IPO earnings management?
2. Do private equity and venture capital sponsored IPOs outperform non-sponsored IPOs in the long run?
3. Is high level of pre-IPO earnings management related to weaker long run performance of the issuer?

4. Is earnings management in PE or VC backed issuers more detrimental to the long run returns of the issuer, i.e., do investors take involvement of PE or VC sponsor as a guarantee of IPO and earnings quality?
5. Do PE or VC sponsors affect underpricing of IPOs?
6. Does earnings management increase underpricing, and is this relation different for PE and VC backed IPOs?

1.3 Contribution of the study

I contribute to prior literature in three ways; First, I use recent data to assess PE and VC sponsors' effect on long run performance of IPOs, level of earnings management in PE sponsored, VC sponsored, and non-sponsored IPOs, and the relation between earnings management and long run aftermarket performance. This is relevant, as after the millennium the number of IPOs in the US has decreased, the average size of IPOs has increased, and the significance of PE and VC sponsoring in the IPO market has increased. Second, I examine the effect that interaction of earnings management and PE or VC sponsoring has on long-run returns of IPOs, that has received scarce attention in academic literature. I strive to find, if investors take involvement of PE or VC sponsor as a guarantee of IPO and earnings quality and are thereby less likely to recognize pre-IPO earnings management. Third, majority of the prior research focuses on either VC backed or buy-out backed IPOs and thus does not fully address the differences between PE or VC backed and non-backed issues. There are significant differences in the company characteristics of PE and VC sponsored issues, but also similarities in the motives, such as building and maintaining reputation, of the sponsors.

I find some evidence on behalf of PE-backing having limiting effect on pre-IPO earnings management, and long run outperformance of PE-backed IPOs, when PE-backed issuers are compared to non-backed issuers, which is consistent with private equity sponsors limiting opportunistic behavior and promoting higher corporate governance standards. The results are consistent with prior literature, e.g., Katz (2009) and Cao & Lerner (2009). However, I do not find significant relation between VC sponsoring and lower pre-IPO EM or higher long-run performance when controlling for the issuer and IPO characteristics, which is contrary to literature documenting lower EM in VC backed IPOs (e.g., Premti & Smith (2020) and Hochberg (2012)) and research of VC-backed IPOs having higher long-run performance (e.g., Brav & Gompers (1997) and Barry & Mihov (2015)). I do not find strong evidence on behalf

of PE or VC sponsoring having significant effect on IPO underpricing after controlling for IPO characteristics. Furthermore, I do not find IPOs as a group being related to significant pre-IPO earnings management measured in abnormal accruals, whereas I do document significantly positive abnormal accruals for non-backed issuers.

My results support EM having negative effect on long-run abnormal return of IPOs, which is consistent with Teoh et. al. (1998) and the view of investors being partly unable to detect pre-IPO EM due to which aggressive earning managers do not fulfill investors' expectations. However, I do not find evidence of earnings management in PE or VC backed IPOs being more detrimental to the long run returns of the issuer or affecting IPO underpricing. Thereby, my results do not provide support for investors taking involvement of PE or VC sponsor as a guarantee of IPO and earnings quality. I do find underpricing being highest in VC-backed IPOs and lowest in PE-backed IPOs, but these differences are mostly explained by IPO and issuer characteristics.

1.4 Limitations

I limit my research to US IPOs with market value of at least $50M measured in the end of the first trading day. Thereby, the results may not be representative of international IPOs, or the smallest IPOs. The abnormal accruals measure requires fundamental company data for the two years prior to the IPO, which is not available for all issuers. This reduces the sample size and could lead to selection bias, if the pre-IPO data is more likely available to certain types of companies, e.g., still active issuers or issuers with higher earnings quality.

I limit the scope of this study to PE and VC sponsors as groups, as I do not separate for high and low-reputation PE and VC sponsors, and do not assess the internal differences in the groups of PE and VC sponsors. There could be differences in the effect different PE and VC sponsors do have on earnings quality of their portfolio companies and in the subsequent performance of the issuers. Furthermore, I do not examine the extent of ongoing involvement the sponsors have in governing the issuers after the IPO, which may differ between sponsors. Thereby, the results may not be generalizable to all PE and VC sponsors, or all IPOs backed by them, but do instead represent the average PE and VC sponsors, and average IPOs backed by such sponsors.

1.5 Structure of this paper

Rest of this paper is structured as follows:

Section 2. Literature review, presents the relevant literature of the topics of this paper;

Section 3. Hypotheses, addresses the hypotheses considering the research questions, and the hypothesis development;

Section 4. Data and sample selection, includes the selection and description of the IPO sample of this study, definition and construction of the abnormal accruals measure of earnings management, description of long run return measures and definitions of control variables used;

Section 5. Methods, covers the definitions of the set of regression models, that I use in this study;

Section 6. Results, includes discussion of the key-results, and the specific results of the regression models;

Section 7. Robustness of the results, assesses the robustness and reliability of the results;

Section 8. Conclusion, provides conclusions of the findings of this paper.

2. Literature review

2.1 Long run underperformance of IPOs

Long run performance of initial public offerings has received extensive attention in academic research and literature. Famously, Ritter (1991) documents significant three-year underperformance of issuing companies. He reports mean equal weighted three-year wealth relative for the IPOs between 1975 and 1984 of 0.831 compared to matching non-IPO companies. This long run underperformance is a widely documented phenomena in different markets and time periods. The underperformance is commonly explained by the high information uncertainty of issuing companies, and the most optimistic investors ending up effectively pricing the issue, as proposed by Miller (1977). However, existence and significance of the underperformance is a subject of controversy and has been challenged e.g., by Brav & Gompers (1997) and Gompers & Lerner (2003). In turn, Schultz (2003) argues that IPOs do underperform compared to their ex-ante expectations of returns, but this is due to the clustering of IPO activity on peak valuation periods, not market inefficiencies nor deliberate timing decisions of issuers.

2.2 IPOs sponsored by private equity and venture capital

Initial public offerings (IPO's) are an important exit strategy for venture capital (VC) and other private equity (PE) funds. In this paper, I use the term private equity (PE) to refer to the private equity sponsors including leveraged buy-out, buy-out and late-stage growth capital funds, whereas earlier literature sometimes uses the term PE to refer to the asset class of non-public equities. PE and VC funds are managed by VC and PE companies, that run simultaneously several funds which have a typical lifetime of 10 years (Metrick & Yasuda (2011)). VC funds invest in early-stage companies, whereas PE funds invest in more established private companies or conduct buyouts of public companies. PE and VC funds strive to increase the value of their portfolio companies by funding and taking an active role in controlling the portfolio companies. As Metrick & Yasuda (2011) conclude, VC's aim to accelerate the growth of their portfolio companies by providing financing, managerial expertise, and networks. PE sponsors typically seek improvements in management, efficiency and often utilize high levels of debt. Both fund types often take their portfolio companies public to exit the position and to return the proceeds to their investors.

Number of IPOs in the US has decreased since the peak in late 1990's, which is linked to the increase in PE and VC industries. Ewens & Farre-Mensa (2020) assess this development and link it to regulatory changes, which have removed obstacles from the PE and VC sponsoring. The authors highlight the importance of the National Securities Markets Improvement Act (NSMIA) in 1996, as one of the main reasons for the increased PE and VC activity because it unified the regulatory framework in the US and allowed PE and VC funds to access more investors than before. Due to the increase in PE and VC industries, companies can use private capital fund their growth, instead of collecting the capital from the public markets in form of an early IPO. This development leads to fewer relatively early-stage start-ups going public, which has reduced the overall number of IPOs in the US, and led to larger average size of the issuing companies, as Ewens & Farre-Mensa (2020) conclude. Also, as the number of early-stage start-ups going public has decreased, share of PE backed IPOs of all IPOs has increased.

2.3 Relation between PE and VC sponsoring and IPO-performance

Private equity owners have been argued to improve operational efficiency of their portfolio companies due to the concentrated ownership, more aligned incentives of owners and management and more efficient corporate governance since Jensen (1989). Consistent with Jensen's arguments, Holthausen & Larcker (1996) do find accounting performance of reverse leveraged buyouts (RLBOs) being higher than the industry averages for at least four years after the IPO, which implies that the benefits of PE ownership are not limited to the period the portfolio company spends private, but also reach the post-IPO period. Performance improving factors often linked to PE ownership such as competent management, improved corporate governance and the disciplinary effect of debt do not lose their effect at the time of the RLBO when the PE sponsor sells its majority stake, as Levis (2011) argues. Supporting this argument, Levis (2011) finds RLBOs in London exchange outperforming other IPOs in terms of both, their accounting performance and three-year market returns.

Cao & Lerner (2009) study reverse leveraged buyouts and IPOs backed by late-stage PE investors between 1981 and 2003. The authors point out, that PE backed IPOs have received negative media attention after a few failed RLBOs in the early 2000's, but do not find any evidence of PE sponsored IPOs being more opportunistic or yielding lower returns than non-PE backed IPOs. Instead of underperformance, Cao & Lerner find RLBOs outperforming other IPOs in the three-year and five-year stock returns, and even outperforming some of the market return benchmarks. They report the industry benchmark three-year buy-and-hold abnormal

Table 1 – Studies of aftermarket performance of PE and VC sponsored IPOs

In Table 1, I list the key studies and their findings considering the relation of PE and VC sponsoring and the aftermarket performance of the sponsored issuers, that I assess in this paper.

Authors	Sponsor type	Findings
Cao & Lerner (2009)	PE	Reverse LBOs outperform other IPOs
Holthausen & Larcker (1996)	PE	The accounting performance of RLBOs superceeds the industry averages for the IPO-year and four subsequent years. The stock return is not abnormally low or high
Levis (2011)	PE	PE backed IPOs in LSE outperform other IPOs and the market in the three years following the IPO. This applies to market returns and accounting performance. Underpricing is modest.
Brav & Gompers (1997)	VC	VC sponsored IPOs do outperform nonsponsored IPOs, and do not underperform the market
Krishnan, Ivanov & Masulis (2011)	VC	IPOs backed by high-reputation VCs do outperform non-backed IPOs and IPOs backed by low-reputation or young VCs
Teoh, Welch & Wong (1998)	VC	VC sponsored IPOs do not differ significantly from other IPOs in terms of aftermarket performance or level of pre-IPO EM
Barry & Mihov (2015)	VC	VC backed IPOs have higher performance than other IPOs, especially when the VC is of high reputation. IPOs with high debt and no VC sponsoring do underperform others.

return being 5% for PE-backed IPOs, whereas it is -7% for non-backed issuers. However, Goktan & Muslu (2018) study international IPOs backed by listed and unlisted PE companies, and find issuers backed by listed PE sponsors having significantly higher long-term returns than issuers backed by unlisted sponsors.

Research considering the performance of VC sponsored IPOs finds VC backed IPOs having similar or better performance than non-sponsored IPOs, which largely corresponds the findings of the PE backed IPOs. Brav & Gompers (1997) study the performance of VC backed and non-VC backed IPOs, and find VC backed IPOs outperforming the non-VC backed issuers in long-run aftermarket returns. They find VC-backed IPOs performing approximately as well as the market as they report monthly average abnormal return of 0.1% and five-year buy-and-hold abnormal return of -3% for VC backed issuers, whereas the non-backed IPOs do underperform

the market and yield on average -21% five-year BHAR. More recently, Megginson et. al. (2019) show that VC backed IPOs in the US are less likely to experience post-IPO financial distress, which is linked to VCs selecting less risky companies to their portfolios and to VCs reducing the risks of financial distress while financing their portfolio companies. On the other hand, Teoh et. al. (2011) do not find VC backed IPOs issuers having significantly different returns than the non-VC backed IPOs, as they study the relation of pre-IPO earnings management and the long-run performance of the issuers.

Krishnan et. al. (2011) examine venture capital reputation, corporate governance, and post-IPO performance. They use the market share of previous IPOs as a proxy for the reputation, and link high reputation VC sponsors to superior aftermarket performance and higher post-IPO involvement in the governance of the issuing companies. Similarly, Barry & Mihov (2015) report VC sponsor's reputation being related to higher post-IPO performance. They find VC backed IPOs having higher performance than other IPOs, but this relation is particularly strong, when the VC sponsor is of high reputation, while non-sponsored IPOs with high debt do underperform other IPOs.

Venture capital backed IPOs have been linked to higher underpricing, measured with first-day returns. Gompers (1996) presents the grandstanding hypotheses, where young VCs would be willing to underprice the issuing companies they sponsor in order to build reputation trough successful IPOs. Also, Lee & Wahal (2004) find Venture capital backed IPOs yielding higher first day returns than other IPOs. However, the evidence of higher underpricing of VC sponsored IPOs is not conclusive, because e.g., Megginson & Weiss (1991) provide evidence on behalf of VCs reducing underpricing compared to unsponsored IPOs with similar size and characteristics trough their certification role. They introduce the certification hypothesis and argue that venture capitalists provide certification for the quality of IPOs, which leads to lesser risks for the investors and thus lower level of underpricing. Contrary to VC backed IPOs, PE backed IPOs have been documented to have lower levels of underpricing e.g., by Cao & Lerner (2009), which is in line with the larger size of the issues and higher corporate governance standards of the PE backed IPOs.

2.4 Pre-IPO earnings management

Earnings management (EM) commonly refers to deliberate upwards or downwards manipulation of a company's net income. Net income can be manipulated to some extent by affecting discretionary accruals, for example by delaying recognition of expenses such as credit losses or by accelerating recognition of income. Earnings can be managed also by timing the R&D expenses, by affecting the estimates of salvaging values or amortizations of tangible and intangible assets and by timing sales of assets and recognition of gains and losses, as Teoh et. al. (1998) point out. Measuring EM is complicated, because the accounting rules do allow some discretion to allow managers to give as accurate view of a company's performance as possible. Dechow, Sloan & Sweeney (1995) assess different accrual-based models designed to detect earnings management and find modified Jones' model being the most powerful one. The modified Jones' model is based on the model first introduced in Jones (1991), where the original model is developed to detect earnings manipulation during import relief investigations. The modified Jones' model calculates expected accruals for a certain time-period based on company characteristics, and the difference between actual and expected accruals, i.e., abnormal accruals, serves as a measure of EM.

Premti & Smith (2020), who examine pre-IPO EM with international data, find significantly positive abnormal accruals in the year of the IPO (t0) and the year prior to the IPO (t-1). They argue that the positive abnormal accruals in the IPO year, which is often used in literature, is an upwards biased measure of EM due to the cashflows caused by the IPO. Thereby, they focus on the year prior to the IPO, and find significantly positive t-1 abnormal accruals, which are approximately 1% to 2% of total assets. This implies pre-IPO EM in form of inflating the performance figures in the year prior to the IPO, but the estimate of the amount of the EM is significantly lower than in t0, where average abnormal accruals range from 3% to 6% of total assets.

Potential motives for earnings management range from hitting managerial performance targets to boosting performance measures prior to an equity offer to increase the attractiveness of the offer. As Titman & Trueman (1986) point out, IPOs are particularly vulnerable events to EM because due to the scarcity of information about the issuing company, the investors are forced to rely heavily on accounting data and displaying higher-than-actual accounting performance has a potential to increase the proceeds to the pre-IPO owners. Indeed, abnormal positive

accruals implicating upwards earnings management prior to IPOs are detected in several academic studies e.g., Teoh, Welch & Wong (1998) and Lee & Masulis (2011).

Teoh, Welch & Wong (1998) argue that the three-year performance of the IPOs of most aggressive quartile of earnings mangers is 20% less compared to the most conservative quartile of earnings mangers. Rangan (1998) studies EM in connection with seasoned equity offerings and documents negative relation between EM and after SEO returns. He concludes, the investors do not completely recognize the effect of earnings management, but rely on the reported, inflated performance measures, and are therefore disappointed in the subsequent reduction in performance. Also, Chen et. al (2013) find that long run aftermarket performance of IPOs is negatively related to EM but document this phenomenon only with issuers related with high information uncertainty.

However, Gao, Meng, Chang & Wu (2017) do not find strong negative relation between long run stock market performance of IPOs and EM, even though they show that institutional investors to some extent adjust their bid prices downwards when the issuer is an aggressive earnings manager. This adjustment is not observed with retail investors, which implies that for investors EM is difficult to recognize. Indeed, Xiong et. al (2011) propose that IPOs with aggressive earnings management were to experience high first day returns, because unsophisticated investors on the secondary market are unable to adjust their valuations according to pre-IPO EM, whereas the bid prices are at least partly adjusted. It appears, that investors are at least partly unable to recognize the pre-IPO earnings management and inflated performance figures and are thereby disappointed with the subsequent performance of the issuing company, resulting weaker long-run aftermarket returns.

2.5 Relation between PE and VC sponsoring and pre-IPO earnings management

Most research of PE or VC sponsor's relation to issuing companies' earnings quality conclude that PE and VC sponsors are related to lesser pre-IPO earnings management or are unrelated to pre-IPO EM, instead of PE and VC sponsors promoting aggressive EM. Katz (2009) studies PE-backed and non-PE backed private companies, and finds PE backed companies having higher earnings quality before and after going public, lower pre-IPO EM and superior after-IPO stock performance. Hochberg (2012) finds similar results with VC sponsored IPOs between 1983 and 1994, as she documents stronger corporate governance systems and lower abnormal

accruals for venture capital backed issuers, on average at 3.2% of total assets, compared to average abnormal accruals of 9.5% for non-VC backed issuers. However, in some studies the link between PE and VC sponsors and reduced pre-IPO earnings management is linked to only high-reputation sponsors: Lee & Masulis (2011) argue, that significant reducing effect on EM is linked only to high-reputation VC sponsors, not VC sponsors as a group and Goktan & Muslu (2018) report that publicly traded PE sponsors are related to higher earnings quality of their portfolio companies, but do not find such relation with private PE sponsors.

Lower level of pre-IPO earnings management in PE and VC backed IPOs can be reasoned with the PE and VC companies' incentives to build and maintain high reputation, and their positive effect on corporate governance practices: Atanasov, Ivanov & Litvak (2012) show that more reputable VCs have lower litigation risks, and that previously litigated VCs suffer lower fund inflows in the future, which supports importance of reputation and its opportunistic behavior decreasing effect. Similarly, Tian et. al. (2016) find VCs having difficulties in taking their portfolio companies public after being involved in fraudulent IPOs and that the fund inflows are sharply decreased after losing reputation. Superior corporate governance policies are also linked to both PE and VC backed companies by several researchers e.g., Baker & Wruck (1989) and Hochberg (2012). This is consistent with the certification hypothesis of Megginson & Weiss (1991), as they argue that VC sponsors do provide certification for the quality of their portfolio companies.

Arguments of PE and VC backed IPOs being more opportunistic and vulnerable to aggressive EM have also been developed, but there is little conclusive evidence of that: Michala (2019) hypothesizes that PE companies would have the proficiency and motives to practice opportunistic pre-IPO earnings management in their portfolio companies, and thereby PE-backed IPOs would be of lower quality and experience weaker long-run aftermarket performance but finds no evidence of such phenomenon. Chou, Gombola & Liu (2006) report, that also RLBOs are related with pre-IPO EM, and more aggressive earnings management is related to weaker post-RLBO stock performance. However, they point out, that RLBOs are not underperforming as a group, and the study does not assess whether EM is more aggressive or conservative in RLBO companies compared to non-PE backed IPO companies.

Table 2 – Studies of pre-IPO earnings management of PE and VC sponsored issuers

In Table 2, I list the key studies and their findings considering the relation of PE and VC sponsoring and the pre-IPO earnings management, that I assess in this paper.

Authors	Sponsor type	Findings
Goktan & Muslu (2018)	PE	Companies sponsored by publicly traded PE companies have lower levels of EM and higher long-run returns than the ones sponsored by non-listed PE companies
Katz (2009)	PE	Earnings quality is higher, pre-IPO EM is lower and aftermarket performance is stronger among PE sponsored issuers compared to other issuers
Michala (2019)	PE & VC	PE or VC backed IPOs do not fail more often than non-backed IPOs, and are not related with higher pre-IPO EM
Chou, Gombola & Liu (2006)	PE (RLBOs)	Positive abnormal accruals related to RLBO's, high EM has negative effect on aftermarket performance
Hochberg (2012)	VC	VC backed issuers have better corporate governance practices and lower level of pre-IPO earnings management
Premti & Smith (2020)	VC	VC sponsored and highly leveraged issuers are less likely to engage in aggressive pre-IPO EM
Lee & Masulis (2011)	VC	High-reputation VCs are associated with less EM in the pre-IPO period, but VCs as a whole group do not have a significant EM-reducing effect

2.6 Interaction between PE and VC sponsors, EM, and post-IPO performance

The relation between PE and VC sponsoring, earnings management and long run aftermarket performance of IPOs has received scarce academic attention and the results are not conclusive, even though the bilateral relations of the factors have been more closely researched. Teoh, Welch & Wong (1998) report superior long run performance of IPOs that are conservative with EM but do not find evidence of VCs significantly reducing EM. Contrarily, Krishnan et. al. (2011) report positive relation between VC reputation, corporate governance and long run performance but do not directly assess earnings management. Studying IPOs backed by public PE companies, Goktan & Muslu (2018) find evidence of PE sponsors improving earnings quality and long run stock performance, but limit this finding only to publicly traded PE sponsors. On the other hand, Katz (2009) argues that PE sponsored IPOs participate less in EM and issues that are majority owned by PE companies do overperform non-PE sponsored IPOs, but they do not directly assess the interaction of earnings management, PE sponsoring and long-run performance of the issuers.

3. Hypotheses

3.1 Hypothesis development

In this thesis, I assess whether private equity and venture capital backed issuers are less prone to aggressive pre-IPO earnings management and if their long-run performance is superior to non-backed IPOs. I hypothesize that earnings management is lower and aftermarket performance is stronger for the PE and VC backed IPOs compared to non-backed IPOs. I support these hypotheses with the importance that preserving and improving reputation has on PE and VC companies; This encourages PE and VC sponsors to monitor their portfolio companies closely and to implement strong corporate governance procedures to avoid opportunistic or fraudulent behaviour that could harm the sponsors' reputation. These factors also discourage use of aggressive earnings management to inflate IPO valuations, whereas non-sponsored issuers have less to lose, if the after-IPO performance of the company fails to live up to the expectations and could thereby be more prone to inflating earnings. I argue that investors are not fully capable of detecting pre-IPO earnings management, but rely on the reported performance measures, and are therefore disappointed in the subsequent reduction in performance of aggressive earnings managers, which deteriorates the long-run returns.

Arguments on behalf of opportunistic behavior and higher EM in PE and VC sponsored IPOs can also be developed, as the sponsors could have the proficiency to distract investors and would benefit of higher bid prices at least in the short run. However, I expect the motives to maintain reputation as a reliable sponsor to transcend the opportunistic short-run motives. This hypothesis is consistent with majority of the prior literature, that reports PE sponsors and at least high reputation VC sponsors improving earnings quality of issuing companies and EM having negative effect on after-IPO long term market performance.

Xiong et. al. (2010) and Gao et. al. (2017) argue that institutional investors to some extent recognize EM and partially adjust their bid prices. However, retail investors do not appear to recognize earnings management, due to which the IPOs with aggressive earnings management were to experience high first day returns, as the unsophisticated investors on the secondary market are unable to adjust their valuations accordingly. I experiment with this hypothesis and expect pre-IPO EM to be related to higher first-day returns. I also hypothesize PE-backed IPOs to experience lower underpricing, as I expect investors to take PE sponsoring as a certification of higher quality of the issue. Contrarily, I expect VC-backed IPOs to experience high first day

returns as especially young venture capitalists have motives to tolerate high underpricing consistent with the grandstanding hypothesis of Gompers (1996).

If investors do take PE and VC involvement as a certification of earnings quality, the hypothesized underpricing-increasing effect of EM should be lower in PE and VC sponsored IPOs. Thereby, I predict pre-IPO earnings management increasing underpricing, but expect the increase being smaller with the PE and VC backed IPOs. Investors appear to be at least partly unable to detect pre-IPO earnings management. Thereby, if investors were to take the involvement of PE or VC sponsors as a certificate of quality, they should be even more disappointed in the aftermarket returns of PE and VC sponsored IPOs involved in aggressive EM compared to non-sponsored issuers that inflated their pre-IPO earnings. Thus, I expect the pre-IPO EM in PE and VC backed companies to have more negative effect on the long-run returns of those companies, than in case of non-backed IPOs.

3.1.1 List of hypotheses

H1) Private equity and venture capital sponsoring has limiting effect on pre-IPO earnings management compared to non-backed issuers
H2) Private equity and venture capital sponsored companies outperform non-backed issuers in three-year post-IPO abnormal stock returns
H3) Higher level of pre-IPO earnings management is related to lower three-year post-IPO stock returns
H4) Pre-IPO earnings management in private equity and venture capital backed companies has more negative effect on the long-run returns of those companies, than earnings management with non-backed issuers
H5) Underpricing is highest among VC-backed IPOs and lowest among PE-backed IPOs
H6) Pre-IPO earnings management increases underpricing, but the increase is smaller with the PE and VC backed IPOs

4. Data and sample selection

4.1 Selection of the IPO sample

Sample of my study consists of domestic US IPOs of common stock in NYSE and NASDAQ issued between January 1st 2004 and December 30th 2018. The IPO event-data is retrieved from Refinitiv Eikon. I exclude IPOs with after offer market value less than $50M, and IPOs where shares offered represent less than 5% of shares outstanding after offer. Furthermore, the IPO has to be original in the sense that the company is not publicly traded in any other stock exchange at the time of the offering. I exclude the IPOs, where the issuer's primary industry is financial (two-digit SIC codes from 60 to 67), because of the differing structure of accruals in these industries. Furthermore, I exclude the issuers, whose primary industry is in the public administration industry group or is not classified (two-digit SIC codes from 90 to 99). These conditions result an initial sample of 1238 IPOs with average (median) market value after offer of $801M ($373M).

The abnormal accruals measure (AAC) representing earnings management, control variables and the return measures introduce additional data requirements. The issuing companies are required to have the income statement, balance sheet and cash flow data available in Refinitiv Datastream for the two years prior to the IPO. Furthermore, the issuer's stock return data must be available in Refinitiv Datastream for at least the first full month after the issue date. In addition to these requirements, I exclude the IPOs with the most extreme accruals, and remove outliers in return of assets (ROA) and debt to equity data. Consistent with prior literature, e.g., Guo et. al. (2011), I control for market to book ratio (M/B). Because M/B ratio is not an appropriate measure for companies with negative equity, I also exclude companies with negative equity after the IPO. My final sample fulfilling the data requirements consists of 681 IPOs with average (median) market value of $942M ($444M) after the offer.

4.2 Private equity and Venture capital backing variables

I divide IPOs into venture capital (VC) backed, private equity (PE) backed and non-backed IPOs. I use the Refinitiv Eikon's *Private Equity Backed IPO Issue* and *Venture Capital Backed IPO Issue* Flags in determining if the issue is backed by either of the sponsors. The flags are set to true, if the issuer was PE or VC-backed at the time of the IPO. PE and VC-backing is mutually exclusive. Of the private equity backed IPOs majority, 91% of my final sample, are reverse leveraged buyouts (RLBOs). For the use of the regression analyses of this study, I construct

indicator variables of PE and VC-backing. The PE indicator variable takes value of 1 if the IPO is backed by a private equity sponsor, otherwise 0, and the VC indicator variable takes value of 1 if the IPO is backed by a venture capital sponsor, otherwise 0.

4.3 IPO sample description

Of the final sample of 681 IPOs 267 (39%) are PE backed, 312 (46%) are VC backed and 102 (15%) are non-backed. The percentage of PE and VC backed IPOs is considerably higher than in most studies in prior literature, where approximately one third of all IPOs have been classified as VC backed and only 10% to 20% as PE-backed. However, the prior literature has documented that the share of VC and PE backed IPOs has increased significantly from the level of 1980's and 1990's, as e.g., Ewens & Farre-Mensa (2020) show. The number of PE, VC and non-backed IPOs by their issue year is presented in Figure 1. The figure also demonstrates the fluctuation of the IPO market and especially the low number of new issues during and right after the 2008 financial crisis is easily observed.

I also apply my sample selection criteria, except for the additional data requirements, for IPOs from 1990 to 2018 to examine, how the IPO activity and the share of PE and VC backed IPOs has developed before and during my sample period of 2004 to 2018. I observe the average number of IPOs per year decreasing from 131 between 1990 and 2003 to 83 between 2004 and 2018. Furthermore, the percentage of non-backed IPOs has decreased sharply from 38% in 1990 to 2003 to only 16% in 2004 to 2018, whereas share of private equity backed IPOs increased from 12% to 30%. The share of VC sponsored IPOs remained more stable and increased slightly from 49% between 1990 and 2003 to 54% between 2004 and 2018. I present the annual numbers of PE-, VC-, and non-backed IPOs from 1990 to 2018 in Figure 2. When relaxing the size-condition, the decrease in non-backed IPOs and increase in VC backed IPOs is even more substantial: The average number of IPOs between 1990 and 2003 was 172 of which 11% were PE-backed, 44% were VC-backed and 45% were non-backed. Between 2004 and 2018 the average number of IPOs was 85 of which 29% were PE-backed, 53% were VC-backed and 18% were non-backed. These findings are consistent with Ewens & Farre-Mensa (2020), who show that number of IPOs has decreased sharply from their peak levels in the late 1990's especially due to the decrease in the smallest IPOs, which is linked to the increase in private equity and venture capital activity.

Figure 1 – IPOs in the final sample by issue year and sponsoring type

Number of PE, VC, and non-backed IPOs by their issue year that are included in my final sample, totalling 681 IPOs. Domestic US IPOs of common stock in NYSE and NASDAQ issued between January 1st 2004 and December 30th 2018 with market value after offer larger than $50M and shares offered-% at least 5% are included. IPOs of companies, whose primary industry is financial or public administration and IPOs that do not fill the additional data requirements are excluded.

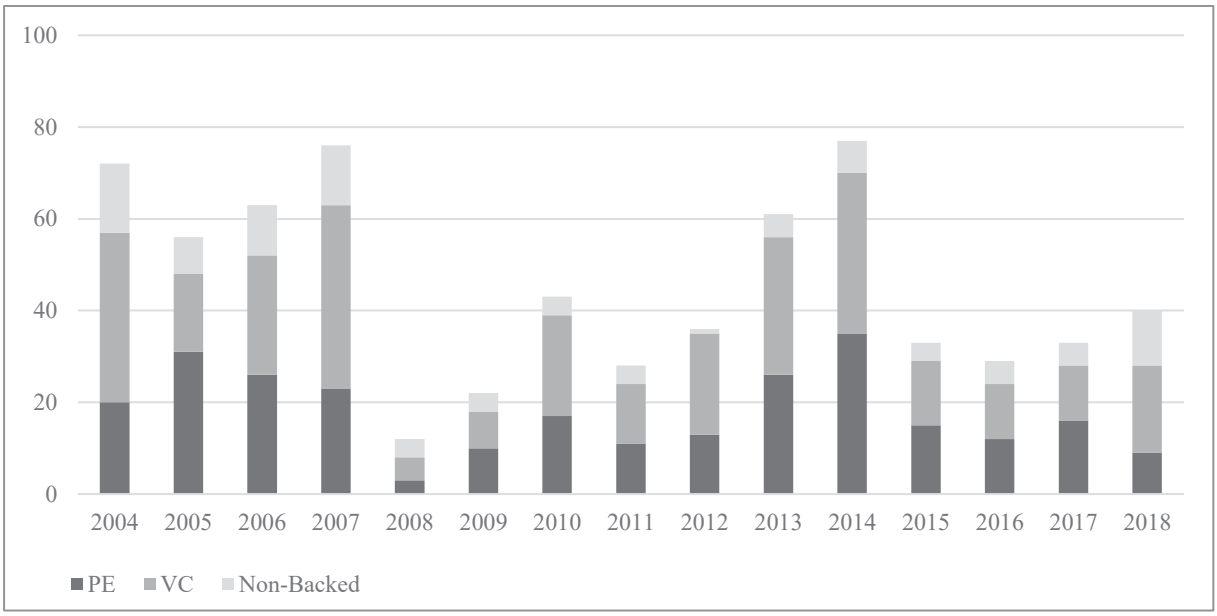
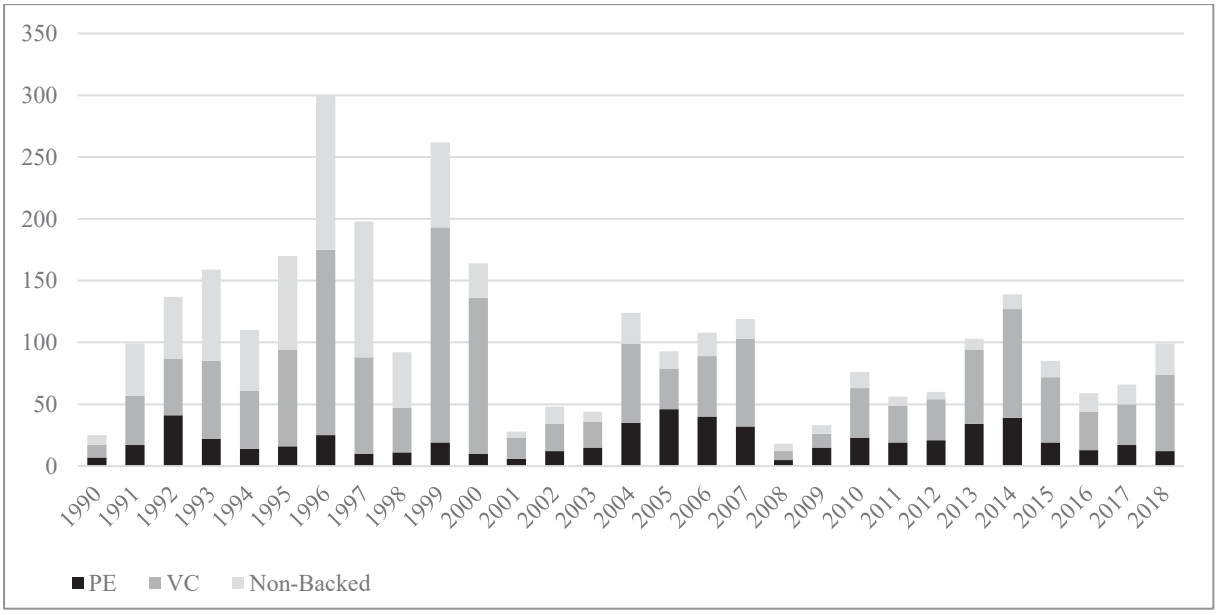


Figure 2 – IPOs from 1990 to 2018 by issue year and sponsoring type

Number of PE, VC, and non-backed IPOs by their issue year from 1990 to 2018. The figure illustrates the change in volume of IPOs and the percentage of non-backed and backed IPOs from 1990's to the sample period of this paper of 2004 to 2018. Domestic US IPOs of common stock in NYSE and NASDAQ issued between January 1st 2004 and December 30th 2018 with market value after offer larger than $50M and shares offered-% at least 5% are included, excluding financial industry and public administration IPOs. The additional data requirements such as income statement data availability are not posed on this sample.



4.4 Measure of earnings management

4.4.1 Constructing the abnormal accruals measure

In measurement of earnings management, I use the modified Jones model that is used to estimating abnormal accruals and is first introduced in Jones (1991). Different versions of the model are widely used in various studies of earnings management, e.g., in Teoh et. al (1998), Xiong et. al. (2010) and Lee & Masulis (2011). Dechow et. al. (1995) examine different models for detecting earnings management and find the modified Jones model being the most powerful one. The modified Jones improves the original model by taking the change in net receivables into account. Furthermore, I include an intercept term in the model whereas most of the earlier research omits the intercept. Kothari et. al. (2005) show that including the intercept decreases heteroscedasticity of the model, makes the abnormal accrual measure more symmetric and improves the efficiency of the size variable. The estimated abnormal accruals can be total, current, or noncurrent accruals, of which I use total accruals defined as net income before extraordinary items less cash flow from operations. My application of the abnormal accruals measure resembles the total accruals measure used in Xiong et. al. (2010).

The modified Jones model is based on industry and year specific multiple liner regression models that determine expected accruals divided by total assets with an estimation sample for each industry and each year based on company characteristics; The inverse of total assets, change in revenue less change in net receivables divided by total assets, and PPE divided by total assets. The abnormal accruals indicating earnings management for a company are then obtained as the prediction error between the company's actual total accruals in year t and the company's expected accruals calculated with the industry and year specific coefficients.

I use the abnormal accruals (AAC) of a company in the fiscal year prior to the IPO as the measure of pre-IPO earnings management, because it represents the potential manipulation of accounting performance reported in the most recent annual statement prior to the issue. In addition, Premti & Smith (2020) find that the abnormal accruals in the IPO year, which are often used in literature, is an upwards biased measure of EM due to the cashflows caused by the IPO, and thereby yields inaccurate and inflated estimates of pre-IPO earnings management. This issue can be avoided by concentrating in abnormal accruals of the year previous of the issue as the indicator of pre-IPO earnings management. However, downside of calculating the abnormal accruals of the year prior to the issue is that it requires fundamental data (income

statement, cash flow statement and balance sheet data) for the two fiscal years prior to the IPO. Because the issuers were private companies in the pre-IPO period data for the two pre-IPO years is not available for all issuers, which reduces the sample size. For the AAC measure, I use fundamental data of the issuing companies and the historical constituents of NASDAQ and NYSE retrieved from Refinitiv Datastream. I drop the companies with inadequate data from my sample.

I define the expected accruals for each issuer based on the issuer's primary two-digit SIC-code. All companies with the same two-digit SIC listed on NYSE or NASDAQ in the year prior to the IPO are used as the estimation sample. If less than 50 companies with the same two-digit SIC-code have the necessary data available, I estimate the expected accruals based on the issuer's one-digit SIC to ensure large enough estimation sample and to limit the effect of outliers. I estimate a multiple linear regression model of the following form for each two-digit SIC group and for each year t prior to an IPO (years 2003 to 2017).

$$\frac{TAC_{i,t}}{TA_{i,t-1}} = \alpha_{j,t} + \beta_{1j,t}\frac{1}{TA_{i,t-1}} + \beta_{2j,t}\frac{\Delta REV_{i,t}-\Delta REC_{i,t}}{TA_{i,t-1}} + \beta_{3j,t}\frac{PPE_{i,t-1}}{TA_{i,t-1}} + \varepsilon_{i,t} \quad (1)$$

Where

$\alpha_{j,t}$ is the constant term of the regression model of industry j in year t;

$\beta_{1,2,3j,t}$ are the coefficients of the independent variables of the regression model of industry j in year t;

$TAC_{j,t}$ is the total accruals in year t for company i in industry j. Total accruals are defined as net income before extraordinary items less cash flow from operations;

$TA_{j,t-1}$ is the total assets for year t-1 for company i in industry j;

$\Delta REV_{j,t}$ is change in revenue in year t for company i in industry j, i.e., revenue in year t less revenue in year t-1;

$\Delta REC_{j,t}$ is change in net receivables in year t for company i in industry j;

$PPE_{j,t-1}$ is property, plant and equipment in the end of the year t-1 for company i in industry j;

$\varepsilon_{i,t}$ is the error term.

The expected accruals for an IPO company x in industry j for year t, where t is the previous year to the issue year, are thereby determined as follows:

$$E\left(\frac{TAC_{x,t}}{TA_{x,t-1}}\right) = \alpha_{j,t} + \beta_{1j,t}\frac{1}{TA_{x,t-1}} + \beta_{2j,t}\frac{\Delta REV_{x,t} - \Delta REC_{x,t}}{TA_{x,t-1}} + \beta_{3j,t}\frac{PPE_{x,t-1}}{TA_{x,t-1}} \quad (2)$$

The abnormal accruals (AAC), that I use as the measure of earnings management, for company x are calculated as the prediction error:

$$AAC_{x,t} = \frac{TAC_{x,t}}{TA_{x,t-1}} - E\left(\frac{TAC_{x,t}}{TA_{x,t-1}}\right) \quad (3)$$

4.4.2 Statistics of the earnings management measure

In Table 3, I present statistics of the AAC measure representing pre-IPO earnings management. The AAC measure is measured as the percentage of the company's lagged total assets. Consistent with hypothesis H1, the average abnormal accruals of the non-backed issuers are higher than abnormal accruals of PE- and VC-backed issuers, and statistically significantly positive. The abnormal accruals of PE-backed companies are insignificantly different from zero, whereas AAC of VC-backed companies is significantly negative, which suggests, that PE- and VC-backed issuers do not on average participate in upwards pre-IPO earnings management. Also, the abnormal accruals of the entire sample are statistically significantly negative at -1.6% of the lagged total assets. This is an interesting result, as majority of literature, e.g., Teoh et. al. (1998) and Lee & Masulis (2011) find positive abnormal accruals in the pre-IPO period, implying upwards earnings management. The abnormal accrual measure suggests that the pre-IPO earnings management is not characteristic for IPO's as a group, but is a phenomenon linked to non-backed IPOs.

In panel B of Table 3, I divide the issuers to aggressive, neutral, and conservative earnings managers. I define aggressive earnings managers as the issuers in the highest quartile of pre-IPO abnormal accruals (AAC). Conservative EM includes the companies in the lowest quartile of abnormal accruals, and neutral EM as the companies with abnormal accruals between the lowest and the highest quartile. Aggressive earnings managers have $AAC \geq 6.2\%$, conservative earnings managers have $AAC \leq -9.0\%$, and neutral earnings managers $-9.0\% < AAC < 6.2\%$. Of the whole sample, 25% issuers are classified as aggressive, 25% as conservative and 50% as conservative earnings managers. Consistent with the high average abnormal accruals of non-backed IPOs, 40% of non-backed issuers are aggressive earnings managers, as only 14% of them are conservative earnings managers. With PE-backed issuers, the share of neutral

earnings managers, i.e, issuers with close-to-zero abnormal accruals is unproportionally high at 68%. In turn, of the VC-backed issuers only 36% are neutral earnings managers, as 39% are conservative and 25% aggressive. The proportions do illustrate the differences between the issuers; PE-backed issuers rarely have extremely high or low AAC in the year prior to the IPO, whereas the deviation with VC-backed issuers is much higher. The non-backed issuers' high proportion of aggressive earnings managers and low proportion of conservative earnings managers further supports the hypothesis H1 of non-backed issuers being more prone to inflating their pre-IPO performance.

Table 3 – Statistics of the abnormal accruals measure

In Table 3 panel A, I present statistics of the AAC measure implicating pre-IPO earnings management of the PE-, VC- and non-backed issuers. I test with Student's t-test, if AAC is significantly different from zero. Significance is denoted as (.) significant at 10% level; (*) significant at 5% level; (**) significant at 1% level; (***) significant at 0.1% level.

In panel B, I divide the issuers to aggressive, neutral, and conservative earnings managers, and present the number and share of companies in the respective quartile. I define aggressive earnings managers as the issuers in the highest quartile of pre-IPO (AAC). Conservative EM includes the companies in the lowest quartile of AAC, and neutral EM as the companies with AAC between the lowest and the highest quartile.

	PE	VC	NON	ALL
Panel A – Statistics				
Average	-0.3 %	-5.1 % ***	5.5 % **	-1.6 % *
Median	0.8 %	-4.2 %	4.6 %	0.0 %
St Dev	14.4 %	22.1 %	17.8 %	19.1 %
n	267	312	102	681
Panel B – Number of aggressive, neutral, and conservative earnings managers				
Aggressive EM				
n	51	78	41	170
%	19.1 %	25.0 %	40.2 %	25.0 %
Neutral EM				
n	181	113	47	341
%	67.8 %	36.2 %	46.1 %	50.1 %
Conservative EM				
n	35	121	14	170
%	13.1 %	38.8 %	13.7 %	25.0 %

4.5 Measure of long run after-IPO performance

I measure long run after-IPO stock performance of the issuing companies for the three years after the IPO as monthly average abnormal return (AAR) and as buy-and-hold abnormal return (BHAR). Versions of both measures of long-run performance are used in various types of academic studies, including studies of after-IPO long-run performance, as e.g., Cao & Lerner (2009) use monthly average abnormal returns and buy-and-hold abnormal returns in their study of three-year performance of RLBOs. BHAR has received some criticism as a downwards biased measure of long-run performance of IPOs. Schultz (2003) argues that IPOs do underperform compared to their ex-ante expectations of returns, but this is due to the clustering of IPO activity on peak valuation periods, not market inefficiencies nor deliberate timing decisions of issuers. However, the focus in my study is on the performance difference of the PE-, VC- and non-backed IPOs, not on the under- or overperformance of the issuing companies compared to their return benchmarks as such. Thereby, using BHAR in the context of this study does not create the issues e.g., Schultz describes.

AAR and BHAR are based on the difference between a company's realized and expected returns. In order to have a broader view of the performance of the issuers, I define the expected return in two different ways: First, I use industry benchmarks, the equal weighted monthly returns of Kenneth French's 10 industry group portfolios, French (2022), of which I use the issuing company's respective industry group's returns. Industry benchmark portfolios are widely used to estimate long-run abnormal return measures, and e.g, Brav & Gompers (1997) use it as one of their long-run performance measures. This approach takes the industry characteristics of the issuers into account, as the industry portfolios are used as a benchmark for the issuers. I denote the expected return based on the industry portfolios with ER_{Ind} and the respective abnormal return measures as AAR_{Ind} and $BHAR_{Ind}$.

Second, I use the expected return based on the Fama-French three-factor (FF3) model first introduced by Fama & French (1993). In this approach, a company's excess return (gross stock return – risk free rate) is regressed on factor returns, that are excess market return (MKT-RF), size (SMB) and book-to market ratio (HML), to determine factor coefficients that represent the company's stock return's exposure to the factors. I use the factor returns from Kenneth French's data library (French (2022)). AAR_{FF} is a company's FF3 model intercept, that indicates the monthly average abnormal return of the company, that is not explained by the risk factor

coefficients. Teoh et. al. (1998) use similar company specific intercepts from the FF3 model as one measure of average long-run abnormal returns. The advantage in the use of Fama-French three-factor model in estimating long-run abnormal returns of IPOs is that it includes the SMB and HML factors, as IPO companies are often small growth companies. For the FF3 buy-and-hold return ($BHAR_{FF}$) measure, I calculate expected return ER_{FF} for the company in month t as sum of the product of the factor coefficients of a company and the factor returns in month t. Thereby, ER_{FF} can be understood as the expected return of a company with the same FF3 risk factor exposures as the issuer has, and $BHAR_{FF}$ as the difference between the issuer's cumulative stock return and the expected cumulative stock return of a company with the same risk factor exposures as the issuer has. I calculate the AAR_{FF} and $BHAR_{FF}$ measures only for issuers that have remained public at least 12 full months after the IPO.

4.5.1 Constructing the average abnormal return measures

For the monthly average abnormal return, I calculate abnormal returns for the 36 months following the IPO for each issuer in the sample. The industry benchmark abnormal return for month t is the difference between the issuer's stock return in month t and the return of the corresponding industry portfolio (ER_{Ind}) in month t. The monthly average abnormal return AAR_{Ind} is the average of the monthly abnormal returns. The FF3 average monthly abnormal return (AAR_{FF}) is the company specific FF3 intercept. If an issuing company is delisted during the 36 month after-IPO period, I use the average abnormal return of the months until the delisting, to avoid survival bias. I do not estimate AAR_{FF} for companies delisted earlier than 12 months after the IPO. I define the AAR return measures for an IPO company i as follows:

$$AAR_{Ind,i} = \frac{1}{n}\sum_{t=1}^{t=n}(r_{i,t} - ER_{Ind,i,t}) \quad (4)$$

$$AAR_{FF,i} = \alpha_{FF3,i} \quad (5)$$

Where

n is the number of months used to estimate the average abnormal return. If the company is delisted within 36 months of the IPO, n is the delisting month, otherwise n is 36;

$t = 1$ is the first full month after the IPO;

$r_{i,t}$ is the stock return of the IPO company i in month t. The return is calculated as the percentage increase in Refinitiv Datastream's return index (data item RI);

$ER_{Ind,i,t}$ is the return of the company i's industry for month t. Industry return is the matched industry's return of Kenneth French's 10 industry portfolios (French (2022));

$\alpha_{FF3,i}$ is the intercept term of the Fama-French three-factor model.

4.5.2 Constructing the buy-and-hold abnormal return measures

Buy-and-hold abnormal return (BHAR) is the difference between compounded realized return for a period and compounded benchmark return or expected return for a period. BHAR can be interpreted as the percentage difference in wealth after investing \$1 in the measured asset compared to the wealth after investing \$1 in the benchmark asset. I calculate BHAR for the 36 months after the IPO. If the company is delisted during the 36 months, I use BHAR for the months until the delisting. However, I define $BHAR_{FF}$ only for companies that were public at least 12 months after the IPO. In $BHAR_{Ind}$ the benchmark is the compounded return of the company's corresponding industry's equal weighted return from Kenneth French's 10 industry portfolios. In $BHAR_{FF}$ the expected return is the compounded expected return based on the Fama-French three-factor model. I calculate the BHAR measures as follows:

$$BHAR_{Ind,i} = \prod_{t=1}^{t=n}(1 + r_{i,t}) - \prod_{t=1}^{t=n}(1 + ER_{Ind,i,t}) \quad (6)$$

$$BHAR_{FF,i} = \prod_{t=1}^{t=n}(1 + r_{i,t}) - \prod_{t=1}^{t=n}(1 + ER_{FF,i,t}) \quad (7)$$

Where

n is the number of months that are used to estimate the buy-and-hold abnormal return. If the company is delisted within 36 months of the IPO, n is the delisting month, otherwise n is 36;

$t = 1$ is the first full month after the IPO;

$r_{i,t}$ is the stock return of the IPO company i in month t. The return is calculated as the percentage increase in Refinitiv Datastream's return index (data item RI);

$ER_{Ind,i,t}$ is the percentage return of the company i's industry for month t from Kenneth French's ten industry portfolios (French (2022));

$ER_{FF,i,t}$ is the expected return for company i in month t calculated with the Fama-French three-factor model.

4.5.3 Statistics of long-run performance

I winsorize the long-run performance measures dropping the bottom 1% and top 1% from each of the measures. I do this to limit the effect of a few companies with the most extreme abnormal performance, which could distract the results, but does not necessarily represent the expected returns of issuers. However, I estimate the key statistical models also with the unwinsorized returns to test the robustness of the results. The robustness tests are discussed in section 7. In Table 4, I present statistics of the long-run return measures for the PE-backed, VC-backed, non-backed and all the IPOs. PE-backed IPOs appear to outperform other IPOs based on all four long-run abnormal return measures. The averages of the abnormal return measures of PE-backed IPOs are positive with all performance measures and the averages are also statistically significantly different from zero based on all but the $BHAR_{FF}$ measure. For VC-backed IPOs, the abnormal return measures are not significantly different from zero, as AAR measures are slightly positive and BHAR measures slightly negative. The non-backed issuers perform worst, as the averages of both BHAR measures are statistically significantly negative. The AAR measures of the non-backed issuers are not significantly different from zero, but are lower than with PE- and VC-backed issuers.

In Figure 3, I present the industry benchmark buy-and-hold abnormal return ($BHAR_{Ind}$) for PE-, VC- and non-backed issuers month-by-month for the 36 months after the IPO. The abnormal return for PE-backed issuers is relatively low for the first few months, but then increases steadily to the 10.3% level in the end of 36th month after the IPO. Vice versa, the $BHAR_{FF}$ for the non-backed issuers is very high for a few after-IPO months, but in long run, the buy-and hold return turns negative and decreases below PE- and VC-backed issuer, to -21.2% in the end of the three-year after-IPO period. VC-backed issuers perform poorly in the first months, but their $BHAR_{Ind}$ then levels between 0% and -10%, ending to -6.4% in the 36th month. The corresponding patterns of BHAR calculated based on the Fama-French three-factor model ($BHAR_{FF}$) are very similar to the $BHAR_{Ind}$ patterns in Figure 3.

Table 4 – Statistics of long-run performance measures for PE-, VC-, and non-backed issuers

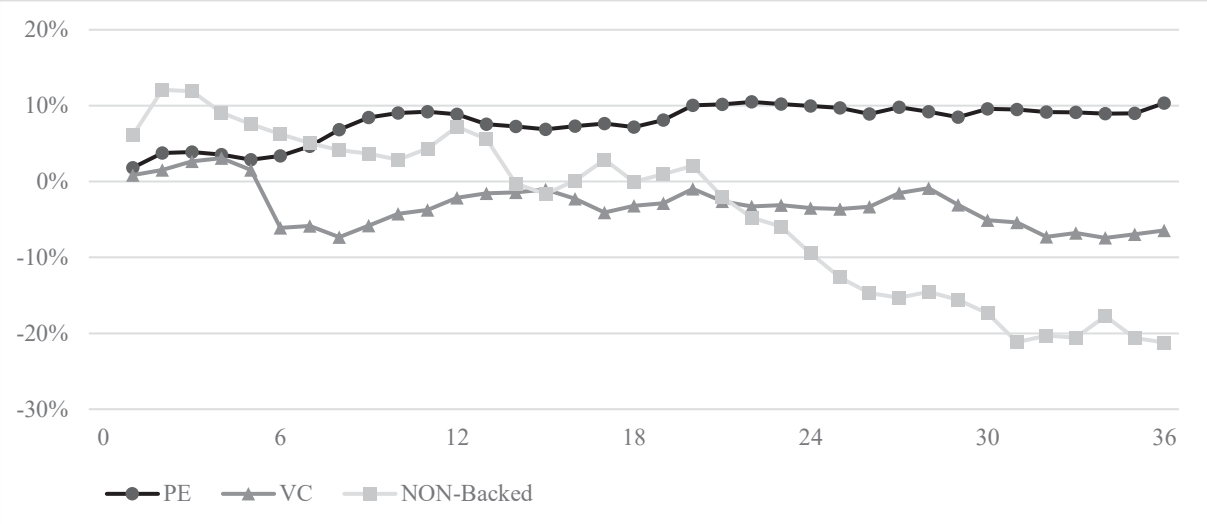
In table 4, I present averages, medians, and standard deviations of the long-run return measures for the PE-backed, VC-backed, non-backed and all the IPOs. The returns are winsorized dropping the bottom 1% and top 1% of each return measure. I test with Student's t-test, if the average returns are significantly different from zero. Significance is denoted as (.) significant at 10% level; (*) significant at 5% level; (**) significant at 1% level; (***) significant at 0.1% level.

		AAR_{Ind}		AAR_{FF}		$BHAR_{Ind}$		$BHAR_{FF}$	
PE	Average	0.4 %	***	0.2 %	*	10.3 %	*	1.7 %	
	Median	0.6 %		0.5 %		-2.3 %		-6.0 %	
	St Dev	0.020		0.022		0.862		0.927	
	n	264		262		265		261	
VC	Average	0.2 %		0.0 %		-6.4 %		-7.8 %	
	Median	0.5 %		0.4 %		-29.5 %		-21.6 %	
	St Dev	0.029		0.030		1.002		1.138	
	n	305		302		302		303	
NON	Average	0.1 %		-0.2 %		-21.2 %	**	-25.3 %	**
	Median	0.1 %		0.2 %		-32.9 %		-25.3 %	
	St Dev	0.026		0.032		0.809		1.020	
	n	98		96		100		96	
ALL	Average	0.3 %	**	0.1 %		-2.0 %		-6.6 %	.
	Median	0.5 %		0.3 %		-19.4 %		-15.9 %	
	St Dev	0.025		0.028		0.928		1.046	
	n	667		660		667		660	

The steady positive development of BHAR of PE-backed issuers in the three-year period (see Figure 3) could be due to less opportunistic behavior during the IPO and the higher corporate governance standards of PE-backed companies. These results are also consistent with findings of Levis (2011), who reports abnormally positive long-run stock returns of PE-backed IPOs and Holthausen & Larcker (1996), who document that the higher accounting performance of RLBO companies extends to several years after the IPO. Also, the steady performance of VC-backed issuers after the weak first six months is supported by higher corporate governance standards enforced by the venture capitalists. The weak performance in the first few trading months could be partly a reversal of the very high first day returns of the VC-backed companies. The non-backed issuers do yield high buy-and-hold abnormal returns in the first trading months, but the returns then deteriorate, which could imply that the pre-IPO performance figures and future prospects of non-backed companies could be exaggerated, due to which investors are disappointed in the long-run. The results are also consistent with hypothesis H2 of PE- and VC-backed issuers outperforming non-backed issuers in the long run.

Figure 3 - Monthly $BHAR_{Ind}$ for PE-, VC- and non-backed IPOs

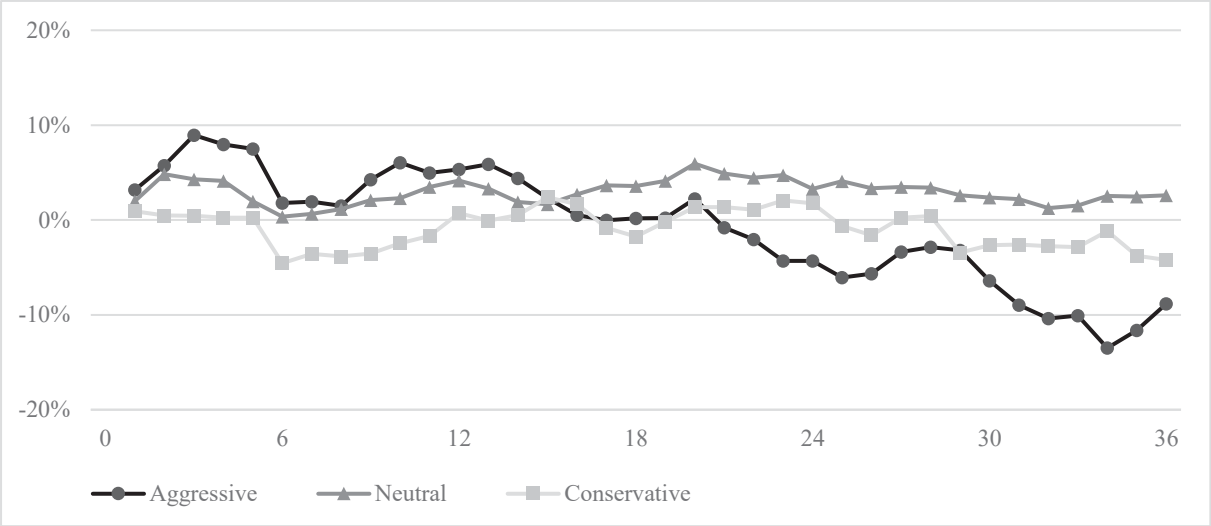
The industry benchmark buy-and-hold abnormal return ($BHAR_{Ind}$) for PE-, VC- and non-backed issuers month-by-month for the 36 months after the IPO. The return corresponds the difference in wealth after investing $1 in each issuer of the type compared to investing $1 per every issuer in the benchmark industry portfolio of the issuer.



In Figure 4, I present the industry benchmark buy-and-hold abnormal return ($BHAR_{Ind}$) of the aggressive, neutral, and conservative earnings managers for the 36 months after the IPO. I define aggressive earnings managers as the issuers in the highest quartile of pre-IPO abnormal accruals. Conservative EM includes the companies in the lowest quartile of abnormal accruals, and neutral EM as the companies with abnormal accruals between the lowest and the highest quartile. Interestingly, the $BHAR_{Ind}$ is highest for the neutral earnings managers, whereas the conservative earnings managers, i.e., the companies with abnormal accruals in the bottom quartile, do have weaker performance compared to the neutral earnings managers. Thereby, it appears that the issuers with especially low abnormal accruals underperform companies with close-to-zero abnormal accruals. However, the companies in the most aggressive quartile of pre-IPO earnings managers do perform worst, which is in line with hypothesis H3. The three-year pattern of BHAR of the aggressive earnings managers is also supportive of the H3, as the BHAR of aggressive earnings managers is highest of the EM groups in the first months but starts to deteriorate during the latter months. This could imply that in the years subsequent to the IPO, the issuers that have inflated their performance figures, do not live up to the expectations of the investors, and thus experience negative abnormal stock returns.

Figure 4 - Monthly $BHAR_{Ind}$ for aggressive, neutral, and conservative earnings managers

The industry benchmark buy-and-hold abnormal return ($BHAR_{Ind}$) for aggressive, neutral, and conservative earnings managers month-by-month for the 36 months after the IPO. I define aggressive earnings managers as the issuers in the highest quartile of pre-IPO abnormal accruals, conservative EM as the companies in the lowest quartile of abnormal accruals, and neutral EM as the companies with abnormal accruals between the lowest and the highest quartile. The return corresponds the difference in wealth after investing $1 in each issuer of the type compared to investing $1 per every issuer in the benchmark industry portfolio of the issuer.



4.6 Control variables and first day return

I follow previous literature in including control variables in the earnings management, long-run stock performance, and first day return regression models to control for IPO and company characteristics of the issuers and to gain a more focused view of the effect the PE and VC sponsors have on the dependent variables. The academic literature controls for plethora of different IPO and company characteristics in pre-IPO earnings management and in long-run IPO performance studies, of which I use the most used ones. Furthermore, in the first day return models the first day return implicating IPO underpricing is the dependent variable, whereas in long-run return models I use the first day return as a control variable, as it has been documented to have a negative relation to long-run after-IPO returns. Definitions of the control variables of all regression models are presented in Table 5.

I use the gross return between the issue price of the IPO and the end price of the first trading day as the measure of first day return, i.e., IPO underpricing. VC-backed IPOs have been linked to higher underpricing, measured with first day returns e.g., by Gompers (1996), who presents the grandstanding hypotheses of young venture capitalists, while PE-backed IPOs have been documented to have lower levels of underpricing e.g., by Cao & Lerner (2009), which is in line

with the larger size of the issues and higher corporate governance standards of the PE-backed IPOs. The IPO underpricing is also time-and-industry dependent, due to which I include year- and industry fixed effects in the first day return regression models.

In the earnings management regression models, I use controls very similar to Lee (2011). I control for issuer's age (Age), issuer's debt to equity ratio (Debt/Equity), price to book ratio (P/B), size measured as natural logarithm of total assets (Size), percentage of offered shares of total shares outstanding after offer (Shares offered-%) and return on assets (ROA). Age, debt to equity and size are expected to have a limiting effect on pre-IPO EM, as older, larger, and more levered companies commonly have more established corporate governance standards and in case of highly levered companies, are under higher scrutiny of the debt holders. Kothari et. al. (2005) show that the abnormal accruals models do not fully explain the accruals of the companies with most extreme performance, and thereby I control for the return on assets of the issuer. High growth companies have higher incentives to inflate their earnings as their earnings multiples are higher, as Lee (2011) points out. Thereby, I control for the price to book ratio of the issuers. The pre-IPO owners have less to gain from pre-IPO earnings management if their equity stake in the issuing company remains high also after the issue. Therefore, I also control for the percentage of shares offered, and expect higher percentage to be related to higher level of pre-IPO EM. In the earnings management regressions, I omit the industry and year fixed effects, as the dependent variable AAC is already industry and year specific, and thus including the industry and year controls could lead to overfitting the model.

The long-run return regression models include the Debt/Equity, P/B, size, and ROA controls, that are same than in the EM regressions. In addition, I control for the first day return and include an issue year indicator variable, that captures the differences in average abnormal long run return across time. The controls are similar to control variables in prior research of long run performance of IPOs, e.g., Levis (2011). I also include industry indicator variables in the regression models where the dependent variable is calculated with the Fama-French three-factor model (AAR_{FF} and $BHAR_{FF}$). This controls for the difference in the abnormal returns of IPOs between industries. However, I omit the industry fixed effects from the long-run abnormal return regressions where the return measure is based on the industry benchmarks (AAR_{Ind} and $BHAR_{Ind}$), to avoid overfitting the model, as the return measures inherently include the difference in return across industries.

In the first day return regression models, I control for the same company and IPO characteristics as in the EM regressions. I also include the year and industry fixed effects to control for the differences in IPO underpricing in different time periods and in different industries. Especially the IPOs issued during hot IPO market have documented to have higher first day returns e.g., Lee & Wahal (2004), which the year fixed effects control. In Table 6, I present the average values of the control variables and the dependent variables of the regression models for PE, VC, and non-backed issuers.

Table 5 – Descriptions of the control variables used in the regression models

Table 5 provides descriptions of the control variables used in the regression models of this study. Included in model-panel indicates whether the variable is used in at least one of the respective regression models. EM denote the models where earnings management measured with abnormal accruals is the dependent variable, First-day return denote the first day return models and 3-year return denote the long-run after IPO performance regression models, where AAR_{Ind}, AAR_{FF}, $BHAR_{Ind}$, and $BHAR_{FF}$ are the dependent variables.

Variable	Description	Included in model		
		EM	First-day return	3-year return
Age	Natural logarithm of the issuer's age in years +1 in the issue year, i.e., ln(Age +1). Age is calculated from the date founded if available, otherwise from date of incorporation.	x	x	
Shares offered -%	Percentage of shares offered in the IPO divided by the total number of shares outstanding after the offer.	x	x	
Debt/Equity	Long-term debt divided by total equity after the offer.	x	x	x
P/B	Price to book ratio of the issuer after the offer, i.e., the compny's market value divided by the company's total equity.	x	x	x
Size	Natural logarithm of the total assets of the issuer in $M in the end of the year prior to the IPO.	x	x	x
ROA	Return on assets of the issuer in the year prior to the IPO, i.e., net income before extraordinary items divided by lagged total assets.	x	x	x
First day return	Underpricing of the IPO defined as gross return between the issue price of the IPO and the end price of the first trading day.			x
Year	Indicator variables for each but one of the calendar years in the sample period of 2004 to 2018. The variable for year t takes value of 1 if the issue date is in the year t, otherwise 0.		x	x
Industry	Indicator variables for each but one of the industries of the issuing companies. The variable for industry j takes value of 1 if the issuer's primary industry is j, otherwise 0. Industries are defined as the Kenneth French's 10 Industry Portfolios (French (2022)), matched with the issuer's 2-digit SIC code.		x	x

5. Methods

5.1 Overview of the methods

The key statistical tests in this study are three groups of multiple linear regression models. I estimate all the models with heteroscedasticity robust standard errors. First, earnings management models consist of regression models where the dependent variable is the abnormal accruals measure (AAC) representing earnings management in the year prior to the IPO. I regress AAC on indictor variables representing if the issuing company is private equity or venture capital sponsored. Second, first day return models have the gross first-day return (underpricing) of the IPO as the dependent variable. I regress the first day return on indicator variables of PE and VC sponsoring and on the AAC measure of earnings management. In addition, I construct interaction variables of the PE and VC variables and the AAC measure (AACxPE and AACxVC) to examine the effect that interaction of PE or VC-sponsoring and EM have on the first day returns. The interaction variables are products of the AAC measure and the PE or VC indicator variable. Third, long-run performance regression models have the three-year abnormal return measures ($AAR_{Ind}, AAR_{FF}, BHAR_{Ind}\ and\ BHAR_{FF}$) as the dependent variables. Similar to the first day return models, I regress the long-run abnormal return measures on the PE and VC indicators, on the AAC measure and on the interaction variables.

The earnings management regression models are designed to answer hypothesis H1, as I test with them, if PE and VC backed IPOs experience lower levels of earnings management than the non-sponsored IPOs. I estimate models with and without the control variables. The controlled models strive to find if the PE and VC sponsors do have an earnings management limiting effect that is not explained by the characteristics of the issuers, whereas the uncontrolled models answer to the question if the level of pre-IPO EM is different for the backed issuers, not taking the company and IPO characteristics into account. I use three different specifications of both the controlled and uncontrolled models; First, I include only the PE indicator variable and omit the VC variable. Second, I include the VC variable but omit the PE variable, and third, I include both the PE and VC indicator variables. I use this approach to, first, examine the level of earnings management in PE-backed IPOs compared to non-PE-backed (i.e., non-backed or VC-backed) IPOs. Second, to compare the level of earnings management in VC-backed IPOs and in non-VC-backed (i.e., non-backed or PE-backed) IPOs. Third, to compare the level of EM in PE and VC-backed IPOs to EM in non-backed IPOs.

Thereby, I estimate total of six different specifications of the earnings management regression models.

With the first day return regression models, I examine the relation PE-backing, VC-backing and earnings management have on the underpricing of the IPOs, to answer hypothesis H5 and H6. Similar to the EM regressions, I estimate uncontrolled and controlled models of model specifications one of which omits the VC indicator, second omits PE indicator and third includes both PE and VC indicator. To test for the potential interaction PE or VC sponsoring and earnings management (AAC) have on underpricing, I also estimate models with the interaction variables AACxPE and AACxVC.

The long-run return models examine hypotheses H2, H3 and H4. I regress the four three-year abnormal return measures ($AAR_{Ind}, AAR_{FF}, BHAR_{Ind}\ and\ BHAR_{FF}$) on the PE and VC indicator variables to examine the three-year stock performance of the issuers with PE- or VC-backing compared to the performance of the non-backed issuers. I estimate the models with and without control variables. Similarly, I regress the long-run abnormal return measures on the AAC measure to assess the relation between pre-IPO EM and long-stock performance of the issuers. I also estimate models that include the interaction variables, to answer hypothesis H4, *Pre-IPO earnings management in private equity and venture capital backed companies has more negative effect on the long-run returns of those companies, than earnings management with non-backed issuers.*

5.2 Earnings management regression models

I examine the level of pre-IPO earnings management with six specifications of OLS linear regression models, that I denote with EM1 to EM6. The dependent variable in all models is the abnormal accruals measure (AAC) for the year prior to the IPO, calculated with the modified Jones model. See section 4.4.1 for more information of the AAC measure. In models EM1 to EM3, I omit the control variables whereas in EM4 to EM6, the control variables are included. See Section 4.6, Table 5 for descriptions of the control variables. As I examine the relation between PE and VC-backing and earnings management, I use the indicator variables of PE and VC-backing taking value of 1 if the IPO is backed by a sponsor of the type, otherwise 0. In models EM1 and EM4, I include the PE-indicator variable and omit the VC-variable, in models EM2 and EM5, I include the VC-indicator variable and omit the PE-variable, and in models

EM3 and EM6, I include both the PE-indicator and the VC-indicator. Thereby, the estimated models are the following form:

$$AAC = \alpha + \beta_{PE}PE \quad \text{(EM1)}$$

$$AAC = \alpha + \beta_{VC}VC \quad \text{(EM2)}$$

$$AAC = \alpha + \beta_{PE}PE + \beta_{VC}VC \quad \text{(EM3)}$$

$$AAC = \alpha + \beta_{PE}PE + \boldsymbol{\beta_{Contr}Contr} \quad \text{(EM4)}$$

$$AAC = \alpha + \beta_{VC}VC + \boldsymbol{\beta_{Contr}Contr} \quad \text{(EM5)}$$

$$AAC = \alpha + \beta_{PE}PE + \beta_{VC}VC + \boldsymbol{\beta_{Contr}Contr} \quad \text{(EM6)}$$

Where

AAC	is the depended variable, abnormal accruals of the pre-IPO year;
α	is a constant;
β_x	are the regression coefficient of variable x;
PE	is the indicator variable of PE-backing;
VC	is the indicator variable of VC-backing;
Contr	is a vector of the control variables; Age, Debt/Equity, P/B, Size, Shares offered-%, and ROA.

5.3 First day return regression models

I examine the relation of PE and VC sponsoring and IPO underpricing with six specifications of OLS linear regression models, that I denote with FD1 to FD6. In models FD1 to FD3, I control for only the year fixed effects, whereas in FD4 to FD6, I include the control variables of Age, Debt/Equity, P/B, Size, Shares offered-%, ROA, and year and industry fixed effects. See Section 4.6, Table 5 for descriptions of the control variables. In models FD1 and FD4, I include the PE-indicator variable and omit the VC-variable, in models FD2 and FD5, I include the VC-indicator variable and omit the PE-variable, and in models FD3 and FD6, I include both the PE-indicator and the VC-indicator. In addition, I test with model FD7 for the effect pre-IPO earnings management measured in abnormal accruals (AAC) has on the first day return and with models FD8 and FD9 for the effect that the interaction of EM and PE or VC sponsoring (interaction variables AACxPE and AACxVC) have on the first day return. In models FD7 to FD9, the control variables and year and industry fixed effects are included. The dependent variable in all models is the gross percentage stock return of the first trading day. Thereby, the estimated models are the following form:

$$R_{First\ Day} = \alpha + \beta_{PE}PE + \boldsymbol{Year} \quad \text{(FD1)}$$

$$R_{First\ Day} = \alpha + \beta_{VC}VC + \boldsymbol{Year} \quad \text{(FD2)}$$

$$R_{First\ Day} = \alpha + \beta_{PE}PE + \beta_{VC}VC + \boldsymbol{Year} \quad \text{(FD3)}$$

$$R_{First\ Day} = \alpha + \beta_{PE}PE + \boldsymbol{\beta_{Contr}Contr} + \boldsymbol{Year} + \boldsymbol{Industry} \quad \text{(FD4)}$$

$$R_{First\ Day} = \alpha + \beta_{VC}VC + \boldsymbol{\beta_{Contr}Contr} + \boldsymbol{Year} + \boldsymbol{Industry} \quad \text{(FD5)}$$

$$R_{First\ Day} = \alpha + \beta_{PE}PE + \beta_{VC}VC + \boldsymbol{\beta_{Contr} * Contr} + \boldsymbol{Year} + \boldsymbol{Industry} \quad \text{(FD6)}$$

$$R_{First\ Day} = \alpha + \beta_{AAC}AAC + \boldsymbol{\beta_{Contr} * Contr} + \boldsymbol{Year} + \boldsymbol{Ind} \quad \text{(FD7)}$$

$$R_{First\ Day} = \alpha + \beta_{AAC}AAC + \beta_{PE}PE + \beta_{AACxPE}AACxPE + \boldsymbol{\beta_{Contr}Contr} + \boldsymbol{Year} + \boldsymbol{Industry} \quad \text{(FD8)}$$

$$R_{First\ Day} = \alpha + \beta_{AAC}AAC + \beta_{VC}VC + \beta_{AACxVC}AACxVC + \boldsymbol{\beta_{Contr}Contr} + \boldsymbol{Year} + \boldsymbol{Industry} \quad \text{(FD9)}$$

Where

$R_{First\ Day}$	is first day return;
α	is a constant;
β_x	are the regression coefficient of variable x;
PE	is the indicator variable of PE-backing;
VC	is the indicator variable of VC-backing;
AAC	is the abnormal accruals of the pre-IPO year;
AACxPE	is the interaction variable of abnormal accruals and PE-backing;
AACxVC	is the interaction variable of abnormal accruals and VC-backing;
Contr	is a vector of the control variables; Age, Debt/Equity, P/B, Size, Shares offered-%, and ROA;
Year	is the year fixed effects, i.e., a vector of the year indicator variables times the regression coefficient of the year;
Industry	is the industry fixed effects, i.e., a vector of the industry indicator variables times the regression coefficient of the industry.

5.4 Long run return regression models

I test the effect PE or VC sponsoring have on the long-run return of the issuers compared to non-sponsored issuers with regression models where the dependent variable is one of the four three-year after-IPO abnormal return measures, $AAR_{Ind}, AAR_{FF}, BHAR_{Ind}$ *or* $BHAR_{FF}$, and the key independent variables are the PE and VC-backing indicator variables. I estimate uncontrolled and controlled versions for each return measure. I denote the uncontrolled model as LR1 and the controlled model as LR2. The control variables, Debt to equity, Size, ROA, First day return, and P/B as well as the year fixed effects are omitted from the uncontrolled models LR1, and are included in the controlled models LR2. However, the industry fixed effects are included in both models (LR1 and LR2), when the dependent variable is AAR_{FF} or $BHAR_{FF}$, because the return measures that are based on the Fama-French three-factor model do not include the industry specific differences in the long-run returns of the issuers. When the dependent variable is AAR_{Ind} or $BHAR_{Ind}$, the industry fixed effects are omitted, as the return measures inherently include the industry specification. The intercept terms in the controlled models do not have real-life interpretations, as the control variables do not have zero means, e.g., Size has a mean of 11.9 (see Table 6) due to which the intercept absorbs the effect of mean of size times the coefficient of size.

In addition, I test for the effect pre-IPO earnings management (AAC) has on the long run return measures with model LR3. Models LR4 and LR5 test the effect the interaction of earnings management and PE or VC sponsoring (interaction variables AACxPE and AACxVC) have on the long run return. I estimate the models for all four long-run performance measures and include the control variables and the year fixed effects in all models. When the dependent variable is AAR_{FF} or $BHAR_{FF}$, I also include the industry fixed effects. Thereby, I estimate the following models for all four long run return measures:

$$R_{3year} = \alpha + \beta_{PE}PE + \beta_{VC}VC \quad (+\boldsymbol{Industry}) \tag{LR1}$$

$$R_{3year} = \alpha + \beta_{PE}PE + \beta_{VC}VC + \boldsymbol{\beta_{Contr}Contr} + \boldsymbol{Year} \quad (+\boldsymbol{Industry}) \tag{LR2}$$

$$R_{3year} = \alpha + \beta_{AAC}AAC + \boldsymbol{\beta_{Contr}Contr} + \boldsymbol{Year} \quad (+\boldsymbol{Industry}) \tag{LR3}$$

$$R_{3year} = \alpha + \beta_{AAC}AAC + \beta_{PE}PE + \beta_{AACxPE}AACxPE + \boldsymbol{\beta_{Contr}Contr} + \boldsymbol{Year} \quad (+\boldsymbol{Industry}) \tag{LR4}$$

$$R_{3year} = \alpha + \beta_{AAC}AAC + \beta_{PE}VC + \beta_{AACxPE}AACxVC + \boldsymbol{\beta_{Contr}Contr} + \boldsymbol{Year} \quad (+\boldsymbol{Industry}) \tag{LR5}$$

Where

R_{3year}	is one of the four long-run after-IPO performance measures, AAR_{Ind}, AAR_{FF}, $BHAR_{Ind}$ *or* $BHAR_{FF}$;
α	is a constant;
β_x	are the regression coefficient of variable x;
PE	is the indicator variable of PE-backing;
VC	is the indicator variable of VC-backing;
AAC	is the abnormal accruals of the pre-IPO year;
AACxPE	is the interaction variable of abnormal accruals and PE-backing;
AACxVC	is the interaction variable of abnormal accruals and VC-backing;
Contr	is a vector of the control variables; Debt/Equity, Size, ROA, First day return, P/B;
Year	is the year fixed effects, i.e., a vector of the year indicator variables times the regression coefficient of the year;
Industry	is the industry fixed effects, i.e., a vector of the industry indicator variables times the regression coefficient of the industry. Industry fixed effect are included only in regression models where the dependent variable is AAR_{FF} or $BHAR_{FF}$.

6. Results

In this section, I present and discuss the results of this study. First, I provide brief overview of the key results. Second, I present the results of the three sets of regression models; earnings management models, first day return models and long run return models. Third, I discuss the key-results of this study, assess the potential explanations of the results, and their relation to prior literature and my hypotheses.

6.1 Overview of the key results

I do not find IPOs as a group being related to significant pre-IPO earnings management as I document average abnormal accruals of -1.6% for the full sample of IPOs. This is considerably lower compared to the findings of Hochberg (2012), who finds average abnormal accruals of 6.8% for IPOs between 1983 and 1994, and slightly lower than findings of Premti & Smith (2020), who documents average abnormal accruals of 0.7% for IPOs from 1988 to 2010. However, with non-backed issuers I do find positive abnormal accruals, at 5.5% of total assets, which is statistically significantly different from zero. I find evidence on behalf of PE-backing having limiting effect on pre-IPO earnings management, when PE-backed issuers are compared to non-backed issuers, as I find statistically significantly negative coefficients for the PE indicator variable in regression models EM3 and EM6, that are presented in Table 7. Venture capital sponsored IPOs have the lowest average abnormal accruals in my sample, but I do not find significant relation between VC sponsoring and lower pre-IPO EM when controlling for the issuer and IPO characteristics.

The underpricing of IPOs measured in first day return is highest for the VC-backed IPOs at 20% on average, lowest for the PE-backed IPOs at 11%, and 15% for the non-backed IPOs. These differences in underpricing are mostly explained by the company and deal characteristics of the IPOs, as I do not find strongly significant relation between the PE or VC sponsoring and underpricing, when I include control variables in the first day return regressions, (see Table 8 models FD4 to FD6). Thereby, I do not find strong evidence on behalf of PE or VC sponsoring having significant effect on IPO underpricing. Furthermore, I do not find significant relation between pre-IPO earnings management and the first day returns.

Table 6 – Averages of key variables for PE, VC, and non-backed issuers

Average values of the variables used in the regression models presented for PE-backed, VC-backed, and non-backed issuers. The abnormal accruals measure (AAC) is described in detail in section 4.4. The long-run performance measures $AAR_{Ind}, AAR_{FF}, BHAR_{Ind}, and\ BHAR_{FF}$ are discussed in section 4.5. The control variable descriptions are presented in Table 5.

	PE-backed	VC-backed	Non-backed	Full sample
AAC	-0.3 %	-5.1 %	5.5 %	-1.6 %
AAR_{Ind}	0.4 %	0.2 %	0.1 %	0.3 %
AAR_{FF}	0.2 %	0.0 %	-0.2 %	0.1 %
$BHAR_{Ind}$	10.3 %	-6.4 %	-21.2 %	-2.0 %
$BHAR_{FF}$	1.7 %	-7.8 %	-25.3 %	-6.6 %
First day return	11 %	20 %	15 %	16 %
ln(Age+1)	2.2	2.3	2.1	2.2
Shares offered-%	28 %	24 %	28 %	26 %
Debt/Equity	1.2	0.2	0.5	0.6
P/B	2.5	3.8	3.1	3.2
ln(Size)	13.2	10.9	11.9	11.9
ROA	0.9 %	-17 %	7 %	-6 %

I find PE-backed IPOs having positive three-year buy-and-hold abnormal return of 10.3% when comparing to industry benchmarks and 1.7% Fama-French three-factor adjusted BHAR, whereas non-backed IPOs yield negative three-year BHARs, of -21.2% to -25.3%. The monthly average abnormal return of PE-backed issuers is 0.4% to 0.2% and of non-backed issuers 0.1% to -0.2% The findings of Cao & Lerner (2009) are similar, but the performance difference is not as extreme, as they find average three-year industry benchmark BHAR of 5% for RLBOs and -7% for non-PE backed IPOs. The three-year BHARs for the VC backed IPOs range from -6.4% to -7.8%, while Brav & Gompers (1997) report average BHAR of -3% for VC backed IPOs and -21% for non-backed issuers. My results do not support the large body of prior literature that reports significant underperformance of IPOs, starting from Ritter (1991), who reports mean equal weighted three-year wealth relative for the IPOs between 1975 and 1984 of 0.831 compared to matching non-IPO companies. Based on my results, it appears that IPOs as a group do not necessarily underperform, but the underperformance could be more related to the non-backed IPOs.

The results provide some evidence on behalf of private equity backed IPOs having stronger long-run stock market performance compared to non-backed IPOs, even after controlling for IPO characteristics, when the long-run performance is measured with buy-and-hold abnormal returns, whereas the regression coefficients of the VC indicator variable are not statistically significant. My results indicate that higher level of pre-IPO earnings management is related to weaker long-run performance, which is consistent with Teoh et. al. (1998). Lastly, I find no significant relation between long-run abnormal returns and eighter of the interaction variables of earnings management and PE or VC sponsoring.

6.2 Results of the earnings management regression models

I present the earnings management regression results in Table 7. The uncontrolled models EM1 to EM3 do not take different company and issue characteristics into account, and thereby their results should be interpreted as the raw difference between the abnormal accruals in backed and non-backed issuers, not PE or VC sponsoring having causal effect on earnings management. The models from EM4 to EM6 do include control variables for issuer age, leverage, P/B, size, shares offered-% and ROA. Thereby, models EM4 to EM6 provide more information of the potential effect the sponsors have on EM, as the company and IPO characteristics are controlled.

I find the pre-IPO earnings management being lower in private equity and venture capital backed companies compared to non-backed issuers, as the regression coefficients of PE (-5.27) and VC (-9.86) indicator variables in the uncontrolled model EM3 are negative and statistically significant at 5% and 0.1% levels. These results imply that the abnormal accruals (AAC), measured as percentage of total assets in the year prior to the IPO, in PE-backed companies are approximately 5ppt lower than in non-backed companies. In case of VC-backed issuers, the difference is even larger, at approximately 10ppt, whereas based on the model EM3, the expected level of AAC is at 5% in non-backed companies. However, in model EM1, where only the PE indicator is included, the coefficient of the PE variable is positive but statistically insignificant. This is due to the setting of the model EM1, where the PE-backed issuers are practically compared to the VC-backed and non-backed issuers. As AAC in the VC-backed IPOs is lower than in PE-backed IPOs, the coefficient of the PE indicator becomes insignificant. In turn, the VC-backed issuers do have statistically significantly lower AAC compared to PE-backed and non-backed issuers, as the significantly negative coefficient in model EM2 demonstrates.

Table 7 – Earnings management regression results

Regression results of the earnings management OLS linear regression models. I present the regression coefficients for the variables, t-statistic in parentheses, and the significance level of the coefficient. Abnormal accruals (AAC) in fiscal year prior to the IPO is the dependent variable in all models. The key independent variables are PE and VC indicator variables, taking value of 1, if the IPO is backed by a PE or VC sponsor, otherwise 0. Control variables are issuer Age (Ln(Age in years +1), Debt/Equity, P/B, Size (Ln(Total assets)), Shares offered-%, and ROA. The model specifications of EM1 to EM6 are described in detail in section 5.2. I use heteroscedasticity robust standard errors in estimation of the t-statistics and significance levels.

Significance levels of the coefficients are denoted as (.) significant at 10% level; (*) significant at 5% level; (**) significant at 1% level; (***) significant at 0.1% level.

Dependent variable: AAC												
Model	(EM1)		(EM2)		(EM3)		(EM4)		(EM5)		(EM6)	
Intercept	-2.47	*	1.15		4.96	**	0.27		6.51		6.03	
	(-2.33)		(1.43)		(2.71)		(0.03)		(0.75)		(0.70)	
PE	2.12				-5.27	*	-1.77				-4.07	*
	(1.54)				(-2.52)		(-1.04)				(-2.06)	
VC			-6.07	***	-9.86	***			-1.68		-4.03	
			(-4.06)		(-4.36)				(-0.79)		(-1.64)	
Age							-0.64		-0.55		-0.50	
							(-1.26)		(-1.05)		(-0.97)	
Debt/Equity							-0.24		-0.38		-0.25	
							(-0.37)		(-0.62)		(-0.39)	
P/B							-0.42	.	-0.40		-0.42	.
							(-1.69)		(-1.61)		(-1.68)	
Size							0.25		-0.25		0.00	
							(0.44)		(-0.42)		(0.00)	
Shares offered-%							1.56		-0.59		-0.22	
							(0.30)		(-0.11)		(-0.04)	
ROA							25.49	***	24.54	***	24.25	***
							(7.21)		(6.53)		(6.43)	
Adjusted R^2	0 %		2 %		3 %		14 %		14 %		15 %	
N	681		681		681		681		681		681	

The lower level of abnormal accruals in VC-backed companies is largely explained by the company and IPO characteristics, as the coefficients of the VC variable are statistically insignificant in models EM5 (-1.68) and EM6 (-4.03). Thereby, the results imply that the VC sponsoring as such does not have significant EM reducing effect, but the characteristics of the venture capital backed IPOs do explain the lower level of abnormal accruals. However, the private equity indicator variable in model EM6 (-4.07) is negative and significant at 5% level, which suggests that PE-backed issuers have lower level of pre-IPO earnings management compared to non-backed issuers even after controlling for the issuer characteristics. This result indicates that private equity sponsors could have a limiting effect on pre-IPO EM i.e., inflating accounting performance with earnings management, and thereby supports the private-equity part of hypothesis H1. However, the result is significant only in model EM6, where PE-backed IPOs are compared to non-backed issuers, not in model EM4, where PE-backed issuers are compared to VC-backed and non-backed issuers.

I include ROA as a control variable in the EM4 to EM6 models because Kothari et. al. (2005) show that the modified Jones model used to estimate abnormal accruals is biased for companies with extreme performances. Interestingly, the coefficient of return on assets (ROA) is significant and positive, implying that issuers with higher profitability would have higher abnormal accruals. This is contrary to the negative ROA coefficients of Lee (2011) and Premti & Smith (2020). However, this could be due to the ROA measure in my sample being left skewed, i.e., extreme negative performances being more common than the positive ones. To ensure that the results of models EM4 to EM6 are not distracted by the ROA control variable, I also estimate the models without the ROA control variable. The results of the PE variable remain consistent, and the coefficient of VC variable remain negative but become statistically significant. Thereby, the key finding of PE backing being negatively related to pre-IPO EM is robust for ROA being included or omitted.

6.3 Results of the first day return regression models

In Table 8, I present the regression results of the first day return regression models. Underpricing in private equity backed IPOs is lower compared to VC-backed and non-backed IPOs, as the coefficient of the PE indicator variable in model FD1 is negative (-7.73) and significant at 0.1% level. Vice versa, the first day return in venture capital IPOs is higher compared to PE-backed and non-backed IPOs, and the VC coefficient in model FD2 is positive (7.47) at 0.1% significance level. In model FD3 where both the PE and VC indicator variables are included, the signs of the coefficient remain the same, but the VC coefficient is not significant, and the PE coefficient is significant on only at the weak 10% level. In the controlled models FD4 to FD6, the coefficients of PE and VC indicators are not significant, except for the weakly negative PE coefficient in model FD4. Thereby, the private equity and venture capital sponsors do not appear to have strong significant effects on fist day return of the IPOs, but the differences are mostly explained by the company and IPO characteristics.

I find significant relations between the control variables and the first day return. Higher Debt to Equity ratio is related to lower level of IPO underpricing, as its coefficients are statistically significant and approximately -2.8 in models FD4 to FD6. Similarly, larger shares offered-% is related to lower level of IPO underpricing as its coefficients are between -28 and -29 in the models FD4 to FD6. In addition, I find higher Price to Book ratio being related to higher IPO underpricing.

I present the results of regression models, where I examine earnings management's and the interaction variables' effect on first day return in Table 9 (models FD7 to FD9). I find no significant relation between pre-IPO earnings management and the first day returns. Also, I do not find the interaction variables of earnings management and PE or VC sponsoring having effect on first day returns.

Table 8 – First day return regression results for PE and VC-variables

Regression results of the first day return, where the key independent variables are PE and VC indicator variables. First day return (gross return of first trading day) in percentages is the dependent variable in all models. For each variable, I present the coefficients of the OLS linear regression models, t-statistics in parentheses, and the significance level of the coefficients. The key independent variables are PE and VC indicator variables, taking value of 1, if the IPO is backed by a PE or VC sponsor, otherwise 0. Control variables are issuer Age (Ln(Age in years +1), Debt/Equity, P/B, Size (Ln(Total assets)), Shares offered-%, ROA, Year fixed effects (Year) and Industry fixed effects (Industry). The model specifications of FD1 to FD6 are described in detail in section 5.3. I use heteroscedasticity robust standard errors in estimation of the t-statistics and significance levels.

Significance levels of the coefficients are denoted as (.) significant at 10% level; (*) significant at 5% level; (**) significant at 1% level; (***) significant at 0.1% level.

Dependent variable: First day return												
Model	(FD1)		(FD2)		(FD3)		(FD4)		(FD5)		(FD6)	
Intercept	16.43	***	10.44	***	13.39	***	31.73	**	29.68	*	29.25	*
	(6.98)		(4.24)		(4.26)		(2.85)		(2.42)		(2.42)	
PE	-7.73	***			-4.55	.	-3.47	.			-2.19	
	(-4.62)				(-1.65)		(-1.68)				(-0.87)	
VC			7.47	***	4.21				3.61		2.34	
			(4.26)		(1.48)				(1.46)		(0.78)	
Age							0.28		0.23		0.22	
							(0.34)		(0.27)		(0.27)	
Debt/Equity							-2.80	***	-2.85	***	-2.79	***
							(-4.08)		(-4.15)		(-4.08)	
P/B							1.22	***	1.23	***	1.22	***
							(4.08)		(4.12)		(4.08)	
Size							-0.83		-0.87		-0.73	
							(-1.10)		(-1.07)		(-0.92)	
Shares offered -%							-28.72	***	-28.35	***	-28.14	***
							(-3.43)		(-3.35)		(-3.34)	
ROA							2.18		2.98		2.77	
							(0.72)		(0.98)		(0.92)	
Year	Yes		Yes		Yes		Yes		Yes		Yes	
Industry							Yes		Yes		Yes	
Adjusted R^2	5 %		5 %		6 %		13 %		13 %		13 %	
N	681		681		681		681		681		681	

Table 9 – First day return regression results for AAC and interaction variables

Regression results of the first day return, where the key independent variables are AAC, PE and VC indicator variables, and the interaction variables AACxPE and AACxVC. First day return (gross return of first trading day) in percentages is the dependent variable in all models. For each variable, I present the coefficients of the OLS linear regression models, t-statistics in parentheses, and the significance level of the coefficients. The key independent variables are the AAC variable representing pre-IPO earnings management, PE and VC indicator variables, taking value of 1, if the IPO is backed by a PE or VC sponsor, otherwise 0, and the interaction variables AACxPE and AACxVC. Control variables are issuer Age (Ln(Age in years +1), Debt/Equity, P/B, Size (Ln(Total assets)), Shares offered-%, ROA, Year fixed effects (Year) and Industry fixed effects (Industry). The model specifications of FD7 to FD9 are described in detail in section 5.3. I use heteroscedasticity robust standard errors in estimation of the t-statistics and significance levels.

Significance levels of the coefficients are denoted as (.) significant at 10% level; (*) significant at 5% level; (**) significant at 1% level; (***) significant at 0.1% level.

Dependent variable: First day return			
Model	(FD7)	(FD8)	(FD9)
Intercept	35.90 **	31.87 **	29.65 *
	(3.20)	(3.00)	(2.48)
AAC	-1.24	-1.67	-0.58
	(-0.24)	(-0.27)	(-0.08)
PE		-3.48 .	
		(-1.69)	
VC			3.60
			(1.46)
AAC x PE		1.07	
		(0.12)	
AAC x VC			-0.72
			(-0.08)
Controls	Yes	Yes	Yes
Year	Yes	Yes	Yes
Industry	Yes	Yes	Yes
Adjusted R^2	12 %	12 %	12 %
N	681	681	681

6.4 Results of the long-run abnormal return regression models

6.4.1 Results of the effect of PE and VC sponsoring on long-run abnormal returns

I test the effect PE or VC sponsoring have on the long-run return of the issuers compared to non-sponsored issuers with regression models where the dependent variable is one of the four three-year after-IPO abnormal return measures, $AAR_{Ind}, AAR_{FF}, BHAR_{Ind}$ *or* $BHAR_{FF}$, and the key independent variables are the PE and VC-backing indicator variables. I present the regression results in Table 10 (dependent variables AAR_{Ind} *and* AAR_{FF}) and in Table 11 (dependent variables $BHAR_{Ind}$ *and* $BHAR_{FF}$). In both tables, I provide the coefficients of the uncontrolled model LR1 and the controlled model LR2. The return in average abnormal return (AAR) measures is the average monthly abnormal return in percentages. The buy-and-hold return is the difference in the compounded return of the issuer and the compounded return of the benchmark (benchmark industry in $BHAR_{Ind}$, and expected return based on the Fama-French three-factor model in $BHAR_{FF}$) in percentages. Thereby the presented coefficients are interpreted as percentage points.

The uncontrolled models LR1 do not take different company and issue characteristics into account, except for the industry fixed effects in the Fama-French three-factor model -based measures (AAR_{FF} *and* $BHAR_{FF}$), and thereby their results should be interpreted as the raw difference between the long-run return with backed and non-backed issuers, not PE or VC sponsoring having causal effect on earnings management. The controlled models LR2 do include control variables of Debt to Equity, Size, ROA, First Day Return, Price to Book and year fixed effects, and thereby provide indication of potential effect the PE and VC sponsors have on the long-run performance, that is not explained by the company and IPO characteristics. It should be noted that the intercept terms in the controlled models do not have real-life interpretations, as the control variables do not have zero means, e.g., Size has a mean of 11.9 (see Table 6) due to which the intercept absorbs the effect of mean of size times the coefficient of size.

The results of the long-run abnormal return regression models provide some evidence on behalf of private equity backed IPOs having stronger long-run stock market performance compared to non-backed IPOs. The PE-backing appears to have positive effect on long-run returns even after controlling for company and IPO characteristics, which implies that PE sponsoring could have long-run return improving effect. However, these results are significant only when the long-run

Table 10 – Long run average abnormal return regression results for PE and VC-variables

Regression results of the long run average abnormal return (AAR) regressions, where the key independent variables are PE and VC indicator variables. The dependent variables AAR are calculated for the 36 months period after the IPO. AAR_{Ind} is the monthly average abnormal return compared to the benchmark industry, and AAR_{FF} is the monthly average abnormal return compared to the expected returns based on the Fama-French three-factor model. For each variable, I present the coefficients of the OLS linear regression models, t-statistics in parentheses, and the significance level of the coefficients. The intercept term has no real-life interpretation in the controlled models LR2. Control variables are issuer's Debt/Equity, Size (Ln(Total assets)), ROA, First Day Return, P/B-ratio, Year fixed effects (Year) and Industry fixed effects (Industry). The model specifications of LR1 and LR2 are described in detail in section 5.4. I use heteroscedasticity robust standard errors in estimation of the t-statistics and significance levels.

Significance levels of the coefficients are denoted as (.) significant at 10% level; (*) significant at 5% level; (**) significant at 1% level; (***) significant at 0.1% level.

Dependent variable	AAR_{Ind}		AAR_{FF}		
Model	(LR1)	(LR2)	(LR1)	(LR2)	
Intercept	0.08	-1.13	-0.35	-2.58	*
	(0.30)	(-1.11)	(-0.91)	(-1.98)	
PE	0.35	0.22	0.78	0.53	.
	(1.23)	(0.76)	(1.94)	(1.38)	
VC	0.18	0.35	0.33	0.48	
	(0.59)	(1.08)	(0.76)	(1.14)	
Debt/Equity		0.06		0.16	.
		(0.68)		(1.81)	
Size		0.10		0.19	*
		(1.27)		(2.00)	
ROA		0.20		0.02	
		(0.43)		(0.04)	
First Day Return		-0.37		0.49	
		(-0.77)		(0.87)	
P/B		0.00		-0.04	
		(0.13)		(-1.29)	
Year		Yes		Yes	
Industry			Yes	Yes	
Adjusted R^2	0 %	0 %	1 %	2 %	
N	667	667	660	660	

Table 11 – Long run buy-and-hold return regression results for PE and VC-variables

Regression results of the buy-and-hold abnormal return (BHAR) regressions, where the key independent variables are PE and VC indicator variables. The dependent variables BHAR are calculated for the 36 months period after the IPO. $BHAR_{Ind}$ is the buy-and-hold abnormal return compared to the benchmark industry, and $BHAR_{FF}$ is the buy-and-hold abnormal return compared to the compounded expected returns based on the Fama-French three-factor model. For each variable, I present the coefficients of the OLS linear regression models, t-statistics in parentheses, and the significance level of the coefficients. The intercept term has no real-life interpretation in the controlled models LR2. Control variables are issuer's Debt/Equity, Size (Ln(Total assets)), ROA, First Day Return, P/B-ratio, Year fixed effects (Year) and Industry fixed effects (Industry). The model specifications of LR1 and LR2 are described in detail in section 5.4. I use heteroscedasticity robust standard errors in estimation of the t-statistics and significance levels.

Significance levels of the coefficients are denoted as (.) significant at 10% level; (*) significant at 5% level; (**) significant at 1% level; (***) significant at 0.1% level.

Dependent variable	$BHAR_{Ind}$		$BHAR_{FF}$	
Model	(LR1)	(LR2)	(LR1)	(LR2)
Intercept	-20.54 *	-95.26 **	-18.94	-103.97 *
	(-2.56)	(-2.72)	(-1.56)	(-2.49)
PE	30.83 **	24.06 *	30.53 **	21.24 .
	(3.22)	(2.22)	(2.59)	(1.65)
VC	13.89	16.42	11.54	15.30
	(1.41)	(1.57)	(0.87)	(1.13)
Debt/Equity		-1.35		0.56
		(-0.42)		(0.17)
Size		6.44 *		7.52 *
		(2.27)		(2.34)
ROA		0.81		8.23
		(0.06)		(0.44)
First Day Return		13.93		12.20
		(0.74)		(0.59)
P/B		1.21		0.38
		(0.90)		(0.25)
Year		Yes		Yes
Industry			Yes	Yes
Adjusted R^2	1 %	1 %	0 %	1 %
N	667	667	660	660

abnormal return is measured in buy-and-hold abnormal returns. I find no statistically significant relations between venture capital sponsoring and any of the long-run abnormal return measures.

The PE indicator variable is positive and significant at 1% level in both uncontrolled buy-and-hold return models (LR1). Furthermore, the PE variable is significant at 5% level in the controlled $BHAR_{Ind}$ model (LR2) and at 10% level in the controlled $BHAR_{FF}$ model. The coefficients of the PE indicator variable in the BHAR models range from 21 to 31, indicating 21pp to 31pp higher buy-and-hold abnormal return compared to the non-backed issuers in the three-year post-IPO period, as shown in Table 11. Thereby, the buy-and-hold models imply that PE-backed IPOs do outperform non-backed IPOs in the long run, and this is not entirely explained by the company and IPO characteristics.

The coefficients of the PE indicator variables are also positive in the models of the average abnormal return measures (AAR_{Ind}, AAR_{FF}) but are not significant except for the coefficient in the AAR_{FF} uncontrolled model LR1, which is positive at the weakly significant 10% level. Furthermore, the R^2 -values of the long-run abnormal return models are very low, which questions the robustness of the results. I also document the Size control variable having positive relation with the long-run abnormal return measures. The relation is positive with all return measures and significant at 5% level with all but the AAR_{Ind} measure.

6.4.2 Results of the effect of EM on long-run abnormal returns

In Table 12, I present the regression results of the model LR3, where I test for the effect pre-IPO earnings management measured in abnormal accruals (AAC) has on the long run return measures. The results support hypothesis H3, *higher level of pre-IPO earnings management is related to lower three-year post-IPO stock returns,* as the coefficient of the AAC variable is negative and significant at 5% level when the dependent variable is $BHAR_{Ind}$. With the other three long-run return measures, the coefficients of the AAC variable are also negative, but significant only at the 10% level. The AAC coefficients of average abnormal return AAR_{Ind} *and* AAR_{FF} models are -1.08 and -1.26. As abnormal accruals are measured as percentage of total assets, the results imply that e.g., a 10ppt increase in pre-IPO AAC would decrease the average monthly abnormal return by 0.108ppt (abnormal return measured in AAR_{Ind}) or by 0.126ppt (abnormal return measured in AAR_{FF}). Similarly, the results indicate that the 10ppt increase in pre-IPO AAC would decrease the 36-month buy-and-hold abnormal return by approximately 4.3ppt in case of both BHAR measures.

Table 12 – Long-run abnormal return regression results for AAC variable

Regression results of the long-run abnormal return regressions, where the key independent variable is the abnormal accruals in the pre-IPO as a percentage of total assets (AAC). The dependent variables AAR and BHAR are calculated for the 36 months period after the IPO. AAR_{Ind} is the monthly average abnormal return compared to the benchmark industry, and AAR_{FF} is the monthly average abnormal return compared to the expected returns based on the Fama-French three-factor model. $BHAR_{Ind}$ is the buy-and-hold abnormal return compared to the benchmark industry, and $BHAR_{FF}$ is the buy-and-hold abnormal return compared to the compounded expected returns based on the Fama-French three-factor model. For each variable, I present the coefficients of the OLS linear regression models, t-statistics in parentheses, and the significance level of the coefficients. The intercept term has no real-life interpretation. Control variables are issuer's Debt/Equity, Size (Ln(Total assets)), ROA, First Day Return, P/B-ratio, Year fixed effects (Year) and Industry fixed effects (Industry). The model specification of LR3 is described in detail in section 5.4. I use heteroscedasticity robust standard errors in estimation of the t-statistics and significance levels.

Significance levels of the coefficients are denoted as (.) significant at 10% level; (*) significant at 5% level; (**) significant at 1% level; (***) significant at 0.1% level.

Dependent variable	AAR_{Ind}	AAR_{FF}	$BHAR_{Ind}$	$BHAR_{FF}$
Model	(LR3)	(LR3)	(LR3)	(LR3)
Intercept	-0.67	-2.27 *	-93.47 **	-99.58 **
	(-0.75)	(-2.03)	(-3.02)	(-2.64)
AAC	-1.08 .	-1.26 .	-42.78 *	-42.68 .
	(-1.70)	(-1.74)	(-2.05)	(-1.72)
Controls	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Industry		Yes		Yes
Adjusted R^2	0 %	3 %	1 %	2 %
N	667	660	667	660

Results of models LR4 and LR5, where I test the effect the interaction of earnings management and PE or VC sponsoring (interaction variables AACxPE and AACxVC) have on the long run abnormal return are presented in Table 13 and Table 14. I find no significant relation between long-run abnormal returns and eighter of the interaction variables. Thereby, the results of the interaction of earnings management and PE or VC sponsoring do not support hypothesis H4; *Pre-IPO earnings management in private equity and venture capital backed companies has more negative effect on the long-run returns of those companies, than earnings management with non-backed issuers.* The control variables of company and IPO characteristics that are used in LR2 model are also included in models LR3, LR4 and LR5. The control variable coefficients have very similar values to the LR2 model, and thus I do not present them in Tables 12 to 14.

Table 13 – Long run return regression results for AACxPE interaction variable

Regression results of the long-run abnormal return regressions, where the key independent variable is the interaction variable of earnings management and PE-sponsoring (AACxPE). I also include the AAC and PE variables to control for the individual effect of these variables. The dependent variables AAR and BHAR are calculated for the 36 months period after the IPO. AAR_{Ind} is the monthly average abnormal return compared to the benchmark industry, and AAR_{FF} is the monthly average abnormal return compared to the expected returns based on the Fama-French three-factor model. $BHAR_{Ind}$ is the buy-and-hold abnormal return compared to the benchmark industry, and $BHAR_{FF}$ is the buy-and-hold abnormal return compared to the compounded expected returns based on the Fama-French three-factor model. For each variable, I present the coefficients of the OLS linear regression models, t-statistics in parentheses, and the significance level of the coefficients. The intercept term has no real-life interpretation. Control variables are issuer's Debt/Equity, Size (Ln(Total assets)), ROA, First Day Return, P/B-ratio, Year fixed effects (Year) and Industry fixed effects (Industry). The model specification of LR4 is described in detail in section 5.4. I use heteroscedasticity robust standard errors in estimation of the t-statistics and significance levels.

Significance levels of the coefficients are denoted as (.) significant at 10% level; (*) significant at 5% level; (**) significant at 1% level; (***) significant at 0.1% level.

Dependent variable	AAR_{Ind}	AAR_{FF}	$BHAR_{Ind}$	$BHAR_{FF}$
Model	(LR4)	(LR4)	(LR4)	(LR4)
Intercept	-0.67	-2.06 .	-75.15 *	-89.61 *
	(-0.72)	(-1.84)	(-2.25)	(-2.25)
AAC	-1.06	-1.06	-44.49 *	-28.71
	(-1.44)	(-1.29)	(-1.97)	(-1.06)
PE	0.00	0.23	13.89	11.28
	(0.01)	(0.84)	(1.44)	(1.04)
AAC x PE	-0.08	-0.78	13.17	-58.12
	(-0.08)	(-0.67)	(0.30)	(-1.11)
Controls	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Industry		Yes		Yes
Adjusted R^2	0 %	2 %	1 %	2 %
N	667	660	667	660

Table 14 – Long run return regression results for AACxVC interaction variable

Regression results of the long-run abnormal return regressions, where the key independent variable is the interaction variable of earnings management and VC-sponsoring (AACxVC). I also include the AAC and VC variables to control for the individual effect of these variables. The dependent variables AAR and BHAR are calculated for the 36 months period after the IPO. AAR_{Ind} is the monthly average abnormal return compared to the benchmark industry, and AAR_{FF} is the monthly average abnormal return compared to the expected returns based on the Fama-French three-factor model. $BHAR_{Ind}$ is the buy-and-hold abnormal return compared to the benchmark industry, and $BHAR_{FF}$ is the buy-and-hold abnormal return compared to the compounded expected returns based on the Fama-French three-factor model. For each variable, I present the coefficients of the OLS linear regression models, t-statistics in parentheses, and the significance level of the coefficients. The intercept term has no real-life interpretation. Control variables are issuer's Debt/Equity, Size (Ln(Total assets)), ROA, First Day Return, P/B-ratio, Year fixed effects (Year) and Industry fixed effects (Industry). The model specification of LR5 is described in detail in section 5.4. I use heteroscedasticity robust standard errors in estimation of the t-statistics and significance levels.

Significance levels of the coefficients are denoted as (.) significant at 10% level; (*) significant at 5% level; (**) significant at 1% level; (***) significant at 0.1% level.

Dependent variable	AAR_{Ind}	AAR_{FF}	$BHAR_{Ind}$	$BHAR_{FF}$
Model	(LR5)	(LR5)	(LR5)	(LR5)
Intercept	-1.01	-2.38 .	-95.75 **	-99.69 *
	(-1.00)	(-1.88)	(-2.74)	(-2.41)
AAC	-1.79 *	-2.39 *	-54.55 .	-72.00 .
	(-2.23)	(-2.37)	(-1.76)	(-1.93)
VC	0.21	0.17	1.96	2.48
	(0.82)	(0.53)	(0.21)	(0.22)
AAC x VC	1.12	1.76	18.45	45.45
	(1.05)	(1.43)	(0.50)	(1.02)
Controls	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Industry		Yes		Yes
Adjusted R^2	0 %	3 %	1 %	2 %
N	667	660	667	660

6.5 Discussion

6.5.1 Discussion of results of pre-IPO earnings management

I document PE and VC-sponsored IPOs having lower level of abnormal accruals in the pre-IPO year compared to non-backed issuers. However, this is largely explained by the differences in company and IPO characteristics. Nevertheless, I do find evidence on behalf of PE-backing having limiting effect on pre-IPO earnings management when PE-backed issuers are compared to non-backed issuers, which partly supports the hypothesis H1, "Private equity and venture capital sponsoring has limiting effect on pre-IPO earnings management compared to non-backed issuers." This is consistent with private equity sponsors limiting opportunistic behavior and promoting higher corporate governance standards and corresponds the findings of Katz (2009), who finds PE backed companies having higher earnings quality before and after going public and PE sponsoring being negatively related to lower pre-IPO EM.

Interestingly, I do not find significant relation between VC sponsoring and lower pre-IPO EM, when controlling for the issuer and IPO characteristics, even though the average abnormal accruals for VC-backed IPOs (-5.1%) are considerably lower than for non-backed IPOs (5.5%) and are also lower than the AAC of PE-backed issuers (-0.3%). After controlling for the IPO characteristics, the regression coefficient of the VC indicator variable is -1.7% in model EM5 and -4.1% in model EM6 (see Table 7 for the earnings management regression results). The coefficients are statistically insignificant but have similar scale to the results of Premti & Smith (2020), who find venture capital sponsored IPOs having significantly reducing effect on EM, as they find coefficient of -2.1% for VC indicator variable implying 2.1ppt lower abnormal accruals for VC backed IPOs compared to non-backed IPOs. Due to the insignificant coefficients of the VC variable in the controlled regression models EM5 and EM6, my results do not support the hypothesis H1 of venture capitalists limiting the earnings management to build or maintain their reputation but instead imply that the company and IPO characteristics of the VC backed IPOs largely explain the low AAC measures of the VC-backed issuers. However, due to the scope of this study, I do not separate for high-reputation VCs, and failing to find significant relation might be due to the differences between different venture capital sponsors. This would be consistent with Lee & Masulis (2011), who argue that significant reducing effect on EM is linked only to high-reputation VC sponsors, not VC sponsors as a group.

I find the average abnormal accruals of the full sample being slightly negative, at -1.6% (see Table 3 for statistics of the AAC measure), which does not support IPOs as a group being related to high levels of pre-IPO earnings management to inflate earnings and the company's valuation. This is contrary to e.g., Hochberg (2012), Teoh, Welch & Wong (1998) and Lee & Masulis (2011), who find positive abnormal accruals during or prior to the issue year, which implicates upwards earnings management. Hochberg (2012) reports average abnormal accruals in the IPO-year of 6.8% for IPOs between 1983 and 1994, and AAC as high as 9.5% for non-backed issuers, which is significantly higher than my results of the level of AAC. The results of Hochberg might be upwards biased due to the use of AAC in the year of the IPO instead of the pre-IPO year, as Premti & Smith (2020) argue that the abnormal accruals in the IPO year are inflated due to the cashflows caused by the IPO. However, in my sample the abnormal accruals for non-backed issuers are on average positive and significant at 5.5%, which is closer to the estimates of Hochberg. Because I also find some evidence on behalf of PE sponsoring reducing the pre-IPO EM compared to non-backed IPOs, the increased importance of private equity sponsors that Ewens & Farre-Mensa (2020) assess, could have a contribution on low average level of pre-IPO abnormal accruals that I document compared to earlier studies. Alternative explanation for the result could be that as I study IPOs issued between 2004 and 2018, and most of the prior literature of EM concentrates in earlier time periods, the difference in results could be explained by factors not related to PE or VC sponsoring, e.g., increased investor scrutiny over time on the earnings quality of the issuers.

6.5.2 Discussion of results of IPO underpricing

The underpricing of IPOs measured in first day return is highest for the VC-backed IPOs and lowest for the PE-backed IPOs. These differences in underpricing are mostly explained by the company and deal characteristics of the IPOs, as I do not find strongly significant relation between the PE or VC sponsoring and underpricing, when I include control variables in the first day return regressions. Thus, my results imply that the VC backed IPOs are more underpriced for their characteristics, not due to the VC involvement, which contradicts with the grandstanding hypothesis of Gompers (1996), who argues that the higher underpricing with VC-backed issues would be due to the motive of VCs to underprice their issues to build reputation.

Lower level of underpricing in PE-backed IPOs is reported in previous literature, e.g., by Cao & Lerner (2009), who document the first day return of RLBOs being 13% and first day return of other IPOs being 22% between 1981 and 2003. This is consistent with my sample, as the underpricing of PE-backed IPOs (on average 11%) is lower than underpricing of non-backed IPOs (on average 15%) or VC-backed IPOs (on average 20%). Similar to the VC-backed IPOs, this difference in underpricing is mostly explained by the company and deal characteristics of the IPOs. However, there are some indications of PE-backed IPOs having reducing effect on underpricing beyond the company and IPO characteristics, which could imply that investors do take the private equity backing as a certification of quality. Nevertheless, this result is significant only at 10% significance level, and thereby is not very robust.

I find no significant relation between pre-IPO earnings management and the first day returns. This contradicts with Xiong et. al. (2010) and Gao et. al. (2017), who argue that institutional investors partly recognize EM and lower their bid prices, due to which the IPOs with aggressive earnings management experience high first day returns, as the unsophisticated investors on the secondary market are unable to recognize EM and adjust their valuations accordingly. Thereby, my results imply that eighter the institutional investors do not adjust their bid prices to EM or alternatively the investors on the secondary market do adjust their valuation to the level of earnings management. Also, I do not find significant relations between the interaction variables of earnings management and PE or VC sponsoring. Thus, I do not find evidence supporting the hypothesis H6, “Pre-IPO earnings management increases underpricing, but the increase is smaller with the PE and VC backed IPOs.”

6.5.3 Discussion of results of long-run abnormal returns

The results of the long-run abnormal returns of the issuers provide some evidence on behalf of private equity backed IPOs having stronger long-run stock market performance compared to non-backed IPOs when the long-run performance is measured with buy-and-hold abnormal returns. I find PE-backed IPOs yielding on average positive three-year BHAR, 10.3% when comparing to industry benchmarks and 1.7% Fama-French three-factor adjusted BHAR, whereas non-backed IPOs yield negative three-year BHARs, of -21.2% to -25.3%. The findings of Cao & Lerner (2009) are similar, but the performance difference is not as extreme, as they find average three-year industry benchmark BHAR of 5% for RLBOs between 1981 and 2003 and BHAR of -7% for non-PE backed IPOs. Also, Levis 2011 documents FF3 adjusted three-

year BHAR of 23.5% for PE-backed issues and BHAR of -9.5% for non-backed IPOs in the UK between 1992 and 2005. I find monthly average abnormal return of PE-backed issuers being 0.4% to 0.2% and of non-backed issuers 0.1% to -0.2% compared to industry benchmarks and FF3 expected returns, respectively. Cao & Lerner (2009) find corresponding average abnormal returns of PE-backed issuers, as they report them having 0.4% average excess returns over the market.

PE-backing appears to have positive effect on long-run returns even after controlling for company and IPO characteristics, as I find significantly positive regression coefficients ranging from 21% to 31% for the PE indicator variable in BHAR regression models presented in Table 11. This implies that PE sponsoring could have a long-run return improving effect and is consistent with the findings of Cao & Lerner (2009) and Levis (2011). The results do support the private equity-part of hypothesis H2, "Private equity and venture capital sponsored companies outperform non-backed issuers in three-year post-IPO abnormal stock returns." This also supports the view of private equity sponsors limiting behavior that could be detrimental to long-run returns in their portfolio companies, trough monitoring and high corporate governance standards. Alternative explanation for the outperformance of PE backed IPOs could be that majority of my sample period from 2004 to 2018 parallels with the era of unprecedentedly low interest rates, that could favor the PE-backed companies who are characterized with use of high leverage. Average debt to equity ratio of the PE-backed issuers in my sample is 1.2, as debt to equity is 0.2 and 0.5 with VC backed and non-backed issuers. Nevertheless, I do control for the debt to equity ratio, which should diminish this issue. However, the results of the overperformance of PE backed IPOs compared to non-backed issuers are not especially robust, as the results are statistically significant only when the long-run abnormal return is calculated as buy-and-hold abnormal returns, whereas the results are not significant when the long-run performance is measured with average abnormal returns.

I do not find statistically significant relations between venture capital sponsoring and any of the long-run abnormal return measures, even as all the abnormal stock return measures for VC backed IPOs are higher than for non-backed IPOs. The three-year BHARs for the VC backed IPOs range from -6.4% to -7.8%, whereas the non-backed issuers have considerably poorer buy-and-hold abnormal returns, from -21.2% to -25.3%. The scale of the results is notably similar to Brav & Gompers (1997), who report average industry benchmark BHAR of -3% for VC sponsored IPOs and -21% for non-sponsored IPOs between 1972 and 1992. The regression

coefficients of the VC indicator variable are positive in all the long-run performance models, but none of the coefficients are statistically significant. This is contrary to the hypothesis H2 of VC sponsored IPOs outperforming non-backed issuers in the long run. This also contradicts with Brav & Gompers (1997) and Barry & Mihov (2015), who report VC backed IPOs overperforming non-backed IPOs. However, Krishnan et. al. (2011) argue that only high-reputation VCs have significantly positive relation to long run performance. As I do not distinguish for the reputation of venture capitalists due to the scope of this study, the insignificance of the results could be due to the difference between VC sponsors.

Consistent with hypothesis H3, "Higher level of pre-IPO earnings management is related to lower three-year post-IPO stock returns", I find evidence of higher level of pre-IPO earnings management measured in abnormal accruals (AAC) being related to weaker long-run post-IPO stock performance. This result is consistent with all four performance measures and is statistically significant at 5% level when the abnormal returns are measured with $BHAR_{Ind}$, but is significant only at 10% level with the other three long-run abnormal return measures. My findings imply, that a 10ppt increase in abnormal accruals would decrease the average monthly abnormal return by 0.11ppt to 0.13ppt and the 36-month buy-and-hold abnormal return by 4.3ppt. The results are consistent with findings of Teoh et. al. (1998), who report that the three-year performance of the IPOs of most aggressive quartile of earnings mangers is 20% less compared to the most conservative quartile of earnings mangers. Also, Chen et. al (2013) find similar results with high information uncertainty issuers. The results support the view that investors do not completely recognize the pre-IPO earnings management, but rely on the reported performance measures, and are therefore disappointed in the subsequent reduction in performance, as Rangan (1998) proposes in his study of seasoned equity offerings and earnings management.

I find no significant relation between long-run abnormal returns and eighter of the interaction variables of earnings management and PE or VC sponsoring, which contradicts with hypothesis H4, "Pre-IPO earnings management in private equity and venture capital backed companies has more negative effect on the long-run returns of those companies, than earnings management with non-backed issuers." Thereby, the results do not support my hypothesis of investors taking the involvement of a PE or VC sponsor as a certification of high IPO and earnings quality, due to which the investors would be more disappointed if the IPO company does not live up to the inflated expectations.

7. Robustness of the results

I conduct additional test to assess the robustness of my results. First, I use the IPO-year abnormal accruals in the abnormal accruals regressions to test if the results are consistent with the primary tests that use AAC of the pre-IPO year. Second, I estimate the long-run return regression models with unwinsorized long-run returns to see if the results are robust even as the most extreme long-run returns are included. Third, I estimate the regression models without the price to book control variable, which allows for slightly larger sample as the companies with most extreme price to book ratios may be included.

The abnormal accruals of the IPO year are used frequently as a measure of IPO EM, see e.g., Hochberg (2012), whereas the primary measure of EM in my thesis are the pre-IPO year abnormal accruals. Thereby, I test if my results are robust when the IPO year AAC are used. It should be recognized that the IPO year AAC is potentially upwards biased measure due to the cash flows resulting from the IPO as Premti & Smith (2020) point out, due to which pre-IPO year AAC should provide more reliable estimate of the pre-IPO EM. Measured in the IPO-year, the average abnormal accruals are higher than in the pre-IPO year. For the full sample, average IPO-year (pre-IPO year) AAC are -0.6% (-1.6%), for PE-backed issuers 0.6% (-0.3%), for VC-backed issuers -3.8% (-5.1%) and for non-backed issuers 6.6% (5.5%). The results of earnings management regression models (EM1 to EM6) estimated with IPO-year AAC as the dependent variable are similar to the primary models where AAC are estimated for the pre-IPO year. However, the coefficients of the VC indicator variables in models EM5 and EM6 are more negative at -6.5 and -8.7 and are statistically significant, whereas the PE coefficient in model EM6 is -3.9 and significant only at 10% level. Thereby, based on the IPO-year abnormal accruals, VC sponsoring appears to have significantly limiting effect on earnings management beyond the controlled IPO characteristics, whereas the relation is only weakly significant measured with the pre-IPO year abnormal accruals. Contrarily, my findings of limiting effect of PE sponsoring on EM is less convincing measured with the IPO-year AAC.

The AAC coefficients in the three-year abnormal return regressions do remain negative when the IPO year abnormal accruals are used, but the coefficient of industry benchmark BHAR regression does reduce to -35% from -43% and the coefficient is significant only at 10% level, which suggests that the results of the detrimental effect of EM on three-year returns are not as convincing when AAC are measured in the year of the IPO instead of the pre-IPO year.

However, the sings of the AAC variable remain negative in all LR3 regressions, and the AAC coefficients are weakly significant in each model. Thereby, the results of EM's negative effect on long-run after-IPO abnormal returns are relatively robust also with the IPO-year abnormal accruals.

In my primary tests of long-run performance, I winsorize the three-year abnormal return measures dropping the bottom 1% and top 1% from each of the measures. I do this to limit the effect of issuers with the most extreme abnormal performance, which could distract the results and does not necessarily represent the expected returns of IPOs. To examine, if the results of the long-run returns are robust even as the most extreme long-run returns are included, I run the long-run return regression models with an unwinsorized sample. When unwinsorized returns are used as the dependent variable, $BHAR_{FF}$ LR2 regression coefficients of PE and VC are larger at 44% and 41% compared to 21% and 15% when winsorized returns are used. The PE indicator variable's coefficient is now significant at 5% level and the VC coefficient at 10% level. However, in industry benchmark BHAR LR2 model, the PE coefficient is smaller but still positive, at 13.5%, which is not statistically significant. The PE and VC coefficients in average abnormal regression models are larger than with winsorized returns, but still not statistically significant. To conclude, also the results with unwinsorized returns do support PE backed IPOs outperforming non-backed IPOs before and after controlling for IPO and issuer characteristics. Nevertheless, the results of PE sponsors' positive effect on long-run returns are not conclusive, as coefficients of PE variables are statistically significant only in the BHAR regressions, not in AAR regressions.

I estimate the regression models without the price to book control variable, which allows for sample of 721 IPOs instead of sample of 681 IPOs in the primary tests. This also allows to test the robustness of the results when the companies with negative book value of equity are included. In the abnormal accrual regression model EM6, the statistically significant coefficient of PE variable remains significant, as is slightly further from zero, at -4.65. With the long-run return regressions, the results and significance levels remain mainly consistent with the original models. Without the price to book control variable, the LR2 model PE coefficient with $BHAR_{Ind}$ dependent variable is now smaller at 19%, and significant only at 10% level, whereas with $BHAR_{FF}$ the PE coefficient is larger at 25% and significant at 5% level instead of 10% level. Similarly, in the LR3 long-run return models, the AAC coefficient in $BHAR_{Ind}$ is smaller and significant only at 10% level, but AAC coefficient in $BHAR_{FF}$ is slightly larger and now

significant at 5% level instead of 10% level. Thereby, the key-results of PE sponsors' negative relation to EM, EM's negative effect on long-run performance and the overperformance measured with buy-and-hold abnormal returns are robust also when the price to book control variable is omitted and the issuers with negative equity are included in the sample.

Overall, the long-run outperformance of PE-backed IPOs is a robust result, when buy-and-hold abnormal returns are used as a measure of EM. This also applies to the additional robustness tests. The results of long-run outperformance are not completely conclusive, because with monthly average abnormal returns, the outperformance is not statistically significant. Also, the negative effect of EM on long-run performance appears to be a relatively robust result. However, using IPO-year abnormal accruals the relation between PE sponsoring and lower EM in model EM6 is only weakly significant, which slightly questions the robustness of the result. Furthermore, I limit the scope of this study to PE and VC sponsors as groups and I do not assess the internal differences in the groups of PE and VC sponsors. There could be differences in the effect different PE and VC sponsors, for example trough their reputation difference, experience, or level of involvement, do have on earnings quality and long-run performance of their portfolio companies. Thereby, the results may not be generalizable to all PE and VC sponsors, or all IPOs backed by them, but do instead represent the average PE and VC sponsors, and average IPOs backed by such sponsors.

8. Conclusions

I do not find IPOs as a group being related to significant pre-IPO earnings management, whereas non-backed issuers appear to be more prone to EM: I document average abnormal accruals of -1.6% for the full sample of IPOs, but with non-backed issuers, I do find positive abnormal accruals at 5.5% of total assets which is statistically significantly different from zero. I find evidence of private equity backing having limiting effect on aggressive pre-IPO earnings management, accounting for approximately 4pp decrease in abnormal accruals compared to non-backed issuers, even after controlling for IPO characteristics. I find PE-backed IPOs significantly outperforming non-backed IPOs in three-year buy-and-hold abnormal returns. The average three-year BHAR of PE backed issuers is from 1.7% to 10.3%, whereas BHAR is -6.4% to -7.8% for VC backed issuers and -21.2% to -25.3% for non-backed IPOs.

These results support the hypothesis of private equity sponsors limiting opportunistic behavior and promoting higher corporate governance standards, and such contribution resulting higher after-IPO long-run performance. Abnormal accruals prior to the IPO are highest and long-run stock performance is weakest for non-backed issuers, which could imply that non-backed issuers were more prone to inflating accounting performance and future expectations as they are less exposed to risk of losing reputation due to IPO with inferior long-run performance. The results are consistent with prior literature of higher earnings quality and long-run performance of PE-backed IPOs (see e.g., Katz (2009) and Cao & Lerner (2009)). However, the significant outperformance of PE backed IPOs is not robust across average long-run abnormal return measures. I do not find evidence of venture capital sponsors reducing pre-IPO EM statistically significantly, or VC-backed IPOs having higher long-run performance when controlling for the issuer and IPO characteristics.

My results imply that pre-IPO earnings management has negative effect on long-run abnormal return of IPOs, which is consistent with Teoh et. al. (1998) and the view of investors being partly unable to detect pre-IPO EM due to which aggressive earning managers do not fulfill investors' expectations. However, I find no evidence of interaction of PE or VC sponsoring and pre-IPO earnings management having any different effect on long-run performance, than in case of non-backed issuers. Earnings management in PE or VC backed IPOs does not appear to be more detrimental to the long run returns of the issuer, and does not significantly affect the IPO underpricing. I do not find PE or VC sponsoring having significant effect on IPO

underpricing after controlling for IPO characteristics. Thereby, the results do not support the hypothesis of investors taking involvement of PE or VC sponsor as a guarantee of IPO and earnings quality.

I contribute to prior literature by providing recent evidence of PE sponsors improving earnings quality of the issuers and being related to higher long-run market performance of the issuers, and of the negative effect pre-IPO earnings management has on long-run returns of the issuing companies. I also introduce tests for the effect that interaction of PE or VC sponsoring and earnings management have on long-run performance of IPOs. Because my results do not support the hypothesis of investors taking PE and VC sponsors as a guarantee of IPO quality and thereby EM in PE or VC backed IPOs being more detrimental to the long run returns, this opens room for further research; The interaction could be examined with high-reputation private equity sponsors and venture capitalists. My inconclusive results may be due to investors not taking PE and VC sponsors as a group as certificate of IPO quality, but the hypothesis might be relevant with high-reputation private equity and venture capital sponsors.

References

Atanasov, V., Ivanov, V., & Litvak, K. (2012). Does reputation limit opportunistic behavior in the VC industry? Evidence from litigation against VCs. The Journal of Finance, 67(6), 2215-2246.

Baker, G. P., & Wruck, K. H. (1989). Organizational changes and value creation in leveraged buyouts: The case of the OM Scott & Sons Company. Journal of Financial Economics, 25(2), 163-190.

Barry, C. B., & Mihov, V. T. (2015). Debt financing, venture capital, and the performance of initial public offerings. Journal of Banking & Finance, 58, 144-165.

Brav, A., & Gompers, P. A. (1997). Myth or reality? The long-run underperformance of initial public offerings: Evidence from venture and nonventure capital-backed companies. The journal of finance, 52(5), 1791-1821.

Cao, J., & Lerner, J. (2009). The performance of reverse leveraged buyouts. Journal of Financial Economics, 91(2), 139-157.

Chen, S. S., Lin, W. C., Chang, S. C., & Lin, C. Y. (2013). Information uncertainty, earnings management, and long-run stock performance following initial public offerings. Journal of Business Finance & Accounting, 40(9-10), 1126-1154.

Chou, D. W., Gombola, M., & Liu, F. Y. (2006). Earnings management and stock performance of reverse leveraged buyouts. Journal of Financial and Quantitative Analysis, 41(2), 407-438.

Dechow, P. M., Sloan, R. G., & Sweeney, A. P. (1995). Detecting earnings management. Accounting review, 193-225.

Ewens, M., & Farre-Mensa, J. (2020). The deregulation of the private equity markets and the decline in IPOs. The Review of Financial Studies, 33(12), 5463-5509.

Fama, E. F., & French, K. R. (1993). Common risk factors in the returns on stocks and bonds. Journal of financial economics, 33(1), 3-56.

French, K. R. (2022, March). Data Library. https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

Gao, S., Meng, Q., Chan, K. C., & Wu, W. (2017). Earnings management before IPOs: Are institutional investors misled?. Journal of Empirical Finance, 42, 90-108.

Gao, X., Ritter, J. R., & Zhu, Z. (2013). Where have all the IPOs gone?. Journal of Financial and Quantitative Analysis, 48(6), 1663-1692.

Goktan, M. S., & Muslu, V. (2018). Benefits of public reporting: Evidence from IPOs backed by listed private equity firms. Journal of Corporate Finance, 50, 669-688.

Gompers, P. A. (1996). Grandstanding in the venture capital industry. Journal of Financial economics, 42(1), 133-156.

Gompers, P. A., & Lerner, J. (2003). The really long-run performance of initial public offerings: The pre-Nasdaq evidence. The journal of finance, 58(4), 1355-1392.

Guo, S., Hotchkiss, E. S., & Song, W. (2011). Do buyouts (still) create value?. The Journal of Finance, 66(2), 479-517.

Hochberg, Y. V. (2012). Venture capital and corporate governance in the newly public firm. Review of Finance, 16(2), 429-480.

Holthausen, R. W., & Larcker, D. F. (1996). The financial performance of reverse leveraged buyouts. Journal of Financial Economics, 42(3), 293-332.

Jensen, M.C., 1989, “Eclipse of the Public Corporation,” Harvard Business Review, 67, 61-74.

Jones, J. J. (1991). Earnings management during import relief investigations. Journal of accounting research, 29(2), 193-228.

Katz, S. P. (2009). Earnings quality and ownership structure: The role of private equity sponsors. The accounting review, 84(3), 623-658.

Kothari, S. P., Leone, A. J., & Wasley, C. E. (2005). Performance matched discretionary accrual measures. Journal of accounting and economics, 39(1), 163-197.

Krishnan, C. N. V., Ivanov, V. I., Masulis, R. W., & Singh, A. K. (2011). Venture capital reputation, post-IPO performance, and corporate governance. Journal of Financial and Quantitative Analysis, 46(5), 1295-1333.

Lee, G., & Masulis, R. W. (2011). Do more reputable financial institutions reduce earnings management by IPO issuers?. Journal of Corporate Finance, 17(4), 982-1000.

Lee, P. M., & Wahal, S. (2004). Grandstanding, certification and the underpricing of venture capital backed IPOs. Journal of Financial Economics, 73(2), 375-407.

Levis, M. (2011). The performance of private equity-backed IPOs. Financial Management, 40(1), 253-277.

Megginson, W. L., Meles, A., Sampagnaro, G., & Verdoliva, V. (2019). Financial distress risk in initial public offerings: how much do venture capitalists matter?. Journal of Corporate Finance, 59, 10-30.

Megginson, W. L., & Weiss, K. A. (1991). Venture capitalist certification in initial public offerings. The Journal of Finance, 46(3), 879-903.

Metrick, A., & Yasuda, A. (2011). Venture capital and other private equity: a survey. European Financial Management, 17(4), 619-654.

Michala, D. (2019). Are private equity backed initial public offerings any different? Timing, information asymmetry and post-IPO survival. Journal of Corporate Finance, 59, 31-47.

Miller, E. M. (1977). Risk, uncertainty, and divergence of opinion. The Journal of finance, 32(4), 1151-1168.

Premti, A., & Smith, G. (2020). Earnings management in the pre-IPO process: Biases and predictors. Research in International Business and Finance, 52, 101120.

Rangan, S. (1998). Earnings management and the performance of seasoned equity offerings. Journal of Financial economics, 50(1), 101-122.

Ritter, J. R. (1991). The long-run performance of initial public offerings. The journal of finance, 46(1), 3-27.

Ritter, J. R., & Welch, I. (2002). A review of IPO activity, pricing, and allocations. The journal of Finance, 57(4), 1795-1828.

Schultz, P. (2003). Pseudo market timing and the long-run underperformance of IPOs. the Journal of Finance, 58(2), 483-517.

Teoh, S. H., Welch, I., & Wong, T. J. (1998). Earnings management and the long-run market performance of initial public offerings. The journal of finance, 53(6), 1935-1974.

Tian, X., Udell, G. F., & Yu, X. (2016). Disciplining delegated monitors: When venture capitalists fail to prevent fraud by their IPO firms. Journal of Accounting and Economics, 61(2-3), 526-544.

Titman, S., & Trueman, B. (1986). Information quality and the valuation of new issues. Journal of accounting and economics, 8(2), 159-172.

Xiong, Y., Zhou, H., & Varshney, S. (2010). The economic profitability of pre-IPO earnings management and IPO underperformance. Journal of Economics and Finance, 34(3), 229-256.