

The Role of Reputation in the Underpricing of Private Equity Backed Initial Public Offerings

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Abstract

This paper explores the impact of private equity (PE) firm reputation on the underpricing of PE backed initial public offerings (IPOs). Using a sample of 470 IPOs issued between January 2011 and December 2015 in the United States, I find that PE backing as such no longer leads to lower initial returns. However, within the sub-sample of PE backed IPOs, issues backed by more reputable PE firms are characterized by less first-day and lock-up returns. I argue that these key findings imply the certification paradigm has shifted from PE backing as such to the adoption of PE firm reputation as an indication of quality. The results further provide partial support for the recently developed analyst lust hypothesis in that “top” underwriters boast larger initial returns and firms that carry out a seasoned equity offering are able to significantly raise prices.

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Keywords

Initial public offerings, underpricing, private equity, reputation, certification theory, analyst lust hypothesis

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1. INTRODUCTION

The private equity industry has shown to be remarkably resilient in the aftermath of the Global Financial Crisis of 2007-2008. Over the years, private equity (PE) firms have left the dire straits they found themselves in by paying down their mountains of debt and, over time, restoring their once dried-up fundraising cycles. In fact, exit activity peaked in 2014 and 2015, reporting all-time high values of \$456 billion and \$422 billion worldwide respectively¹ (Bain & Company, Inc., 2016).

The workings of the PE model were first discussed in the pioneering work of Jensen (1989). He argued that, through close monitoring of managers and directors, high leverage, involvement in the setting of long-term strategic direction and better control over corporate resources, operational efficiencies could be achieved and portfolio company value maximized. Several authors have contributed new evidence on the intricacies of superior PE governance, including Klier et al. (2009), Kaplan and Strömberg (2009), Ivashina and Kovner (2010) and Axelson et al. (2013) to name but a few.

The eventual exit of portfolio companies is arguably one of the most important decisions faced by PE firms (Levis, 2011). Broadly, the most popular exit routes are the sale to another company ("strategic sale"), sale to another sponsor ("secondary leveraged buyout") or through an initial public offering (IPO). The reasons that drive PE firms to pick one route over the other have been widely documented in the literature, including market conditions (Ritter and Welch, 2002) (Axelson et al., 2013), fund structure (Cummings and MacIntosh, 2003), and portfolio company financial conditions and sponsor reputation (Cao, 2011). Out of the available exit routes, this paper addresses the IPO exit decision for PE firms.

Similar to how the number and value of sponsor-backed IPOs has increased over the years past the Global Financial Crisis², the existing literature on sponsor backed IPOs³ has proliferated in an equal fashion. In general, the literature can be split in two streams. The first stream revolves around the certification role that PE firms have and the resulting negative impact on the underpricing of their IPOs. This literature is based on the seminal "certification hypothesis" set forth by Megginson and Weiss (1991) and Barry et al. (1990). The other stream contradicts this theory, and describes how PE firms deliberately underprice their issues in order to ease their capital raising efforts in future fundraising cycles. This idea was initially introduced by Gompers (1996) and further discussed by many scholars, such as, for example, Lee and Wahal (2004).

Given the fact that there is such an abundance of research on the performance and underpricing of sponsor backed IPOs, it is perhaps surprising that the reputation of PE firms has not nearly received as much attention as underwriter reputation. In particular, there exists a literature gap with regard to the impact of the reputation of the backing PE firms and the underpricing of the issue. Although Levis (2011) provides a comprehensive overview of PE backed IPOs in the U.K. issued during the

period 1992-2005, his analysis is limited to the impact of PE firm reputation on the aftermarket performance of the IPOs and does not include other independent variables. Similarly, Mogilevsky and Murgulov (2012) discuss the underpricing of buyout backed, venture capital backed and non-sponsor backed IPOs using a sample of U.S. IPOs issued between January 2000 and December 2009. Although they do discuss the underpricing of PE backed IPOs, their data is quite outdated and they also do not include PE firm reputation as an explanatory variable. This paper specifically addresses this gap in the literature and attempts to answer the following research question:

What is the impact of private equity firm reputation on the underpricing of PE backed initial public offerings in the U.S.?

In order to test my hypotheses, I compile and analyze a sample of 470 IPOs that were listed on the NASDAQ or New York stock exchange between January 2011 and December 2014. The results evince that, first, firms that go public after receiving PE funding are not characterized by lower initial returns than those firms that are not backed by PE firms. I do find differences within the sub-sample of PE backed issues, however, as firms that were backed by more reputable PE firms prove to leave less money on the table than those firms backed by PE firms of less stature. Finally, I find no evidence that PE firm reputation is positively related to returns to lock-up period.

The contribution to the literature is twofold. First, to my knowledge, this is one of the first studies that looks into the determinants of IPO underpricing using a comprehensive sample of firms that went public in the period *ex post* the Global Financial Crisis. The results might thus unveil changed relationships for the traditional determinants of underpricing, in addition to the impact of reputation. Second, I explore explicitly the role of PE firm reputation in initial and lock-up returns of the issue, whilst controlling for other predictors that have been identified in the literature. This specific link has not been explored in prior literature and may thus add another dimension to the array of underpricing predictors.

The remainder of this paper is structured as follows. The first section consists of the theoretical framework, introducing the prevailing theories and empirical evidence on IPO underpricing, followed by the development of the hypotheses that form the foundation of my research. An overview of the methodology employed to test my hypotheses, as well as the data collected is presented next. The final section consists of a discussion and analysis of the results, along with concluding remarks on the academic and practical relevance of my findings.

2. THEORETICAL FRAMEWORK

2.1 Theories on Underpricing

The phenomenon of IPO underpricing is well documented across dimensions of time and space. In essence, we speak of an underpriced initial public offering when the first-day closing bid price exceeds the offer price of the issue. In this case, the difference between the two represents the degree of underpricing, and ultimately, the money that was 'left on the table' by the issuing firm and underwriting party.

Ibbotson (1975) and Ritter (1984) were among the first to document the underpricing of common stock new issues during the 1960s and 1980 respectively. Although they both describe the above-average first-day returns on these issues, they do not conjure up conclusive explanations for the phenomenon. Over the years following, however, several theories have been developed in attempts to explain underpricing. These theories can be split up in three main streams: those founded on the existence of different types of information asymmetries in the stock market; those pertaining to behavioral finance theories;

¹ The values mentioned are of realized exits and thus do not include those exits that are not yet materialized.

² Bain & Company, Inc. (2016). "Global Private Equity Report 2016". The overall trend has been positive, although 2015 saw a slowdown in the number and value of sponsor backed IPOs on a global scale.

³ In this paper, the terms sponsor backed IPOs and PE backed IPOs are used interchangeably to include IPOs backed by multiple types of private equity, including leveraged buyouts and venture capital.

and those describing the relevance of ownership and control theories on the underpricing phenomenon. In the following sections these are described in more detail and their intricacies are explained.

2.1.1 Information Asymmetries

The study of information asymmetry is not unknown to the world of finance. In fact, several renowned researchers have related the existence of information asymmetry in the market for new common stock issues to the phenomenon of underpricing.

In his seminal work, Rock (1986) presents his ‘Winner’s Curse’ model. Assuming some investors are better informed than others, and the new issue market is characterized by quantity rationing, those that are better informed will over time crowd out the uninformed investors. Given the information they have about new issues, informed investors will want to subscribe only to those issues that are underpriced, whereas the uninformed investors will subscribe to all issues. As a result, underpriced issues are oversubscribed and shares are distributed pro-rata, meaning that on average, the uninformed are left with a greater proportion of overpriced shares and the informed with a greater proportion of underpriced shares. In order to compensate for this adverse selection and prevent the uninformed from leaving the market, firms are forced to underprice their issues. Beatty and Ritter (1986) build on this model and show that for an issue characterized by greater *ex ante* uncertainty, the uninformed investors are at an even greater disadvantage, thereby significantly raising the degree of necessary underpricing.

Rather than revolving around information asymmetries between different groups of investors, another stream of literature investigates the disparity of information between the issuing firm and the investing public. In a market characterized by *ex ante* uncertainty, only the issuing firm is aware of its own quality prior to the offering. So as to signal this quality to the investing public, firms may find it attractive to deliberately underprice their offerings in some circumstances. Allen and Faulhaber (1989) posit that, as opposed to low quality firms, only high quality firms are able to recoup the initial loss from underpricing through future cash flows. Welch (1989) proposes a similar model of quality signaling, introducing the notion of imitation costs for low quality firms. Here, high quality firms that pursue a multiple issue strategy may want to deliberately underprice their issues in order to decrease information asymmetry and guarantee more favorable conditions in the case of a seasoned equity offering (SEO).

It is important to note, however, that multiple signaling mechanisms exist for issuing firms, and that underpricing is considered to be a relatively expensive course of action. Alternatives include the choice of high quality underwriter (Booth and Smith, 1986), high quality auditor (Titman and Trueman, 1986), or even the voluntary disclosure of accounting data.

2.1.2 Behavioral Finance

So as to add another string to the bow of underpricing explanations, scholars have also employed behavioral finance theories to amalgamate normative financial theories and investor psychology.

A well-documented phenomenon in the behavioral finance literature is the occurrence of “information cascades”. This term describes a situation of sequential issues in which subsequent investors decide to ignore their private information and base their decisions solely on the purchasing decisions of earlier investors. Welch (1992) posits that such path dependencies and

cascades provide an explanation for underpricing, since if the issue is underpriced to a certain degree, the issuer can ensure the success of the offering and cause subsequent investors to disregard their own private information. Underpricing is thus a stimulating mechanism to convince investors to purchase shares, and thereby ultimately decide the success or failure of the IPO.

Many of history’s financial bubbles can be ascribed to irrational exuberance on the part of the investing public. However, as these events have shown, investor sentiment can change in the blink of an eye and cause bubbles to burst. Ljungqvist et al. (2004) show that in ‘hot markets’, issuers use ‘regular’ institutional investors as intermediaries for selling shares to sentiment investors, and that these regulars expropriate value from sentiment investors by rationing supply and setting high offer prices. In this context, regulars hold significant levels of inventory, and in order to compensate for the risk of sentiment change, underpricing comes into play.

A final behavioral approach to IPO underpricing proposed by Loughran and Ritter (2002) involves prospect theory. Prospect theory assumes that issuers value a change in wealth more than the actual level of wealth. Due to the fact that oftentimes preissue shareholders retain a significant part of their shares after an IPO, the benefits accruing from aftermarket stock returns outweigh the opportunity costs of underpricing the initial issue. As a result, issuers care less about initial day returns and experience a positive net effect of underpricing.

2.1.3 Ownership and Control

The last branch of IPO underpricing literature pertains to the dispersion of ownership and control and the consequential occurrence of agency problems. Particular attention is devoted to potential conflicts between preissue shareholders (i.e., management) and outside investors.

Stoughton and Zechner (1998) investigate the role of ownership and control on underpricing and find that there is a positive relationship between strategic rationing (at the advantage of large investors) and underpricing. Due to their nature and the establishment of institutional mechanisms, large investors are better able to monitor management. The flipside of the coin, however, is that smaller investors are able to free ride on the abilities of larger investors. After investigating this trade-off, the authors find that it is in the firm’s best interest to underprice their issues in favor of large investors, as the benefits gained from information production and monitoring outweigh the costs of free riding.

However, Brennan and Franks (1997) find conflicting evidence that suggests issuing firms may be inclined to underprice their issues in favor of smaller investors in order to retain a controlling interest *ex post* IPO. By underpricing the issue, oversubscription is ensured and share allocation rationed. This then allows owners to discriminate in their allotment of shares, particularly against strong blockholders, with the aim of reducing outside investor monitoring and the risk of hostile takeovers.

Booth and Chua (1996) posit that in their efforts to secure a disperse ownership base, firms underprice their offerings. The decision to underprice is related to the secondary market liquidity that flows from ownership dispersion, which decreases the required return on the part of investors. The lower rate of required return then results in a higher equilibrium share price⁴.

⁴ This can be simulated using the Gordon growth model. If we assume a firm to operate a stable dividend policy, we can estimate the firm’s share price (P_0) to be $\frac{D_t}{r-g}$, where r is the

Finally, they note that the initial costs of information gathering by potential investors are also offset by underpricing.

2.2 Hypotheses Development

In order to advance hypotheses it is insightful to first look at the existing body of literature that evaluates the role and impact of private equity backing on the underpricing of new issues. In the vanguard of describing the underpricing of PE backed IPOs, Megginson and Weiss (1991) and Barry et al. (1990) argue that PE firms reduce the underpricing of their offerings due to the fact that their monitoring is perceived by the capital markets as a proxy for high quality governance. Megginson and Weiss (1991) go on to set out a “certification hypothesis” which explains the role the involvement of PE firms has in signaling and certifying the quality of the issuing firm, thereby reducing information asymmetries and ultimately underpricing. Although a contradicting “grandstanding hypothesis” (Gompers, 1996) has been developed that posits PE involvement instead leads to more underpricing, more recent papers by e.g. Boumans (2010) and Mogilevsky and Murgulov (2012) provide evidence that the certification hypothesis holds true for multiple different kinds of sponsor backed IPOs as well. Given the growing stock market volatility and the fact that a significant portion of today’s IPOs are classified as high-tech and inherently more risky⁵, the certification role is bound to of even more importance. This leads to me to hypothesize the following.

Hypothesis 1: Private equity backed IPOs display significantly lower levels of underpricing than non-private equity backed IPOs.

As mentioned, the main argument against the certification hypothesis is founded on Gompers’ (1996) grandstanding hypothesis and argues that PE firms deliberately underprice their offerings in order to ease further fund raising efforts and establish a reputation for themselves (Lee and Wahal, 2004). However, this line of reasoning falls flat concerning IPOs backed by more reputable PE firms, as those parties tend to be larger and to have already established a name for themselves. In fact, if the grandstanding theory is further inverted, more reputable PE firms are expected to underprice their issues to a lesser degree than their less reputable counterparts.

What is more, Ivashina and Kovner (2010) and Mogilevsky and Murgulov (2012) examined the role and impact of the relationship between banks and PE firms. They found that repeated transactions reduce information asymmetries and result in more favorable transaction and underwriting conditions. Following the definition of firm reputation as the amount of private equity direct capital a firm has raised⁶, more reputable PE firms have higher levels of capital under management (CUM) and, on average, tend to take more portfolio companies public and interact more frequently with banks to acquire high levels of debt and leverage to fund their practices. Building on game theory, the situation at hand is a repeated game in which reputable PE firms possess power over underwriters. Assuming underwriters exhibit rent-seeking behavior, it is thus in their best interest to minimize underpricing so as to attract future business from their ‘top’ PE clients. These arguments lead to me advance the following hypothesis.

required rate of return and g the constant growth rate. As r decreases, the denominator decreases in a similar fashion, resulting in a higher share price.

⁵ EY (2015). “EY Global IPO Trends 2015 4Q”. Measured by the Chicago Board Options Exchange Volatility Index (VIX ®).

⁶ This is also the definition employed by Private Equity International in their top 300 rankings.

Hypothesis 2: IPOs that are backed by more reputable private equity firms are significantly less underpriced than those backed by private equity firms of less stature.

The last hypothesis pertains to the lock-up period following the offering. As is their business model, PE firms incline to ‘cash out’ and exit their portfolio companies after taking them public. However, they are limited from doing so initially by means of a lock-up period, which typically lasts 180 days (Brav and Gompers, 2003). I thus posit that PE firms place superior value on the return to lock-up period, and also employ this measure as means to allocate their future business, in line with the above argument of repeated gaming. Since underwriters find it in their best interest to maintain business with highly reputable firms, they will provide all-star analyst coverage to ensure a high price after the lock-up period expires (Bradley et al., 2011). Providing such coverage is not as attractive for lower quality PE firms however, as the limited size and benefits of their future business do not outweigh the coverage costs. This line of thought is central to the “analyst lust hypothesis” (Liu and Ritter, 2011) and leads me to further the following hypothesis.

Hypothesis 3: IPOs that are backed by more reputable private equity firms show significantly larger initial returns to lock-up period than those backed by private equity firms of less stature.

3. METHODOLOGY AND DATA

3.1 Methodology

3.1.1 Regression Models

Consistent with the extant literature (Jenkinson and Sousa, 2015), I employ the following two multiple regression models:

$$\text{Underpricing}_i = \alpha_0 + \beta_1 \text{PE}_i + \beta_2 \text{UW_Rank}_i + \beta_3 \text{Ln_Proceeds}_i + \beta_4 \text{Ln_Age}_i + \beta_5 \text{Ln_Assets}_i + \beta_6 \text{ROA}_i + \beta_7 \text{SEO}_i + \beta_8 \text{Nasdaq}_i + \beta_9 \text{Pharma}_i + \beta_{10} \text{Software}_i + \beta_{11} \sum_{t=1}^T \text{Year}_i + \varepsilon \quad (1)$$

The first model tests the first hypothesis regarding the impact of PE backing on underpricing for the entirety of the sample.

$$\text{Returns (Initial/Lock-up)}_i = \alpha_0 + \beta_1 \text{VC}_i + \beta_2 \text{Ln_Fundsraised}_i + \beta_3 \text{UW_Rank}_i + \beta_4 \text{Ln_Proceeds}_i + \beta_5 \text{Ln_Age}_i + \beta_6 \text{Ln_Assets}_i + \beta_7 \text{ROA}_i + \beta_8 \text{SEO}_i + \beta_9 \text{NASDAQ}_i + \beta_{10} \text{Pharma}_i + \beta_{11} \text{Software}_i + \beta_{12} \sum_{t=1}^T \text{Year}_i + \varepsilon \quad (2)$$

The second model pertains to the second and third hypotheses and the relationship between PE firm reputation (as measured by funds raised) and initial returns and abnormal returns to lock-up period, as will be tested using the sub-sample of PE backed IPOs. Two variables measuring fund size and capital under management are also added to serve as additional proxies for fund reputation and thus provide robustness to the results.

Before describing the variables in more detail, it is important to first note that more often than not, firms in the sample were backed/underwritten by more than one entity. In these cases, the percentages of beneficial ownership prior to completion of the offering/allocated shares were used as lever to determine the lead PE firm/underwriter. This is identical to the metric used by researchers before me (Krishnan et al., 2009). However, even then the sample still featured firms that owned/were allocated identical percentages of a particular company, in which case arithmetic averages were employed to estimate the parameters of the regression model. Finally, following the evidence of Jovanovic and Szentes (2007), I assume the bookbuilding mechanism of IPOs to be exogenous to my models.

3.1.2 Dependent Variables

The first dependent variable, underpricing, is calculated using the following equation (Liu and Ritter, 2011):

$$\text{Initial return}_{it} = \frac{P_{t=1} - P_{t=0}}{P_{t=0}}, \quad (3)$$

where $P_{t=1}$ is the first-day closing price and $P_{t=0}$ is the offer price.

The second dependent variable, return to lock-up expiration, is measured as the abnormal return (AR_{it}) over the 180-day period:

$$AR_{it} = \left[\left(\frac{P_{t=180} - P_{t=0}}{P_{t=0}} \right) + D_i \right] - [r_f + \beta_i(r_m - r_f)], \quad (4)$$

where $P_{t=180}$ is the closing price at the lock-up expiration date, $P_{t=0}$ is the offer price, D_i is the dividend yield, β_i is the leveraged industry beta, r_f is the 6-month treasury bill rate and r_m is the raw market return over the 180-day period.⁷

It is important to note that this paper primarily explores the relationship between PE firm reputation and stock price appreciation in the run up to the lock-up expiration date, as this relates to the analyst coverage described in my third hypothesis. Although the above calculation of lock-up return includes dividend yield for good measure, I find that abnormal returns for the sample are predominantly driven by capital appreciation.

3.1.3 Independent Variables

PE is a dichotomous variable where a value of one implies the IPO is backed by a PE firm and zero that the IPO is non-PE backed. Based on the available information in a prospectus, firms are classified as backed if a PE firm holds at least 1% of beneficial shares prior to the offering. I postulate that a negative relationship exists between PE backing and initial returns.

LN_Fundsraised represents the natural logarithm of the value (in \$ million) of funds raised by the lead PE firm in the five years period prior to the year in which the portfolio company was taken public. Following my second hypothesis, I posit this variable to be negatively related to the initial returns. As regards my third hypothesis, I expect the relationships between all variables defined below and underpricing to remain the same, with the exception of the PE reputation proxies. In these cases, I expect a positive association between the reputation of the backing PE firm and the returns to lock-up period (180 days).

LN_Fundsize represents the value (in \$ million) of the size of the funds managed by the lead PE firm during the five years prior to the initial date of the sample window (01/01/2013). This variable serves as another proxy for firm reputation, as firms of higher stature are better able to attract funds from investors in follow on fundraising rounds (Sirri and Tufano, 1998). I would therefore expect this variable to negatively relate to underpricing, and positively to returns to lock-up period.

LN_CUM represents the natural logarithm of the value (in \$ million) of the capital under management (CUM) of the lead PE firm. In the same vein as funds raised and fund size, negative and positive relationships are expected between this variable and underpricing, and returns to lock-up period respectively.

3.1.4 Control Variables

VC is a dichotomous variable where a value of one implies that the issuing firm is backed by a venture capital firm, and zero that the issuing firm is sponsored by a PE firm specialized in buyouts. Due to their nature, VC firms invest in firms that are generally less established, of higher risk and characterized by more *ex ante* uncertainty (Gompers and Lerner, 1999). This leads me to assume that this variable may be positively related to underpricing.

UW_Rank is a variable that represents the reputation of the lead underwriter using the Carter Manaster ranking. This method of ranking underwriters on a scale from 0 to 9 has been widely

adopted throughout the underpricing literature, and the rankings used in this paper are those published for the 2010-2011 and the 2012-2014 period by Jay Ritter. Conforming to the certification hypothesis (Booth and Smith, 1986), I expect IPOs that are underwritten by higher quality underwriters to be less underpriced.

Ln_Age is a variable that measures the natural logarithm of 1+the age of the issuing firm from inception to the time that it went public. Firms that are older are expected to have published more public information during their lifetime, thereby reducing uncertainty and information asymmetry, which ultimately results in less underpricing. Various scholars such as Loughran and Ritter (2002) have also controlled for age in their studies on IPO underpricing.

Ln_Assets is the natural logarithm of the issuing firm's total pre-IPO assets (in \$ millions). Taking firm assets as a proxy for firm size, I assume larger firms to be characterized by less *ex ante* uncertainty. The implication is that a negative association is expected between this variable and underpricing.

ROA is a variable that signifies the issuing firm's return on assets as earnings before interest and taxes (EBIT) over assets. Well-performing, financially healthy firms are expected to tally with more confidence on the part of investors, thereby reducing the necessary degree of underpricing.

Ln_Proceeds is a variable that measures the natural logarithm of the issue proceeds (in \$ million). Mogilevsky and Murgulov (2012) found that PE backed IPOs are significantly larger than non-sponsor backed IPOs. In particular, smaller issues are on average characterized by more *ex ante* uncertainty (due to their speculative nature) and thus go hand in hand with higher levels of underpricing (Beatty and Ritter, 1986).

SEO is a dichotomous variable that denotes whether or not the issuing firm has undertaken a seasoned equity offering. Based on the signaling hypothesis (Welch, 1989), I expect firms that carry out a seasoned equity offering to have a greater incentive to underprice, and thus expect to see higher levels of initial returns for these issues.

NASDAQ is a dichotomous variable where unity implies the issue was listed on the NASDAQ stock exchange and zero that the issue was listed on the New York stock exchange (NYSE). I expect issues listed on the NASDAQ to be more speculative and characterized by greater levels of *ex ante* uncertainty, both positively affecting the level of underpricing.

The *Pharma* and *Software* dummies serve to control for fixed industry effects in accordance with the Fama and French (1997) industry classifications. What is more, Ritter (1984) documents so-called "hot market" conditions in which underpricing is more pronounced; to control for this effect, $(n - 1)$ dummy variables are added to represent the offer years present in the sample.

Finally, to ensure my results are not driven by outliers, I winsorize initial returns and returns to lock-up expiration at the 1st and 99th percentile (Ruppert, 2006).

3.2 Data Collection

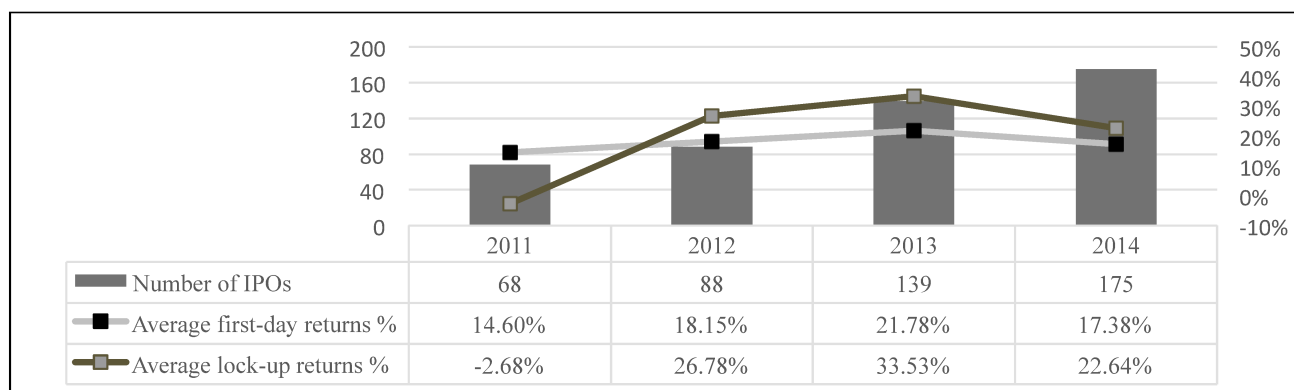
For the composition and collection of my sample the ThomsonOne VentureXpert and ThomsonOne Banker databases were employed. Further information on the nature (PE backing), pre-issue assets, pre-issue ROA, offer price, and size of the issues was manually collected using the ORBIS and LexisNexis® databases, in addition to the Securities and Exchange Commission 424B/S-1 filings registered in the S.E.C. EDGAR database.

The initial raw sample consists of 884 IPOs that were listed on

⁷ Industry betas were sourced from Aswath Damodaran's website and market returns for the NASDAQ All-Share and NYSE All-Share indexes were retrieved from Datastream.

Figure I. Number of IPOs and Returns by Year

Note. The reported IPOs exclude ADRs, closed-end funds, REITs, unit offerings and banks. Data is collected from ThomsonOne, LexisNexis® and ORBIS. The initial returns are calculated as the percentage change between offer price and the price at the close of the first trading day. Lock-up returns are calculated as the abnormal returns between the listing date and the date of lock-up expiration.



the NASDAQ or New York stock exchange (NYSE) between January 2011 and December 2014 (inclusive). However, in order to improve the generalizability of my research, American depository receipts (ADRs), closed-end funds, real estate investment trusts (REITs), unit offerings (warrants), and banks are excluded. After filtering the original data and omitting issues that lack the necessary information, the final sample comprises 470 IPOs, of which 390 are PE backed and 80 are non-PE backed IPOs.

Figure I illustrates the annual volume and returns for the IPOs issued between January 2011 and December 2014. The number of IPOs steadily increases over the sample period, as do the initial returns between 2011 and 2013. This positive trend tallies with the industry figures presented by *Bain & Company* (2016), and hints at the existence of “hot” IPO market conditions. What is more, the visible patterns are identical to those described by Lowry and Schwert (2002) in that periods characterized by high first-day returns are often succeeded by a large inflow of initial listings. They argue this might be related to issuers’ response to inflating market valuations.

In untabulated results the sample is also partitioned by industry. At 23.5%, the majority of firms are Pharmaceutical companies (SIC codes 2834-2836), followed by Software Publishers (SIC codes 7372-7375), who make up 19.7% of the sample firms.

4. EMPIRICAL RESULTS

4.1 Firm and Offering Characteristics

Table I presents information on the firm and offering characteristics for the sample. There are significant differences between the PE backed and non-PE backed IPOs in terms of initial returns, underwriter ranking and firm age. In contrast with the findings of Megginson and Weiss (1991) and my first hypothesis, the mean initial return of PE backed IPOs is 20.24 percent whereas that of non-PE backed IPOs is only 7.48 percent. Further, the significant disparity between the mean underwriter ranking of PE backed and non-PE backed IPOs may have several explanations. On the supply side, reputable underwriters have often built close relationships over time with PE firms in efforts to secure their lucrative business. On the demand side, PE firms more actively seek reputable underwriters that are able to provide premium analyst coverage, since this is believed to affect their return on investment at the time of exit (Aggarwal et al., 2002). Since non-sponsored firms are oftentimes not repeat customers and do not place as much emphasis on returns to lock-up period, these arguments do not hold true for non-PE backed IPOs. These explanations are in accordance with the reasoning in my second and third

hypothesis respectively. What is more, the results also indicate that PE backed firms tend to be older than non-PE backed firms on average. It is interesting to see however, that this maturity is not associated with a larger firm size as measured in pre-IPO assets. A possible explanation for both of these observations is that the PE backed sub-sample is made up largely out of VC backed firms which, as Panel B in Appendix C illustrates, are not only a lot smaller than buyout backed firms (in terms of assets) but also tend to be quite old with a mean of 7.70 years. Finally, and perhaps more importantly, the results allude to the existence of differences between the sub-samples of PE backed and non-PE backed IPOs with regard to first-day returns and returns to lock-up period.

4.2 Bivariate Correlations

Table II illustrates the bivariate Pearson correlations for the variables used in the various regression models. Strong positive correlations exist between the variables Log (Funds Raised), Log (Funds Size) and Log (CUM), which is unsurprising given the manner in which these variables are constructed. *Ceteris paribus*, the more funds a PE firm raises will increase the total size of the funds it manages, which in turn, over time goes hand in hand with an increase in its total capital under management. To avoid multicollinearity issues impacting the results, separate regression models have been performed in which the effects of the proxies for firm reputation are each tested separately. The results also show moderate correlation between the natural logarithm of issue proceeds and pre-IPO assets. This makes intuitive sense given the fact that investment banks predominantly value firms on the basis of their assets⁸ (Deloof and Inghelbrecht, 2009). The latter correlation does not warrant adapting any of the models however, as its acceptable tolerance and variable inflation factor scores signify its influence is limited.

4.3 Regression Results

4.3.1 PE Backing and Underpricing

The results of the various regression models are reported in Table III. The first regression model has limited predictive ability, being able to account for just 9.1% of the variation in first-day returns. The first hypothesis predicts that PE backing should be negatively related to initial returns. Column 1 shows that the results do not back this prediction; in fact, the PE dummy variable is positive. The coefficient of 7.654 indicates

⁸ The commonly used discounted cash flow (DCF) analysis values companies on the basis of their future cash flows, which in turn derive from the underlying assets that produce them.

Table I. Summary Firm and Offering Characteristics

Note. This table provides summary descriptive statistics for the filtered sample of 470 IPOs listed on the NASDAQ or NYSE between January 2011 and December 2014. Panel A and B display descriptive statistics for the sub-sample of private equity backed and non-sponsor backed IPOs respectively. The initial return is calculated as the percent return between the first-day closing price and the offer price. Return to lock-up is the percent return between the 180-day closing price and the offer price, adjusted for market fluctuations. Funds raised, funds size and capital under management are the total for the five years prior to the issue. Firm age is measured as the years between inception and listing date. Lead underwriter Carter Manaster ranking is the ranking during the period 2010-2011 or 2012-2014 depending on the year of issue. Issue proceeds is the value raised in the offering. Pre-IPO assets are the total assets before the IPO. Pre-IPO ROA is calculated as EBIT over assets before the IPO. In total, 337 sample firms conducted a seasoned equity offering, of which 282 were private equity backed. The total number of sample firms listed on the NASDAQ stock exchange is 270, of which 227 are private equity backed.

<i>Panel A: Private Equity Backed IPOs (N=390)</i>					
Variable	Mean	Median	Std. dev.	Minimum	Maximum
Initial Return (percent)	20.24	11.08	28.75	-21.35	119.67
Return to Lock-Up (percent)	24.73	17.09	54.16	-73.43	201.52
Funds Raised (\$ million)	5,569.34	1,074.30	11,474.54	5.00	67,275.42
Funds Size (\$ million)	7,405.02	1,300.00	16,615.44	40.00	107,619.93
Capital Under Management (\$ million)	13,330.38	3,000.00	22,649.82	12.78	99,128.00
Lead Underwriter Carter Manaster Ranking	8.49	9.00	1.02	3.00	9.00
Issue Proceeds (\$ million)	296.67	116.15	912.90	10.73	16,006.88
Age (years)	7.45	6.60	6.61	0.18	91.66
Pre-IPO Assets (\$ million)	1,456.79	86.99	8,337.46	0.12	151,167.00
Pre-IPO ROA (percent)	-40.87	-2.31	153.81	-1,725.81	103.64
Offer Price (\$)	15.16	15.00	5.96	4.00	45.00
<i>Panel B: Non-Private Equity Backed IPOs (N=80)</i>					
Variable	Mean	Median	Std. dev.	Minimum	Maximum
Initial Return (percent)	7.48**	4.57	18.22	-21.35	76.33
Return to Lock-Up (percent)	9.41**	-7.81	54.51	-73.43	201.52
Funds Raised (\$ million)	-	-	-	-	-
Funds Size (\$ million)	-	-	-	-	-
Capital Under Management (\$ million)	-	-	-	-	-
Lead Underwriter Carter Manaster Ranking	7.13**	8.50	2.33	2.00	9.00
Issue Proceeds (\$ million)	274.86	108.00	498.39	2.80	2,955.36
Age (years)	4.28*	2.30	5.30	0.13	27.31
Pre-IPO Assets (\$ million)	4,223.13	137.53	25,111.88	0.84	216,394.00
Pre-IPO ROA (percent)	-81.78	3.55	673.69	-5,972.41	168.19
Offer Price (\$)	14.61	14.00	7.60	4.00	43.00

*, ** denote significant differences between the means of the sub-samples at the 0.05 and 0.01 level respectively.

Table II. Pearson Correlation Matrix

Note. This table presents bivariate correlations between various dependent and independent variables used in the regression models. Variable definitions are provided in Table I. Dummy variables for exchange, issue year and industry are omitted for brevity.

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]
Initial Return	[1]	1											
Return to Lock-Up	[2]	.427**	1										
PE Dummy	[3]	.169**	.105*	1									
VC Dummy	[4]	.163**	.114*	.469**	1								
Log (Funds Raised)	[5]	-.081	-.106*	-	-.447**	1							
Log (Funds Size)	[6]	-.096	-.108*	-	-.500**	.933**	1						
Log (CUM)	[7]	-.112*	-.052	-	-.391**	.781**	.836**	1					
Underwriter Rank	[8]	.141**	.117*	.328**	.090	.297**	.298**	.263**	1				
Log (Proceeds)	[9]	.079	-.008	.120**	-.286**	.539**	.569**	.474**	.547**	1			
Log (1+Age)	[10]	.080	-.009	.400**	.315**	-.107*	-.111*	-.133**	.037	-.103*	1		
Log (Assets)	[11]	-.039	-.053	-.022	-.474**	.531**	.576*	.475*	.476**	.710**	-.037	1	
ROA	[12]	.067	.062	.051	-.065	.204**	.227**	.121*	.249**	.171**	-.070	.288**	1
SEO Dummy	[13]	.030	.287**	.015	-.080	.063	.125*	.131**	-.106*	.024	-.071	-.028	-.061

*, ** mark significance at the 0.05 and 0.01 level respectively.

that, ceteris paribus, PE backed IPOs tend to be 7.65% more underpriced than their non-sponsored counterparts at the 0.1% level. This is inconsistent with the findings Megginson and Weiss (1991) report, and leads me to reject my first hypothesis; I find significant evidence that PE backed IPOs are in fact *more* underpriced than non-PE backed IPOs.

The results further indicate that lead underwriter rank is positively related to initial returns, supporting previous findings by Loughran and Ritter (2004) that the conventional certification role of underwriters has changed over time. This might also be related to the analyst lust hypothesis, a topic I will touch upon later when discussing the other models. Surprisingly, but in line with the findings Mogilevsky and Murgulov (2012) report, there is a positive relationship between the size of the issue and underpricing. The significant negative coefficient of Log (Assets) supports the notion that larger firms effectively alleviate some of the *ex ante* uncertainty that drives initial returns. The findings in Column 1 also partially back the mechanism of purposely underpricing to benefit further equity offerings (Welch, 1989), as positive but insignificant relationship exists between firm profitability (ROA) and the SEO dummy, and underpricing. What is more, the dummy variable denoting NASDAQ listing does not prove to be significant. This leads me to believe that although issues listed on the NASDAQ might be more capricious, this difference does not express itself in the form of higher levels of underpricing. I find negative and positive industry effects exist for Pharma and Software companies respectively, which corresponds to the documented *ex ante* uncertainty surrounding high-tech industries (Ritter, 1984). Finally, I find no fixed year effects exist for any of the years in the sample period.

4.3.2 PE Firm Reputation and Initial Returns

Columns 2 to 4 report the regression results for the models that employ funds raised, funds size, and capital under management respectively as proxies for PE firm reputation. All three models are in the low end in terms of their ability to predict first-day returns for PE backed IPOs, accounting for 8.3%, 8.7% and 9% respectively. Although the coefficients for the VC dummies are positive in all three models, they are not significant at the

0.10% level. This means that, despite the abundance of theory on the impact of VC backing on underpricing, my results do not provide significant support for either end of the grandstanding-certification paradox from the onset.

However, I do find substantial support for my second hypothesis as all three proxies for PE firm reputation are negatively related to initial returns at the 0.05% level. The coefficient of -2.150 for Log (Funds raised) indicates that roughly every percent increase in the value of funds raised leads to a 2.15% decrease in underpricing. Further, I find that for every percent increase in the total size of a PE firm's funds (as measured by the natural logarithm of funds size), the IPO is 2.67% less underpriced. Finally, the coefficient of -2.721 underlines the gravity of firm reputation in that every 1% increase in the backing PE firm's capital under management is accompanied by 2.72% less initial returns. Unlike the correlations reported for the VC dummy, these results clash with the grandstanding hypothesis (Gompers, 1996) and potentially signify that a certification mechanism is still in play *within* the sub-sample of PE backed IPOs.

Similar to the first regression model, the regressions reported in Columns 2 to 4 once more stress that more reputable underwriters and larger issues are associated with higher levels of headline underpricing. On the firm level, age remains to be a weak predictor of first-day returns. I also find that firm size in terms of pre-IPO assets is significantly more important for PE backed issues, reporting significance at the 0.01% level for all three models. Interestingly, the results of all models imply a positive relationship exists between firm profitability and initial returns. At first, this might seem counter-intuitive if we take ROA to be a measure of investor confidence in the firm, but it does in fact make sense in the context of signaling (Allen and Faulhaber, 1989) if firms with favorable prospects (measured in profitability) signal their quality by means of deliberate underpricing. Similar to the results of the whole sample, there exist negative and positive industry effects for the Pharma and Software dummies respectively for PE firms. Finally, the SEO, NASDAQ and year fixed effect dummies exhibit no strong significant relationship to underpricing in any of the models.

Table III. Ordinary Least Squares Regressions of Initial Returns and Lock-Up Returns

Note. This table reports the regression results for the sample of 470 IPOs listed on the NASDAQ or NYSE between January 2011 and December 2014. Variables are defined in Table I. The sub-sample of PE backed firms comprises 390 IPOs. The dependent variables in the regressions are initial returns for Columns 1-4 and returns to lock-up period for Columns 5-7, both expressed in percentages. For brevity, correlation coefficients are omitted for year and industry dummies. The t-statistics are in parentheses.

	<i>All IPOs</i>			<i>PE Backed IPOs</i>			
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Constant	-18.913 (-1.913)	-11.391 (-.672)	-9.607 (-.570)	-6.240 (-.373)	-41.552 (-1.369)	-36.350 (-1.206)	-38.687 (-1.287)
PE Dummy	7.654* (1.935)	-	-	-	-	-	-
VC Dummy	-	3.658 (.833)	2.982 (.679)	3.949 (.935)	6.057 (.750)	4.396 (.546)	6.726 (.862)
Log (Funds Raised)	-	-2.150** (-2.175)	-	-	-2.976* (-1.694)	-	-
Log (Funds Size)	-	-	-2.666** (-2.456)	-	-	-4.524** (-2.354)	-
Log (CUM)	-	-	-	-2.721** (-2.575)	-	-	-2.810 (-1.496)
Underwriter Rank	2.101* (1.787)	2.533 (1.430)	2.592 (1.477)	2.683 (1.563)	10.528*** (3.428)	10.698*** (3.522)	10.588*** (3.544)
Log (Proceeds)	4.214** (2.333)	6.305*** (2.441)	6.497** (2.719)	6.118*** (2.658)	-4.938 (-1.165)	-4.240 (-1.010)	-5.562 (-1.358)
Log (1+Age)	1.338 (.663)	.362 (.134)	.477 (.178)	.117 (.045)	-4.604 (-.962)	-4.385 (-.926)	-4.871 (-1.048)
Log (Assets)	-3.069*** (-3.282)	-2.915** (-2.168)	-2.735** (-2.041)	-2.648** (-2.017)	-.900 (-.371)	-.521 (-.217)	-.676 (-.285)
ROA	.006 (1.464)	0.023* (1.845)	.022* (1.899)	.020* (1.735)	.021 (.989)	.021 (1.013)	.019 (.932)
SEO Dummy	3.997 (1.402)	5.149 (1.469)	5.735 (1.645)	5.715* (1.679)	44.267*** (7.043)	45.398*** (7.270)	44.673*** (7.298)
NASDAQ Dummy	3.652 (1.216)	3.101 (.850)	3.335 (.923)	3.906 (1.105)	.095 (.014)	.495 (.076)	.896 (.140)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R ²	.091	.083	.087	.090	.187	.194	.187
No. of Observations	460	345	350	366	345	350	366

*, **, *** mark significance at the 0.1, 0.05, and 0.01 level respectively.

4.3.3 PE Firm Reputation and Return to Lock-Up

The final three models depicted in Columns 5 to 7 employ the same regression equation as models 2-4, but this time capture the effect of the predictor variables on the return to lock-up expiration (180 days post IPO listing date). All models display moderate predictive abilities, as they are able to explain 18.7%, 19.4% and 18.7% of the variation in lock-up returns, respectively. In all three models I report quite strong effects of the VC dummy, ranging from 4.40% to 6.73% higher returns to lock-up expiration for VC backed IPOs. Akin to the previous three models however, these results lack significance at any of the conventional levels.

The third hypothesis implies that IPOs backed by more reputable PE firms should be characterized by higher abnormal

returns to lock-up period. As shown in Columns 5 to 7 however, this is not the case for any of the regression models. On the contrary, Columns 5 and 6 even highlight significant negative relationships between two proxies of PE firm reputation, funds raised and funds size, and lock-up returns. This evidence directly conflicts that of prior research (Bradley et al., 2011) and leads me to reject my third hypothesis; rather than as predicted by the literature, I find that PE firms of more stature are presented with *lower* returns to lock-up period.

The results further show that the positive relationship between underwriter reputation and underpricing is even stronger for an extended time period. I find that at the 0.01% level, an increase of 1 in the Carter Manaster underwriter ranking is met with at least a 10.53% increase in lock-up returns. In terms of firm and issue characteristics, the significance of the effects of issue size,

firm size and firm profitability disappear for 180-day returns. Firm age and the NASDAQ dummy remain insignificant for all models. The SEO dummy exhibits a strong positive relationship to lock-up returns at the 0.01% level, implying that PE firms that carry out a seasoned equity offering experience at least 44.27% percent higher returns than those that do not. This is consistent with Cliff and Denis (2004) and suggests that firms who carry out an SEO are able to significantly raise prices in the run-up to the expiration date. Finally, the findings indicate a significant negative fixed year effect exists for issues listed in 2011, as well as a negative Software dummy association.

4.3.4 Additional Robustness Checks

Next to using multiple proxies for PE firm reputation, I also carry out two additional checks to ensure the key findings in this research are accurate and robust. First, I assess whether the significant associations between PE firm reputation and initial returns, and returns to lock-up period hold without winsorizing the latter two variables. The results from running the same regression models as in Columns 2-7 show that the same associations continue to be significant at the 0.1, 0.05 and 0.01 level, respectively. Second, I run the same regression specifications after partitioning the sub-sample of PE backed IPOs into those backed by venture capital, and those backed by buyout firms. I find that for both groups the direction of the relationship between PE firm reputation and return does not change. This leads me to conclude that the observed effect of PE firm reputation holds for both types of sponsors.

5. DISCUSSION

This paper provides partial support for the analyst lust hypothesis (Aggarwal et al., 2002)(Bradley et al., 2011). Although I do *not* find that ‘top’ PE firms are relatively more underpriced, there does indeed exist a strong positive relationship between ‘top’ underwriters who are able to facilitate all-star coverage and the return to lock-up of PE backed issues. However, to test whether the presumptions underlying this hypothesis still hold true in the post-GFC era, one would have to look at the corresponding post-IPO analyst coverage the issues received during the sample period. If there does in fact turn out to be analyst coverage post-IPO, then this might allude to a change of payment method, whereby leaving money on the table has lost its preference. It would also be interesting to differentiate between PE firms who hold large and smaller ownership shares, as by this token we would expect those with more “skin in the game” to exert more power over underwriters in order to increase returns to lock-up.

The results further indicate that there is *no* significant negative relationship between sponsor backing and underpricing, which casts doubt on the traditional role ascribed to PE firms in certifying their portfolio companies (Megginson and Weiss, 1991). This could be due to the fact that the number of PE backed IPOs has increased steadily over the years in the sample (both of high and low quality), making PE backing as such no longer a differentiating factor. Instead, I find that within the sub-sample of PE backed IPOs, PE firm reputation might serve to reduce information asymmetries as an indication of firm quality. This suggests the traditional paradigm of certification by means of sponsor backing or underwriter reputation might have shifted towards the adoption of PE firm reputation.

Although the PE industry is characterized by low entry barriers and high fragmentation (Wright and Robbie, 1998), the findings from this research may have practical implications in that reputation could serve as an element of differentiation for PE firms. By the same token, the reciprocal nature of PE firm reputation suggests that this reputational advantage should be even stronger for more reputable firms. Since these firms are

better able to attract and filter out high quality firms that yield better returns on investment (Krishnan et al., 2009), they will in turn raise more funds from investors and thus impose informal entry barriers. These reputational differences could also have implications for the decision-making process of firm executives seeking private equity funding. Granted that more reputable PE firms often demand a larger equity stake (Gompers and Lerner, 2001), the traditional trade-off between ownership stakes and the benefits that PE firms bring to the table is expanded by the dimension of less money ‘left on the table’.

No research comes without limitations, so it is important to recognize the key constraint of this paper. The results from this research might vary from that of previous studies because of the different measures employed for PE firm reputation. Although throughout the literature several measurements have been employed, such as PE firm age (Gompers, 1996), IPO frequency (Lee and Wahal, 2004), and IPO market share (Krishnan et al., 2009), I do believe the proxies of funds raised, funds size and capital under management better capture a PE firm’s reputation. These measures are not susceptible to a scenario in which a LP leaves and founds his own firm (in which case he might still be able to carry over his reputation and client relationships) nor are they limited to measuring a PE firm’s reputation solely on the basis of stock market presence (as this would fail to incorporate the performance in other types of PE exits, such as a secondary sale). Notwithstanding the above reasoning, the difference in measurement might still limit this paper’s comparability.

Next to the issues of analyst coverage and certification theory, it would be interesting to investigate the impact of PE firm reputation in other areas of finance. Daniels and Vijayakumar (2007) find that underwriter certification also serves to reduce information asymmetries in the bond market, and scholars ought to find out whether the same effect holds for PE firm reputation. Further research should also expand on the work of Krishnan et al. (2009) and Levis (2011) and explore the effect of PE firm reputation on long-term performance using a reputation measure identical to the one used in this research.

6. CONCLUSION

The impact of private equity firm reputation is a rather unexplored area of research in the context of IPO underpricing. In particular, this paper investigates whether the reputation of the lead backing PE firm affects (lock-up) returns of the issues.

Using a sample of 470 IPOs listed between January 2011 and December 2014, I find no evidence that PE backed IPOs are less underpriced than their non-backed counterparts. This suggests that PE backing as such is no longer a certifying factor of firm quality (Megginson and Weiss, 1991). Within the sub-sample of 370 PE backed IPOs, I test the effect of PE firm reputation using multiple proxies. The results show that issuers backed by more reputable PE firms are characterized by *lower* initial returns. I also test whether PE reputation affects longer-term underpricing, looking at the returns to lock-up period expiration. The evidence indicates that, contrary to my prediction, PE firm reputation is *negatively* related to returns to lock-up expiration. Both of these findings are inconsistent with the more recently developed analyst lust hypothesis (Liu and Ritter, 2011) but instead suggest a shift to PE firm reputation as certification for – and indication of – firm quality.

The key findings of this research have implications for the decision-making of firms seeking private equity funding, and also elicit further investigation directed at the role of PE firm reputation on long-term performance measures and in different areas of finance.

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8. APPENDIX

A. Summary Firm and Offering Characteristics for VC Backed and Buyout Backed IPOs

Note. This table provides summary descriptive statistics for the filtered sub-sample of 390 PE backed IPOs listed on the NASDAQ or NYSE between January 2011 and December 2014. Panel A and B display descriptive statistics for the sub-sample of buyout capital backed and venture capital backed IPOs respectively. The initial return is calculated as the percent return between the first-day closing price and the offer price. Return to lock-up is the percent return between the 180-day closing price and the offer price, adjusted for market fluctuations. Funds raised, funds size and capital under management are the total for the five years prior to the issue. Firm age is measured as the years between inception and listing date. Lead underwriter Carter Manaster ranking is the ranking during the period 2010-2011 or 2012-2014 depending on the year of issue. Issue proceeds is the value raised in the offering. Pre-IPO assets are the total assets before the IPO. Pre-IPO ROA is calculated as EBIT over assets before the IPO.

Panel A: Buyout Capital Backed IPOs (N=162)

Variable	Mean	Median	Std. dev.	Minimum	Maximum
Initial Return (percent)	17.35	8.75	26.26	-21.35	119.67
Return to Lock-up (percent)	20.06	17.45	43.93	-73.43	165.73
Funds Raised (\$ million)	10,601.26	3,934.00	15,697.90	39.95	67,275.42
Funds Size (\$ million)	14,470.82	4,100.00	23,033.84	40.00	107,619.93
Capital Under Management (\$ million)	22,367.44	8,000.00	2,806.55	110.00	99,128.00
Lead Underwriter Carter Manaster Ranking	8.68	9.00	0.72	3.00	9.00
Issue Proceeds (\$ million)	512.47	199.45	1,355.62	12.00	16,006.88
Age (years)	7.20	5.80	9.20	0.18	91.66
Pre-IPO Assets (\$ million)	3,201.81	581.14	12,631.05	3.09	151,167.00
Pre-IPO ROA (percent)	-26.86	5.19	402.18	-528.02	50.14
Offer price (\$)	16.97	17.00	5.94	5.00	44.00

Panel B: Venture Capital Backed IPOs (N=245)

Variable	Mean	Median	Std. dev.	Minimum	Maximum
Initial Return (percent)	22.45***	16.11	29.88	-21.35	119.67
Return to Lock-up (percent)	28.10*	16.22	60.98	-73.43	201.52
Funds Raised (\$ million)	1,840.20***	634.05	3,719.59	5.00	29,245.87
Funds Size (\$ million)	2,113.29***	679.00	4,465.35	12.28	37,114.20
Capital Under Management (\$ million)	6,601.88***	2,400.00	14,329.29	12.78	99,128.00
Lead Underwriter Carter Manaster Ranking	8.39*	9.00	1.19	3.00	9.00
Issue Proceeds (\$ million)	195.27***	92.00	1,029.18	10.00	16,006.88
Age (years)	7.70***	7.10	3.97	0.30	27.31
Pre-IPO Assets (\$ million)	133.71***	51.61	455.49	0.12	6,331.00
Pre-IPO ROA (percent)	-66.81	-27.03	187.70	-1,725.86	103.64
Offer Price (\$)	13.95***	13.00	5.80	4.00	45.00

*, **, *** denote significant differences between the means of the sub-samples at the 0.1, 0.05 and 0.01 level respectively.

B. Regression Results Prior to Winsorizing Initial Returns and Returns to Lock-Up

Note. This table reports the regression results for the sample of 470 IPOs listed on the NASDAQ or NYSE between January 2011 and December 2014, before winsorizing initial returns and returns to lock-up. Variables are defined in Table I. The subsample of PE backed firms comprises 390 IPOs. The dependent variables in the regressions are first-day returns for Columns 1-4 and returns to lock-up period for Columns 5-7, both expressed in percentages. For brevity, correlation coefficients are omitted for year and industry dummies. The t-statistics are in parentheses.

	<i>All IPOs</i>			<i>PE Backed IPOs</i>			
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Constant	.402 (.034)	9.666 (.472)	10.615 (.523)	12.532 (.628)	-43.490 (-1.333)	-37.833 (-1.167)	-40.099 (-1.241)
PE Dummy	7.715* (1.850)	-	-	-	-	-	-
VC Dummy	-	2.743 (.572)	1.892 (.396)	2.989 (.647)	8.765 (1.010)	6.988 (.807)	9.350 (1.115)
Log (Funds Raised)	-	-2.456*** (-2.359)	-	-	-2.920 (-1.545)	-	-
Log (Funds Size)	-	-	-3.112*** (-2.731)	-	-	-4.616** (-2.233)	-
Log (CUM)	-	-	-	-2.926*** (-2.636)	-	-	-2.895 (-1.434)
Underwriter Rank	2.182* (1.757)	2.769 (1.489)	2.830 (1.538)	2.888 (1.602)	10.782*** (3.264)	10.969*** (3.358)	10.861*** (3.382)
Log (Proceeds)	4.026** (2.129)	6.129** (2.420)	6.382** (2.541)	5.843** (2.411)	-5.794 (-1.271)	-5.016 (-1.111)	-6.354 (-1.455)
Log (1+Age)	1.046 (.494)	.019 (.007)	.160 (.057)	-.241 (-.088)	-5.887 (-1.144)	-5.659 (-1.112)	-6.158 (-1.233)
Log (Assets)	-2.911*** (-2.875)	-2.881** (-2.011)	-2.670* (-1.874)	-2.566* (-1.831)	-.114 (-.044)	.287 (.111)	.135 (.053)
ROA	.006 (1.382)	.022* (1.759)	.022* (1.804)	.020 (1.649)	.021 (.911)	.021 (.932)	.019 (.854)
SEO Dummy	4.510 (1.503)	5.938 (1.596)	6.660* (1.800)	6.441* (1.782)	45.561*** (6.741)	46.730*** (6.959)	45.999*** (6.991)
NASDAQ Dummy	4.473 (1.401)	4.826 (1.234)	5.135 (1.327)	5.616 (1.481)	1.311 (.185)	1.711 (.244)	2.126 (.308)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R ²	.091	.087	.093	.092	.174	.181	.175
No. of Observations	460	345	350	366	345	350	366

*, **, *** mark significance at the 0.1, 0.05, and 0.01 level respectively.

C. Regression Results for the Sub-Samples of VC Backed and Buyout Backed IPOs

Note. This table reports the regression results for the sub-sample of 390 PE backed IPOs listed on the NASDAQ or NYSE between January 2011 and December 2014. Variables are defined in Table I. Panel A and B describe the results for the sub-samples of buyout capital backed and venture capital backed IPOs respectively. The dependent variables in the regressions are first-day returns for Columns 1-3 and returns to lock-up period for Columns 4-6, both expressed in percentages. For brevity, correlation coefficients are omitted for year and industry dummies. The t-statistics are in parentheses.

<i>Panel A: Buyout Capital Backed IPOs (N=162)</i>						
	[1]	[2]	[3]	[4]	[5]	[6]
Constant	-18.881 (-.650)	-17.141 (-.594)	-16.310 (-.571)	-36.719 (-.822)	-35.765 (-.803)	-31.259 (-.711)
Log (Funds Raised)	-1.960 (-1.307)	-	-	-.811 (-.367)	-	-
Log (Funds Size)	-	-2.335 (-1.535)	-	-	-.975 (-.433)	-

Log (CUM)	-	-	-2.548 (-1.608)	-	-	-2.501 (-1.075)
Underwriter Rank	6.557* (1.932)	6.516* (1.940)	6.913** (2.071)	8.341 (1.615)	8.300 (1.619)	8.686 (1.715)
Log (Proceeds)	-1.737 (-.610)	-1.541 (-.548)	-1.573 (-.570)	-9.101** (-2.156)	-9.007** (-2.156)	-8.077* (-1.978)
Log (1+Age)	4.627 (1.367)	4.610 (1.376)	4.038 (1.205)	6.947 (1.372)	6.942 (1.382)	6.184 (1.234)
Log (Assets)	-2.373 (-1.617)	-2.232 (-1.524)	-2.175 (-1.496)	-1.352 (-.610)	-1.297 (-.586)	-.956 (-.436)
ROA	.063 (1.197)	.066 (1.260)	.060 (1.160)	-.092 (-1.174)	-.091 (-1.171)	-.093 (-1.217)
SEO Dummy	8.892* (1.739)	9.511* (1.865)	9.262* (1.845)	42.878*** (5.584)	43.139*** (5.623)	43.459*** (5.771)
NASDAQ Dummy	6.200 (1.294)	6.225 (1.312)	6.855 (1.458)	5.484 (.776)	5.495 (.783)	6.115 (.882)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R ²	.073	.079	.082	.260	.262	.268
No. of Observations	147	149	152	147	149	152

Panel B: Venture Capital Backed IPOs (N=245)

	[1]	[2]	[3]	[4]	[5]	[6]
Constant	-24.387 (-1.103)	-24.218 (-1.096)	-22.073 (-1.001)	-15.999 (-.363)	-7.688 (-.175)	-13.435 (-.306)
Log (Funds Raised)	-1.061 (-.815)	-	-	-3.441 (-1.328)	-	-
Log (Funds Size)	-	-1.012 (-.687)	-	-	-5.581 (-1.912)*	-
Log (CUM)	-	-	-1.090 (-.773)	-	-	-2.737 (-.982)
Underwriter Rank	-1.052 (-.502)	-1.090 (-.526)	-1.021 (-.505)	10.500*** (2.626)	10.815*** (2.743)	10.432*** (2.699)
Log (Proceeds)	16.306*** (4.366)	16.251** (4.394)	15.978*** (4.465)	-8.890 (-1.193)	-8.733 (-1.190)	-9.910 (-1.530)
Log (1+Age)	-1.859 (-.454)	-1.868 (-.461)	-2.003 (-.511)	-17.467** (-2.166)	-17.138** (-2.155)	-17.873** (-2.305)
Log (Assets)	-2.577 (-1.013)	-2.539 (-1.005)	-2.459 (-1.000)	5.175 (1.010)	5.608 (1.108)	5.537 (1.114)
ROA	.023 (1.592)	.023 (1.631)	.022 (1.599)	.002 (.082)	.002 (.084)	.001 (.031)
SEO Dummy	3.692 (.847)	3.867 (.893)	4.026 (.955)	48.231*** (5.523)	49.501*** (5.723)	48.755*** (5.765)
NASDAQ Dummy	1.496 (.301)	1.625 (.331)	1.868 (.392)	2.119 (.208)	2.574 (.257)	2.771 (.283)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R ²	.143	.143	.146	.198	.206	.198
No. of Observations	213	217	230	213	217	230

*, **, *** mark significance at the 0.1, 0.05, and 0.01 level respectively.