

The Role of Venture Capital Backing in the Underpricing and Long-Run Performance of Chinese IPOs*

ERIC ABRAHAMSSON[†] and JONATHAN JOHANSSON[‡]

Stockholm School of Economics

Master Thesis in Finance

Spring 2017

ABSTRACT

We investigate the role of venture capital (VC) backing in the underpricing and long-run performance of initial public offerings (IPOs) in China from 2004 to 2012. China provides a unique contextual setting for conducting such an examination with a regulatory framework in the going public process vastly different from its western peers. The government decides on which companies that are allowed to go public, has the last word in the pricing of IPO shares, and controls the timing of IPOs. Reforms introduced in 2009 has improved the pricing of IPO shares and enhanced venture capitalists ability to exit their investments through IPOs in mainland China. We find that VC backed IPOs experience significantly lower first-day returns than comparable non-VC backed IPOs in the period from 2010 to 2012, with an average return difference of 6.67%. Our results are robust when accounting for differences in offering and firm characteristics, and thus, we provide support for the venture capitalist certification hypothesis proposed by Megginson and Weiss (1991), in which, venture capitalists reduce the information asymmetry between investors and issuing firms by certifying the offering price, and thus, reduce first-day returns. We further show that VC backed IPOs significantly outperform non-VC backed IPOs in the 36-month period following the IPO, and hence, our results provide evidence of venture capitalists adding value to their portfolio companies post-IPO as well. Our findings suggest that the importance of venture capitalists increases as the IPO market becomes more market-oriented and conforms towards the standards found in developed countries. We complement previous studies conducted in developed markets by providing evidence that venture capitalists involvement also matter in emerging markets with more stringent regulatory restrictions.

WITH A SEVEN-FOLD GROWTH in the value of venture capital (VC) investment between 2010 and 2015, China now accounts for more than three times the VC investment of all European countries combined, and is only surpassed by the US in terms of the volume and value of VC deals. In this paper, we examine the role of VC backing in the underpricing and long-run performance of initial public offerings (IPOs) in China. While the topic has been thoroughly investigated in developed

*We would like to thank our tutor Ramin Baghai for the insightful and constructive comments during the development of this thesis.

[†]22733@student.hhs.se

[‡]22734@student.hhs.se

markets, emerging markets in general, and China in particular, has not received its warranted attention. Literature investigating VC backed IPOs in developed markets have generated mixed results. On the one hand, the presence of VC backing lowers underpricing as venture capitalists reduce the information asymmetry inherent in IPOs. On the other hand, venture capitalists may have an incentive to excessively underprice the issues of their portfolio companies in order to alleviate future fundraising. However, the going public process in China clearly differentiates its IPO market from those found in Anglo-American countries, necessitating an extension to the extant literature within the field. The government decides on which companies that are allowed to go public and has a considerable influence over the pricing and timing of IPOs. Reforms including relaxed listing requirements and a more market-oriented IPO pricing and approval process has positively affected venture capitalists ability to exit their portfolio companies via domestic IPOs in recent years, but still, the going public process in China is characterized by government interventions. Post-IPO, the superior long-run performance of VC backed IPOs is often attributed to the monitoring role of venture capitalists. The less developed disclosure rules for listed companies in China can be argued to make the venture capitalists monitoring services even more valuable to investors in the secondary market. This paper fills a void in the current literature by providing evidence of venture capitalists significant role in reducing first-day returns and improving long-run performance in the world's largest emerging market in which the regulatory environment is constantly evolving.

In the literature, the terms underpricing and first-day returns are used interchangeably to reflect the relative change from the offer price of an IPO to its closing price on the first day of public trading. Loughran et al. (1994, updated in 2016) show that IPO underpricing has been a persisting phenomenon in 52 countries around the globe. The underpricing levels in China stand out in comparison to those of developed markets. Since the stock market's inception in the early 1990s, the average first-day return of newly listed issues has been a staggering 114%, a level considerably higher than in any of the major world markets. Papers examining IPO underpricing in China confirm that the first-day returns are extraordinarily high, with average levels ranging from 123% to 462%, depending on the time period under investigation.¹ Most literature argue that IPO underpricing is an effect of asymmetric information, mainly prevalent between the issuer and the investors. Rational investors fear a lemons problem when issuers are better informed than investors, and high-quality issuers may attempt to signal their superiority by leaving money on the table in the IPO, deterring low-quality issuers from imitating.

One of the earliest efforts in investigating the role of VC backing in the context of IPO underpricing was made by Megginson and Weiss (1991). By matching US VC backed IPOs to non-VC backed IPOs from 1983 to 1987 on industry and offering size, they provide evidence of VC backed IPOs being less underpriced than their non-VC backed counterparts. They argue that venture capitalists certify the value of the issuing firms, and thus reduce the information asymmetry between investors and issuing firms. Their argument depends on venture capitalists having a reputational capital at stake that would be forfeited if they overprice a new issue, but in order to secure future

¹See for example Chang et al., 2008 and Tian, 2011.

deal flow of promising firms they cannot underprice an issue too excessively either. Conflicting findings are put forth by Lee and Wahal (2004), who find that US VC backed IPOs from 1980 to 2000 are more underpriced than comparable non-VC backed IPOs. Their argument is in line with the grandstanding hypothesis proposed by Gompers (1996), in that, higher underpricing leads to larger flows of capital into subsequent funds raised by venture capitalists. Therefore, venture capitalists may have an incentive to underprice the issues of their portfolio companies as this reduces their effort in future fundraising activities.

In a perfect world, one would want to observe the underpricing of a VC backed IPO and the underpricing of that same IPO had it not received VC funding. Given the nonexperimental nature of the data, all we can observe is the underpricing of a VC backed IPO and the underpricing of a non-VC backed IPO. To isolate the effect of VC backing, we employ a modified matching procedure to that of Lee and Wahal (2004). We match each of the 297 VC backed IPOs in our sample on the basis of industry and closest in offering size to a non-VC backed IPO that has taken place within 12 months of the VC backed IPO. During our full sample period, our results show that VC backed IPOs are less underpriced than non-VC backed IPOs with a statistically significant average first-day return difference of 5.12%. Dividing our sample into two subperiods, we find that the difference in underpricing is driven by the comparatively lower underpricing of VC backed IPOs from 2010 to 2012, the period in which 90% of our sample of VC backed IPOs has taken place. In this latter period, the average return difference is 6.67%, statistically significant at the 1% level. In mid-2009, a book-building reform was implemented into the IPO pricing process, letting market forces decide on issue prices to a larger extent than before when the government essentially determined the offer price of an IPO. Even when accounting for differences in offering and firm characteristics, our results are robust, thus we provide evidence of venture capitalists, as third-party investors, are able to certify the value of the IPO in the post-reform period from 2010 to 2012. Our finding that venture capitalists are able to attract more reputational underwriters is further support for the certification hypothesis.

The long-run performance of IPOs is another topic closely related to the literature on underpricing, with most papers finding that IPOs tend to underperform non-issuing firms, regardless of benchmark used.² Brav and Gompers (1997) examine whether the presence of a VC investor affect the aftermarket performance of IPOs, finding that VC backed IPOs outperform non-VC backed IPOs in the five years following the offering. The outperformance of VC backed IPOs is often attributed to venture capitalists monitoring role and the existence of better management teams in VC backed firms. The Chinese evidence is sparse, but Liu et al. (2013) find that the presence of a VC/PE³ investor has no significant impact on the post-IPO performance.

To examine the long-run performance of VC backed IPOs, we compute the differences in buy-and-hold abnormal returns (BHARs) and cumulative abnormal returns (CARs) between VC and non-VC backed IPOs up to three-year post-IPO event window. The BHARs and CARs for each

²See for example Ritter (1991) and Loughran and Ritter (1995).

³However, Liu et al (2013) do not make a distinction between whether an issue is private equity or venture capital backed, instead they pool the two investor types together.

of the two IPO types are adjusted by three benchmarks, a broad Chinese equity index⁴, self-constructed size and book-to-market portfolios, and self-constructed Fama-French industry portfolios. Our results show that VC backed IPOs significantly outperform their non-VC counterparts in the 36-month period following the IPO. Our findings suggest that venture capitalists invest in better performing firms and that they add value to their portfolio companies post-IPO, e.g. by monitoring their portfolio companies and their ability to hire superior management teams.

It is only in recent time that an examination of venture capitalists role in the underpricing and long-run performance of IPOs has been possible to carry out in China. It was not until the turn of the millennium that VC investments would become a vital source of capital for promising young Chinese companies. Fast forward to 2015, and Chinese companies raised a total of \$49 billion through 1,635 VC deals, with three out of the top five global VC deals being made in China⁵. The formation of the board for growth enterprises in 2009, with relaxed listing requirements compared to that of the other stock exchanges has further enabled VC exits through domestic IPOs rather than overseas listings. As a result of the relaxed listing requirements, in combination with the book-building pricing process introduced in mid-2009, we see that the number of VC backed IPOs drastically increase in this year, coming from very modest levels previously, to accounting for more than 50% of the IPOs in 2012. Further, with less developed disclosure rules for listed firms and a regulatory framework in the going public process vastly different from the US-influenced stock markets found in most developed countries, the role of venture capitalists in reducing information asymmetry can be argued to be even greater. China Securities Regulatory Commission (CSRC), the Chinese equivalent to the Securities and Exchange Commission (SEC) in the US, has complete discretion over the IPO process. As opposed to the IPO process in the US, in which the SEC focus on the accuracy and truthfulness of the information disclosed by IPO applicants, all firms wishing to go public in China are subject to CSRC's approval in order to progress with an IPO. Additionally, CSRC determines the number of shares issued, sets the offer price, and ultimately controls the timing of the IPO. While several reforms have been introduced to make the going public process more market-oriented, the essential feature of the system still prevails, in that, it remains under strict control of the government through CSRC. Previous studies (Liu et al., 2013; Li and Zhou, 2015) suggest that venture capitalists do not only contribute with the functions normally associated with them, but that the presence of VC backing also improves the probability of receiving IPO approval in addition to receiving favorable treatment in regards to the pricing of the issue.

This paper is organized as follows. In Section I, a brief overview of the venture capital industry in China, China's stock market, and the regulatory framework in the going public process is provided. Section II provides a review of the previous literature within the field. In Section III, the sample selection is defined. In Section IV, the methodology of our study is explained. Section V presents descriptive statistics on the Chinese IPO market. In Section VI, the results from our tests are presented along with an analysis of those results. Section VII concludes the paper.

⁴The equity index employed is the MSCI China, further specified in Section III of this paper.

⁵EY (2016)

I. Institutional Background

A. *The Development of China's Venture Capital Industry*

In contrast to the US market, China has had a much shorter history of venture capital. The concept was officially introduced in 1985 in the central government's "Decision to Reform the Science and Technology System", and the first VC firm was established the same year. However, it would take an additional 15 years for the VC industry in China to become a dominant force in the global VC landscape, both in terms of deal size and number of deals. During the five-year period between 2010 and 2015, VC investment in China grew from \$7 billion in 2010 to \$49 billion in 2015, while US, the largest VC market, only doubled in size during the same period. Even though the US still dominates the global VC landscape, China's growing significance compared to the US and Europe has become evident. Nonetheless, although the Chinese VC industry has become a dominant force on the global market in terms of investees, the top VC investors in China are foreign VC funds.⁶

The VC cycle in China is not considerably different from those in traditional VC markets. The funds are usually organized as a limited partnerships, where investors serves as limited partners and venture capitalists as general partners. What has historically separated the Chinese VC market from the Anglo-American VC markets has been the limitations of exiting investments via domestic IPOs. This has been partially driven by a heavily regulated Chinese capital market, substantive requirements to receive IPO approval, and an inefficient listing process. The following section presents a brief overview of the development of the capital markets in China and its effect on venture capitalists exit opportunities.

B. *China's Stock Market - Characteristics and Listing Requirements*

China established its two primary stock exchanges, the Shanghai Stock Exchange (SSE) and the Shenzhen Stock Exchange (SZSE), in 1990 and 1991 respectively. This was a significant landmark in the country's transformation from a centrally-planned to market-based economy, a transition that had been initiated by the economic reforms in 1978. In 2004, a board for small- and medium-sized companies (SME) was opened on the SZSE, and then in 2009, a market geared towards growth enterprises (officially named "ChiNext") was also created on the SZSE. Since the inception of China's capital markets, the development has been astonishing. In terms of total stock market capitalization, China is now the second biggest public equity market in the world, with the number of listed companies exceeding 3,000.

In contrast to the Anglo-American exchanges, the listing requirements on the two primary stock exchanges, the SSE and the SZSE, are substantially higher, with strict cash flow, revenue and profit requirements. This has resulted in these two exchanges being more oriented towards larger

⁶EY (2016); 1st: Sequoia Capital, 2nd: IDG Capital Partners and 3rd: Matrix Partners.

state-owned enterprises (SOEs), while smaller privately-owned enterprises (POEs) previously have preferred to list overseas, for example in Hong Kong, Singapore and the US. The establishment of the SME and the ChiNext was a measure to entice more POEs to list domestically, relaxing some of the listing requirements present on the two main boards. Especially, the creation of the ChiNext, which still has some profitability requirements but no minimum cash flow requirement, contributed to more POEs, with and without VC backing, to list domestically rather than overseas. In 2008, the lock-up period for investors in an IPO was reduced from three years to one year, further enticing venture capitalists to list their portfolio companies in mainland China.

C. Regulatory Framework in the Going Public Process

The specific rules and regulations regarding new share issuance in China have been frequently revised over the nearly three decade existence of the domestic stock markets. However, the fundamental feature of China’s going public process has remained largely unchanged, in that, it remains under close control of the government. In the early stages of the stock market development, various Chinese authorities played dominant roles in the IPO process. In 1998, the regulatory authorities were consolidated into China Securities Regulatory Commission (CSRC), which is essentially a ministry of the central government. In the US, the review of IPO applicants by the Securities and Exchange Commission (SEC) focuses on the completeness, accuracy and truthfulness of the information disclosed by the applicant firms. This is in stark contrast to how the CSRC operates in China, which performs multiple reviews of each applicant firm, e.g. by evaluating the soundness of their financial performance, their corporate governance systems, and their law-compliance records. Ultimately, CSRC decides on whether or not to approve the applicant firms for an IPO, and also formally decides on the issue price, the number of shares issued and the timing of the IPO. A stream of literature investigating the regulatory environment regarding the IPO approval and IPO pricing process in China has followed in its gradual development. Liu et al. (2013) find that VC and private equity (PE) backed firms have an increased possibility of receiving IPO approval, and Li and Zhou (2015) provide evidence that the presence of VC/PE investors in a company filing for IPO receives favorable treatment in the IPO pricing process by being able to influence CSRC’s eventual decision on the issue price.

Originally, a fixed price-to-earnings (P/E) ratio method was used to determine the offer price of an IPO. That is, the offering price was required to be the product of net earnings per share and multiplier determined by CSRC. In different periods, this multiplier has had a ceiling of 15 to 20 times earnings (Tian, 2011), which sets a pricing cap on IPO shares. The issue was that the determined P/E ratio ignored industry differences and prevailing market conditions, thus vastly different P/E ratios for comparable companies could be observed in the secondary market, resulting in high first-day returns (Cheung et al., 2009). Since then, several rounds of market-oriented reforms on the IPO pricing process has been implemented. In mid-2009, CSRC implemented book-building into the IPO pricing process, with the intent of letting market forces determine issue prices. The book-building method allows underwriters to seek bids from institutional investors, and the final

negotiated price determines the offer price. In reality though, numerous cases have shown that CSRC still has an influence over the pricing of IPO shares⁷.

The CSRC also has complete discretion over the supply of IPO shares. In the early development of the stock market, the government had a quota system installed, under which CSRC determined the total quota for new share issuance on an annual basis. Each province received its rationed IPO quota, and identified suitable candidates from those firms that had applied for an IPO. However, these IPO candidates still needed to receive approval from the regional security regulator, the stock exchange and CSRC. In 2004, a sponsor system was introduced, in which investment banks recommend its client firms, which are then evaluated by CSRC, and if approved, can progress with an IPO.

While the sponsor system, which is still in place, is a further step towards a more market-oriented listing process, the conditional IPO approval by the CSRC means that the government still intervenes in firms' access to the IPO market. The numerous freezes on IPOs that CSRC has imposed during turbulent market periods is further evidence of their control of the share issuance process. For example, in June 2009 CSRC reopened the IPO market after it had been closed for 8 months, and in January 2014 CSRC ended a 14-month moratorium on domestic IPOs⁸. Following the reopening of the IPO market in 2014, a limit on first-day returns was adopted as part of the CSRC's new trading reforms. The new pricing guidelines has, however, incentivized companies to announce a relatively lower offer price in order to increase the probability of receiving IPO approval. This has consequently led to firms almost invariably experiencing first-day returns of 44%, which is the regulatory limit for how much the price can appreciate on the first day of trading.

The lengthy evaluation of IPO applicants by CSRC has also created a huge backlog of firms wishing to go public (and that satisfies the listing requirements) but which are queuing to go through the IPO approval process. In 2016, this backlog was estimated to be nearly 900 companies.⁹ Official statements in both 2015 and 2016 has suggested that China is moving towards a US-style registration-based IPO system, in which the tasks of CSRC would be more in line with what the SEC does, focusing on the information disclosed by the applicant firms, letting the capital markets decide on the issue price and share issuance volume. However, the new system was likely to come with "Chinese characteristics".¹⁰

II. Literature Review

A. *IPO Underpricing*

The widespread evidence of IPO underpricing is evident by the large body of literature investigating the phenomena. For example, by compiling the results from several research papers, Loughran et

⁷Bloomberg News (2016)

⁸Bloomberg News (2013)

⁹Hong (2016)

¹⁰Yu (2015)

al. (1994, updated in 2016) document evidence of underpricing in 52 countries, with developing markets exhibiting larger levels of average underpricing than developed markets. The results from papers examining underpricing in the Chinese market confirm the view of Chinese IPOs being substantially more underpriced than their Anglo-American peers. For example, Mok and Hui (1998) report that the average underpricing is 462% by examining 101 IPOs from 1990 to 1993 and Su and Fleisher (1999) find that the median underpricing of 308 IPOs from 1987 to 1995 is 231%. Chang et al. (2008) report average first-day returns of 123% examining 891 IPOs from 1996 to 2004, while Tian (2011) report average first-day returns of 247% examining 1,377 IPOs from 1992 to 2004.

Among the explanations offered for underpricing, theories on information asymmetry between the issuing firms and investors represent the bulk. When issuers are better informed than investors, rational investors fear a lemons problem: only issuers with worse-than-average quality offerings are those willing to offer their shares at an "average" price. In order for high-quality issuers to signal their superiority to low-quality issuers, they set an offer price below what the capital markets value them at, deterring low-quality issuers from imitating. Post-IPO, these high-quality issuers can recoup the value they forwent at the IPO, for example through new equity issuances (Welch, 1989), favorable market reactions to dividend announcements (Allen and Faulhaber, 1989), or analyst coverage (Chemmanur, 1993). Beatty and Ritter (1986) argue that even though IPOs on average are underpriced, an investor cannot be certain of the offering value since the price might decline once it starts trading and more information about the firm is revealed. They coin the term "ex ante uncertainty" to reflect the investor's uncertainty regarding the value of the offering. They argue that the greater the "ex ante uncertainty" is regarding the offering value, the greater the expected underpricing is.

The theories aiming to explain the severe underpricing levels observed in the Chinese market are plentiful. Su and Fleisher's (1999) argument is in line with Welch (1989), in which issuers signals their value through underpricing, and then recoups their up-front sacrifice through seasoned equity offerings. Chang et al. (2008) argue that investors know less about IPO shares than already traded stocks, and that IPO shares are subject to higher risks, hence underpricing is expected, which is similar to the argument made by Beatty and Ritter (1986). Tian (2011) is the first to formally articulate that the specific institutional setting of the Chinese primary market could explain the severe underpricing that has been observed. During his sample period from 1992 to 2004, he finds that the extreme underpricing in China is principally caused by government intervention through IPO pricing regulations and the control of IPO share supply. The government's discretion over which companies that are allowed to be listed restricts the supply of IPO shares, and pricing caps sets an offer price which is too low, creating a demand gap that leads to excessive buying of shares on the first day of public trading. He finds empirical evidence of these regulations accounting for more than half of the massive underpricing observed in China.

B. The Role of Venture Capital Backing in IPO Underpricing

Another body of literature closely connected to IPO underpricing is the literature seeking to disseminate the effect on underpricing based on whether a company has received venture capital funding previous to the IPO or not. The pioneering papers examining the role of VC backing in the underpricing of IPOs were made by Megginson and Weiss (1991) and Barry et al. (1990). By matching VC backed IPOs to non-VC backed IPOs on industry and closest in offering size, Megginson and Weiss (1991) find that VC backed IPOs exhibit lower underpricing than their non-sponsored counterparts using a sample of US IPOs between 1983 and 1987. The authors argue that their results are consistent with the certification hypothesis presented in Booth and Smith (1986), in which venture capitalists reduce information asymmetry between investors and issuing firms, thereby certifying the offering value of the issuing firms. Their argument builds on the notion that venture capitalists have a reputational capital at stake that would be forfeited if they overprice a new issue, since that would deteriorate their relationship with institutional investors. The reputational capital of venture capitalists must be worth more than the one-time benefit they would receive by overpricing an issue. Since most venture capitalists return to the IPO market with new portfolio companies, this is almost always the case. However, in order to secure future deal flow of promising young companies, they cannot underprice an issue too excessively either as this is a direct cost to the issuing firm. By examining US IPOs between 1978 and 1987, Barry et al. (1990) find that the ownership stake of the venture capitalist, the length of board service, and the number of venture capitalists invested in the pre-IPO firm is negatively correlated with IPO underpricing. Thus, Barry et al. (1990) conclude that the monitoring role of venture capitalists is recognized by the capital markets through lower underpricing. Gompers and Lerner (1997) show that the differences in underpricing between VC backed and non-VC backed IPOs are sensitive to the methodology employed and the estimation period.

One of the more recent papers within the field by Lee and Wahal (2004) matches VC backed IPOs using a modified methodology to that of Megginson and Weiss (1991) as they additionally require the non-VC backed IPO take place within two years of the VC backed IPO. Using US IPO data from 1980 to 2000, they find opposite results to those of the aforementioned papers, namely that VC backed IPOs experience higher underpricing than comparable non-VC backed IPOs. Consistent with the findings of Gompers (1996) who proposed the grandstanding hypothesis, Lee and Wahal (2004) show that higher underpricing leads to larger flows of capital into subsequent VC funds. Thus, venture capitalists have an incentive to underprice the offerings of their portfolio companies in order to raise follow-on funds. Evidence from Gompers (1996) suggests that companies backed by young venture capitalists are taken public earlier and are more underpriced at their IPOs than those of established venture capitalists. Younger venture capitalists have an incentive to perform early IPOs of their portfolio companies in order to establish a track record and raise new capital whereas older venture capitalists with a proven track record can perform IPOs later in the company's life cycle, which on an average leads to lower levels of underpricing.

C. The Long-Run Performance of IPOs

A natural extension to the literature on IPO underpricing is the literature focused on the long-run performance of IPOs. Using several benchmarks, Ritter (1991) finds that US IPOs from 1975 to 1984 significantly underperform a sample of comparable non-issuing firms matched by size and industry. Extending the effort, Loughran and Ritter (1995) document evidence of US IPOs in the period from 1970 to 1990 underperforming non-issuing firms in the five-year period following the IPO. Evidence on the aftermarket performance of IPOs in the Chinese market is sparse, but Chan et al. (2004) find that IPOs from 1993 to 1998 slightly underperform their size-matched, book-to-market-matched, and size and book-to-market-matched portfolios over a three-year period post-IPO.

D. The Role of Venture Capital Backing in the Long-Run Performance of IPOs

Brav and Gompers (1997) are the first to examine whether venture capitalists affect the long-run performance of IPOs. By studying 934 VC backed and 3,407 non-VC backed US IPOs from 1972 to 1992, they find that VC backed IPOs outperform non-VC backed IPOs over a five-year period subsequent to the IPO, but only when returns are weighted equally. To gauge the robustness of their results, they test the performance against broad market indices, Fama-French industry portfolios and matched size and book-to-market portfolios, revealing no qualitative change in their results. Dividing the non-VC backed sample on the basis of size reveals that the underperformance of non-VC backed IPOs is primarily driven by small issues. Often, the superior aftermarket performance of VC backed IPOs is attributed to the existence of better management teams and corporate governance systems in VC backed firms. Krishnan et al. (2011) provide further evidence of more reputational venture capitalists investing in portfolio companies with better aftermarket performance. By examining a sample 1,595 UK IPOs from 1992 to 2005, Levis (2011) shows that there are significant differences across various types of IPOs, based on whether they are PE backed, VC backed or non-sponsored. Levis (2011) finds that the underperformance of his sample of IPOs can be attributed to the poor performance of VC backed and non-sponsored issues, and that PE backed IPOs actually outperform regardless of benchmark used. Liu et al. (2013) examine whether PE/VC backed IPOs out- or underperform non-sponsored issues in the Chinese secondary market between 2004 and 2011, finding no statistically significant differences in the long-run performance of VC/PE backed and non-sponsored IPOs. However, the robustness of Liu et al. (2013) results can be questioned as they only use a market index to adjust their returns, and the fact that they do not make a distinction between whether an issue is PE or VC backed causes their results to be rather incomparable with studies specifically examining VC backed IPOs.

III. Sample Selection

A. Sample Identification and Supplemental Data

The analysis of this paper focuses on IPOs floated in the Chinese market from 2004 to 2012. The lower bound is set due to a limited number of VC backed firms going public prior to 2004. This is primarily due to a less accommodating regulatory environment along with the fact that the only platforms available for listings, the Shenzhen Stock Exchange and the Shanghai Stock Exchange, were oriented towards SOEs. The upper bound was set as a consequence of the 14-month long freeze on domestic IPOs starting in late 2012, as well as CSRC's new trading reform restricting first-day returns in 2014. Following the new trading reform, prospective issuers tend to price their shares cheaply in order to ensure IPO approval, causing first-day returns to nearly exclusively rise by the regulatory limit of 44% (see figure 1). This phenomena appears to affect all IPOs regardless of whether the issuer is VC or non-VC backed (see figure 2), which makes it difficult to asses the influence of VC backing post-2014.

Figure 1. Median Underpricing of IPOs Floated from 2004 to 2016

The figure displays the median first-day returns and IPO activity by year in the mainland Chinese stock market from 2004 to 2016. The bars represent median first-day returns and the connected lines represent the number of IPOs in each year. The graph does not report figures for 2013 due to a freeze on IPOs in that year. The 44% cap on first-day returns came into effect in the beginning of 2014.

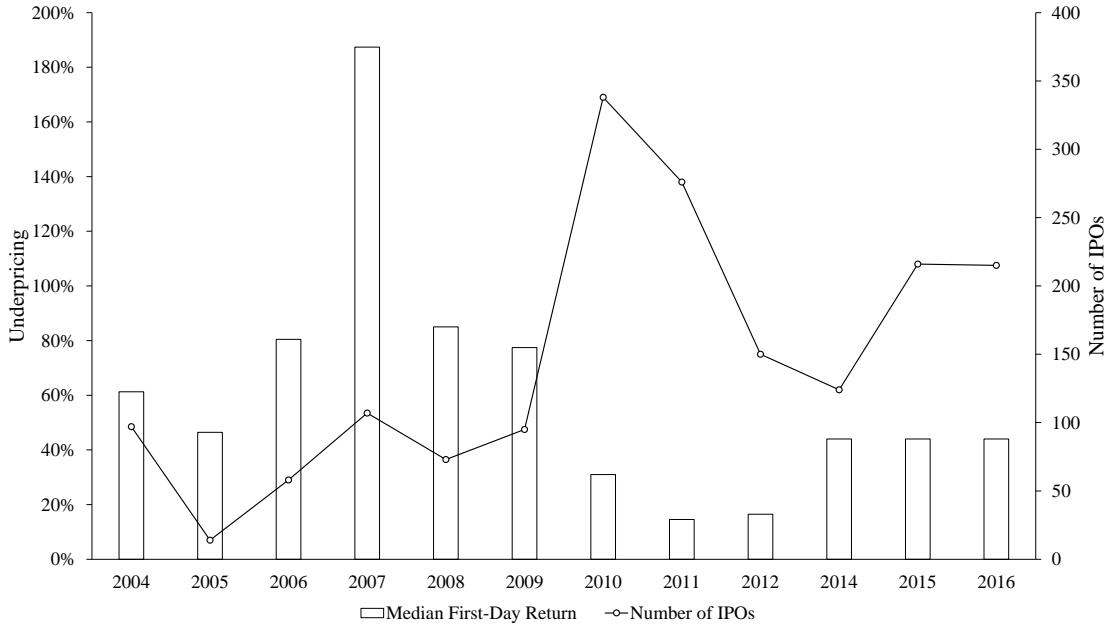
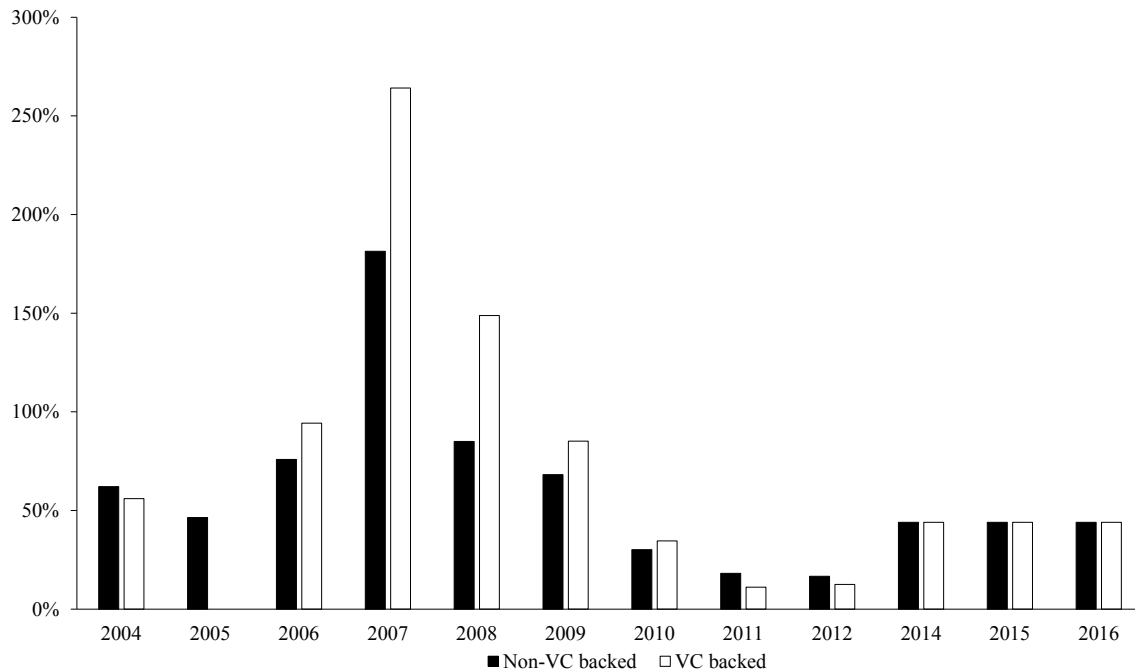


Figure 2. Median Underpricing of IPOs Floated from 2004 to 2016, by IPO Type

The figure displays the median first-day returns for VC and non-VC backed IPOs from 2004 to 2016. The graph does not report figures for 2013 due to a freeze on IPOs in that year. The 44% cap on first-day returns came into effect in the beginning of 2014.



In order to capture the entire stock market of mainland China we include all stock exchanges, i.e. the SSE, the SZSE, the SME, and the ChiNext. We have further narrowed our study to investigating only ordinary domestic individual shares (A shares), which are nearly exclusively available for trading by citizens of the People’s Republic of China. Listings not classified as IPOs are excluded, as well as IPOs of any company active in the insurance or banking sector. Delisted firms are included in order to avoid survivorship bias. The universe of 1208 A-share IPOs is obtained from SDC Platinum. The database provides us with financial data prior to the IPO, offer prices, amounts raised, lead underwriters and a distinction whether the listed firm is VC backed or non-VC backed.

Daily stock prices and market capitalization values are collected from Datastream. Although we evaluate the long-run performance based on monthly returns, daily returns are initially obtained as IPOs occurs on different dates. Daily returns are then compounded up to the end of the first trading month. As for changes in stock price, we measure it in terms of total return index in order to account for the effect of capital gains. In other words, the total return index adjusts for any cash distribution by reinvesting them in the stock, allowing us to evaluate the aftermarket performance from an investor’s point of view. Market capitalization values are obtained for the three consecutive years following the IPO.

Datastream further provides us with market capitalization values and book-to-market ratios for the self-constructed benchmark portfolios, and daily returns for the market index (MSCI China A

Index). Firms that are missing book values of equity are excluded from the portfolios. As for the industry portfolios, we utilize the Fama-French 10 industry classification.

For data compared over longer time periods, such as amount offered, we adjust the observations for inflation. Inflation data is collected from the Organisation for Economic Co-operation and Development (OECD).

B. Data Quality Issues

Although the obtained data from SDC Platinum is comprehensive and nearly complete, some firm and offering specific data is missing for the issuing firms. As for the publicly available information such as ticker and incorporation dates, we managed to fill in the gaps for all observations. Nevertheless, data such as accounting figures prior to the IPO were difficult to obtain. Table A1 presents the data available as a percentage of the total amount of observations. Evident by the reported figures, some variables are missing more observations than others. The number of available book value of equity observations (95.6%) and asset observations (96.1%) are fairly high and should not affect the robustness of our results. The information available on preceding year’s revenue and earnings per share (EPS) on the other hand is a slightly lower with an availability ratio of 70.4%.

Another problem with SDC is that some of the variables such as the amount of money raised and the accounting data are reported in million US dollars rather than CNY, which in turn exposes our dataset to fluctuations in exchange rates. We have therefore gathered daily CNY/USD exchange rates from Datastream to normalize the observations around the exchange rate of the 31st of December 2013.¹¹

As for the self-constructed benchmark portfolios, Datastream does not provide us with a complete set of equity book values for the listed Chinese firms. Nevertheless, it is only a small fraction of the listed firms that are missing equity values (14.3%). Given that one firm alone accounts for a small fraction of the total portfolio value, the aggregated return should not be significantly affected.

IV. Methodology

A. Underpricing

The vast majority of literature within this field attempt to measure the degree of underpricing in terms of first-day returns. In this study, we thus utilize the most common procedure by referring to underpricing as the relative change in closing price of the first trading day to the offer price:

$$\text{Underpricing} = \frac{P_c - P_o}{P_o} \quad (1)$$

Where P_o is the offer price of IPO firm i and P_c is the closing price on the first trading day for IPO firm i .

¹¹The exchange rate were reported to 6.052 CNY/USD at 31th of December in 2013, Datastream

B. Matching and Research Design

As highlighted by Loughran and Ritter (2004), the level of underpricing is varying over time. Other studies have further documented a relationship between firm and offering characteristics to first-day returns (Ritter, 1984; Hogan et al., 2001). In order to measure the relative influence of different IPO types, it is essential that these characteristics are randomly distributed over the sub-samples. With that said, it has been well documented that venture capitalists invest in certain types of firms, and that these have non-conforming characteristics to other IPO types. In fact, Lee and Wahal (2004) document nonrandom distributions and characteristics of VC backed IPOs. In other words, to truly capture the relative influence of VC backing, one would ideally want to compare the level of underpricing for a VC backed firm with itself, as if it was non-VC backed. Such a procedure is however impossible to accomplish given the nonexperimental nature of the data. Previous papers have instead attempted to capture venture capitalists effect in underpricing by matching a single VC backed IPO to non-VC backed IPOs based on the most deviating offering and firm characteristics. The pioneering paper within the field by Megginson and Weiss (1991) matches VC backed IPOs using the first three digits of the SIC code, and as closely as possible on amount of money raised. Later studies have further extended this matching procedure by adding variables to primarily control for the timing of the IPO (Lee and Wahal, 2004). Thus, in this paper, we match a sample of 297 VC backed IPOs with 297 non-VC backed IPOs based on the first two digits of the SIC code and as closely as possible on the offering size. Additionally, the non-VC backed flotation has to have occurred 12 months prior to or after the VC backed IPO. The methodology that we use is supposed to account for the endogenous choices in a matching framework, allowing causal inferences in nonexperimental settings.

As for the differences in underpricing between VC and non-VC backed IPOs, first-day returns are tested using a parametric statistical hypothesis test (Matched pair's t-test) and a nonparametric statistical hypothesis test (Wilcoxon signed rank test). Unlike parametric statistics, nonparametric statistics make no assumptions about the probability distributions, which is an advantage if our sample would display skewness or fatter tails.

Furthermore, as Gompers and Lerner (1997) document that differences in underpricing between VC backed and non-VC backed IPOs are sensitive to the estimation period, we examine underpricing over two sub-periods, one defined as between 2004 and 2009, and the other between 2010 and 2012. The cut-off year roughly coincides with the establishment of the ChiNext. Prior to the opening of the ChiNext, the number of VC backed IPOs were quite modest, and then increased significantly after the launch. Furthermore, CSRC introduced book-building into the IPO pricing process in mid-2009, with the aim of letting market forces determine issue prices. Also, since no new issues occurred during the first half of 2009, using 2010 as the cut-off year avoids the risk of matching a VC backed IPO to a non-VC backed IPO that were listed prior to the pricing reform. The defined sub-periods thus allows us to examine underpricing for VC and non-VC backed IPOs in two periods with different regulatory restrictions.

C. Robustness Issues

We perform a variety of checks to validate that the first-day returns across the IPO types are not driven by our choice of explanatory variables. To validate the matching variables, potential dispersions in additional offering and firm characteristics are tested. Megginson and Weiss (1991), for instance, report significant deviations between their matched samples in terms of amount offered and firm age at the time of their IPOs. Moreover, the authors find differences in the quality of underwriters used, where VC backed firms tend to hire more reputable underwriters. Similar to Megginson and Weiss (1991), we estimate underwriter quality as the fraction of the total amount of money brought to the market. If a deal involves several lead underwriters, the average of the underwriters' market shares is used. A larger market share implies higher underwriter quality.

Furthermore, the Chinese IPO market is quite unique in the sense that there exists an unknown waiting time between the issue date and when the securities ultimately are traded in the secondary market. As this duration has proven to affect underpricing levels, we test whether the waiting time is significantly different between VC and non-VC backed IPOs. In addition to these variables, we further test if the matched samples exhibit nonrandom distributions in their equity-to-assets ratio prior to the IPO, book value of assets, preceding year's revenue and EPS based on the last twelve months prior to the IPO.

Similar to Megginson and Weiss (1991), we also consider an alternative methodology that addresses the endogeneity issue in a regression framework. This is done to make sure that the coefficient of the causal variable of interest does not suffer from an omitted variable bias. The following explanatory variables are therefore included in the regressions:

1.TYPE: We include a dummy variable which determines whether the IPO is VC backed or not (1 if it is VC backed and 0 if it is non-VC backed).

2.LOGAMT: The log of the amount offered is included as previous studies have documented a significant relationship between offering size and initial returns (Ritter 1984; Hogan et al., 2001). Since the offering amount on average is higher for VC backed IPOs, controlling for size enables us to examine the effect of VC backing.

3. MKTSHR: Market share of underwriters is controlled for to separate the effect of VC backing and the influence of high quality underwriters. As documented by Megginson and Weiss (1991), there is a significant relationship between higher underwriter quality and lower underpricing, indicating that underwriters provide some level of certification to the issue. Su and Brookfield (2013) further verify that this relationship exists in the Chinese IPO market. We therefore want to examine if more reputable underwriters reduce information asymmetry.

This gives an OLS regression of first-day returns against whether or not the IPO is VC backed (TYPE), the log of the amount offered (LOGAMT), and the average market share of the lead

underwriter (MKTSHR) for the matched sample of 297 VC backed IPOs and 297 non-VC backed IPOs:

$$R_1 = \alpha_0 + \alpha_1 TYPE + \alpha_2 LOGAMT + \alpha_3 MKTSHR + e_i^b \quad (2)$$

Finally, we further test whether or not the results are driven by one large venture capitalist that potentially could reduce underpricing better than any other of the players in the VC market. Zero2IPO Group provides us with an annual ranking of the top venture capitalists in China based on surveys that includes such aspects as investments, management, fundraising activities and exits. Following the reforms in 2009, the venture capital firm Shenzhen Capital Group has been ranked number one in 2010 and 2011, and number two in 2012.¹² During this period, Shenzhen Capital Group has been involved in 13 IPOs, representing 4.6% of the total number of VC backed IPOs post-2009. These IPOs are then excluded from the sample, to validate that our results are robust.

D. Long-Run Performance

The procedure of analyzing long-run performance is quite complicated in the sense that there exists various method regarding the computation of abnormal returns, and how these should be aggregated. As there are both arguments in favor and against each method, there is still no consensus on a preferred way of how to measure these. Previous literature has further documented that results are dependent on which risk metric that is used. Thus, several methods will be utilized to verify the validity of our results.

Adding to this, previous research employ different time regimes, where some put emphasis on calendar time, while other focus on event time. In this study, we choose the event time regime to ensure comparability with the relevant research within this particular field (Brav and Gompers, 1997; Levis, 2011). Thus, abnormal returns are computed for a given number of months following the IPO dates. This study analyzes aftermarket performance based on the 36 consecutive months after the IPO, which is typically considered as the lower limit for long-run performance studies. Our data thus extends until the last trading day of 2015. As suggested by Brav and Gompers (1997), the returns are calculated by compounding daily returns up to the end of the first trading month and from then compounding monthly returns for the 35 remaining months. The event window starts at the beginning of the second day of trading to avoid potential distortions from underpricing. If a firm is delisted, the returns are compounded until the delisting date. Moreover, the three-year time period is split into sub-periods of 6, 12 and 24 months in order to analyze short term differences in aftermarket performance.

As for the return metrics, there are mainly two methods used when calculating long-run abnormal returns. The first measure, the cumulative abnormal return (CAR) across time yields the following formula:

¹²Zero2IPO Group (2010, 2011 & 2012)

$$CAR = \sum_{t=0}^T R_i - R_{benchmark} \quad (3)$$

Where R_i refers to the raw return for IPO firm i , $R_{Benchmark}$ is the return for the matched benchmark and t is the number of months following the IPO date.

The second measure, the buy-and-hold abnormal return (BHAR), is defined as the difference between the raw buy-and-hold return of the IPO firm and the benchmark buy-and-hold return:

$$BHAR = \prod_{t=0}^T (1 + R_i) - \prod_{t=0}^T (1 + R_{benchmark}) \quad (4)$$

Where R_i is the raw return for IPO firm i , $R_{Benchmark}$ is the return for the matched benchmark and t is the number of months following the IPO date.

As highlighted by Barber and Lyons (1997) in their review about abnormal returns, the traditional method of calculating abnormal returns by CARs are not as appealing on economic grounds, because basically it is just a biased predictor of the BHAR metric. The authors state that BHARs more accurately reflect investment experience, as it in contrast to CARs include the compounding effect. In other words, BHARs measure the abnormal returns gained by the investors who follow a buy and hold strategy. The downside, however, is that using a geometric approach like BHARs could potentially lead to more skewed results, due to extreme outliers that arise from compounding. The aggregated returns can therefore be driven by a small amount of extraordinarily successful or unsuccessful firms. Hence, we analyze both the median BHARs and CARs as this mitigates the effect of extreme outliers.

The benchmark used to adjust the return metrics should ideally have the same exposure toward fundamental risk as the IPO firms. This is however difficult to find in practice. Instead, academic literature (Brav and Gompers, 1997; Levis, 2011) typically use several benchmark types such as broad equity indices (both equally and value weighted) and portfolios with similar risk characteristics to the IPO firm.

In this study, the returns of each IPO will firstly be adjusted for market movements using the MSCI China A Index, which includes all listed A shares on the Shenzhen and Shanghai stock exchanges. Furthermore, each IPO firm is matched to an industry portfolio to control for events that affect returns of entire industries. We use the 10 industry portfolios classifications by Fama and French as our benchmark (see table A2 for detailed information about the portfolio classifications). However, we employ broader industry classes compared to Brav and Gompers (1997) to make sure that we have a reasonable amount of firms within each portfolio. Finally, the IPO firms are matched with six self-constructed portfolios based on their size and book-to-market ratios as these are important determinants of the cross section of stock returns (Fama and French, 1992 and 1993). We will therefore form six (2 X 3) value-weighted portfolios containing all Shenzhen (Main Board,

SME and ChiNext) and Shanghai listed stocks. We employ a modified procedure to Fama and French, where the sample of stocks are sorted into two market capitalization and three book-to-market sub-groups and rebalanced at the beginning of each year. As for the two size portfolios, we use the median market capitalization as cut-off point, while the 30th and 70th percentile are used to further split the size portfolios into three book-to-market portfolios. Each IPO is then matched to one of these six portfolios on the basis of size and book-to-market ratio at the IPO date. In order to avoid matching IPO firms with themselves, we exclude 36 consecutive months of trading following the IPO date for firms that has gone public within the time period under investigation. Negative book values are also excluded.

Since we analyze median values as well, the estimated abnormal returns are tested using non-parametric statistical hypothesis tests, the Wilcoxon signed rank test as well as the Mann-Whitney U test. The signed rank test is used to investigate whether the full sample abnormal returns deviate from zero, while the Mann-Whitney U test is used to test for differences between VC and non-VC backed IPOs.

V. Descriptive Statistics

The following section provides a brief overview of the analyzed dataset. The aim is to highlight the historical development of VC backed IPOs, characteristics of the various stock exchanges, what industries VC backed IPOs pertain to, as well as other unique features of the the Chinese IPO market.

A. Number of IPOs and Amount Raised by IPO Type

In table I, we present the number of IPOs during our sample period from 2004 to 2012 as well as the median amount of money raised through the IPOs. The full sample includes 1208 IPOs, with a median amount of money raised through the IPOs of \$90 million.

Dividing the sample into our defined sub-periods, from 2004 to 2009 and 2010 to 2012, the number of IPOs are 444 and 764 respectively. The number of companies floated in the later sub-period is more than 70% higher than the number of IPOs prior to 2010 (which is twice as long). In fact, none of the years in the period from 2004 to 2009 have a higher number of IPOs than any of the years in the period from 2010 to 2012. IPOs did not only grow in numbers, but also in offer sizes with the median amount of money raised in the later sub-period being \$110 million, double the median amount of the 2004 to 2009 period.

By IPO type, the table shows that the fraction of VC backed IPOs out of the total number of IPOs grew considerably and consecutively following the modest levels of pre-2009. While the fraction of VC backed IPOs was considerably higher in 2009 than in the preceding years, the 21 VC backed IPOs in that year was still a considerably lower number compared to the number of VC backed IPOs in the following three years. In fact, more than 90% of the VC backed IPOs in

Table I: Number of IPOs and Amount Raised

The table presents the number of IPOs during the sample period from 2004 to 2012, as well as the median amount of money raised in million USD through the IPO. We further break down the IPOs into VC backed IPOs and non-VC backed IPOs to illustrate the fraction of VC backed IPOs out of the total number of IPOs. The table is further divided into the defined sub-periods, from 2004 to 2009 and from 2010 to 2012. Values are adjusted for the exchange rate of 6.052 CNY/USD at the 31st of December 2013

Time period	Full sample of IPOs		VC backed IPOs		Non-VC backed IPOs	
	Number of IPOs	Amount of money raised	% out of total number of IPOs	Amount of money raised	% out of total number of IPOs	Amount of money raised
2004	97	\$47m	1%	\$92m	99%	\$47m
2005	14	\$42m	0%	n.a.	100%	\$42m
2006	58	\$48m	5%	\$43m	95%	\$49m
2007	107	\$43m	2%	\$66m	98%	\$43m
2008	73	\$53m	3%	\$63m	97%	\$53m
2009	95	\$102m	19%	\$97m	81%	\$102m
2010	338	\$124m	25%	\$137m	75%	\$122m
2011	276	\$109m	44%	\$125m	56%	\$99m
2012	150	\$81m	53%	\$74m	47%	\$82m
2004-2009	444	\$55m	6%	\$86m	94%	\$53m
2010-2012	764	\$110m	37%	\$113m	63%	\$109m
2004-2012	1208	\$90m	26%	\$109m	74%	\$84m

our sample occurred in the years from 2010 to 2012. In both sub-periods, the median amount of money raised is higher for the VC backed IPOs than for the non-VC backed IPOs.

B. Number of IPOs and Amount Raised by Stock Exchange

Table II displays the number of IPOs and the median amount of money raised in the IPOs by each stock exchange. Starting with the full sample of 1208 IPOs, we find that the SME represents the largest platform for new listings. However, the opening of the ChiNext coincides with an increased IPO activity, as well as a rise in the number of VC backed IPOs. So, even though data for the ChiNext is only available for the period from 2009 to 2012, it still represents the largest platform for VC backed listings (51.4%).

Moreover, the SME and the ChiNext together account for 89.4% of the total number of VC backed IPOs, making them the most important platforms for VC exits through domestic IPOs. One interesting finding is that the Shenzhen Main Board has only accounted for one new listing after the establishment of the SME board.

The dominance of VC backed listings on the SME and the ChiNext can be attributed to the primary exchanges having stricter listing requirements and being more oriented toward SOEs. The table further presents the median amount of money raised on each stock exchange. During our sample from 2004 to 2012, we find that the SSE has had the largest IPOs in terms of median amount of money raised (\$147 million). The SME and ChiNext reports fairly similar amounts of money raised figures. Any further inferences regarding the median amount raised on the SZSE is not done considering that only one IPO occurred during the defined time period.

Table II: Number of IPOs and Amount Raised by Stock Exchange

The table presents the number of IPOs and median amount raised in million USD by each stock exchange out of the full sample of 1208 IPOs. Statistics are provided for the two main boards, Shenzhen Stock Exchange and Shanghai Stock Exchange, as well as for the Shenzhen SME and ChiNext. The table is further divided into the defined sub-periods, from 2004 to 2009 and 2010 to 2012. Values are adjusted for the exchange rate of 6.052 CNY/USD at the 31st of December 2013

Time period	Shanghai Main Board			Shenzhen Main Board			Shenzhen SME			Shenzhen ChiNext		
	NVC	VC	Amt	NVC	VC	Amt	NVC	VC	Amt	NVC	VC	Amt
2004	57	1	\$60m	1		\$701m	38		\$36m			
2005	2		\$77m				12		\$36m			
2006	7		\$346m				48	3	\$43m			
2007	8		\$163m				97	2	\$42m			
2008	2		\$3 962m				69	2	\$52m			
2009	5		\$2 297m				49	5	\$108m	23	13	\$79m
2010	14	7	\$436m				165	35	\$126m	75	42	\$112m
2011	19	15	\$260m				68	46	\$116m	68	60	\$82m
2012	13	10	\$184m				28	25	\$87m	30	44	\$66m
2004-2009	81	1	\$74m	1	0	\$701m	313	12	\$49m	23	13	\$79m
2010-2012	46	32	\$289m	0	0	\$0m	261	106	\$117m	173	146	\$87m
2004-2012	127	33	\$147m	1	0	\$701m	574	118	\$86m	196	159	\$86m

C. Number of IPOs by Industry

In table III, we report the number of matched VC backed IPO firms and what industry they pertain to based on the first two digits in their four-digit SIC code. SIC codes are designed the way that the first digit of the SIC code represents a broad industry classification, and the more digits you add subsequently up until the full four-digit SIC code, the more specific the industry distinction becomes. Based on the first two digits of the SIC code, a large concentration of the VC backed IPO firms in our sample are active in the manufacturing of Electronic & other electric equipment, Industrial Machinery & Equipment, and Chemical & Allied Products, followed by a smaller fraction of the firms being classified as active in the Business Services sector. Together these four industry classes represent 61% of the total number of matched pairs. The remaining industries have a fairly low representation of VC backed IPOs.

Table III: Industry Classification of Matched Sample by First Two Digits of the SIC Code

The table reports the number of matched pairs of VC backed and non-VC backed IPOs, and what industry they pertain to based on the first two digits in their four-digit SIC code. SIC codes are designed the way that firms are firstly categorized into 11 divisions, that are divided into 83 two-digit major groups, that are further subdivided into 416 three-digit industry groups, and finally disaggregated into 1,005 four-digit industries.

Industry class	Two-digit SIC	No. of pairs	Fraction
Agricultural Production - Crops	01	1	0.3%
Agricultural Production - Livestock	02	2	0.7%
Oil & Gas Extraction	13	2	0.7%
Heavy Constrction, Except Building	16	1	0.3%
Food & Kindred Products	20	12	4.0%
Apparel & Other Textile Products	23	3	1.0%
Lumber & Wood Products	24	1	0.3%
Paper & Allied Products	26	2	0.7%
Printing & Publishing	27	2	0.7%
Chemical & Allied Products	28	40	13.5%
Petroleum & Coal Products	29	2	0.7%
Rubber & Miscellaneous Plastics Products	30	5	1.7%
Leather & Leather Products	31	2	0.7%
Stone, Clay, & Glass Products	32	8	2.7%
Primary MetalIndustries	33	11	3.7%
Fabricated MetalProducts	34	10	3.4%
Industrial Machinery & Equipment	35	46	15.5%
Electronic & Other Electric Equipment	36	65	21.9%
Transportation Equipment	37	8	2.7%
Instruments & Related Products	38	17	5.7%
Miscellaneous ManufacturingIndustries	39	4	1.3%
Trucking & Warehousing	42	1	0.3%
Water Transportation	44	1	0.3%
Communications	48	1	0.3%
Electric, Gas, & Sanitary Services	49	6	2.0%
Wholesale Trade - Durable Goods	50	2	0.7%
Wholesale Trade - Nondurable Goods	51	3	1.0%
General Merchandise Stores	53	1	0.3%
Automotive Dealers & Service Stations	55	1	0.3%
Business Services	73	31	10.4%
Motion Pictures	78	1	0.3%
Engineering & Management Services	87	5	1.7%
Total		297	100%

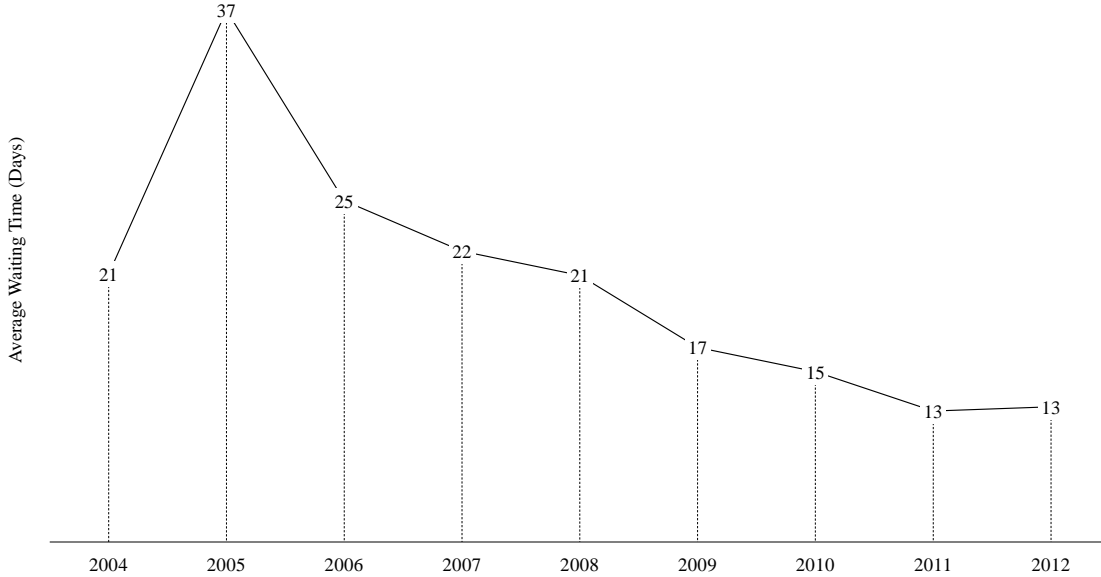
D. *Waiting Time Between Date of Issuance and Listing Date*

Figure 3 presents the duration between the issue date and the listing date of an IPO. Unlike the US market, where the issuing firm can be traded on the secondary market the following day, Chinese IPOs experience an unknown waiting time between the issue date and the actual listing date.

The duration appears due to the need of meeting several required regulations. Guo and Brooks (2009) find that the waiting time is an indication of firm quality with high-quality IPOs tending to be subscribed and listed faster. If the duration is long, underpricing is required as investors are exposed to the risk that the IPO will not be listed and their investment is thus locked up for a long time. Evidently, the average waiting time has been on a steady decline since 2006. Looking at the two defined sub-periods, it is clear that the average waiting time is significantly lower for IPOs floated in the latter 2010 to 2012 period. These findings suggest that the IPO market has also become more efficient due to improvements in the listing process.

Figure 3. Number of Days Between Issue Date and Listing Date

The graph displays the average waiting time measured in days between the issue date and the listing date. The figures are measured on a yearly basis.



VI. Results and Analysis

A. *Differences in Firm and Offering Characteristics of the Matched Samples*

Table IV reports differences in offering and firm characteristics to ensure the validity of our matching variables. We test differences in preceding year's revenue, book value of assets, book value of equity as percentage of book value of assets, firm age, waiting time between the issue and listing date, the

EPS last twelve months prior to the IPO, and underwriter reputation. It is well documented that venture capitalists invests in certain types of firms and that these have discrepant characteristics to non-sponsored firms. The following section provides evidence that the endogeneity issue does not only apply to developed markets, but also to an emerging market such as China.

As reported in the table, preceding year's revenue, firm age and the waiting time appears to be similar across the IPO types. Although both revenue and earnings per share is somewhat greater for VC backed issuers, the difference is insignificant. Regarding waiting time, non-VC backed firms experience a slightly shorter duration between the date of issuance and the listing date, albeit the difference is not statistically significant. Furthermore, VC backed firms have a significantly higher ratio of the book value of common equity to the book value of assets than non-VC backed firms. As for the firm age, Muscarella and Vetsuypens (1989) has documented a negative relationship between first-day returns and the age of the issuing firm, due to a higher amount of publicly available information for older firms. However, unlike the results from earlier papers (Megginson and Weiss, 1991; Lee and Wahal, 2004), we find that the age of the issuing firms is close to identical for the two IPO types.

Table IV: Differences in Firm and Offering Characteristics

The table presents the tests of differences in offering and firm characteristics using a difference in means test for the sample of 297 VC backed and 297 non-VC backed IPOs matched on the first two digits of the SIC code, as closely as possible on offering size and the non-VC backed floating within 12 months prior to or after the VC backed IPO. Offer size, book value of assets, preceding years revenue and earnings per share is reported in million USD. Values are adjusted for the exchange rate of 6.052 CNY/USD at the 31st of December 2013.

Firm and offering characteristics	Number of matched pairs	VC backed IPOs	Non-VC backed IPOs	Differences in mean, t-stat
Offer Size	297	\$158.3m	\$139.2m	2.12
Age	297	10.5	10.8	-0.74
Book value of assets	288	\$226.6m	\$161.6m	0.96
Book value of equity as % of book value of equity	288	56.2%	53.3%	2.34
Preceding year's revenue	137	\$227.0m	\$180.4m	1.18
Underwriter's market share	297	4.4%	3.6%	2.66
EPS last twelve months prior to the IPO	137	0.036	0.032	1.53
Waiting time	297	14.3	14.2	0.23

Moreover, even though we match as closely as possible on offering size, VC backed IPOs tend to raise larger amounts of money in their IPOs. Similar to previous literature (Megginson and Weiss, 1991; Lee and Wahal, 2004), we find that VC backed firms utilize more reputable underwriters. As argued by Megginson and Weiss (1991), VC backed firms should attract underwriters with higher quality since it lowers their cost of due diligence and protects their own reputational capital.

Additionally, the venture capitalists' association with higher quality underwriters enhances their ability to place the issue with institutional managers. Thus, higher quality of the underwriter and larger offering amounts is negatively related to first-day returns. Since the offering amount and market share of the underwriter are nonrandom for the matched samples, these explanatory variables are controlled for in order to capture the relative influence of VC backing.

B. Underpricing by IPO Type

Table V shows the number of IPOs and the average first-day returns for VC backed IPOs and their matched non-VC backed IPOs. We report raw average first-day returns for VC backed and matched non-VC backed IPOs as well as the average return differences between the VC backed and their matched non-VC backed IPOs, and its associated t-statistics. In order to ensure that our sample does not contain any extreme outliers which could potentially distort our results, we also present the corresponding median first-day returns for both IPO types, their differences, and associated z-statistics.

Similar to the numerous studies investigating IPO underpricing, we report that regardless of whether an IPO is subject to being VC backed or not, they exhibit positive first day-returns during the entire sample period. For our full sample of IPOs from 2004 to 2012, the average first-day return of VC backed IPOs is 31.42% compared to 36.55% for non-VC backed IPOs. The return difference of 5.12% is statistically significant at the 10% level. However, Gompers and Lerner (1997) argue that differences in underpricing between VC backed IPOs and non-VC backed IPOs are sensitive to the estimation period, thus we also present first-day returns for two sub-periods. Further, the aim is to examine differences between two regulatory settings. The ability of venture capitalists to certify the issue should diminish when the government strictly controls the IPO pricing mechanism, while the importance of a venture capitalist instead increases as prices are determined by market forces rather than CRSC.

Thus, when dividing our sample into our sub-periods, 2004 through 2009, containing 25 VC backed IPOs, and 2010 through 2012, containing 272 VC backed IPOs, we find that the average first-day returns are significantly lower in the latter period following the pricing reforms implemented in mid-2009, which has helped in reducing the information asymmetry between outside investors and corporate insiders. Our results show that the underpricing levels has indeed decreased after the reform. In the period from 2004 through 2009, VC backed IPOs exhibit an average first-day return of 108.05%, while the average first-day return is 96.34% for non-VC backed IPOs. In the period from 2010 through 2012, however, the underpricing levels are drastically reduced for both VC and non-VC backed IPOs, to 24.38% and 31.05% respectively. The difference in average first-day returns of 6.67% in this period is statistically significant at the 1% level. The results from the post-reform period provide evidence of VC backed IPOs being associated with significantly lower first-day returns than their non-VC backed counterparts, while prior to 2010 our results show that the underpricing of VC and non-VC backed IPOs is not significantly different from each other.

The median first-day returns exhibit different levels of underpricing than the averages, but the

relationship for the differences in first-day returns is identical, with VC backed IPOs being less underpriced than non-VC backed IPOs between 2010 and 2012, and not statistically different in the period from 2004 to 2009. In the latter period, the difference in median first-day returns is 5.88%, and still significant at the 1% level.

Table V: Differences in Underpricing

The table presents the tests of differences in first-day returns for the sample of 297 VC backed and 297 non-VC backed IPOs matched on the first two digits of the SIC code, as closely as possible on offering size and the non-VC backed floating within 12 months prior to or after the VC backed IPO. Deviations are tested using the matched pair's t-test as well as the Wilcoxon signed rank test. Medians are reported in brackets below the averages.

Time period	VC backed IPOs		Non-VC backed IPOs	Statistical tests	
	Number of IPOs	First-day return	Matched first-day return	Return difference	T-statistic [Z-statistic]
2004-2009	25	1.0805 [0.8882]	0.9634 [0.4611]	0.1171 [0.4271]	0.62 [1.41]
2010-2012	272	0.2438 [0.1709]	0.3105 [0.2297]	-0.0667 [-0.0588]	-2.61 [-2.43]
2004-2012	297	0.3142 [0.2090]	0.3655 [0.2700]	-0.0512 [-0.0610]	-1.81 [-1.68]

C. Further Extension of Underpricing by IPO Type

Table VI and VII reports the results of the the OLS regression of first-day returns against whether or not the IPO is VC backed (TYPE), the log of the amount offered (LOGAMT), and the average market share of the lead underwriter (MKTSHR) for the matched samples. VC backed IPOs exhibit lower first-day returns on average over the full time period, statistically significant at the 10% level. In other words, the presence of a venture capitalist lowers the first-day return after controlling for size and the certification provided by underwriters.

When further dividing the full sample based on the sub-periods, we find that the coefficient TYPE is insignificant in the period from 2004 to 2009, while negative and statistically significant at the 5% level in the period from 2010 to 2012. As for the the control variables, the log of the amount offered (LOGAMT) is negative and statistically insignificant. The market share of the lead underwriter (MKTSHR) is statistically insignificant for the full sample, as well as in the two sub-periods. Thus, unlike the findings of Megginson and Weiss (1991), the quality of the underwriter does not appear to provide any direct certification effect to the issue.

Table VI: Regression of First-Day Returns

The table reports the OLS regression results of first-day returns, measured as the relative change from the offer price to the closing price on the first day of trading, against whether or not the IPO is VC backed (TYPE) and the natural log of the amount offered (LOGAMT). The regression is conducted for the matched sample of 297 VC and non-VC backed IPOs.

VARIABLES	Full sample period	2004 - 2009	2010 - 2012
TYPE	-0.0477* (-0.0286)	0.0998 (-0.198)	-0.0637** (-0.0259)
LOGAMT	-0.0809 (-0.0851)	-0.347 (-0.845)	-0.0568 (-0.0753)
Constant	0.748* (-0.403)	2.527 (-3.818)	0.58 (-0.358)
Observations	594	50	544
R-squared	0.014	0.023	0.027
Number of pairs	297	25	272

Standard errors in parentheses

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

Table VII: Extended Regression of First-Day Returns

The table reports the OLS regression results of first-day returns, measured as the relative change from the offer price to the closing price on the first day of trading, against whether or not the IPO is VC backed (TYPE), the natural log of the amount offered (LOGAMT) and the quality of the underwriter (MKTSHR). Underwriter quality is approximated as the fraction of the total amount of money brought to the market. If a deal involves several lead underwriters, the average of the underwriters' market shares is used. The regression is conducted for the matched sample of 297 VC and non-VC backed IPOs.

VARIABLES	Full sample period	2004 - 2009	2010 - 2012
TYPE	-0.0500* (-0.0289)	0.11 (-0.224)	-0.0654** (-0.0261)
LOGAMT	-0.0887 (-0.0861)	-0.338 (-0.868)	-0.0642 (-0.0763)
MKTSHR	0.308 (-0.506)	-0.476 (-4.423)	0.278 (-0.451)
Constant	0.774* (-0.405)	2.502 (-3.909)	0.605* (-0.361)
Observations	594	50	544
R-squared	0.015	0.023	0.028
Number of pairs	297	25	272

Standard errors in parentheses

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

The regression aims to address the endogeneity issue, i.e. the fact that VC backed IPOs tend to raise larger amount of money and utilize more reputable underwriters. It is well documented that these characteristics are correlated with the level of underpricing, and must therefore be controlled for to measure the relative influence of VC backing. Still, when addressing this issue, we provide evidence of VC backed IPOs significantly exhibiting lower first-day returns compared to non-VC backed IPOs. Thus, investors appear to require less compensation for the undertaken risk when buying shares in a issuing firm backed by a venture capitalist. We argue that this is first and foremost due to the venture capitalist's ability to certify the issue price as a third-party investor.

In general, third party certification has value whenever securities are being issued in capital markets where insiders of the issuing firm and outside investors have different information regarding the value of the issuing firm. These information asymmetries should be even more severe in an emerging market such as China, where disclosure rules are less developed. For a third-party to be able to certify the value, and thus reduce information asymmetry, it is essential that the actor is incentivized to set a fair value of the offering firm. We argue that venture capitalists fill this role in China, as they have a reputational capital at stake, and that this exceeds the maximum one-off benefit they receive from certifying an issue falsely. Since venture capitalists bring portfolio firms to the market on an ongoing basis, they should have a strong incentive to build a trustworthy reputation in order to retain access to the IPO market on favorable terms in the future (Megginson and Weiss, 1991). In fact, Shenzhen Capital Group alone was involved in 13 IPOs from 2010 to 2012. So, even though a venture capitalist could benefit from selling securities at a higher price, the cost of compromising their relationship with institutional investors is likely to be greater.

Interestingly, differences in first-day returns between VC backed and non-VC backed IPOs deviate significantly in the sub-period from 2010 to 2012, while being statistically insignificant different from zero during 2004 to 2009. This is intuitive, as a third-party's ability to certify the value is eroded when government authorities have a major influence over the pricing of IPOs. Hence, following the deregulation of IPO share prices in mid-2009, issue prices started to be determined by market forces rather than a centralized government authority. This is further illustrated by the significantly lower underpricing levels in the 2010 to 2012 period compared to the levels exhibited in the 2004 to 2009 period. Thus, as the pricing mechanism approaches a more efficient setting, the importance of third-party certification increases as well.

Furthermore, even though we exclude the IPOs of the most reputable venture capitalist post-2009 (Shenzhen Capital Group) from the matched sample, we still see that our results persist (see table A3 and table A4).

These findings provide evidence that venture capitalists indeed provide certification to the issue, not only in developed markets, but also in an emerging market like China. Further support for the venture capitalists certification role is provided by our finding that VC backed issuers are able to attract more reputable underwriters than non-VC backed issuers.

D. Long-Run Performance of Full Sample

Figure 4 displays the adjusted median BHARs and CARs, and their development following the IPO date. We find that the abnormal returns, regardless of return metric and benchmark used, are negative after 24 months of trading. The graph further displays that the listed firms experience a sharp deterioration in adjusted CARs and BHAR close to the IPO. It is not until the second year that the market, and the size and book-to-market adjusted CARs approaches zero. Interestingly, all median CAR metrics are positive at the end of the estimation period. Meanwhile, the adjusted BHARs also experience a positive trend following the two-year anniversary of the IPO. These values are however close to zero after 36 months. The following sections will provide a deeper insight into the statistical significance of the abnormal returns, and how the performance is attributed across the two IPO types.

Figure 4. Abnormal Returns 36 Months Post-IPO

The figure displays the the development of median BHARs and CARs adjusted for market movements (MSCI China A index), industry effects (Fama-French 10 industry classification), and size and book-to-market effects (6 self-constructed portfolios), over the 36-month period following the IPO.

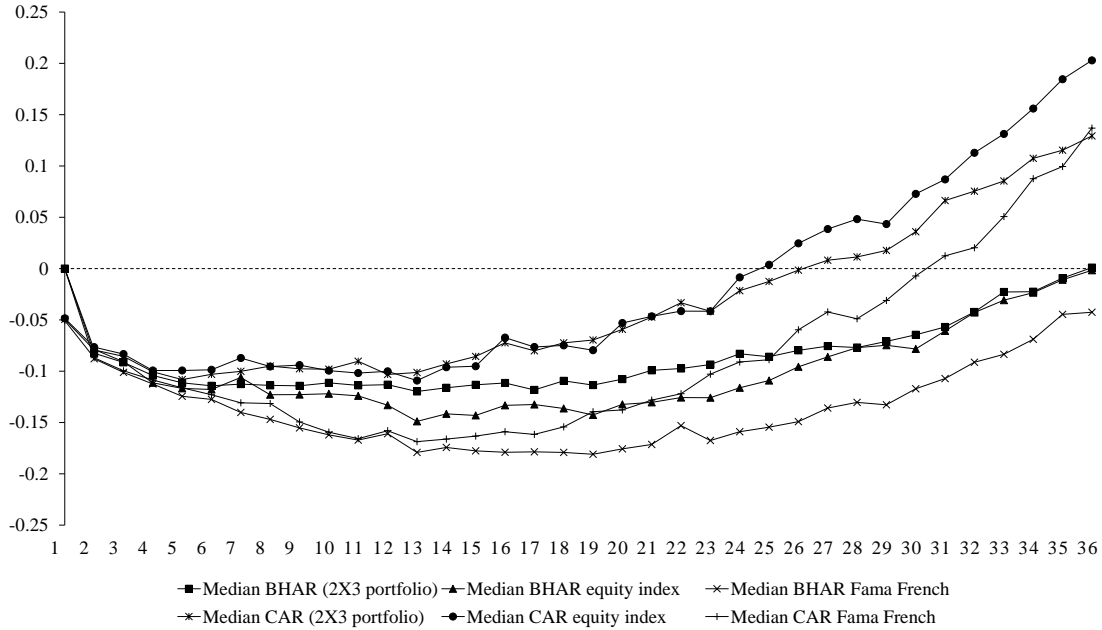


Table VIII reports median raw buy-and-hold returns, as well as the BHARs and CARs using three alternative benchmarks for the entire sample of IPOs from 2004 to 2012 calculated until the three-year anniversary of the IPO. The return data thus stretch at farthest into 2015. The data is reported in the intervals 6, 12, 24 and 36 months post-IPO, excluding first-day returns, for the whole sample of IPOs using three alternative benchmarks: 1) the size and book-to-market portfolios, 2) the MSCI China A index, and 3) the Fama-French industry portfolios.

Until the two-year anniversary of the IPO, the results are consistent with previous evidence from the US and UK markets (Ritter, 1991; Loughran and Ritter, 1995; Levis, 2011) as the entire sample

of IPOs underperform regardless of benchmark used, with statistical significance. The results from the 36-month BHARs are however mixed. While the full sample of IPOs slightly underperform the MSCI China A index with statistical significance, the full sample of IPOs slightly outperform its matched size and book-to-market portfolios. The 36-month BHAR using the Fama-French industry portfolios is negative and suggest that the full sample of IPOs underperform relative to this benchmark, however the result is insignificant at conventional levels.

To validate the results for the entire sample of IPOs, the right hand side of the table reports median Cumulative Abnormal Returns (CARs) using the three benchmarks specified above. As the CARs do not include the compounding effect inherent in the BHARs, it should reduce the effect of extreme return outliers. Evidently, the CARs at the three-year anniversary are positive and significant at the 1% level. The 24-month CARs are negative, but statistically insignificant when adjusted by the size and book-to-market portfolios and the MSCI China A Index. The negative CARs until 12 months post-IPO are at similar levels to the BHARs reported above. The results suggests that when calculating the BHARs for the full sample of IPOs, the compounding effect has worsened the relative aftermarket performance of the IPOs, evident by the positive and statistically significant CARs at the three-year anniversary of the IPO compared to the mixed results from the BHARs calculations.

Table VIII: Long-run Performance of Full Sample

The table displays the unadjusted buy and hold returns, and the adjusted BHARs and CARs split into the periods of 6, 12, 24 and 36 months following the IPO. BHARs and CARs are adjusted for size and book-to-market effects (6 self-constructed portfolios), market movements (MSCI China A index), and industry effects (Fama-French 10 industry classification).

Month	Buy and hold returns	BHAR			CAR		
		SBM portfolios	Market index	Industry portfolios	SBM portfolios	Market index	Industry portfolios
6	-15.4%	-0.1142***	-0.1179***	-0.1274***	-0.1031***	-0.0986***	-0.1230***
12	-20.4%	-0.1131***	-0.1332***	-0.1609***	-0.1031***	-0.1001***	-0.1580***
24	-24.0%	-0.0830***	-0.1162***	-0.1590***	-0.0216	-0.0086	-0.0910***
36	1.9%	0.0010***	-0.0017***	-0.0426	0.1292***	0.2029***	0.1368***

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

E. Long-Run Performance by IPO Type

Breaking down aftermarket performance into VC and non-VC backed IPOs, table IX displays that both VC and non-VC backed firms underperform their respective benchmark during the first year of trading. However, 24 months after the listing date, VC backed IPOs perform similar to the market index, size and book-to-market portfolios, and industry portfolios. In fact, over the full 36-month period, VC backed IPOs significantly outperform their benchmarks. The non-VC backed

IPOs exhibit statistically significant negative BHARs in the two consecutive years following the IPO, while approaching a similar performance to the market index and size and book-to-market portfolios for the complete estimation period.

Furthermore, when investigating the long-run performance by benchmark and IPO type separately, we find that the industry adjusted abnormal returns appears to be the highest for VC backed IPOs, while the lowest for non-VC backed IPOs. This can be attributed to VC backed firms being listed in industries with lower risk and thus having smaller expected returns (Brav and Gompers, 1997). For the remaining adjusted risk metrics, however, the size and book-to-market and market adjusted BHARs exhibit fairly similar results for both VC backed IPOs and non-VC backed IPOs.

Table IX: Long-Run Performance by IPO Type, in Terms of BHAR

The table displays the adjusted BHARs for the defined periods of 6, 12, 24 and 36 months following the IPO. Abnormal returns are further divided into VC and non-VC backed IPOs. The BHARs are adjusted for size and book-to-market effects (6 self-constructed portfolios), market movements (MSCI China A index), and industry effects (Fama-French 10 industry classification).

Months	VC backed			Non-VC backed		
	SBM portfolios	Market index	Industry portfolios	SBM portfolios	Market index	Industry portfolios
6	-0.0982***	-0.1138***	-0.1101***	-0.1165***	-0.1179***	-0.1383***
12	-0.1128***	-0.1483***	-0.1265***	-0.1131***	-0.1264***	-0.1699***
24	-0.0447	-0.0800	-0.0841	-0.0989***	-0.1241***	-0.1927***
36	0.1387***	0.1146***	0.1424***	-0.0269	-0.0280	-0.1073**
*** p<0.01, ** p<0.05, * p<0.1						

As presented in table X, the calculated CARs display similar results as the BHARs, with VC backed and non-VC backed IPOs significantly underperforming in the first two years of trading. In contrast to the BHARs however, the abnormal returns seems to be positively skewed toward the IPO date. In fact, the market adjusted as well as size and book-to-market adjusted CARs are positive for VC backed firms, statistically significant at the 5% level already after two years of the IPO. Further, the CARs of the non-VC backed IPOs are now significantly positive over the full estimation period. A reasonable source of explanation is the compounding components incorporated in the BHAR metric, where abnormal returns are heavily affected by underperforming firms during the first two years of trading. One interesting finding is that the reported figures contradicts the large body of literature conducted in developed markets (see for example Levis, 2011), in the sense that VC backed IPOs outperform their respective benchmarks in the long run.

Table X: Long-Run Performance by IPO Type, in Terms of CAR

The table presents the adjusted CARs for the defined periods of 6, 12, 24 and 36 months following the IPO. Abnormal returns are further divided into VC and non-VC backed IPOs. The CARs are adjusted for size and book-to-market effects (6 self-constructed portfolios), market movements (MSCI China A index), and industry effects (Fama-French 10 industry classification).

Months	VC backed			Non-VC backed		
	SBM portfolios	Market index	Industry portfolios	SBM portfolios	Market index	Industry portfolios
6	-0.0853***	-0.0977***	-0.0998***	-0.1118***	-0.0991***	-0.1375***
12	-0.0856***	-0.1119***	-0.1132***	-0.1069***	-0.0972***	-0.1758***
24	0.0316**	0.0311**	0.0221	-0.0480	-0.0200	-0.1328***
36	0.2887***	0.3097***	0.3536***	0.0999***	0.1572***	0.0309*
*** p<0.01, ** p<0.05, * p<0.1						

Furthermore, even though we observe aftermarket performance for VC and non-VC backed firms, and find that VC backed IPOs perform better in relation to their respective benchmarks, it is not yet decided whether VC backed IPOs outperform the non-VC backed IPOs with statistical significance. Hence, table XI reports a test in differences of abnormal returns between the two sub-samples using a nonparametric test (Mann-Whitney U-test). A higher mean rank indicates that the sub-sample is skewed toward more positive values, and vice versa for a low mean rank. The expected mean rank is 600 because from our sample of 1208 IPOs, 9 non-VC backed firms are excluded due to missing data on observations needed to match them to any of the benchmarks. A greater mean rank value would imply higher abnormal returns. The test for differences in the long-run performance is based on the full event window, i.e 36 months following the IPO.

As for the median BHARs, VC backed IPOs significantly outperform the non-VC backed IPOs 36 months following the IPO, regardless of benchmark employed (Z-statistic at a minimum of 3.32). A further validation of our results is presented on the right hand side of the table, where median CARs are reported. The presented figures appears to align with the computed differences in BHARs, indicating that the results are not dependent on which risk metric that is used.

Table XI: Test for Differences in Long-Run Performance Between VC and non-VC Backed IPOs

The table displays the differences in the adjusted CARs and BHARs between VC and non-VC backed IPOs 36 months following the IPO. BHARs and CARs are adjusted for size and book-to-market effects (6 self-constructed portfolios), market movements (MSCI China A index), and industry effects (Fama-French 10 industry classification). We use a nonparametric test (Mann-Whitney U-test) to test for differences in long-run performance. The expected mean rank is reported in brackets

IPO type	No. of obs.	36-month BHAR				36-month CAR			
		Mean rank		Diff. in median	Z-statistic	Mean rank		Diff. in median	Z-statistic
		Size & book-to-market portfolios				Size & book-to-market portfolios			
NVC	889	580	[600]	-0.166	-3.315	580	[600]	-0.189	-3.316
VC	310	656	[600]			656	[600]		
		Market index				Market index			
NVC	889	577	[600]	-0.143	-3.848	578	[600]	-0.152	-3.683
VC	310	665	[600]			662	[600]		
		Fama-French industry portfolios				Fama-French industry portfolios			
NVC	889	564	[600]	-0.250	-6.086	566	[600]	-0.323	-5.839
VC	310	703	[600]			699	[600]		

To sum up the results from the long-run performance section, below we will analyze the after-market performance of the full sample, as well as differences across both IPO types.

Inconsistent with the findings of Levis (2011), Ritter (1991), and Loughran and Ritter (1995), we report that Chinese IPOs exhibit positive long-run performance when adjusted by our benchmarks. However, previous findings usually attribute the long-run underperformance of IPOs to misvaluations at the time of the IPO and that issuers and underwriters are expected to take advantage of investor optimism by performing IPOs during high valuation periods. The approval-based system in China makes it close to impossible to intentionally time favorable market conditions, given the lengthy approval process. Therefore, the number of IPOs should not be, by choice, concentrated in periods where market valuations are high on average. Additionally, the government's potential ability to limit the offer price, thereby capping valuations, further complicates firm's capability to conduct IPOs at high valuations.

Furthermore, we find that VC backed IPOs outperform non-VC backed IPOs in the long-run, regardless of benchmark or risk metric used. This is in line with the documented results by Brav and Gompers (1997). Our results, on the other hand, contradicts the findings of Levis (2011), who attributes long-run underperformance of IPOs to the poor performance of his sub-sample of VC backed and non-sponsored IPOs. The underperformance of VC backed listings could partially be explained by the fact that venture capitalists are even more prone to exploit investor optimism, and thus, "cashing out" their investment when valuations are high, leading to subsequent deterioration in the value post-IPO. In other words, at the time of the secondary sale of the stock, the market reacts negatively to the inside information of the venture capitalist, as it is expected that such investor only would be willing to sell if the shares are overvalued (Gompers and Lerner, 1998). Other explanations related to this finding could be that pre-IPO invested venture

capitalists selling their shares after the lock-up period expires, and that this change in ownership causes a decrease in the value-added monitoring of the firm. For instance, previous studies have shown that the presence of large minority shareholders, who usually engage in costly monitoring management, plays an important role in increasing a firm's value (Shleifer and Vishny, 1986). Again, our findings are interesting due to the unique features of the Chinese capital market, in which it is significantly harder to time IPOs in favorable market conditions, coupled with far longer lock-up periods associated with issuing new shares. In 2008, the lock-up period was reduced from three years to one year post-IPO. However, the lock-up period is still longer in China than in the US market where the lock-up period typically lasts between 90 to 180 days. We suggest that a more reasonable explanation for the diverging performance across the two IPO types is instead that the superior performance is attributed to the existence of better management teams and corporate governance systems in VC backed firms, or that venture capitalists are able to select firms with better long-run performance to invest in. Relating these results to the findings in the underpricing section, it could also be the case that venture capitalists reduce the information asymmetry in IPOs, leading to less expectation adjustments post-IPO. Nevertheless, these findings provide evidence of VC backed firms being able to deliver a greater amount of return to their investors than non-VC backed firms.

VII. Conclusion

By examining 310 VC backed IPOs in China between 2004 and 2012, we aim to extend previous papers investigating the role of VC backing in the underpricing and long-run performance of IPOs by providing evidence from China, an emerging market with a unique regulatory environment. We provide evidence of venture capitalists being able to, as third-party investors, reduce the information asymmetry between corporate insiders and outside investors, and thus, reduce underpricing. Additionally, we find that venture capitalists add value to their portfolio companies post-IPO which generates higher returns to the investors of VC backed firms.

Similar to the findings from papers examining underpricing in developed markets, we find non-conforming offering and firm characteristics between VC and non-VC backed IPOs. We show that VC backed listings raise larger amounts of money and utilize more reputable underwriters. The latter finding supports the certification role of venture capitalists, as VC backed issuers are able to attract more reputable underwriters than non-VC backed issuers. Our underpricing results show that VC backed IPOs exhibit lower first-day returns during the full sample period from 2004 to 2012. When addressing the endogeneity issue in a regression framework, we still provide evidence of VC backed IPOs experiencing significantly lower first-day returns than non-VC backed IPOs. Furthermore, differences in first-day returns between VC backed and non-VC backed IPOs deviate significantly in the sub-period from 2010 to 2012, while being statistically insignificant different from zero from 2004 to 2009. Our findings suggest that as the IPO market becomes more efficient and market-oriented, the importance of third-party certification increases. Specifically, the introduction

of book-building into the IPO pricing process in mid-2009, in which market participants determine the offer price of a new issue rather than the government, enabled venture capitalists to certify the offering value of their portfolio companies going public. For future research on the role of VC backing in IPO underpricing in China, it would be interesting to investigate how differences between venture capitalists in terms of reputation, experience and whether it is domestic, foreign or government backed, affects their ability to reduce information asymmetry in IPOs.

Regarding the long-run performance across the two IPO types, we find that VC backed IPOs not only perform better than the non-VC backed IPOs, but they also outperform their respective benchmarks after 36 months of their IPO. We suggest that the superior aftermarket performance of VC backed firms is attributed to the existence of better management teams, superior corporate governance systems, or that venture capitalists select firms with better long-run performance to invest in. It could also be the case that venture capitalists reduce the information asymmetry and thus less expectation adjustments are required post-IPO. Nevertheless, these findings provide evidence of VC backed firms being able to deliver greater returns to their investors compared to non-VC backed firms in the 36-month period following their IPO. An extension to the work we have done could be to examine venture capitalists post-IPO stake, board representation and final exit strategies.

Since China's VC landscape, regulatory environment and stock markets are under constant development, there will be a need for additional research on the topic of VC backing and its implications in a Chinese setting. We contrast the role that venture capitalists play in two markedly different institutional settings, finding that venture capitalists importance increases when the going public process approaches a more market-oriented setting. With regulatory changes on the horizon that will make the IPO process more similar to that of developed countries, our evidence suggests that the importance of venture capitalists will increase.

VIII. References

- Allen, Franklin, and Gerald R. Faulhaber, 1989, Signalling by underpricing in the IPO market, *Journal of Financial Economics* 23, 303-323.
- Barber, Brad M., and John D. Lyon, 1997, Detecting long-run abnormal stock returns: The empirical power and specification of test statistics, *Journal of Financial Economics* 43, 341-372.
- Barry, Christopher B., Chris J. Muscarella, John W. Peavy III, and Michael R. Vetsuypens, 1990, The role of venture capital in the creation of public companies: evidence from the going-public process, *Journal of Financial Economics* 27, 447-472.
- Beatty, Randolph P., and Jay R. Ritter, 1986, Investment banking, reputation, and the underpricing of initial public offerings, *Journal of Financial Economics* 15, 213-232.
- Bloomberg News, 2013, China's move to end IPO halt sparks rally in finance, December 2.
- Bloomberg News, 2016, Why China's IPOs are still seen as a sure thing, February 1.
- Booth, James R., and Richard L. Smith, 1986, Capital raising, underwriting and the certification hypothesis, *Journal of Financial Economics* 15, 261-281.
- Brav, Alon, and Paul A. Gompers, 1997, Myth or reality? The longrun underperformance of initial public offerings: Evidence from venture and nonventure capitalbacked companies, *Journal of Finance* 52, 1791-1821.
- Chang, Eddy, Chao Chen, Jing Chi, and Martin Young, 2008, IPO underpricing in China: New evidence from the primary and secondary markets, *Emerging Markets Review* 9, 1-16.
- Chemmanur, Thomas J., 1993, The pricing of initial public offerings: A dynamic model with information production, *Journal of Finance* 48, 285-304.
- Cheung, Yan-leung, Zhiwei Ouyang, and Weiqiang Tan, 2009, How regulatory changes affect IPO underpricing in China, *China Economic Review* 20, 692-702.
- EY, 2016, EY global venture capital trends 2015.
- Fama, Eugene F., and Kenneth R. French, 1992, The crosssection of expected stock returns, *Journal of Finance* 47, 427-465.
- Fama, Eugene F., and Kenneth R. French, 1993, Common risk factors in the returns on stocks and bonds, *Journal of Financial Economics* 33, 3-56.
- Gompers, Paul A., 1996, Grandstanding in the venture capital industry, *Journal of Financial Economics* 42, 133-156.

Gompers, Paul A., and Josh Lerner, 1997, Venture capital and the creation of public companies: do venture capitalists really bring more than money?, *Journal of Private Equity* 1, 15-32.

Gompers, Paul A., and Josh Lerner, 1998, Venture capital distributions: Short-run and long-run reactions, *Journal of Finance* 53, 149-192.

Guo, Haifeng, and Robert Brooks, 2009, Duration of IPOs between offering and listing: Cox proportional hazard models-evidence for Chinese A-share IPOs, *International Review of Financial Analysis* 18, 239-49.

Hogan, Karen M., Gerard T. Olson, and Richard J. Kish, 2001, A comparison of reverse leveraged buyouts and original initial public offers: Factors impacting their issuance in the IPO Market, *Financial Review* 36, 1-18.

Hong, Shen, 2016, Chinese regulator plans to prune waiting list for IPOs, *Wall Street Journal*, July 5.

Krishnan, C.N.V., Vladimir I. Ivanov, Ronald W. Masulis, and Ajai K. Singh, 2011, Venture capital reputation, post-IPO performance, and corporate governance, *Journal of Financial and Quantitative Analysis* 46, 1295-1333.

Lee, Peggy M., and Sunil Wahal, 2004, Grandstanding, certification and the underpricing of venture capital backed IPOs, *Journal of Financial Economics* 73, 375-407.

Levis, Mario, 2011, The performance of private equitybacked IPOs, *Financial Management* 40, 253-277.

Li, Guoping, and Hong Zhou, 2015, Political connections and access to IPO markets in China, *China Economic Review* 33, 76-93.

Liu, Qigui, Jinghua Tang, and Gary G. Tian, 2013, Does political capital create value in the IPO market? Evidence from China, *Journal of Corporate Finance* 23, 395-413.

Loughran, Tim, Jay R. Ritter, 1995, The new issues puzzle, *Journal of Finance* 50, 2351.

Loughran, Tim, and Jay R. Ritter, 2004, Why has IPO underpricing changed over time?, *Financial Management* 33, 5-37.

Loughran, Tim, Jay R. Ritter, and Kristian Rydqvist, 1994, Initial public offerings: International insights, *Pacific-Basin Finance Journal* 2, 165-199.

Meggison, William L., and Kathleen A. Weiss, 1991, Venture capitalist certification in initial public offerings, *Journal of Finance* 46, 879-903.

Mok, Henry M.K., and Y. V. Hui, 1998, Underpricing and aftermarket performance of IPOs in Shanghai, China, *Pacific-Basin Finance Journal* 6, 453-474.

- Muscarella, Chris J., and Michael R. Vetsuypens, 1989, The underpricing of second initial public offerings, *Journal of Financial Research* 12, 183-192.
- Ritter, Jay R., 1984, The "hot issue" market of 1980, *Journal of Business*, 215-240.
- Ritter, Jay R., 1991, The long-run performance of initial public offerings, *Journal of Finance* 46, 3-27.
- Shleifer, Andrei, and Robert W. Vishny, 1986, Large shareholders and corporate control, *Journal of Political Economy* 94, 461-488.
- Su, Chen, and David Brookfield, 2013, An evaluation of the impact of stock market reforms on IPO underpricing in China: The certification role of underwriters, *International Review of Financial Analysis* 28, 20-33.
- Su, Dongwei, and Belton M. Fleisher, 1999, An empirical investigation of underpricing in Chinese IPOs, *Pacific-Basin Finance Journal* 7, 173-202.
- Tian, Lihui, 2011, Regulatory underpricing: Determinants of Chinese extreme IPO returns, *Journal of Empirical Finance* 18, 78-90.
- Welch, Ivo, 1989, Seasoned offerings, imitation costs, and the underpricing of initial public offerings, *Journal of Finance* 44, 421-449.
- Yu, Xie, 2015, China ushers in new IPO registration system but it's likely to come with "Chinese characteristics", *South China Morning Post*, December 9.
- Zero2IPO Group, 2010, 2011 & 2012, China Venture Capital Private Equity Annual Ranking.

IX. Appendix

Table A1: Missing Data

The table presents variables that lack observations. The right hand side report the completeness of the sample in terms of available data as a percentage of the total number of observations. The table is further divided on the basis of the two studies, i.e. the underpricing study as well as the aftermarket study.

Variables for underpricing study	Number of missing observations	Availability as % of total nr of IPOs
Total number of IPOs	1208	
Book value of assets before IPO	47	96.1%
Book value of equity before IPO	53	95.6%
Preceeding year's revenue	357	70.4%
EPS twelve months before IPO	358	70.4%
Variables for long-run study	Number of missing observations	Availability as % of total nr of listed firm
Total number of listed firms	3277	
Market capitalization	6	99.8%
Book-to-market ratio	470	85.7%

Table A2: Detail for 10 Industry Portfolios

The table presents information about the fama french industry portfolios. The portfolios are constructed based on the SIC-codes.

Portfolio	Fama French Industry Classification
1	Consumer NonDurables - Food, Tobacco, Textiles, Apparel, Leather, Toys
2	Consumer Durables - Cars, TV's, Furniture, Household Appliances
3	Manufacturing - Machinery, Trucks, Planes, Chemicals, Off Furn, Paper, Com Printing
4	Energy - Oil, Gas, and Coal Extraction and Products
5	Hi-Tech - Computers, Software, and Electronic Equipment
6	Telecom - Telephone and Television Transmission
7	Shops - Wholesale, Retail, and Some Services (Laundries, Repair Shops)
8	Health - Healthcare, Medical Equipment, and Drugs
9	Utilities
10	Other - Mines, Constr, BldMt, Trans, Hotels, Bus Serv, Entertainment, Finance

Table A3: Robustness check, differences in first-day returns between the matched samples

The table presents the tests of differences in first-day return for the sample of 261 IPOs post-2009, excluding IPOs backed by Shenzhen Capital Group. Deviations are tested using the matched pair's t-test as well as the Wilcoxon signed rank test. Medians are reported in brackets below the averages.

Time period	VC Backed IPOs		Non-VC Backed IPOs		Statistical Tests	
	Number of IPOs	First-day return	Matched first-day return		Return difference	T-statistic [Z-statistic]
2010-2012	261	0.2454 [0.1711]	0.3093 [0.2297]		-0.0639 [-0.0586]	-2.43 [-2.28]

Table A4: Robustness check, first-day returns for the matched samples in a regression framework

The table reports a robustness check for the the OLS regression results of first-day returns, measured as the relative change from the offer price to the closing price on the first day of trading, against whether or not the IPO is VC backed (TYPE), the natural log of the amount offered (LOGAMT) and the quality of the underwriter (MKTSHR). The regression is conducted for the matched sample of 261 IPOs post-2009, excluding IPOs backed by Shenzhen Capital Group.

Regression	Constant	TYPE	LOGAMT	MKTSHR	R-squared	Number of pair
(1)	0.5470 (-0.3610)	-0.0613** (-0.0266)	-0.0499 (-0.0759)		0.024	261
(2)	0.5620 (-0.3650)	-0.0623** (-0.0268)	-0.0545 (-0.0771)	0.167 (-0.464)	0.024	261

Standard errors in parentheses

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