Why do some Chinese technology firms avoid ChiNext and go public in the US?

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Abstract

Some Chinese technology firms prefer to go public on US exchanges despite the launch of ChiNext as a NASDAQ-style board of the Shenzhen Stock Exchange in late 2009. Conventional hypotheses based on sales internationalization and issuing costs fail to explain this preference. Instead, our findings suggest the existence of a separating equilibrium in which small but profitable firms choose ChiNext and large firms backed by foreign venture capital prefer US exchanges as their IPO location. Our findings have broader implications for entrepreneurial finance in China. Policy suggestions are offered for increasing the number of foreign VC-backed IPOs on ChiNext.

JEL classification: G15, G24, G32

Keywords: IPO, venture capital, China

1 Introduction

ChiNext is a new board of the Shenzhen Stock Exchange (SZSE) launched in October 2009. According to the SZSE, the purpose of ChiNext is 'to promote the development of innovative enterprises and other growing start-ups'.[1] It is developed as a NASDAQ-style exchange for

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[1]http://www.szse.cn/main/en/ListingatSZSE/ListingQA/

the shares of Chinese technology firms. Since its launch, more than 300 firms have gone public on ChiNext, raising more than $31.5 billion in total. To put these figures into perspective, over the same period, 184 firms went public on NASDAQ raising $24.1 billion.

ChiNext has been a long time coming. Initial plans to set it up were announced during the NASDAQ Bubble period, but were shelved after the bubble burst. The main driver behind ChiNext's launch has been the growth of the venture capital (VC) industry in China. A new board similar to NASDAQ was seen as essential to further the industry's development, since the strict listing requirements of the main boards in Shanghai and Shenzhen made it very difficult for VC firms to exit their investment via an initial public offering (IPO) (White et al., 2005). A first step was taken in 2004 when the SZSE launched the Small and Medium Enterprise (SME) board. However, the board failed to meet the needs of the VC industry, since the listing requirements were still too stringent for the majority of entrepreneurial firms to be eligible for listing. According to Tan et al. (2013), only approximately 20% of firms that went public on the SME Board between May 2004 (the market's inception) and December 2008 had venture capital backing.

ChiNext finally emerged in late 2009 with relatively looser listing requirements than the SME board. For instance, a firm cannot go public on the SME Board if its intangible assets represent more than 20% of net assets. ChiNext places no such restriction on issuers. Moreover, the SME Board requires issuers to be profitable during the three years before an IPO with a minimum aggregate net profit of RMB 30 million, whereas a firm is eligible to go public on ChiNext if it was profitable during the two years previous to an IPO with a minimum aggregate net profit of RMB 10 million.[2]

NASDAQ has built up its reputation as a top exchange for technology stocks and has attracted the IPOs of Chinese high-tech firms.[3] An IPO on NASDAQ or the New York Stock Exchange (NYSE) can be a lucrative exit for the founders of a firm and the venture capitalists

[2]For a comprehensive list of the listing requirements of the SME Board and ChiNext see http://www.szse.cn/main/en/ListingatSZSE/ListingRequirements/.

[3]Examples include Actions Semiconductor Co Ltd (IPO year: 2005), Baidu Inc (2005), China GrenTech Corporation Limited (2006), China Medical Technologies Inc (2005), China Sunergy Co Ltd (2007), Ctrip.com International Ltd (2003), JA Solar Holdings Co Ltd (2007), Shanda Interactive Entertainment Limited (2004), Spreadtrum Communications Inc (2007), and Vimicro International Corporation (2005).

who backed the firm. Data from the Securities Data Company (SDC) shows that more than 60 Chinese firms went public on NASDAQ or the NYSE and raised an aggregate amount of 11.2 billion U.S dollars (measured in 2012 prices) within the five year period that preceded the launch of ChiNext. Approximately half of these firms were in a high-tech industry, and around 65% of the high-tech issuers were VC-backed.

In China, both regulators and the VC industry expected ChiNext to fulfil the role of NASDAQ. However, contrary to expectations, the launch of ChiNext did not put an end to the era of IPOs by Chinese technology firms on NASDAQ and the NYSE. Chinese technology firms have continued to go public in the US. The primary purpose of this paper is to address the following research question. Why do some Chinese technology firms not take up the option of going public on ChiNext and conduct an IPO in the US instead? The answer is far from obvious, since ChiNext, a domestic exchange designed to attract entrepreneurial high-tech firms, is the natural IPO location for such firms. Furthermore, the question has broader implications for entrepreneurial finance in China. According to Black and Gilson (1998, p. 245), a vibrant VC industry requires a 'well developed stock market that permits venture capitalists to exit through an initial public offering (IPO).' In the past, Chinese equity markets have struggled to offer entrepreneurial high-tech firms a market for their IPOs, and some of these firms still prefer a foreign IPO despite the launch of ChiNext. Therefore, it is important to investigate why ChiNext is not attractive for all Chinese technology firms, since this investigation contributes to our understanding of the issues faced by entrepreneurial firms and the VC industry in China.

We put forward three main hypotheses that have have the potential to answer our research question. These three hypotheses are based on (i) product market considerations, (ii) issuing costs, and (iii) foreign VC backing. According to the first hypothesis, firms are more likely to engage in a foreign listing when a larger fraction of their total sales is generated abroad (Saudagaran, 1988, Saudagaran and Biddle, 1995, and Mittoo, 1992), or when their strategy is to expand their foreign sales with the visibility brought by the foreign listing (Pagano et al., 2002, Bancel and Mittoo, 2001). We use hand-collected data to examine geographical

segments of sales up to three years before and two years after an IPO and find no convincing evidence that these considerations cause Chinese technology firms to go public in the US. Chinese technology firms that choose to conduct an IPO in the US mainly operate in China before and after their issues.

The second hypothesis is motivated by the fact that average underpricing is much higher in China compared to the US. Reported figures commonly exceed 100% in China. For instance, Tan et al. (2013), whose sample includes the IPOs on the SME Board between May 2004 and December 2008, report an average underpricing of 160% and 125% for VC-backed and non-VC-backed IPOs respectively. Similarly high estimates are reported in Lin and Tian (2012), Tian (2011), and Chan et al. (2004). Average underpricing is considerably lower in the US at around 15-20% (Loughran and Ritter, 2004, Ljungqvist, 2007). The latest statistics on Jay Ritter's homepage show that the average first-day return in the US market between 1980 and 2012 is 17.9%.[4] If a firm believes that it will leave a substantial amount of money on the table by going public on ChiNext, it might prefer to conduct an IPO in the US instead. Indeed, we find that average underpricing is lower for Chinese technology firms that choose NASDAQ/NYSE over ChiNext as their IPO destination. However, when we match firms on the basis of their pre-IPO characteristics, no significant difference remains. We conduct a similar exercise in terms of gross spread and document that Chinese technology firms that go public on ChiNext actually pay a lower gross spread than comparable firms that go public in the US. The results concerning underpricing and gross spread remain robust when the potential endogeneity of the choice of going public in the US is addressed. Therefore, issuing costs cannot be the reason why ChiNext is not attractive for some Chinese technology firms.

Recent research shows that foreign VCs are less likely to exit via an IPO inside China, and an IPO outside China is more likely when there is foreign VC backing (Humphery-Jenner and Suchard, 2013a, Humphery-Jenner and Suchard, 2013b). There are several reasons for foreign VCs to avoid an IPO inside China. For instance, regulators can favor domestic VC-backed firms during the IPO approval process (Zhang et al., 2007, Bruton and Ahlstrom, 2003,

[4] http://bear.warrington.ufl.edu/ritter/IPOs2012Underpricing.pdf

and White et al., 2005) and foreign VCs lack the necessary political connections (Humphery-Jenner and Suchard, 2013a). In order to test whether foreign VC backing is the main driver behind a Chinese technology firm's decision to go public in the US, we analyze the pre-IPO financing sources of sample firms that went public in the US. We find that all but one of these firms are backed by foreign VC firms. Over several financing rounds, the average firm raises close to $80 million before going public. Furthermore, it is common for these firms to sell shares owned by existing shareholders either during the IPO or by way of a follow-up seasoned equity offering (SEO). This strengthens the argument that foreign VCs' desire of a successful exit drives Chinese technology firms to go public in the US. We also investigate IPO prospectuses of Chinese firms that went public on ChiNext and find that only less than 7% of the technology firms we examine have foreign VC backing. These findings suggest that IPOs of Chinese technology firms that have foreign VC backing are clustered in the US. Therefore, we conclude that foreign VC backing is a major factor that drives Chinese technology firms to pursue an IPO outside China rather than on ChiNext.

Finally, we model a Chinese technology firm's choice of going public on NASDAQ/NYSE versus ChiNext. The literature suggests that firm size is likely to be a major determinant of this choice (Saudagaran, 1988, Pagano et al., 2002). We hypothesize that profitability should also be a significant determinant, since foreign VCs can prefer a timely IPO exit in the US rather than an IPO on ChiNext that is delayed until the firm meets ChiNext's profitability requirements. Our results confirm these predictions, with both size and profitability being significant determinants of the IPO location. In fact, we show that it is not difficult to predict a Chinese technology firm's IPO location on the basis of its pre-IPO characteristics, even without knowing whether it has foreign VC backing or not. This implies a separating equilibrium in which Chinese technology firms that go public on ChiNext are small but profitable, and those that conduct an IPO in the US tend to be large, not necessarily profitable, and foreign VC backed.

The contribution of the present paper is twofold. As well as being the first in the literature to evaluate whether ChiNext, a new and fast-growing exchange, has been successful

in its mission of attracting Chinese technology firms, our findings shed light on the broader issue of IPO exits of entrepreneurial firms in China. The paper contributes by showing that while ChiNext was launched with the expectation of facilitating IPO exits of entrepreneurial technology firms, this expectation has been only partially realized to date. ChiNext has been successful in attracting the IPOs of small technology firms that are profitable, but large and foreign VC-backed firms still tend to prefer an IPO in the US, despite the fact that they mainly operate in China. These findings are topical given the IPO hiatus in China that started in late 2012 and the current debate regarding the IPO approval system enforced by Chinese regulators.[5] Our findings imply that policy makers must focus on improving (i) the transparency of the approval system, (ii) market liquidity, and (iii) listing requirements relating to firm profitability to make ChiNext an attractive venue of exit for foreign VCs.

Secondly, the paper adds to the strands of literature on a firm's decision to go public abroad and American depositary receipt (ADR) issues by foreign firms in the US. According to data provided in Gao et al. (forthcoming), between 2005 and 2009, ADRs accounted for 12% of all IPOs in the US, and almost 75% of ADR issues were conducted by Chinese firms. Our findings show that ADR IPOs of Chinese technology firms in the US are strongly motivated by foreign VC backing rather than product market considerations and issuing costs. The results are consistent with Hursti and Maula (2007) who study foreign IPOs conducted by European firms and who find that pre-IPO ownership by foreign investors and high-tech industry membership are major determinants of going public abroad (see also Blass and Yafeh, 2001). Bruner et al. (2004) compare issuing costs (underwriting fees and underpricing) across foreign and domestic IPOs conducted in the US and find that they are comparable. On the other hand, Ejara and Ghosh (2004) find that ADR IPOs are significantly less underpriced in comparison to matching US IPOs. However, these papers do not investigate whether it is cheaper for a firm to go public abroad rather than at home. We match Chinese technology firms that go public in the US with those on ChiNext and show that such firms cannot expect

[5]These topics are widely covered in the press. See e.g., 'China's IPO door indefinitely shut' (Wall Street Journal, US Edition, December 27, 2012, p. C2) and 'China gets tough toward IPOs - As regulator thins the waiting list, investors ask if it's more than short-term fix' (Wall Street Journal, Asia Edition, February 22, 2013, p. 15).

to lower their (direct and indirect) issuing costs significantly by going public in the US.

The rest of the paper is organized as follows. The hypotheses are developed in Section 2. In Section 3, we describe the data and perform empirical tests of the hypotheses developed in the previous section. Finally, Section 4 concludes with a discussion of the policy implications of our results.

2 Hypotheses

2.1 Theoretical background

There is a well-developed body of theoretical literature on why firms go public. The reasons include owners' desire for diversification and exit (Pástor et al., 2009, Zingales, 1995), raising capital to invest in growth opportunities (Pástor and Veronesi, 2005), lowering cost of capital (Chemmanur and Fulghieri, 1999), obtaining ownership dispersion to curb excessive monitoring (Pagano and Röell, 1998), and preempting industry competitors (Chemmanur and He, 2011). Furthermore, exploiting favorable market conditions (Pagano et al., 1998) and using common stock as a currency for acquisitions (Çelikyurt et al., 2010) are often cited as motivations for an IPO.[6]

The theoretical literature on the decision to go public *abroad* is much more limited. In fact, this decision is often not distinguished from that of cross-listing shares on a foreign exchange. For instance, Pagano et al. (2002, p. 2653), who study foreign listings of companies, do not separate firms that list shares on foreign exchanges as 'their first port of entry into the public equity market' from those that enter a foreign exchange 'after having already listed on their domestic exchange'. However, Caglio et al. (2013) find that the determinants of the decision to go public abroad are different from the determinants of the decision to cross-list shares on an overseas exchange.

Chemmanur and Fulghieri (2006) and Stulz (2009) provide theories of going public abroad, which are supported by empirical evidence in Caglio et al. (2013). Chemmanur and Fulghieri

[6] See Ritter and Welch (2002) and Bancel and Mittoo (2013) for a review of the theory and evidence on why firms go public.

argue that a firm is more likely to go public abroad if the investors that can value the firm at a low cost are clustered in a foreign market. This theory offers a clear explanation of why Chinese technology firms went public on NASDAQ or the NYSE *prior* to the launch of ChiNext, but this explanation is less convincing now, since ChiNext is designed to be a NASDAQ-style exchange that specifically targets technology firms. The model developed in Stulz (2009) predicts that foreign IPOs will tend to originate from countries that have poor disclosure standards. While this model provides a good reason why Chinese firms have a higher propensity to go public abroad compared to firms from some other countries, it cannot fully explain why ChiNext has been successful in attracting some Chinese technology firms and not the others. There are some other theoretical arguments put forward in the prior literature that can potentially explain this issue. In what follows, we discuss these arguments in detail and develop testable hypotheses based on them.

2.2 Product market considerations

There is evidence in the literature that a firm is more likely to list shares outside its home country if a significant fraction of its revenues is generated abroad. The idea is that such a firm has a product market reputation in a foreign market and goes public in that market to benefit from its established reputation. Saudagaran (1988) finds that foreign sales as a fraction of total sales is higher for firms that list shares abroad. Saudagaran and Biddle (1995) extend this line of research by showing that cross-listing firms tend to list their shares in the country where the main part of their foreign sales derive from. There is also survey evidence regarding the link between foreign sales and listing abroad. Mittoo (1992) conducts a survey of Canadian firms that listed shares in the US and UK and observes that about half of the respondent firms generate more than fifty percent of their sales in foreign markets.

Several other papers argue that firms may have a motivation to list shares abroad not necessarily because the *existing* level of foreign sales is high, but because they aim to *increase* the level of foreign sales. Bancel and Mittoo (2001) argue that firms may be strategically seeking a foreign listing to expand their foreign operations. Similarly, Pagano et al. (2002)

point out that listing shares abroad can serve as an advertisement for the firm's product and cause a shift in foreign sales.

In this context, it is possible that some Chinese technology firms prefer to go public on a US stock exchange if they are either exporting their products to the US already (i.e., have an established product market reputation), or aiming to increase their exports with the visibility brought by their IPOs (i.e., building/extending product market reputation). These product market considerations are formalized in the following two hypotheses:

> H1a: A large fraction of the revenues generated by Chinese technology firms that go public in the US is due to foreign sales.
>
> H1b: Foreign sales grow significantly following the IPOs of Chinese technology firms in the US.

2.3 Issuing costs

Positive initial returns in the IPO market is often interpreted as evidence of underpricing; and Chinese IPO markets are characterized by extremely high initial returns, particularly in 1990s when the pricing of IPO shares was heavily regulated. Chan et al. (2004) report an average underpricing of 178% for A-share IPOs during the 1993–1998 period; Tian (2011) estimates the average underpricing as 247% during the 1992–2004 period; Lin and Tian (2012) document an average underpricing of 111% between 2001 and 2009; and Tan et al. (2013), whose period covers between May 2004 and December 2008, report 160% and 125% for VC-backed and non-VC-backed IPOs respectively. In comparison, Loughran and Ritter (2004) find that the average initial return is 18.7% for US IPOs over the period between 1980 and 2003. According to the statistics provided by Jay Ritter, the average first-day return of US IPOs between 1980 and 2012 is 17.9%.

Underpricing is an indirect cost of going public, since issuers 'leave money on the table' (Loughran and Ritter, 2002) by agreeing to an offer price well below the aftermarket price. Given that the average underpricing is substantially lower in the US, Chinese firms that believe they would suffer heavy underpricing if they went public on ChiNext might prefer

to go public on NASDAQ or the NYSE. Technology firms are particularly susceptible to severe underpricing, since information asymmetry, an important determinant of underpricing (see e.g., Beatty and Ritter (1986)), is more pronounced for such firms, hence the stronger motivation for them to go public in the US.

> H2a: Chinese technology firms that go public in the US experience less underpricing than comparable firms that go public on ChiNext.

Two points have to be emphasized regarding this hypothesis. First, a lower average underpricing in the US subsample of Chinese technology IPOs is not sufficient evidence for H2a. The difference in average underpricing could be due to a difference in average firm quality that can be caused by the difference in the listing standards between US and ChiNext (Johan, 2010), or the differential level of enforcement on cases of fraud (Cumming and Johan, 2013). In other words, if listing standards and law enforcement act as screening devices, the quality of a Chinese technology firm that goes public in the US rather than on ChiNext will be on average higher, and its underpricing will be on average lower. What H2a states is different. It argues that a firm chooses to go public in the US if it believes that its IPO will be underpriced less than an IPO on ChiNext conducted by a firm of *comparable* (not *average*) quality. Secondly, if this hypothesis is supported a new question is raised: If issues are significantly less underpriced in the US and issuers care about underpricing, why are *all* Chinese technology firms not going public there? A potential explanation for this question may be based on the motivations of H1a. Suppose that two Chinese technology firms are very similar to each other except that one has already built up product market reputation in the US. It will be easier for that firm to conduct an IPO in the US, since US investors are already familiar with the firm. On the other hand, the firm that is unknown in the US might find it more difficult to go public there despite being attracted to the prospect of lower underpricing.

Underpricing is not the only cost associated with going public. There are direct costs of going public as well. The direct costs are quite substantial and add up to 11% of the gross proceeds on average in the US (Lee et al., 1996). Gross spread, or underwriter fees, is the main component of direct costs and it is very often set exactly equal to 7% in the US

(Chen and Ritter, 2000). Given that ChiNext is a new market, there is more uncertainty about the success of an IPO. Therefore, underwriters who put their reputation at stake when taking firms public (Beatty and Ritter, 1986) can demand a higher percentage gross spread as compensation for the higher risk they are taking on. Furthermore, it is possible that the underwriters command a strong bargaining power until ChiNext becomes a fully mature and competitive IPO market. If this is the case, they can use their power to set the gross spread higher. Both the risk and the bargaining power based considerations imply a higher percentage gross spread, which might deter some firms from going public on ChiNext and give them an incentive to go public in the US if the gross spread there is lower.

> H2b: Chinese technology firms that go public in the US pay a lower percentage gross spread than comparable firms that go public on ChiNext.

2.4 Foreign VC backing

The venture capital industry in China has been growing steadily during the past decade in parallel with the development of Chinese equity markets. According to Humphery-Jenner and Suchard (2013b), VC investment in China has risen to $31.4 billion in 2010 from $1.2 billion in 1999. While in its early years the industry was led by domestic VC firms, foreign VC firms have started to play an increasing role since early 2000s (Zhang et al., 2007).

A key element of the venture capital cycle is the investment exit (Gompers and Lerner, 2001). The exit not only allows partners of a VC firm to realize a return on their investment, but also recycles funds for new investments. An initial public offering is the preferred mode of exit for successful VC-backed investments in the US. However, the actual exit has always been a challenge for VC firms doing business in China. In what follows we examine the issues that make an IPO exit in China harder for VC firms. Some of these issues affect foreign VCs only, whereas others have an impact on domestic as well as foreign VCs. Since foreign VCs are in a better position to help their firms complete an IPO aboard, we mainly refer to them in the discussion.[7]

[7] Humphery-Jenner and Suchard (2013a, p. 608) explain that 'foreign VCs are typically larger, better connected with key intermediaries, more experienced, and more knowledgeable than are domestic VCs about

Once a firm applies to go public in China, it is added to a waiting list for IPO approval by the China Securities and Regulatory Commission (CSRC). The waiting period is reported to be anything between six months and a couple of years. Zhang et al. (2007) note that politics is involved in the approval decision, such that foreign VCs believe that firms backed by domestic VCs are favored in the process. Bruton and Ahlstrom (2003, p. 249) argue that firms backed by international capital are in a less favorable position for a domestic listing, and they should 'look to either strategic buyers or a listing on a foreign exchange such as the NASDAQ.' In a similar vein, several papers argue that foreign VCs are less likely to have the political connections (or 'guangxi') that will increase the likelihood of IPO approval (see e.g., Humphery-Jenner and Suchard, 2013b). Finally, White et al. (2005, p. 910) mention that: 'As in other areas, the government is also concerned about foreign dominance, and will continue to do what it considers to be supportive of local venture capital firms vis-à-vis foreign firms.'

A long lock-up period is a further impediment to an IPO exit in China. The rules of listing shares on ChiNext state that shares issued before the IPO are not transferable for a period of one year after the listing. Furthermore, the pre-IPO shares of controlling shareholders are subject to a lockup period of 36 months.[8] The lock-up period is typically 180 days in the US (see e.g., Bradley et al., 2001). Therefore, a foreign VC firm that has backed a Chinese technology firm bears a longer lock-up period before exit, if the firm goes public on ChiNext rather than NASDAQ/NYSE.

An additional challenge for foreign VCs that make an investment exit in China is the repatriation of profits. Zhang et al. (2007) claim that the problems associated with the convertibility of yuan incentivize foreign VCs to prefer investing in Chinese firms that have the potential of listing overseas in the first place.

Listing requirements impose a barrier to an IPO exit in China too. ChiNext is launched as a NASDAQ-style exchange primarily to provide innovative growth firms access to capital markets. In this respect, the requirements for listing shares on ChiNext are less stringent than

international (developed) markets.'

[8] 12 months after the IPO, controlling shareholders can apply to the CSRC for an exemption.

those of the SME Board of the SZSE. For instance, the SME board requires profitability in the past three years, with net profits of at least RMB 30 million in aggregate, whereas ChiNext requires profitability in the past two years, with either net profits of at least RMB 10 million in aggregate, or minimum net profits of RMB 5 million and revenue of RMB 50 million in the past year, plus a revenue growth of 30% for either of the past two years. However, technology firms can still be unprofitable at the time when VCs desire an exit. For instance, Jain et al. (2008) point out an increase in the number of firms that go public before reaching profitability and argue that this increase is mainly driven by technology firms. Darrough et al. (2012) argue that failure to meet the profitability requirements is one of the main reasons why a Chinese firm's IPO application can be rejected by the CSRC. Compared to ChiNext, NASDAQ offers a lot more flexibility in terms of listing requirements. It not only contains three different tiers (Global Select Market, Global Market, and Capital Market) for different sizes of firms, but also in each tier it is sufficient for a firm to satisfy one (out of a few) set of listing standards.[9] Therefore, foreign VC-backed Chinese technology firms that have the prospect of profitability, but that do not satisfy the profitability requirements of ChiNext, have to go public abroad, unless they can afford to wait until they become profitable.

The issues on legality are also likely to motivate foreign VCs to prefer an IPO outside China. Cumming et al. (2006) find that IPO exits by VC-backed firms are more likely to occur in countries with a higher quality of legal system. Zhang et al. (2007) note that foreign VCs that invest in Chinese firms prefer 'offshore domiciling' in countries where the legal jurisdiction is more predictable.

Finally, Chinese equity markets do not rank highly in terms of the quality of their trading rules and liquidity. Cumming et al. (2011) provide rankings of stock exchanges in terms of trading rules. The Shenzhen and Shanghai stock exchanges perform worse than NASDAQ and NYSE with regard to price manipulation, market manipulation, and insider trading rules. Cumming et al. find that detailed trading rules improve liquidity. Especially, price manipulation and insider trading rules have positive impacts on volatility and bid-ask spreads

[9]The information is obtained from the Initial Listing Guide, which is downloaded from https://listingcenter.nasdaqomx.com/Home.aspx.

respectively. Clearly, VCs would prefer an exit from their investments in a liquid market. As a result, foreign VCs might find an IPO on a liquid US exchange more attractive than on ChiNext.

To sum up, the discussion above provides several reasons why foreign VC-backed technology firms might prefer to avoid an IPO on ChiNext: (i) long queues for going public, (ii) political bias in IPO approvals, (ii) long lock-up periods, (iii) issues with the repatriation of profits, (iv) strict restrictions on profitability, (v) lower quality of the legal system, (vi) underdeveloped trading rules and issues with liquidity. Therefore, we hypothesize that a Chinese technology firm's decision to go public in the US will depend on whether or not the firm is backed by a foreign VC firm.

> H3a: Foreign venture capital backing is a major determinant of a Chinese technology firm's decision to go public in the US, rather than on ChiNext.

We should emphasize that foreign VC backing *per se* does not cause Chinese technology firms to go public in the US. Instead, the underlying reasons itemized above cause foreign VCs that desire a successful exit to select the firms that have the potential to go public in the US and to put an effort in helping such firms conduct an IPO on NASDAQ/NYSE.

H3a can be tested directly by examining whether the Chinese technology firms that go public in the US are backed by foreign VCs or not. Furthermore, if Chinese technology firms are going public in the US to provide foreign VCs and other owners with a successful exit, it is likely that the IPOs of these firms will feature secondary shares offered by existing shareholders and/or the firms will sell secondary shares in an SEO soon after their IPOs. Moreover, we anticipate that at least some of these firms will not meet the listing requirements of ChiNext, particularly those regarding profitability. In general, we expect that the average profitability will be lower for the firms that go public in the US, since they do not have to be profitable at the time of their IPOs, whereas those that go public on ChiNext do.

> H3b: There is a negative relationship between profitability and going public in the US rather than on ChiNext.

Furthermore, the literature documents that larger firms are more likely to list shares abroad (Saudagaran, 1988, Pagano et al., 2002). If, as argued by Zhang et al. (2007), foreign VCs target Chinese firms that have the potential to go public abroad, we expect the target firms to be large, since smaller firms might not be able to undertake the onerous task of conducting an IPO in the US.

> H3c: There is a positive relationship between size and going public in the US rather than on ChiNext.

In summary, based on the evidence offered by the literature, we hypothesize that foreign sales, issuing costs (underpricing and gross spread), and foreign VC backing can potentially explain why some Chinese technology firms prefer US exchanges over ChiNext as their IPO location. We expect pre-IPO firm characteristics of the two group of firms to differ substantially, especially in terms of size and profitability. In the next section, we test these hypotheses after first describing the data.

3 Empirical tests

3.1 Data

The dataset contains Chinese firms that went public on ChiNext and those that conducted an IPO in the US by issuing ADR shares between October 2009 (when ChiNext was launched) and April 2012. The IPO data is obtained from the SDC database. The variables include name, ticker, listing date, foundation date, offer price, number of primary shares, number of secondary shares, number of shares outstanding before the IPO, gross proceeds, gross spread, Standard Industry Classification (SIC) code, and a categorical macro-industry variable. We use the data provided on the website of the SZSE to cross-check the listing date and offer price of firms that went public on ChiNext. In cases of disagreement (three cases regarding the listing date, and two cases regarding the offer price) we use the data provided by the stock exchange. Similarly, the data provided on the website of NASDAQ is used to cross-check the listing date and offer price of firms that went public in the US. We find no cases of

disagreement.

Apart from the IPO data collected from the SDC, we obtain data on pre-IPO firm characteristics, which is needed when testing the hypotheses discussed in Section 2. The data on financials is obtained from Compustat for the US subsample and Datastream for the ChiNext subsample.

The initial sample includes 376 firms, 311 of which went public on ChiNext and the remaining 65 on NASDAQ or the NYSE. We classify an IPO firm as a technology firm if one of the following two conditions hold: (1) the firm is identified as a technology firm according to the criteria of Loughran and Ritter (2004); (2) the firm's macro industry is high-technology according to the SDC. Loughran and Ritter define technology firms as those that are operating in one of the following industries (4-digit SIC codes in parentheses): computer hardware (3571, 3572, 3575, 3577, 3578), communications equipment (3661, 3663, 3669), electronics (3671, 3672, 3674, 3675, 3677, 3678, 3679), navigation equipment (3812), measuring and controlling devices (3823, 3825, 3826, 3827, 3829), medical instruments (3841, 3845), telephone equipment (4812, 4813), communications services (4899), and software (7371, 7372, 7373, 7374, 7375, 7378, 7379). The macro industry variable provided by the SDC is based on a Thomson Reuters proprietary classification scheme that uses SIC codes, North American Industry Classification System (NAICS) codes and overall company business description.

We examine our initial sample of 376 firms and identify 150 technology firms, which constitute our final sample. 128 firms in our final sample went public on ChiNext and 22 firms in the US. Descriptive statistics are provided in Table 1. All of the 22 IPOs in the US subsample and approximately 75% of the 128 IPOs in the ChiNext subsample took place between January 2010 and December 2011. Average proceeds are $134 million and $100 million for the US and ChiNext subsamples respectively. Univariate analysis of pre-IPO profitability and size provide the first evidence in support of hypotheses H3b and H3c respectively. A Wilcoxon-Mann-Whitney test rejects that the distribution of pre-IPO profitability is the same across the US and ChiNext subsamples at the 1% significance level. Chinese technology firms that are not profitable at the time when they desire an IPO prefer an issue in the US, since they

cannot list shares on ChiNext until they become profitable. Furthermore, the statistics in Panel C suggest that among the Chinese firms that go public in the US, technology firms are less profitable. This is consistent with our proposition that meeting the profitability requirement is particularly challenging for technology firms and that ChiNext will miss out on some technology IPOs as a result. Finally, in Panel D, we observe that Chinese technology firms that go public on ChiNext are smaller compared to those that undertake an IPO in either US exchange (a Wilcoxon-Mann-Whitney test rejects equality of distributions at the 1% significance level), which is consistent with the prior literature. We investigate further the significance of profitability and size as determinants of IPO location in a multivariate setting in Section 3.4.1.

[Insert Table 1 about here]

3.2 Product market considerations of going public in the US

A frequently cited reason for listing shares abroad is that the issuing firm either has a strong presence in foreign markets (especially in the country in which it chooses to list shares) and benefits from its product market reputation, or aims to capitalize on the visibility brought by the IPO to increase its foreign sales. Therefore, some of the Chinese technology firms might prefer the US exchanges over ChiNext, because they either generate a large fraction of their sales abroad (particularly in the US), or aim to increase the sales of their products or services in foreign markets. In Section 2, these arguments are formalized as H1a and H1b and the purpose of this subsection is to test these two hypotheses.

We manually collect data on the geographical breakdown of sales of sample firms that conducted an IPO in the US from 20-F reports filed with the Securities and Exchange Commission. We denote the fiscal year in which the IPO took place as $y = 0$. Thereafter, $y = 1$ ($y = -1$) is the succeeding (preceding) fiscal year, and so on. The data spans up to three years before and two years after the IPO. Using this data we calculate the percentage of domestic sales. Some issuers do not report a breakdown when their operations are mainly domestic. For instance, the 20-F report filed by Kingtone Wirelessinfo Solution Holding Ltd on January

20, 2011 states (on page F-15) that: 'as the Company's long-lived assets are substantially all located in the PRC and substantially all the Company's revenues are derived from within the PRC, no geographical segments are presented.'[10] In these cases domestic sales are assumed to represent 100% of total sales.

We also calculate a Herfindahl index (for each firm and year) to measure the geographic concentration of sales. In particular, after expressing the sales figure from each country (or region) as a fraction of total sales, we square the fractions and then sum them. This yields a value between 0 and 1. Higher values indicate more concentration. If domestic sales account for 100% of total sales, the index has a value equal to 1.

Table 2 presents the relevant statistics and significance tests. On average, domestic sales account for no less than 80% of total sales in any of the years surrounding the IPO. The median firm generates all of its sales domestically between $y = -3$ and $y = 2$. For the vast majority of firms, domestic sales account for at least 50% of total sales. The average levels of Herfindahl indices are quite high across the years, which indicates geographical concentration of sales. This is not surprising given that for most firms the bulk of sales is generated domestically. This provides evidence against H1a, since the typical Chinese technology firm that goes public in the US has either little or no foreign sales at the time of its IPO.

[Insert Table 2 about here]

We also test for the significance of year-to-year changes in the percentage of domestic sales and the Herfindahl index. The p-values of signed-rank tests indicate that the percentage of domestic sales do not change significantly around the IPO year.[11] Conversely, we observe a drop in the Herfindahl index between $y = -1$ and $y = 0$ that is significant at the 5% level, however the drop is too small to have any economic significance.

Finally, we define the domestic sales percentage of firm j in $y = i$ as $DS_j(y = i)$ and regress $DS_j(y = i)$ on $DS_j(y = -3)$, where $i > -3$:

$$DS_j(y = i) = \alpha + \beta DS_j(y = -3) + \epsilon_j \qquad i > -3 \tag{1}$$

[10] PRC stands for the People's Republic of China.

[11] We have also compared $y = -3$ with $y = 1$ and $y = -1$ with $y = 1$. The differences are still not significant.

If going public in the US has no significant impact on the percentage of sales Chinese technology firms generate domestically, we would expect $\alpha = 0$ and $\beta = 1$, such that the domestic sales percentage three years before the IPO is a useful forecast of the domestic sales percentage in subsequent years.[12] On the other hand, if Chinese technology firms are going public in the US to increase their foreign sales, the joint hypothesis that $\alpha = 0$ and $\beta = 1$ should be rejected. The regression output in Panel B of Table 2 shows that the domestic sales percentage three years before the IPO is a significant determinant of the domestic sales percentage up to two years after the IPO. Furthermore, in all five cases, we fail to reject that $\alpha = 0$ and $\beta = 1$. Therefore, domestic and foreign sales percentages remain more or less the same up to three years after the IPO, which is evidence against H1b.

Taken together, the evidence presented in Table 2 suggests that the IPOs of Chinese technology firms in the US (during the period when ChiNext has been active) are not driven by product market considerations. Firms that prefer US exchanges mostly operate in China where their long-lived assets are allocated. They do not experience an economically significant shift in their foreign sales following their IPOs.

3.3 Costs of going public on ChiNext versus NASDAQ/NYSE

A stylized fact about IPO markets is that IPOs yield positive initial returns on average (see e.g., Loughran and Ritter, 2004, Ritter and Welch, 2002 and Ibbotson et al., 1994 for the US evidence, and Loughran et al., 1994 and Boulton et al., 2011 for international evidence). Initial return is typically measured as the percentage change between the offer price and the closing price on the first day of trading. In the US, the market return between the offering and listing dates is close to zero. Consequently, initial returns are not adjusted. However, there is a long time gap between the offering and listing dates in Chinese markets (the median time gap is 14 calendar days in our sample of ChiNext IPOs). Therefore, papers that study underpricing of Chinese IPOs normally adjust initial returns by subtracting the market return between the offering and listing dates (see e.g., Chan et al., 2004). We follow this practice

[12] In essence, this is similar to a Mincer-Zarnowitz-type regression (Mincer and Zarnowitz, 1969) used in the forecasting literature.

and use the Shenzhen A-Share stock price index to estimate market returns.

High levels of initial returns is the norm rather than the exception for firms that go public in China. Initial returns exceeding 50% are not uncommon. In our sample, about a quarter of the 128 IPOs on ChiNext yielded an initial return of at least 50%. The average level of initial returns is much lower in the US (17.9% between 1980 and 2012 according to the latest statistics on Jay Ritter's homepage). To the extent that initial returns proxy for underpricing, which is an indirect cost of going public, Chinese firms will have a motivation to go public in the US. Therefore, we investigate whether the sample firms that preferred an IPO on NASDAQ or NYSE did so in order to avoid suffering from heavy underpricing.

We report underpricing levels of firms that went public on ChiNext and NASDAQ/NYSE in Column (i) of Panel A in Table 3. Underpricing UP is defined as the initial return between the IPO date and the listing date for the IPOs in the US subsample and as the initial return between the IPO date and the listing date minus the market return over the same period for the IPOs in the ChiNext subsample. Both mean and median underpricing are lower for firms that go public in the US, and the difference in medians is statistically significant at the 10% level. At first sight these figures seem to support H2a, such that a motivation for Chinese technology firms to go public in the US rather on ChiNext is the prospect of lower underpricing. However, such a comparison of means and medians ignores any likely heterogeneity between the two subsamples.

[Insert Table 3 about here]

3.3.1 Propensity score matching

We address the issue of heterogeneity by matching firms that go public in the US with those that conduct an IPO on ChiNext. In particular, we use the following variables representing pre-IPO firm characteristics to estimate propensity scores: $ln(Sales)$ (natural logarithm of sales), $Debt$ (long-term debt over total assets), $Profit$ (profit margin i.e. net income over sales), $Intan$ (intangible assets over total assets), $CapX$ (capital expenditure over total as-

sets), and T/O (asset turnover i.e. sales over total assets).[13] All variables are measured at the end of the fiscal year before the IPO took place (i.e., $y = -1$). $Sales$ is measured in millions of US dollars. $Debt$, $Profit$, $Intan$, $CapX$, and T/O are reported in percentage points.

After estimating propensity scores, we employ a nearest neighbor (N.N.) matching algorithm and match firms in the US subsample with firms that have the closest propensity score in the ChiNext subsample. The statistics in Column (ii) of panel A in Table 3 indicate that the statistically and economically significant gap in median underpricing observed in Column (i) disappears after the N.N. matching. This suggests that H2a is no longer supported once the heterogeneity between the firms in the US and ChiNext subsamples is accounted for. Thus, Chinese technology firms that go public in the US are not less underpriced than *comparable* firms that choose to go public on ChiNext. Lower underpricing does therefore not seem to be the motivation for these firms to prefer a listing in the US.

We try alternative propensity score matching algorithms to test whether the findings based on the N.N. matching are robust. We begin with caliper matching, such that a firm in the US subsample is matched with up to five firms in the ChiNext subsample that have a propensity score within a caliper of 0.01. Kernel matching is employed next. More specifically, an IPO in the US subsample is matched with all IPOs in the ChiNext subsample, but control IPOs with closer propensity scores are given higher weights.[14] Radius matching is also used, such that all IPOs in the ChiNext subsample that are within a caliper 0.01 are used as control IPOs. Finally, we employ stratification matching with five strata. The sample is divided into five blocks on the basis of propensity scores such that within each block the average propensity score is similar between the US and ChiNext subsamples. The differences in underpricing are measured within each block, and a weighted average of these differences is taken as the average treatment effect on the treated (ATT). Mean and median underpricing figures based on caliper, kernel, and radius matching are reported in Panel A of Table 3 alongside N.N. matching. The ATT estimate using stratification matching is 13.607. This suggests higher

[13] See Rosenbaum and Rubin (1983) for a discussion on how matching based on propensity scores can remove bias due to observed covariates.

[14] We use an Epanechnikov kernel, but the results are not sensitive to this choice and remain the same if a biweight, triweight, or Gaussian kernel is used.

underpricing for the US subsample, but the estimate is not statistically significant (the t value is 0.837). As a result, regardless of the propensity score matching algorithm used, there is no significant difference in mean or median underpricing between the US and ChiNext subsamples once we control for the differences in pre-IPO firm characteristics.

As a final robustness test, we focus on the subsample period between January 2010 and December 2011, since there are no IPOs in the US subsample between October and December 2009 and between January 2012 and April 2012. The results are reported across Columns (vi)-(x) of Panel A in Table 3. As before, the median underpricing is significantly lower in the US subsample, but once we account for the heterogeneity between pre-IPO characteristics of the US and ChiNext IPOs, no significant difference remains in mean or median underpricing. Overall, the results presented in panel A do not support H2a.

Apart from underpricing, which is an indirect cost, there are direct costs of going public. Lee et al. (1996) estimate that the direct costs average 11% of the proceeds in the US. The largest component of the direct cost is gross spread. In the US, gross spread is exactly 7% for most of the IPOs (Chen and Ritter, 2000, Abrahamson et al., 2011). Since ChiNext is a new market, it is possible that underwriters charge higher fees to compensate themselves for the risk of taking firms in a new market with no track record, or to exploit any bargaining power they might have until the market becomes more competitive. Higher direct costs of going public on ChiNext might induce Chinese technology firms to conduct an IPO in the US.

Figure 1 shows the distribution of gross spread for the firms in our sample. Not surprisingly, gross spread is tightly centered at 7% for the firms that go public in the US, whereas the distribution is dispersed for the IPOs on ChiNext. The mean and median of the two distributions are compared in Panel B of Table 3. The figures indicate that the gross spread is actually slightly higher for a firm that goes public in the US. Especially for the subsample period between January 2010 and December 2011, the difference in means and the difference in medians are both statistically significant when kernel or radius matching is employed. Therefore, a Chinese technology firm cannot expect to experience a lower gross spread by going public in the US. This constitutes evidence against H2b.

[Insert Figure 1 about here]

3.3.2 Endogenous treatment effects models

Propensity score matching techniques are very useful in eliminating potential biases caused by heterogeneity in observable variables across the US and ChiNext subsamples. However, if part of a firm's quality is not observed and is causing a Chinese technology firm to go public in the US and at the same affecting the underpricing of its shares, then there may be a hidden bias in the results presented in Table 3.[15]

We investigate the robustness of the findings in Table 3 by estimating regression models that explicitly model a Chinese technology firm's choice of going public in the US. In particular, we regress underpricing or gross spread on its determinants and account for the endogeneity of the choice of IPO location (NASDAQ/NYSE versus ChiNext). We follow the approach taken in prior literature in choosing the determinants of underpricing or gross spread.

The variables we use to explain underpricing UP are sales $Sales$, firm age Age (the difference between the IPO year and the year the firm was founded), the ratio of retained shares to the public float $Overhang$, market returns over the 30-day period before the IPO $Market$ (a value-weighted index of NYSE, AMEX, and NASDAQ stocks and Shenzhen A-Share stock price index are used for the US and ChiNext subsamples respectively), and a dummy variable US which is equal to one if a Chinese technology firm went public in the US. UP is positively correlated with uncertainty and many papers (see e.g., Loughran and Ritter, 2004 and Lowry et al., 2010) use $ln(Sales)$, $ln(1+Age)$, or both as proxies for uncertainty such that larger and older firms are expected to have lower levels of underpricing. While shares sold in an IPO can be subject to underpricing, those retained by pre-IPO owners are not (Habib and Ljungqvist, 2001, Bradley and Jordan, 2002). Therefore, a negative correlation is expected between underpricing and $Overhang$. There is also evidence in prior literature that underpricing is related to pre-IPO market conditions. Loughran and Ritter (2002) document

[15]Technically, there is no hidden bias when the assignment to treatment, which is going public in the US in our context, is ignorable à la Rubin (1978), given the pre-IPO firm characteristics used in our matching models.

a positive relationship between market movements in the three weeks before an IPO and initial returns (see also Derrien and Kecskés, 2007). Thus, we expect to observe a positive relationship between $Market$ and underpricing. As a result, our ordinary least squares (OLS) regression model for underpricing is:

$$UP_j = u_0 + u_1 US_j + u_2 ln(Sales)_j + u_3 ln(1 + Age)_j + u_4 Overhang_j + u_5 Market_j + e_j \quad (2)$$

However, if unobserved factors that cause Chinese technology firms to go public in the US simultaneously affect the underpricing of their IPO shares, US is an endogenous variable in Equation (2). We account for this by running an endogenous treatment effects model.[16] In particular, we model a Chinese technology firm's decision to go public in the US by using covariates that are expected to explain this choice.[17]

$$US_j = \begin{cases} 1, & \text{if} \quad US_j^* = w_0 + w_1 \ln(Sales)_j + w_2 Profit_j + w_3 Debt_j \\ & \qquad\qquad + w_4 CapX_j + w_5 Intan_j + w_5 T/O_j + z_j > 0 \\ 0, & \text{otherwise} \end{cases} \quad (3)$$

where e_j and z_j are bivariate normal and their correlation coefficient is ρ (see Maddala, 1983 for further details). The endogenous treatment effects model is estimated using full maximum likelihood. It is useful to test whether $\rho = 0$. If $\rho \neq 0$, then the error terms of Equations (2) and (3) are correlated and correcting for the endogeneity of US in Equation (2) is necessary.

Our findings are presented in Panel A of Table 4. We report the results of OLS models based on Equation (2) as well as endogenous treatment effects models based on Equations (2) and (3) to allow for comparisons. Model (i) is the baseline OLS model. While all the firms in our sample are technology firms, they still belong to different industries within the technology

[16] Derrien and Kecskés (2007) use the same modeling framework when measuring how much an IPO's underpricing is affected by a firm's decision to list shares before its IPO. Johan (2010) uses this approach when investigating the relationship between underpricing and a firm's decision to go public on a senior rather than a junior market.

[17] This section focuses on the impact of IPO location on underpricing and gross spread. Therefore, we defer the detailed discussion of how we choose the covariates that determine the IPO location until Section 3.4.1, which investigates whether a Chinese technology firm's choice of IPO location can be predicted on the basis of its pre-IPO firm characteristics.

sector and the level of underpricing can vary across industries. Therefore, Model (ii) adds industry fixed effects using 3-digit SIC codes. Model (iii) adds year fixed effects to account for the cyclical nature of IPO underpricing (Loughran and Ritter, 2004). Finally, Model (iv) focuses on the subsample period between January 2010 and December 2011. The coefficient of US is negative, but not statistically significant across Models (i)-(iv). This finding remains robust across Models (vi)-(viii), which are endogenous treatment effects models.[18] There is no evidence that Chinese technology firms are significantly less underpriced in the US.

[Insert Table 4 about here]

What remains to be done is to use OLS and endogenous treatment effects models to investigate whether Chinese technology firms pay a lower *Spread* (gross spread as percentage of gross proceeds) in the US. Prior literature (see e.g., Torstila, 2003) documents that a key determinant of gross spread is the amount of proceeds raised in an IPO, such that there are economies of scale in underwriting fees. Furthermore, James (1992) and Beatty and Welch (1996) consider the reciprocal of the offer price OP as an explanatory variable, since it proxies for risk that can impact gross spread.[19] As a result, our ordinary least squares (OLS) regression model for gross spread is:

$$Spread_j = s_0 + s_1 US_j + s_2 ln(Proceeds)_j + s_3(1/OP_j) + v_j \tag{4}$$

We also consider an endogenous treatment effects model that takes into account the potential endogeneity of US in Equation (4). In particular, we model US in the same manner as in Equation (3). Our findings are shown in Panel B of Table 4. Across both OLS models (Models (i)-(iv)) and endogenous treatment effects models (Models (v)-(viii)), the main variable of interest US has a positive coefficient. In Models (v)-(viii), we observe that ρ is significantly different from zero. This suggests that it is appropriate to correct for the endogeneity of US in Equation (4). We observe that the coefficient of US is higher in Models (v)-(viii) in com-

[18] We fail to reject that $\rho = 0$ in Models (vi)-(viii), which provides no evidence that unobservable factors that cause Chinese technology firms to go public in the US also affect the underpricing of their IPOs.

[19] For ChiNext IPOs, we obtain the offer price converted into US dollars from the SDC.

parison with Models (i)-(iv). It is statistically significant at the 1% level in Models (v)-(vii) and at the 5% level in Model (viii). These results imply that Chinese technology firms cannot lower the gross spread of their IPOs by going public in the US. In fact, the evidence suggests the opposite, such that firms that choose to go public on NASDAQ/NYSE bear a higher gross spread.

In summary, the results presented in Table 4 are highly consistent with those in Table 3. They give no indication that it is cheaper (in terms of issuing costs) for a Chinese technology firm to go public in the US. These findings do not support H2a and H2b as the main reasons why some Chinese technology firms prefer US exchanges over ChiNext for IPOs.

3.4 Foreign VC backing as a driver of going public outside China

The evidence provided so far in the paper suggests that product market considerations and issuing costs (underpricing and underwriter fees) fail to explain why some Chinese technology firms go public in the US, while others conduct IPOs on ChiNext. Section 2 offers several reasons why the choice of IPO location might be primarily influenced by the presence of foreign VC backing. This subsection investigates whether this is the case for Chinese technology firms that went public in the US.

We examine the IPO prospectuses of the sample firms that went public in the US and investigate whether they are backed by foreign VC firms. We find that 21 out of the 22 Chinese technology firms that went public in the US are backed by foreign VCs, and only a single firm has no foreign VC backing. In total, 20 out of the 21 foreign VC-backed firms have pre-IPO issues of (convertible) preferred stock, which is common in VC contracting (Kaplan and Strömberg, 2003). Table 5 provides statistics on the amount of proceeds the firms raise in these issues. The figures are in millions of US dollars and include proceeds raised by the exercise of warrants. The majority of firms have issues of Series A and B preferred stock, and more than half have issues of Series C preferred stock as well. On average, the firms raise about $78 million in total before going public in the US. The figure rises to $86 million if two firms that did not issue preferred stock are excluded. This constitutes a significant amount of

investment by foreign VC firms, which explains why a successful IPO exit is crucial for them.

[Insert Table 5 about here]

If a successful exit motivates the IPOs of Chinese technology firms in the US, it should be common for these firms to offer shares owned by existing shareholders in their IPOs or follow-up SEOs. The figures reported in Table 6 show that 14 out of 22 firms offered secondary shares when they went public in the US. The secondary shares represented about 22% of all shares offered. Furthermore, six firms filed for follow-up offerings within a year of going public. The average time between the IPO and the filing for a follow-up offering was about six months. All of the filings included secondary shares, which represented on average more than 70% of all shares offered.

[Insert Table 6 about here]

We note that the figures in Table 6 are noisy estimates of the liquidation of ownership by foreign VCs, since secondary shares can also be offered by other pre-IPO owners. Furthermore, VCs can exit gradually over a longer term and via distributions to investors in the fund (Gompers and Lerner, 1998). Nonetheless, the substantial amount of secondary shares offered in both IPOs and follow-up SEOs underscores the fact that foreign VCs are, to some extent, motivated by a successful exit when taking their firms public in the US.

The fact that Chinese technology firms in the US subsample are foreign VC backed does not preclude the possibility that those in the ChiNext subsample are also mostly foreign VC backed. If foreign VC backing is as common in the ChiNext subsample as it is in the US subsample, then clearly foreign VC firms are not as particular about IPO location as argued by H3a. To investigate this issue, we examine IPO prospectuses of firms that went public on ChiNext and search for evidence of foreign VC funding. Both technology and non-technology firms are included in our analysis to have a broader sense of VC exits on ChiNext. We manually search prospectuses to find the pre-IPO ownership information of ChiNext IPOs that took place between October 2009 and December 2010. A firm is considered as (foreign)

VC funded if its pre-IPO owners include at least one (foreign) fund. A domestic (foreign) fund raises all (part) of its capital from sources inside (outside) China.[20]

There are 163 IPOs during the period we examine, representing more than half of all ChiNext IPOs in the sample (see Panel A in Table 1). We identify 133 funds, which exit 191 times in total via an IPO on ChiNext. Therefore, a fund exits on average 1.44 times on ChiNext during a 15 month period. The median fund exits only once over the same period. These figures are quite low and suggest that funds (both domestic and foreign) do not frequently exit on ChiNext.[21] Nevertheless, there are outliers, and six funds exit four or more times, representing more than 20% of all exits. However, all of these funds are domestic.[22] In fact, we identify only seven funds as foreign, while the remaining 126 funds are domestic.

Table 7 provides further information about VC exits on ChiNext. Overall, more than 60% of technology firms and approximately 55% of non-technology firms that go public on ChiNext between October 2009 and December 2010 are backed by at least one fund. The number of funds backing an IPO is typically low and almost three quarters of such IPOs are backed by no more than two funds. Of the 163 ChiNext IPO firms we examine, less than 4% receive backing from a foreign fund. Conditional on receiving backing from a fund, the percentage of funds that are foreign VC backed is 6.38%. The figures are higher for technology firms, but pale in comparison to the rate of foreign VC backing in the US subsample. As discussed earlier in this subsection, 21 of the 22 Chinese technology firms in the US subsample are foreign VC backed, whereas we closely examine 63 Chinese technology firms that are in the ChiNext subsample and find that only four of them have foreign VC backing.

[Insert Table 7 about here]

[20] Funds are classified as domestic or foreign according to the following procedure. When we identify a fund among the pre-IPO owners, we further search the IPO prospectus, since it contains some information about the fund. If this information is insufficient to establish the fund's sources of capital, we search for the fund's website and seek information there. If we still do not have enough information to make a decision, then we search online directories that provide information about fund raising events and make a decision.

[21] In fact, the figures would be even lower if we could account for the VC funds that never had an exit on ChiNext.

[22] They are, namely, China Science and Merchants Capital Management Co Ltd, Guosen Hongsheng Venture Investment Co Ltd, Shenzhen Capital Group Co Ltd, Shenzhen CDF-Capital Co Ltd, Shenzhen Cowin Venture Capital Investments Ltd, and Shenzhen Fortune Venture Capital Co Ltd

Overall, the findings discussed here suggest that IPOs of foreign VC-backed Chinese technology firms are heavily clustered in the US. This is consistent with H3a, such that foreign VC-backed Chinese technology firms tend to avoid an exit on ChiNext and prefer IPOs on NASDAQ/NYSE. Given the strong evidence for H3a in this subsection and against H1a, H1b, H2a, and H2b in Sections 3.2 and 3.3, we conclude that foreign VC backing is a decisive factor why some Chinese technology firms choose NASDAQ/NYSE as their IPO destination.

3.4.1 Predicting IPO location on the basis of pre-IPO firm characteristics

The findings in Section 3.4 that foreign VCs are reluctant to exit via an IPO on ChiNext imply that foreign VCs may target entrepreneurial firms that have the potential to go public outside China as argued by Zhang et al. (2007). In particular, we expect them to avoid small firms that have no chance of undertaking an IPO on a US exchange. Furthermore, profitability requirements for listing shares on ChiNext (while more relaxed compared to the SME board) are still strict for technology firms. In the US, many such firms go public with the prospect of profitability, but without being profitable at the time of their IPOs (Jain et al., 2008). Consequently, we expect a significant difference in profitability in addition to size. Moreover, if differences in listing and legal standards act as screening tools (Johan, 2010, Cumming and Johan, 2013), then firms in the US and ChiNext subsamples may differ in other pre-IPO firm characteristics that are informative about firm quality.

We compare pre-IPO characteristics of the firms in our US and ChiNext subsamples in Panel A of Table 8. Variables are as defined in Section 3.3, with the exception of *Assets* (total assets in millions of US dollars). As predicted, firms in the US subsample are much larger. Specifically, they are almost three times larger in terms of *Assets* and two times larger in terms of *Sales*. Additionally, there is a large difference in profit margins. In fact, the mean value is negative for the US subsample. In general, the average profit margin is much higher in the ChiNext subsample due to firms having negative profit margins in the US subsample. In terms of other characteristics, the median long-term debt is close to zero in both subsamples, however the mean is higher for the US subsample. The subsamples also differ in terms of

asset turnover and capital expenditures, but not in terms of intangibility.

[Insert Table 8 about here]

Overall, the statistics in Panel A indicate that there is a marked heterogeneity between pre-IPO characteristics of Chinese technology firms that went public in the US and those that conducted an IPO on ChiNext. This implies a separating equilibrium in which a certain type of Chinese technology firm is much more likely to go public in the US rather than on ChiNext. To test this conjecture, we estimate the following logistic regression model:

$$Pr(US = 1) = F(\beta_0 + \beta_1 Size + \beta_2 Profit + \beta_3 Debt + \beta_4 CapX + \beta_5 Intan + \beta_6 T/O) \quad (5)$$

where US (originally defined in Section 3.3.2) is a binary variable equal to one if the IPO was on NASDAQ/NYSE and 0 if it was on ChiNext, $Size$ is equal to either $ln(Sales)$ or $ln(Assets)$, and $F(x) = e^z/(1 + e^z)$ is the cumulative logistic distribution. H3b and H3c predict that $\beta_1 > 0$ and $\beta_2 < 0$ respectively. Specifically, larger Chinese technology firms are more likely to go public in the US, but more profitable ones are more likely to go public on ChiNext.

The regression output is presented in Panel B of Table 8. The results support H3b and H3c, such that the coefficients of size and profitability are both significant and have signs as expected. Furthermore, all models have considerable explanatory power with R-squared values in the region of 0.5. Figure 2 plots $Sensitivity$ (true positive rate) against 1 - $Specificity$ (false positive rate) for Models (i) and (iii) in Table 8. $Sensitivity$ captures a model's ability to classify sample firms that went public in the US correctly, whereas 1 - $Specificity$ measures the model's rate of error when it predicts that a sample firm is in the US subsample, while it is in fact in the ChiNext subsample. The plots in Figure 2 suggest that both models achieve a level of $Sensitivity$ as high as about 0.9, with 1 - $Specificity$ as low as almost 0.1. For both models, the area under the receiver operating characteristics (ROC) curve exceeds 0.9.[23]

[23]The area under the ROC curve has a minimum value of 0.5 when a model has no discriminating power. It attains a maximum value of one when the model correctly identifies all true positives and negatives.

Therefore, we conclude that these models may be useful in predicting a Chinese technology firm's IPO location based on its characteristics before going public.

[Insert Figure 2 about here]

Figure 3, which plots the distribution of the propensity scores for Models (i) and (iii) in Table 8, provides further evidence regarding the major differences between the pre-IPO characteristics of firms that went public in the US and those that went public on ChiNext. The majority of firms that went public on ChiNext have very low propensity scores. In other words, it is easy to predict their choice of IPO location based on their pre-IPO characteristics. Moreover, approximately half of the firms that went public in the US are off the common support, meaning there is no comparable firm in the ChiNext sample. This is consistent with the idea of a separating equilibrium. Together with the results presented in Panel B of Table 8, the separation between the two groups of firms observed in Figure 3 imply that firms which go public in the US are both much larger than their counterparts which go public on ChiNext and also less likely to be profitable. These findings are consistent with H3b and H3c.

[Insert Figure 3 about here]

4 Discussion and conclusion

Some Chinese technology firms choose to go public on NASDAQ or the NYSE, and not on ChiNext, a domestic exchange that is designed to attract technology firms. Their choice becomes puzzling given our findings that these firms mainly operate in China before and after their IPOs, they do not experience lower underpricing by going public in the US, and they pay a higher gross spread as a result of their choice.

The puzzle is resolved when we compare the pre-IPO ownership structure between the firms that are in the US and ChiNext subsamples. VC backing is common in both subsamples, but while all except one of the firms in the US subsample are backed by foreign VCs, the rate of foreign VC backing is very low in the ChiNext subsample. Therefore, foreign VC backing is a decisive factor behind the choice of IPO location. We also show that it is

not difficult to predict a Chinese technology firm's IPO location on the basis of its pre-IPO characteristics. In particular, size and profitability are both significant determinants of IPO location. Collectively, the findings imply a separating equilibrium such that small but profitable Chinese technology firms tend to go public on ChiNext, while large and foreign VC-backed ones tend to prefer an IPO in the US.

These findings have broader implications for entrepreneurial finance in China. Black and Gilson (1998) argue that the VC industry of a country flourishes in the presence of well functioning stock markets that provide VC firms with opportunities to exit successful investments via IPOs. For many years, the development of the VC industry in China was slowed by the near impossible task of taking entrepreneurial firms public on the main boards in Shanghai and Shenzhen. The SME board launched in 2004 helped little in resolving this issue. It was with high expectations that ChiNext, a NASDAQ-style board, commenced operations in late 2009.

This paper provides the first evaluation of ChiNext's potential to attract IPOs of Chinese technology firms. It concludes that ChiNext has been only partially successful in its mission, since it is not yet an attractive IPO location for entrepreneurial technology firms backed by foreign VCs. There are clear policy implications that follow. There is currently a debate in China about improving the transparency of the IPO approval system. In February 2012, the CSRC published a full list of the 515 IPO applicants for the first time. Of these, 220 applicants were waiting to go public on ChiNext. There is an effort to move away from the current 'approval-based' system to a 'market-oriented' and 'disclosure-based' system (see e.g., "In China, debate on IPO disclosure", The Wall Street Journal Online, March 8, 2012). Our findings imply that such a move could increase the number of technology firms that go public on ChiNext. Foreign VC-backed technology firms that marginally prefer conducting IPOs in the US may switch preferences and apply to go public on ChiNext, if they believe that under the market-oriented system their applications will not be discriminated against in favor of domestic VC-backed firms.

A further policy implication of our findings concerns market liquidity. We find that Chinese

technology firms that go public in the US tend to sell secondary shares in their IPOs and follow-up SEOs. This may suggest that foreign VCs prefer conducting IPOs in the US so as to exit their investments in a liquid market. Therefore, regulators can transform ChiNext into a more attractive IPO location for foreign VCs by taking measures aimed at improving liquidity.

We find that profitability is a key determinant of the IPO location. ChiNext requires issuers to be profitable at the time of their IPOs. This is a strict requirement for entrepreneurial technology firms. Chinese technology firms can go public in the US before being profitable and this in indeed the case for some of such firms in the sample. Foreign VCs may be reluctant delay their exit until the firm becomes profitable and, thus, be deterred from going public on ChiNext. As a result, relaxing the profitability requirement could be an incentive for foreign VCs to pursue an IPO within China.

There are a number of directions for future research concerning the IPO location choice of Chinese technology firms. In this paper, we do not compare the post-IPO performance between the US and ChiNext subsamples. In order to evaluate post-IPO share and operating performances, it would be ideal to have data for up to five years following the IPO. This data has not yet become available, since many firms listed on ChiNext have been public less than three years. It would be interesting to make this comparison when data becomes available, since we could evaluate whether there is any difference in firm quality that is revealed ex post. It would also be revealing to investigate the factors that determine whether an entrepreneurial firm receives foreign, domestic, or no VC financing.

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Table 1: Descriptive statistics

The sample includes Chinese firms that went public on ChiNext or NASDAQ/NYSE between October 2009 and April 2012. A firm is classified as a technology firm if its SIC code is in the list used by Loughran and Ritter (2004) to identify tech stocks, or it is classified as a high-technology firm by the SDC. Average gross proceeds are reported in millions of US dollars. Pre-IPO profitability is net income as a percentage of sales in the final fiscal year before the IPO. Pre-IPO size is total assets in millions of US dollars in the final fiscal year before the IPO.

	Technology		Non-technology		All	
	ChiNext	US	ChiNext	US	ChiNext	US
Panel A: Number of IPOs						
Oct 2009 - Dec 2009	15	0	27	10	42	10
Jan 2010 - Dec 2010	46	15	75	25	121	40
Jan 2011 - Dec 2011	49	7	73	7	122	14
Jan 2012 - Apr 2012	18	0	8	1	26	1
Oct 2009 - Apr 2012	128	22	183	43	311	65
Panel B: Average gross proceeds						
Oct 2009 - Dec 2009	98.19	-	79.45	75.06	86.14	75.06
Jan 2010 - Dec 2010	135.29	95.51	116.41	93.92	123.59	94.52
Jan 2011 - Dec 2011	80.98	216.89	97.22	59.55	90.70	138.22
Jan 2012 - Apr 2012	63.06	-	121.19	71.53	80.95	71.53
Oct 2009 - Apr 2012	100.00	134.13	103.51	83.42	102.06	100.58
Panel C: Pre-IPO profitability						
minimum	4.11	-121.36	3.48	-53.62	3.48	-121.36
25th percentile	16.28	-42.22	12.73	5.50	13.89	3.38
median	22.97	8.80	16.33	15.33	18.57	13.56
75th percentile	31.52	15.39	22.15	23.40	26.75	22.58
maximum	58.14	47.13	58.34	59.51	58.34	59.51
Panel D: Pre-IPO size						
minimum	10.49	17.91	10.23	8.77	10.23	8.77
25th percentile	27.00	60.27	31.96	44.69	29.30	48.40
median	38.83	105.06	45.81	69.97	42.62	83.75
75th percentile	57.48	154.49	68.20	148.55	62.03	154.49
maximum	279.70	523.92	457.70	727.38	457.70	727.38

Table 2: Product market considerations of going public in the US

Domestic and foreign sales of the 22 Chinese technology firms that went public in the US between October 2009 and April 2012 are analyzed. The data is collected from the annual 20-F filings. The steps taken to calculate the Herfindahl index for a firm in a particular year are as follows. First, the sales figure from each country (or region) is expressed as a fraction of total sales. Then, the fractions are squared. Finally, the squared fractions are added to obtain the Herfindahl index. $y = 0$ is the fiscal year in which the IPO took place. $y = 1$ ($y = -1$) is the succeeding (preceding) fiscal year, and so on. Signed-ranked tests are conducted to investigate the significance of changes in the percentage of domestic sales (or the Herfindahl index) from $y = i - 1$ to $y = i$. p-values of these tests are reported in the table. In Panel B, domestic sales (%) in $y = -1$, where $i > -3$, is regressed on domestic sales (%) in $y = -3$. The estimates for the intercept (α) and slope (β), and the p-value of the F-test $\alpha = 0$ and $\beta = 1$ are reported. Robust standard errors are reported in parentheses. ***, **, and * stand for significance at 1, 5, and 10 percent levels respectively.

	y=-3	y=-2	y=-1	y=0	y=1	y=2
			Panel A			
Domestic sales (%)						
mean	86.14	84.82	84.35	82.22	81.47	80.88
median	100.00	100.00	100.00	100.00	100.00	100.00
p-value		0.37	0.52	0.12	0.42	0.16
Herfindahl index						
mean	0.85	0.85	0.84	0.81	0.81	0.82
median	1.00	1.00	1.00	1.00	1.00	1.00
p-value		0.47	0.97	0.03	0.52	0.03
Observations						
Domestic sales≥50%	18	19	20	19	18	10
Domestic sales<50%	2	3	2	3	3	3
Total	20	22	22	22	21	13
			Panel B			
α		-8.16	-4.09	-0.86	4.97	5.95
		(9.44)	(9.28)	(6.56)	(8.98)	(12.68)
β		1.08***	1.03***	1.00***	0.94***	0.96***
		(0.10)	(0.10)	(0.07)	(0.09)	(0.13)
p-value ($\alpha = 0$ & $\beta = 1$)		0.47	0.81	0.85	0.77	0.35
Observations		20	20	20	19	12
R-squared		0.96	0.91	0.88	0.86	0.93

Table 3: Comparison of the costs of going public - propensity score matching

Underpricing and gross spread of 128 ChiNext IPOs and 22 NASDAQ/NYSE IPOs conducted by Chinese technology firms between October 2009 and April 2012 are compared. Underpricing is calculated as the percentage change between the offer price and the closing price on the first trading day. For ChiNext IPOs, underpricing is adjusted by subtracting the return on the Shenzhen A-Share stock price index between the offering and listing dates. Gross spread is the underwriting fee as a percentage of total proceeds. p-values of tests for the equality of means and medians are provided. Matched as well as unmatched differences are reported. Matching is based on propensity scores, which are estimated using the following pre-IPO characteristics: ln($Sales$), $Debt$, $Profit$, $Intan$, $CapX$, and T/O (see Section 3.3 for definitions). The following matching techniques are employed. Nearest neighbor (N.N.) matching: Each treatment IPO (i.e., an IPO in the US subsample) is matched with the control IPO (i.e., an IPO in the ChiNext subsample) that is the nearest neighbor. Caliper matching: Each treatment IPO is matched with up to five control IPOs within a caliper of 0.01. Kernel matching: Each treatment IPO is matched with all control IPOs and control IPOs with closer propensity scores are given higher weights. Radius matching: Each treatment IPO is matched with all control IPOs within a caliper of 0.01.

	Oct 2009 - Apr 2012					Jan 2010 - Dec 2011				
	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)
	unmatched	N.N. matching	Caliper matching	Kernel matching	Radius matching	unmatched	N.N. matching	Caliper matching	Kernel matching	Radius matching
Panel A: Underpricing										
mean										
ChiNext	33.435	17.900	19.031	22.407	22.245	28.215	16.361	16.442	20.381	17.441
US	24.616	35.086	36.914	35.086	36.914	24.616	35.086	33.753	35.086	33.753
p-value	0.253	0.323	0.355	0.427	0.425	0.636	0.278	0.401	0.360	0.405
median										
ChiNext	29.246	7.601	7.484	20.045	14.636	24.527	5.653	5.653	20.579	20.524
US	5.947	13.317	8.000	13.317	8.000	5.947	13.317	13.317	13.317	13.317
p-value	0.065	0.371	0.637	0.371	0.637	0.065	0.655	0.617	0.371	0.617
Panel B: Gross spread										
mean										
ChiNext	6.394	6.547	6.675	5.956	6.576	6.323	5.310	5.536	5.789	5.796
US	6.983	6.802	6.778	6.802	6.778	6.983	6.802	6.753	6.802	6.753
p-value	0.199	0.723	0.897	0.035	0.721	0.133	0.046	0.131	0.025	0.062
median										
ChiNext	6.240	6.324	6.562	6.384	6.143	6.170	6.324	6.324	6.324	6.225
US	7.000	7.000	7.000	7.000	7.000	7.000	7.000	7.000	7.000	7.000
p-value	0.000	0.361	0.629	0.000	0.317	0.000	0.160	0.302	0.000	0.003

Table 4: Comparison of the costs of going public - endogenous treatment effects

Underpricing and gross spread of IPOs are compared across the US and ChiNext subsamples using regression analyses. The sample contains 128 ChiNext IPOs and 22 US (NASDAQ/NYSE) IPOs conducted by Chinese technology firms between October 2009 and April 2012. In Panel A, the dependent variable is UP, the percentage change between the offer price and the closing price on the first trading day. For ChiNext IPOs, this is adjusted by subtracting the return on the Shenzhen A-Share stock price index between the offering and listing dates. In Panel B, the dependent variable is *Spread*, the gross spread as a percentage of gross proceeds. US is a dummy variable equal to one (zero) if a Chinese technology firm is in the US (ChiNext) subsample. It is treated as exogenous in OLS models and endogenous in endogenous treatment effects models. The OLS models for underpricing and gross spread are:

$$UP_j = u_0 + u_1 US_j + u_2 ln(Sales)_j + u_3 ln(1+Age)_j + u_4 Overhang_j + u_5 Market_j + e_j$$

$$Spread_j = s_0 + s_1 US_j + s_2 ln(Proceeds)_j + s_3 (1/OP_j) + v_j$$

Endogenous treatment effects models (both for underpricing and gross spread) are estimated using full maximum likelihood and US is modelled as follows:

$$US_j = \begin{cases} 1, & \text{if} \quad US_j^* = w_0 + w_1 ln(Sales)_j + w_2 Profit_j + w_3 Debt_j + w_4 CapX_j + w_5 Intan_j + w_6 T/O_j + z_j > 0 \\ 0, & \text{otherwise} \end{cases}$$

Sales is the firm's sales measured in millions of US dollars. $Profit$ is net income over sales. $Debt$, $CapX$, $Intan$, T/O are long-term debt, capital expenditures, intangible assets, and sales over total assets respectively. All of these financials are measured in $y = -1$ (i.e., one fiscal year before the IPO) and reported in percentage points (except *Sales*). *Age* is the difference between the IPO and foundation years. *Overhang* is the ratio of retained shares to the public float. $Market$ is the market return over the 30-day period before the IPO. A value-weighted index of NYSE, AMEX, and NASDAQ stocks and Shenzhen A-Share stock price index are used to calculate $Market$ for the IPOs in the US and ChiNext subsamples respectively. *Proceeds* is gross proceeds in millions of US dollars. OP is the offer price in US dollars. Some of the underpricing and gross spread models contain industry (based on 3-digit SIC codes) and year fixed effects (f.e.). For endogenous treatment effects models, the p-value of a Wald chi-square test and the p-value of the test that $\rho = 0$ are reported, where ρ captures the correlation between z_j and e_j (v_j) in Panel A (B). Robust standard errors are reported in parentheses. ***, **, and * stand for significance at 1, 5, and 10 percent levels respectively.

(continued)

Table 4–*Continued*

	OLS models				Endogenous treatment effects models			
	Oct 2009 - April 2012			2010-11	Oct 2009 - April 2012			2010-11
	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)
Panel A: Underpricing								
US	-22.41	-22.79	-18.85	-18.49	-24.11	-20.40	-16.52	-14.98
	(14.72)	(17.40)	(16.95)	(17.68)	(18.96)	(19.63)	(17.41)	(17.68)
$ln(Sales)$	-14.15***	-14.21***	-12.73***	-12.96***	-13.92***	-14.55***	-13.07***	-13.56***
	(4.06)	(4.84)	(4.29)	(4.72)	(4.42)	(5.07)	(4.34)	(4.81)
$ln(1+Age)$	-1.27	-3.92	-0.37	-3.00	-1.07	-4.22	-0.62	-3.46
	(4.76)	(5.11)	(4.85)	(5.57)	(4.98)	(4.93)	(4.61)	(5.25)
$Overhang$	1.02***	0.99**	0.97**	0.97**	1.03***	0.97***	0.95**	0.94**
	(0.32)	(0.38)	(0.40)	(0.41)	(0.34)	(0.37)	(0.38)	(0.38)
$Market$	1.17***	1.11***	1.16***	1.16***	1.17***	1.11***	1.16***	1.15***
	(0.24)	(0.28)	(0.33)	(0.37)	(0.23)	(0.26)	(0.30)	(0.34)
Constant	82.96***	81.90***	69.54***	76.40***	81.82***	113.59***	93.21***	103.58***
	(17.80)	(18.18)	(19.34)	(20.98)	(20.18)	(27.54)	(28.07)	(29.63)
Industry f.e.	no	yes	yes	yes	no	yes	yes	yes
Year f.e.	no	no	yes	yes	no	no	yes	yes
					US^*			
$ln(Sales)$					1.10**	1.14**	1.14**	1.13***
					(0.43)	(0.45)	(0.45)	(0.43)
$Profit$					-0.02**	-0.02**	-0.02**	-0.02**
					(0.01)	(0.01)	(0.01)	(0.01)
$Debt$					0.01	0.00	0.00	-0.00
					(0.03)	(0.03)	(0.03)	(0.03)
$CapX$					-0.10***	-0.09***	-0.09***	-0.09**
					(0.03)	(0.04)	(0.04)	(0.04)
$Intan$					0.03	0.03	0.03	0.03
					(0.03)	(0.03)	(0.03)	(0.03)
T/O					-0.02*	-0.02*	-0.02*	-0.02*
					(0.01)	(0.01)	(0.01)	(0.01)
Constant					-3.16*	-3.31*	-3.30*	-3.15*
					(1.71)	(1.77)	(1.74)	(1.68)
Observations	144	144	144	112	144	144	144	112
R-squared	0.23	0.29	0.39	0.33				
Wald chi-sq. test					0.00	0.00	0.00	0.00
ρ=0					0.81	0.72	0.63	0.50

(continued)

Table 4–*Continued*

	OLS models				Endogenous treatment effects models			
	Oct 2009 - April 2012			2010-11	Oct 2009 - April 2012			2010-11
	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)
Panel B: Gross spread								
$USIPO$	0.93**	0.93*	0.81*	0.65	1.86***	1.88***	1.82***	1.70**
	(0.46)	(0.50)	(0.44)	(0.47)	(0.44)	(0.46)	(0.55)	(0.67)
$ln(Proceeds)$	-1.79***	-1.62***	-1.46***	-1.68***	-2.19***	-2.06***	-1.90***	-2.17***
	(0.44)	(0.45)	(0.38)	(0.40)	(0.39)	(0.38)	(0.33)	(0.38)
$1/OP$	0.23	1.35	-0.48	-2.54	-1.45	-0.48	-2.21	-4.85**
	(2.04)	(2.11)	(1.78)	(1.85)	(2.03)	(2.01)	(1.75)	(2.32)
Constant	14.31***	11.65***	12.37***	15.03***	16.35***	15.60***	16.71***	17.59***
	(2.32)	(2.66)	(2.14)	(1.90)	(2.12)	(1.99)	(1.66)	(1.98)
Industry f.e.	no	yes	yes	yes	no	yes	yes	yes
Year f.e.	no	no	yes	yes	no	no	yes	yes
					US^*			
$ln(Sales)$					1.04***	1.13***	1.12***	1.04***
					(0.28)	(0.27)	(0.25)	(0.26)
$Profit$					-0.03***	-0.03***	-0.03**	-0.03**
					(0.01)	(0.01)	(0.01)	(0.01)
$Debt$					0.00	0.00	0.00	-0.00
					(0.01)	(0.01)	(0.01)	(0.01)
$CapX$					-0.09***	-0.09***	-0.08**	-0.09***
					(0.03)	(0.03)	(0.03)	(0.03)
$Intan$					0.01	0.01	0.01	0.00
					(0.02)	(0.02)	(0.02)	(0.02)
T/O					-0.01**	-0.01**	-0.01**	-0.01**
					(0.00)	(0.00)	(0.00)	(0.00)
Constant					-3.25***	-3.61***	-3.67***	-3.13***
					(1.08)	(1.09)	(1.05)	(1.05)
Observations	150	150	150	117	149	149	149	116
R-squared	0.29	0.34	0.48	0.43				
Wald chi-sq. test					0.00	0.00	0.00	0.00
ρ=0					0.00	0.00	0.01	0.05

Table 5: Pre-IPO financing of Chinese technology firms that went public in the US

Average proceeds (in millions of US dollars) raised from the pre-IPO issues of (convertible) preferred stock and warrants is reported. The subsample includes 22 Chinese technology firms that went public in the US between October 2009 and April 2012. The data is collected from IPO prospectuses. Occasionally, firms can issue Series A-1, A-2 (or Series B-1, B-2) and so on. In such cases, figures are aggregated and reported as a single Series A (or B). We calculate the averages in two different ways. The first assumes a firm raised zero dollars in all series subsequent to its final issue. The second excludes such cases and calculates averages conditional on an issue.

	Series A	Series B	Series C	Series D	Series E	Series F	Total
Missing series treated as zeros							
Mean	17.19	16.35	13.74	24.56	4.09	2.27	78.20
Median	10.00	9.98	6.00	0.00	0.00	0.00	52.50
Count	22	22	22	22	22	22	22
Missing series excluded							
Mean	18.90	23.98	25.20	135.06	45.03	50.00	86.02
Median	12.08	13.22	22.53	43.40	45.03	50.00	55.35
Count	20	15	12	4	2	1	20

Table 6: Exit by pre-IPO owners of Chinese technology firms that went public in the US

Secondary shares as a percentage of total shares offered is reported. The subsample includes 22 Chinese technology firms that went public in the US between October 2009 and April 2012. The data is collected from IPO and SEO prospectuses. Follow-up SEOs include those filed within a year following the IPO. The last column reports the average number of days between the listing date and the SEO filing date.

	IPO		Follow-up SEO		
	Count	Secondary	Count	Secondary	Days
Primary shares only	8	0.00%	3	51.78%	228.00
With secondary shares	14	22.26%	3	91.00%	123.00
All	22	14.16%	6	71.39%	175.50

Table 7: VC backing of Chinese technology firms that went public on ChiNext

The sample includes 163 Chinese firms that went public on ChiNext between October 2009 and December 2010. A firm is classified as a technology firm if its SIC code is in the list used by Loughran and Ritter (2004) to identify tech stocks, or if it is classified as a high-technology firm by the SDC. A firm is considered to be (foreign) VC funded if its pre-IPO owners include at least one (foreign) fund. A domestic (foreign) fund raises all (part) of its capital from sources inside (outside) China. N is the count of observations. Percentage calculations are based on either the number of all firms in the relevant category (columns titled 'All'), or the number of VC-backed firms in the relevant category (columns titled 'VC backed').

	Technology			Non-Technology			All		
	N	All	VC backed	N	All	VC backed	N	All	VC backed
Panel A: Presence of VC backing in ChiNext IPOs									
Yes	38	62.30%		56	54.90%		94	57.67%	
No	23	37.70%		46	45.10%		69	42.33%	
All	61	100.00%		102	100.00%		163	100.00%	
Panel B: Number of VCs backing a particular ChiNext IPO									
4 or more	4	6.56%	10.53%	6	5.88%	10.71%	10	6.13%	10.64%
3	4	6.56%	10.53%	10	9.80%	17.86%	14	8.59%	14.89%
2	13	21.31%	34.21%	18	17.65%	32.14%	31	19.02%	32.98%
1	17	27.87%	44.74%	22	21.57%	39.29%	39	23.93%	41.49%
0	23	37.70%	-	46	45.10%	-	69	42.33%	-
Panel C: The origin of the VC backing ChiNext IPOs									
Domestic	34	55.74%	89.47%	54	52.94%	96.43%	88	53.99%	93.62%
Foreign	4	6.56%	10.53%	2	1.96%	3.57%	6	3.68%	6.38%
None	23	37.70%	-	46	45.10%	-	69	42.33%	-

Table 8: Predicting IPO location on the basis of pre-IPO firm characteristics

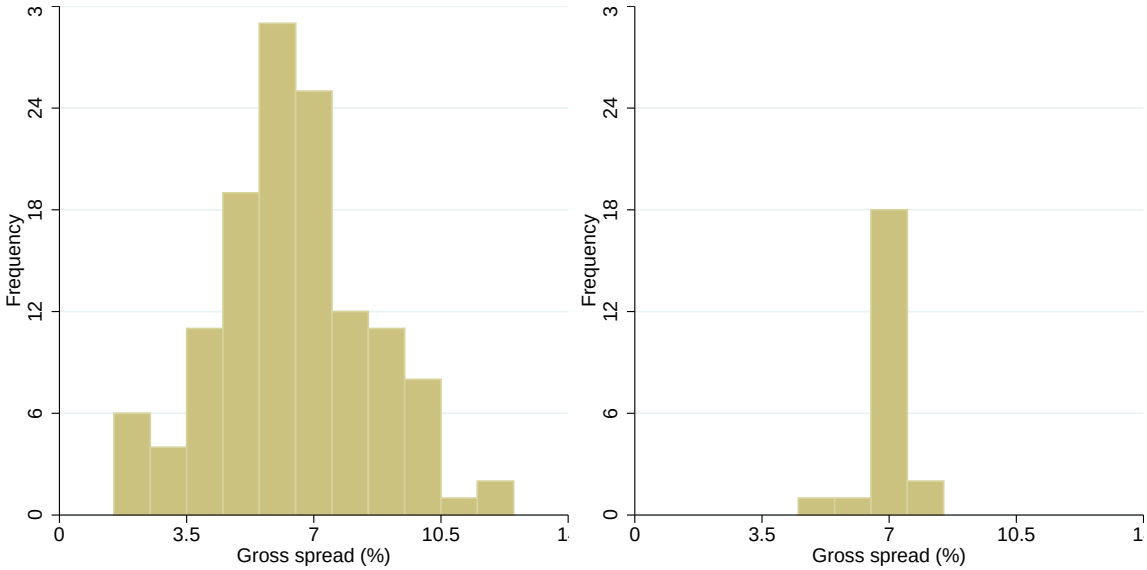
Statistics on pre-IPO characteristics are reported in Panel A. The sample contains 150 firms, 128 of which went public on ChiNext and 22 of which went public in the US between October 2009 and April 2012. p-values for Wilcoxon-Mann-Whitney tests are also reported. $Assets$ ($Sales$) is the firm's total assets (sales) measured in millions of US dollars. $Profit$ is net income over sales. $Debt$, $CapX$, $Intan$, T/O are long-term debt, capital expenditures, intangible assets, and sales over total assets respectively. All of these financials are measured in $y = -1$ (i.e., one fiscal year before the IPO) and reported in percentage points (with the exception of $Assets$ and $Sales$). In Panel B, the results of logistic regression models are reported, in which the dependent variable is the IPO location US, such that $US = 1$ ($US = 0$) if the IPO took place on NASDAQ/NYSE (ChiNext). In Models (ii) and (iv), the sample is restricted to IPOs that took place between January 2010 and December 2011. Robust standard errors are reported in parentheses. ***, **, and * stand for significance at 1, 5, and 10 percent levels respectively.

Panel A: Pre-IPO firm characteristics

		$Assets$	$Sales$	$Profit$	$Debt$	$CapX$	$Intan$	T/O
ChiNext	mean	46.64	39.5	24.83	1.83	9.78	4.66	88.85
	median	38.83	32.25	22.97	0.00	7.49	3.09	87.71
NASDAQ/NYSE	mean	140.67	80	-10.75	10.36	4.86	8.03	72.85
	median	105.06	78.06	8.8	0.07	3.16	1.88	67.08
	p-value	0.00	0.00	0.00	0.01	0.00	0.63	0.00

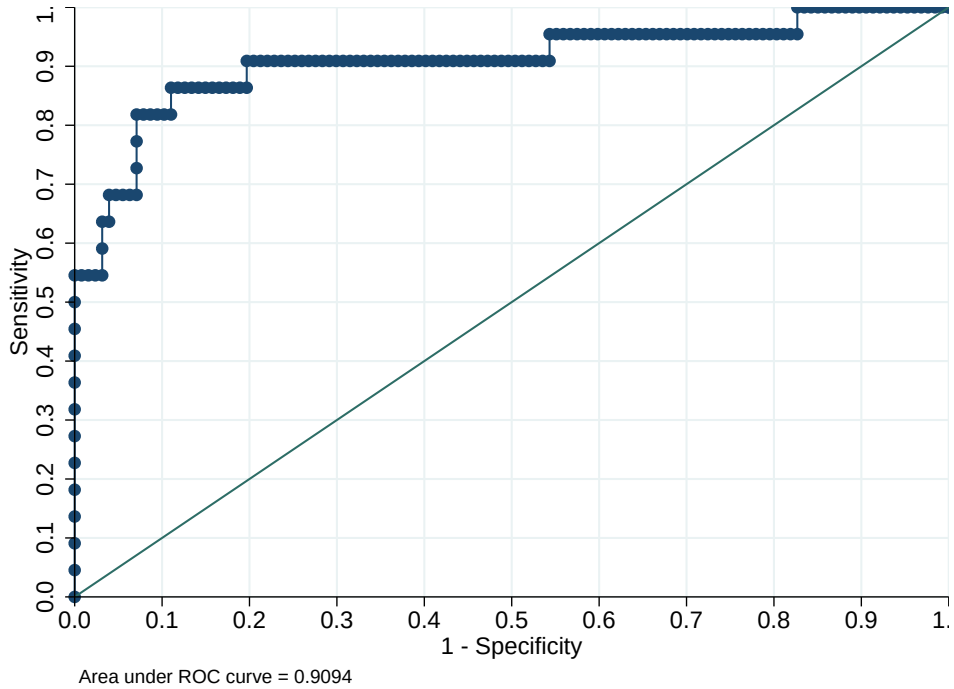
Panel B: Logistic regression models

	Constant	ln($Assets$)	ln($Sales$)	$Profit$	$Debt$	$CapX$	$Intan$	T/O	Obs.	R-sq
Model (i)	-5.54*		1.93**	-0.06**	0.02	-0.15**	0.06	-0.03	149	0.49
	(3.20)		(0.78)	(0.03)	(0.02)	(0.07)	(0.05)	(0.02)		
Model (ii)	-4.97*		1.79**	-0.06**	0.02	-0.14**	0.06	-0.02	116	0.48
	(2.99)		(0.72)	(0.03)	(0.02)	(0.07)	(0.05)	(0.02)		
Model (iii)	-8.98**	2.21**		-0.06*	0.01	-0.17**	0.06	0.00	149	0.52
	(4.30)	(0.88)		(0.03)	(0.02)	(0.07)	(0.05)	(0.01)		
Model (iv)	-7.97**	2.02**		-0.06**	0.01	-0.16**	0.05	0.00	116	0.51
	(3.92)	(0.80)		(0.03)	(0.02)	(0.07)	(0.05)	(0.01)		

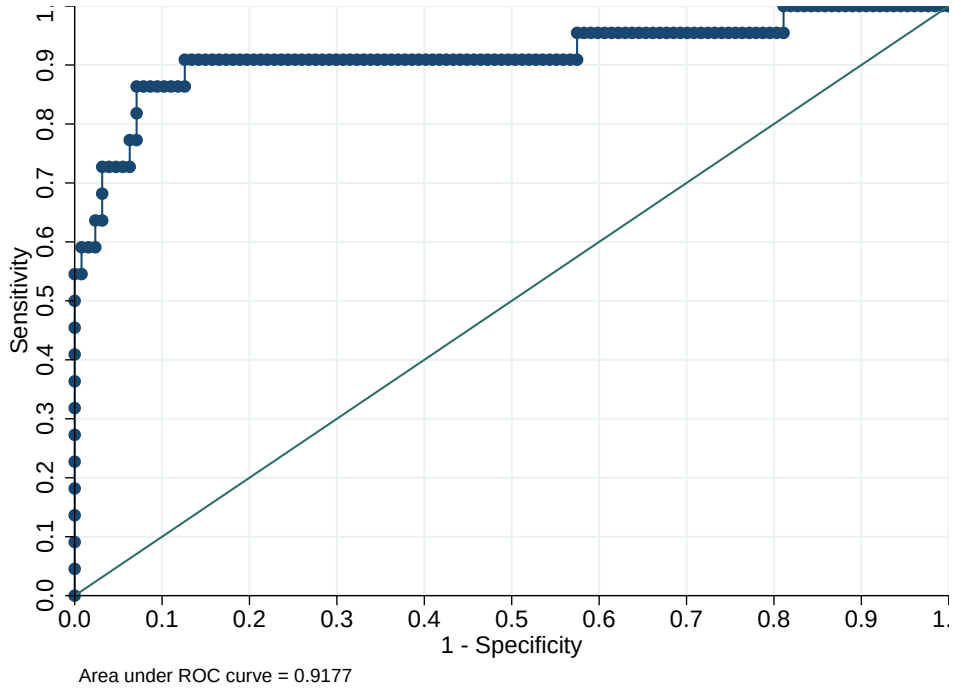


(a) ChiNext (b) NASDAQ/NYSE

Figure 1: The distribution of gross spread in ChiNext and NASDAQ/NYSE.

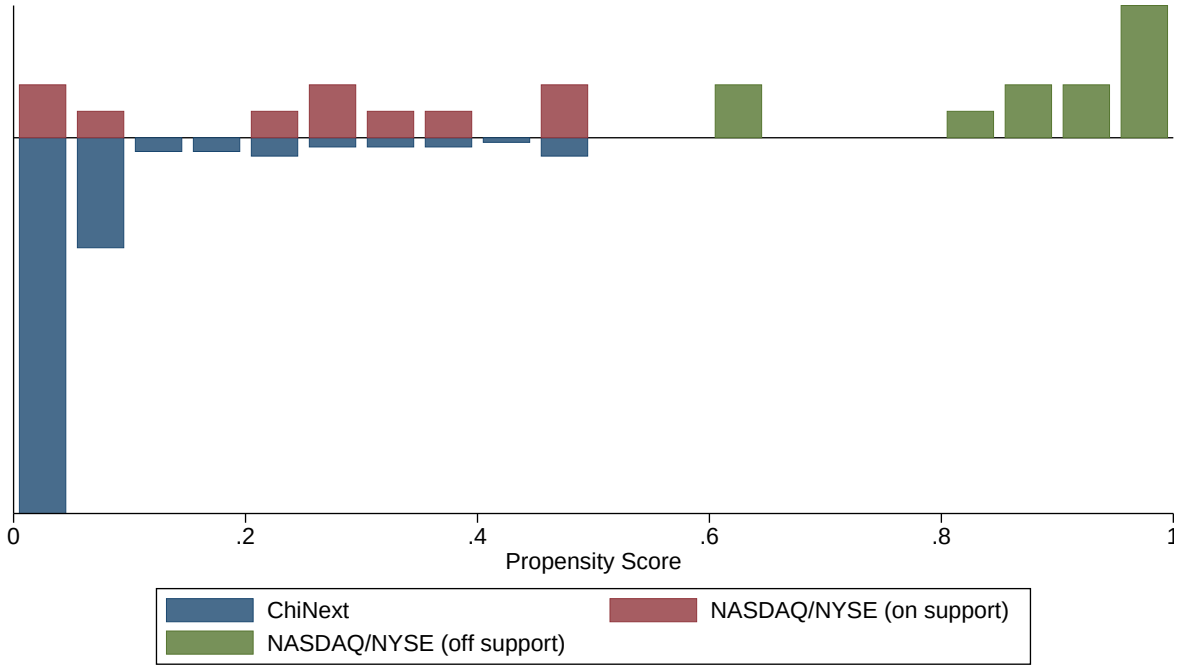


(a) Model (i)

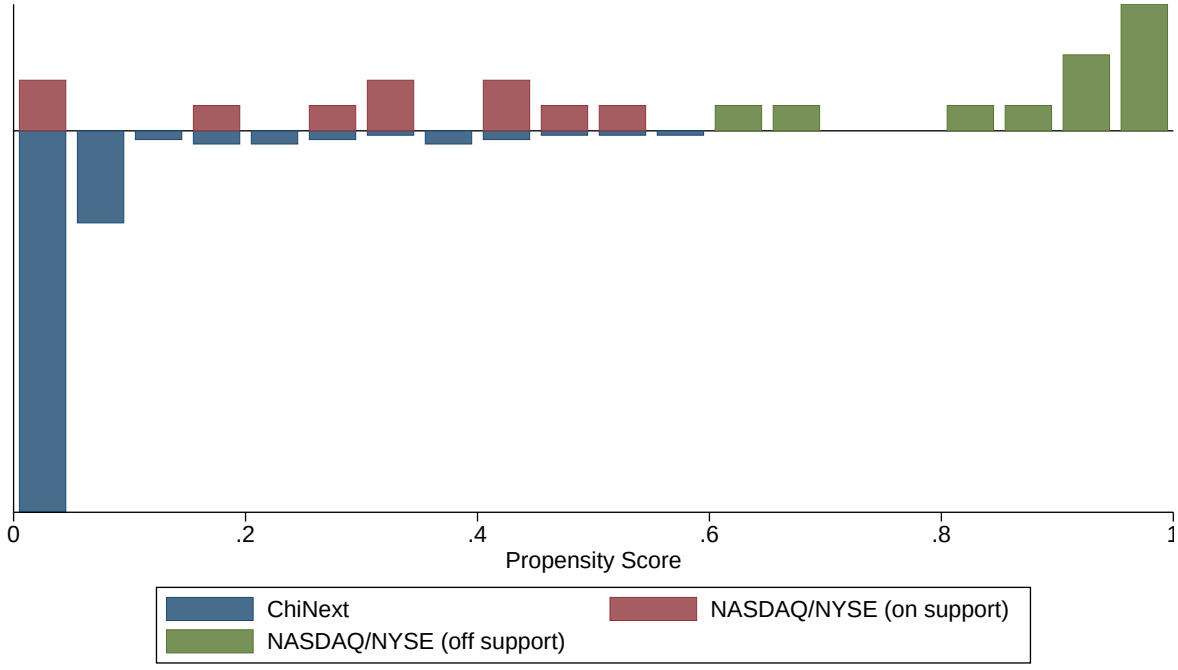


(b) Model (iii)

Figure 2: Predictive power of logistic regression Models (i) and (iii) in Table 8.



(a) Model (i)



(b) Model (iii)

Figure 3: The distribution of propensity scores estimated using logistic regression Models (i) and (iii) in Table 8.