Initial Public Offerings (IPOs) on ChiNext: Good Investment or Not?

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Abstract

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Keywords: ChiNext, initial public offerings, underpricing, underperformance

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1.0 Introduction

ChiNext was established in October 2009 to enable private, innovative, and high-growth firms' access to Chinese capital markets. The ChiNext's focus on privately owned firms differs considerably from the partial privatizations which dominate the Chinese Main Board. To open the capital markets to these private high-growth firms, ChiNext lowers listing requirements on profitability and firm size compared to the Main Board. The differences in firm characteristics, as well as, the regulatory environments are likely to lead to differences in both initial public offerings (IPO) underpricing and long-run performance for ChiNext compared to the Main Board and the SME Board[2]. We explore the ChiNext IPO under-pricing, long-run performance, and their determinants in this paper and compare these to the SME and Main Boards.

Researchers find that IPOs in the Chinese Main Board experience an extraordinarily high degree of underpricing (Mok and Hui, 1998; Gao, 2010), while underperformance is only moderate relative to the IPOs in the developed markets (Chan, Wang and Wei, 2004). It is argued that these unique features of the IPO performance on the Chinese Main Board are associated with their partial privatisation nature, the lack of investment opportunities in China, equity separation of listed firms[3], and strict government regulations in the IPO process (Gu, 2003, and Liu and Xiong, 2005). The influence of these characteristics is likely to be considerably less for ChiNext IPOs, given that they are typically not partial privatisations of government owned assets, face lower regulatory hurdles when listing, as well as, ChiNext itself providing investors with an additional set of investment opportunities. As such, we could expect the IPO underpricing and long-run performance for ChiNext listings to differ considerably from Main Board IPOs.

Based on a sample of 281 IPOs listed between October 2009 and December 2011, we find that the initial average market-adjusted abnormal return (MAAR) on ChiNext is 33.5%. Although the average MAARs of ChiNext is significantly higher than Main Board IPOs

[2] Chinese Main Board refers to the Shanghai Stock Exchange (SHSE) and part of Shenzhen Stock Exchange (SZSE). The SME Board is a small component of the SZSE. It is not a NASDAQ-type market. The SME Board mainly targets mature SMEs with established track records. Despite separate trading systems, supervisory mechanism, stock coding, and indexes, the SME Board adopts the same set of listing rules as that in the Main Board (details see section 2).

[3] Shares were classified into tradable and non-tradable shares. In 2005, the China Securities Regulatory Commission (CSRC) announced the "split share structure reform" which indicates that the segregation of shares into tradable and non-tradable shares will be officially abandoned in the near future.

(23.2%), it is not significantly different from SME IPOs (38.1%) during the same sample period. To explain the underpricing, we include variables suggested by the informational asymmetry model (Rock, 1986; Beatty and Ritter, 1986), the signalling model (Allen and Faulhaber, 1989), the behavioural theory (Loughran and Ritter, 2002), as well as the unique ownership structure of Chinese-listed firms (Chan et al, 2004). We find evidence supporting the information asymmetry hypothesis and the behavioural theory on underpricing of ChiNext IPOs, but no evidence supporting the signalling hypothesis.

When examining the one-year post-listing performance of 153 IPOs listed between October 2009 and December 2010, the average cumulative abnormal return (CAR) is -41.2% and buy-and-hold abnormal return (BHAR) is -45.7%. The ChiNext long-run performance is significantly worse when compared to both the Main and SME Boards, and substantially lower than other developed countries (Levis, 1993; Loughran and Ritter, 1995). Our regression results highlight that underperformance is explained by offering P/E ratio, initial underpricing, the percentage change in returns on assets (ROA) from pre-issuing to one year after, the change in the fraction of floating A-shares from issuing to one-year after, although the change in ROA wins the horse-racing regression race.

This paper contributes to the literature by: 1) providing a detailed description on the ChiNext Market and presents a listing regulatory comparison of the ChiNext, SME and Main Boards; 2) comparing the underpricing and long-run performance of the ChiNext market with the Main and SME Boards, and 3) examining underpricing and underperformance of ChiNext IPOs using a comprehensive set of explanatory variables. In doing so, this paper provides an overview of ChiNext IPOs short-run and long-run performance, which will be beneficial to policy-makers, investors and academics.

The remainder of this article is structured as follows. Section 2 presents the institutional details of the ChiNext market. Section 3 presents the underpricing theory as well as data, method and results relating to ChiNext IPO underpricing including comparison to SME and Main Board IPOs. In Section 4 we outline the long-run IPO performance and Section 5 concludes the paper.

2.0 Development and characteristics of ChiNext

In 1990 and 1991, the Shanghai Stock Exchange (SHSE) and the Shenzhen Stock Exchange (SZSE) were established to mainly provide financing channels to state-owned enterprises (SOEs) through partial privatisation. However, according to the Chinese Ministry of Commerce, small- and medium-sized enterprises (SMEs) account for 99% of all businesses in China and are responsible for approximately 60% of the nation's GDP (World Federation of Exchanges, 2010). In 2004, the SME Board was established within the SZSE to facilitate the equity financing of SMEs. Despite separate trading systems, supervisory mechanism, stock coding, and the indexes, the SME Board adopts almost the same set of listing requirements as that in the Main Board. Firms that cannot satisfy those stringent rules still find it difficult to raise external equity. In response to challenges exacerbated by the global financial crisis (GFC) when SMEs were hard hit, the Chinese government launched the "Growth Enterprise Board" (also called ChiNext) - a new NASDAQ-type secondary stock market - in SZSE on October 30, 2009. ChiNext addresses a long-standing issue in China's economy: loans from banks and financial instiutions being mainly oriented to state-owned enterprises (Bloomberg Business Week, 2010). By the end of 2011, 281 companies were successfully listed on Chinext, raising a total amount of RMB200.32 billion (US$31.87 billion[4]) through IPOs. Many of the listed firms belong to one of the seven "strategic emerging industries" (e.g. clean energy, semiconductors, chemical engineering, pharmaceuticals, alternative materials, and new-generation IT services) designated by the Chinese government (Lerner and Wong, 2011, p154).

Table 1 compares the listing requirements of ChiNext with those of the Main and SME Boards. ChiNext has a lower listing threshold than the Main Board or the SME Board in terms of profitability, asset size and share capital. To qualify for listing in ChiNext, firms are required to have accumulated net profits of more than RMB 10 million (US$1.6 million) for the past two financial years, compared to accumulated net profits of RMB 30 million (US$4.8 million) over the previous three years on the Main and SME Boards. Moreover, ChiNext removes the Main and SME Board listing requirement of having a maximum of 20% intangible assets to net assets. In addition, ChiNext only requires that the post-IPO total shareholders' equity is greater than RMB 30 million (US$4.8 million) compared to a

[4] To ensure the consistency during the currency conversion, we use the Bank of China exchange rate on January 1st, 2013 (1 USD = 6.2855 RMB).

minimum equity of RMB 50 million (US$8.0 million) for firms listed on the SME and Main Boards.

[Insert Table 1 here]

Despite the lower listing requirements, ChiNext introduces stringent lock-up requirements for original shareholders. First, no more than 50% of the newly subscribed shares before six months of issuing can be traded within two years after listing. Second, the lock-up rules governing management share sales were tightened for ChiNext in November 2010. The new rules require that management who resign within six months of listing are not permitted to sell shares until 18 months after their departure and those who resign between seven and twelve months after IPO are not allowed to sell shares until 12 months after their departure.

The delisting rules[5] are stricter and more explicit for ChiNext firms than for the Main or SME Boards in terms of the requirements on firms' audited net assets, qualified financial reports by the Certified Public Accountant (CPA) and the accumulative trading volume. Finally, ChiNext tightens the information disclosure standards and sets up an Investor Suitability Programme to protect the interests of investors. ChiNext requests issuers to disclosure major risks involved and present risk alerts on prominent positions in the prospectus[6]. Within one month after listing, the company shall disclose forward-looking information and other information relating to its future operations and present an annual report to briefly explain its business strategy, new product or technology development, investment projects and so forth (World Federation of Exchanges, 2010). With greater uncertainty and price volatility compared to that of the Main Board, ChiNext shares may not be suitable for all investors. The Chinese Security Regulatory Committee (CSRC) requires individual investors on ChiNext to have more than two years' trading experience, while those who have less than two years' experience but insist on joining this market to make a written declaration accepting all the risks involved.

3.0 Underpricing of IPOs

[5] On April 20th 2012, the Shenzhen Stock Exchange introduced new delisting rules governing ChiNext-listed companies. The new delisting system came into effect on May 1st 2012. Firstly, the new delisting rules strengthen the disclosure regarding the delisting risks. Secondly, the policy regarding delisting has also been strengthened. Companies will be delisted from the ChiNext if their stock trade below their original offer price for 20 consecutive days; or if they receive three warnings from the exchange within the most recent 3 years; or if after correcting for the material errors or false representations the adjusted net asset value is negative for the most recent two years.

[6] From *Interim Measures on the Administration of Initial Public Offerings and Listings of Shares on the ChiNext*

3.1 Literature review and hypotheses development

There have been numerous studies on IPO underpricing world widely. Loughran, Ritter and Rydqvist (1994) give a summary of the average initial returns on IPOs in 25 countries and indicate that the degree of underpricing varies significantly across countries, with average returns generally higher in developing markets than in developed ones.

During the last two decades, IPO underpricing has inspired a large body of literature trying to explain why issuers are willing to leave money on the table. Rock's (1986) information asymmetry model suggests that the equilibrium offer price that includes a finite discount is necessary to compensate and attract the uninformed for trading against superior information (the winner's curse model). Extending Rock's model, Ritter (1984) and Beatty and Ritter (1986) argue that IPO underpricing is rational and explained as a premium for the uncertainty surrounding the value of new issues. In general, the greater uncertainty about the true value, the higher the expected initial return an IPO will have (Beatty and Ritter, 1986).

Beatty and Ritter (1986) produce another proposition which focuses on the role of investment banks in enforcing an underpricing equilibrium. If an underwriter does not underprice the offer price enough, uninformed investors subject to the winner's curse problem will not participate in its IPO offering. On the other hand, if an underwriter underprices the offer price too much, potential issuers that seek to raise as much money as possible will cease doing business with this underwriter. Beatty and Ritter argue that underwriters who cheat by pricing "off the line" will be penalized and lose market share. Other studies confirm the role of underwriters and show that underpricing is smaller when new issues are taken by prestigious underwriters (Carter and Manaster, 1990; Megginson and Weiss, 1991).

Information asymmetry often results in high financing costs to IPO firms, especially in Chinese stock market (Mok and Hui, 1998; Chi and Padgett, 2005a). Chan *et al.* (2004) document that underpricing is positively associated with the time gap between offering and listing while negatively associated with offering size. Chi and Padgett (2005a) attribute the excess initial returns to strong investor demand and a high proportion of uninformed individual investors. Yu and Tse (2006) find evidence supporting the winner's curse model in explaining the high initial returns of IPOs (123.6%) during 1995-1998.

As the listed firms are relatively small and unknown compared to their Main Board or SME Board counterparts, we expect investors will require higher compensation for the higher uncertainty regarding ChiNext IPOs. In this study, we include the following five variables to test the impact of the information asymmetry. (1) Firm size which is measured as the natural logarithm of total asset[7] (LNTA). Larger firms typically disclose more information leading to lower information asymmetry (Beatty and Ritter, 1986). (2) Firm age (age). Ritter (1991) uses age as a measure for ex-ante uncertainty and finds younger firms have higher risk and thus are more likely to experience a greater underpricing than old firms. (3) The time between offering and listing (Ldays). Chan *et al*. (2004) argue that a long time gap increases the risk to investors resulting in greater underpricing. (4) Underwriter reputation (Underwriter). Megginson and Weiss (1991) find that IPOs underwritten by prestigious underwriters have lower underpricing, as underwriters play an important role in reducing the ex-ante uncertainty. We rank the underwriters[8] based on the number of IPOs underwritten during 2009-2011 for all Chinese stock exchanges. (5) Offer price to earnings (P/E) ratio: According to the information asymmetry theory, the higher the offering P/E ratio, the less space is for initial returns and vice versa (Ljunqvist, 2004; Li and Zhang, 2011).

Behavioural explanations argue that "irrational" and/or "sentiment" investors bid up the IPO price beyond true value in the short-run. Welch (1992) suggests that investors may not value new issues based on the economic fundamentals but based on the market trends and investors' psychology. Ljungqvist (2004) argue that the IPO markets are more likely to be affected by the investors' over pessimism and over enthusiasm. Loughran and Ritter (2002) propose prospect theory[9] to explain why U.S. issuers left so much money on the table during 1999-2000. Gao (2010) separates the IPO initial returns into pre-market deliberate underpricing and aftermarket overpricing for Chinese Main Board IPOs. She finds strong evidence supporting the behaviour theory which emphasizes the investor sentiment effect on share returns.

The lack of alternative investment choices may mean Chinese investors are willing to pay high prices for the long waited new shares, thus pushing up the price in the short-run (Deng

[7] We find that total asset is highly correlated with issue size.
[8] For robustness we also use the 2009 Bloomberg underwriter ranking to define underwriter quality and we get similar results. A dummy variable 1 is used as proxy for IPOs issued by top 8 underwriters, and 0 otherwise.
[9] The prospect theory argues that when there is unexpected strong investor demand during the preselling period, issuers acquiesce in leaving more money on the table. When demand is weak, issuers bargain hard over the offer price with their underwriters (Loughran and Ritter, 2002).

and Dorfleitner, 2008). In this study, we include two variables to test the behavioural theories including the lottery winning ratio (Lottery) and market returns prior to IPO issuance (Market Momentum). A low (high) lottery winning ratio indicates strong (weak) individual investor demand for an IPO[10]. Derrien (2005) argues that IPOs with strong individual investor demand are more likely to be overvalued and thus have higher initial returns. Following Loughran and Ritter (2002), we estimate Market Momentum as the market returns over the 15 trading days before the offer date. Loughran and Ritter (2002) find that offer prices only adjust partially to public information and first-day returns are predictable based on lagged market returns.

Early studies find that the unique ownership structure of Chinese-listed firms plays a non-negligible role in IPO performance (Mok and Hui, 1998; Chan et al, 2004). Unlike IPOs on the Main Board which have relatively few management shares, ChiNext IPOs have a much higher percentage of management shares (Manashare). According to the agency hypothesis (Jensen and Meckling, 1976) and the signalling hypothesis (Leland and Pyle, 1977), conflicts between managers and shareholders are reduced through management ownership and that this is a signal of higher firm quality. Jain and Kini (1994) also find that managerial ownership improves firm performance. To investigate the impact of management ownership on underpricing in ChiNext firms, we include the percentage of management shares at issuing (Manashare).

Sun and Tong (2003) find that legal person ownership has a positive impact on post-issue performance due to the monitoring power of legal entities. Shleifer and Vishny (1997) argue that a firm with large ownership concentration has better corporate governance as large shareholders monitor and remove managers who do not maximize shareholders' value. We include both legal person ownership (Legshare) and the proportion of shares held by the largest five shareholders (Large5) as control variables. The description of variables and their expected relationship with underpricing are highlighted in Table 2.

[Insert Table 2 here]

[10] Under current book-building pricing system in China, underwriters allocate approximately 20% of the new shares offline to institutional investors and the remaining 80% to individual investor online bids using a lottery system at the set price (Gao, 2010).

3.2 Data and method

Our data is retrieved from the China IPO Research Database of China Stock Market and Accounting Research (CSMAR), the CSMAR Trading Database, the CSMAR Corporate Governance Database, and the CSMAR Financial Statement Database. We also cross check firms' prospectus and listing documents. Our sample period for IPO underpricing is from October 2009 to December 2011 and our sample consists of 281 IPOs.

As the ChiNext Price Index was not officially released until June 2010, we use the SME Price Index as a proxy for ChiNext market returns. We also use the SME Price Index as the benchmark for the SME Board IPOs. For the Main Board, the SSE composite A-share index is used as the benchmark.

IPO raw returns are calculated as follows:

$$R_{i1} = (P_{i1}/ P_{i0}) -1 \quad (1)$$

where R_{i1} is the initial return for stock *i* on its first trading day, P_{i1} is the closing price of stock *i* on the first day of trading and P_{i0} is the offering price of stock *i*. We then calculate the return on the corresponding market index between the offering day and the first trading day of the new issue *i* (R_{m1}) as follows:

$$R_{m1} = (P_{m1}/P_{m0}) - 1 \quad (2)$$

where P_{m1} is the closing value of the market index on the first trading day of new issue *i*, and P_{m0} is the closing value of market index on the offering day of new issue *i*. Finally we estimate the market-adjusted abnormal return ($MAAR_{i1}$) for stock *i* on the first trading day as follows.

$$MAAR_{i1} = ((1+R_{i1})/(1+R_{m1})-1) *100 \quad (3)$$

3.3 IPO Underpricing results

We first undertake a general analysis of IPO underpricing, and then examine the determinants of underpricing for ChiNext IPOs.

3.3.1 Initial returns and MAARs

Table 3 Panel A presents the raw returns and MAARs for 281 IPOs listed on ChiNext from October 2009 to December 2011. We find an average raw return is 37.9% and the average

MAAR is 33.5% for the whole period, while the average MAARs drops from 61.3% in 2009 to 36.4% in 2010 and 23.0% in 2011 which are all significantly different from 0, indicating underpricing for ChiNext IPOs. There are two possible reasons for the decreasing underpricing year by year on ChiNext. One is that the regulations on this new market have been altered and strengthened. For instance, in 2010, the lock-up period for management shares was extended to reduce the resignation of executives and subsequent heavy sell-offs. The second reason may be investor 'learning' where knowledge about the ChiNext market and its stocks has improved. Guo and Fung (2011) find that the ChiNext Board was surrounded by speculation and high volatility, especially on the first trading day of IPOs listed during 2009. Statistics from the SZSE report overall losses incurred by individual investors who actively participated in the ChiNext IPO speculation, and the exchange also issued official warnings regarding the risks of speculating in ChiNext IPOs. The declining underpricing suggests that over-time investors have learnt from these earlier experiences.

[Insert Table 3 here]

Panel B of Table 3 compares raw returns and MAARs for IPOs on the ChiNext, SME and Main Boards over the same sample period. Although the average ChiNext MAARs is significantly higher than the Main Board (23.2%), it is not significantly different from that in the SME Board (38.1%) during the whole sample period. In 2009 the raw underpricing returns are significantly higher for ChiNext IPOs than those on either the SME or Main Boards. However, the differences in MAARs across the three markets are not significantly different in any of the years.

3.3.2 Descriptive statistics

Table 4 Panel A summarises the fundamental characteristics of the 281 IPO firms listed on ChiNext. We also analyse IPO firms separately by year to examine potential difference. Our results show that IPOs listed in 2010 have a larger average issuing price and gross proceeds than those listed in 2009 or 2011. The median value of the time gap between offering and listing (Ldays) significantly decreases from 17 days in 2009 to 9 days in 2011. The offering P/E ratio is higher in 2010 than those in the other two years. The median value of the online Lottery winning ratio increases from 0.70 in 2009 to 0.99 in 2011, and the average market momentum declines from 1.20% to -2.96%, implying that investors' demand and general

market sentiment become much weaker in 2011. Regarding the ownership structure at issuing, the floating A-shares constitute approximately 20% of total shares. Natural-person shares play a dominant role on the ChiNext listed firms, making up an average of 48% of total shares. Legal entities make up approximately 30%, whereas the state only owns about 2% of total shares in ChiNext market. Management shares make up about 80% of natural-person shares and 39% of the total shares outstanding. The largest shareholder of a typical firm owns approximately 34% of total shares, whereas the top 5 shareholders on average control about 63% of total shares outstanding.

Panel B of Table 4 displays the industry classification of 281 IPO firms based on the 4-digit industry classification system of the CSRC. As shown, the manufacturing firms constitute approximately 68% of the total IPOs and information technology firms only make up about 18% of total IPOs. Only 14% firms belong to the other 8 industries. No Finance or Insurance companies were listed on ChiNext during 2009-2011. In this study, we define IPO firms in the information technology industry as high-tech firms.

[Insert Table 4 here]

Comparison of the variables across the trading platforms is presented in Panel C of Table 4. The average issue price of ChiNext IPOs is higher than those on the SME and the Main Boards, with statistically significant difference of RMB 4.36 and RMB 15.17 respectively. The high issue prices of ChiNext IPOs are consistent with their high P/E ratios at issue. Consistent with the ChiNext goal of enabling smaller firms access to the capital market, the gross proceeds and total assets for ChiNext firms are significantly smaller than the other markets. Ownership structure also differs substantially across the markets with ChiNext IPOs having a greater ownership by natural persons (48%), while the SME Board is dominated by legal-entity shareholders (39%) and the Main Board firms' are controlled by legal-entity shares (34%) and the state shares (30%). In addition, ChiNext IPOs management ownership (40%) is significantly higher than their counterparts on the SME (30%) and Main Boards (13%).

3.3.3 IPO underpricing regression analysis

This section reports the multiple regression analysis for underpricing. To avoid multicollinearity we check the correlation matrix among independent variables and the

tolerance and variance inflation (VIF) values[11]. The tolerance and VIF values are all within the acceptable limits, except for Manashare and Legshare which are highly correlated (0.804). Therefore we have to separate these two variables and the complete ordinary least squares (OLS) regression models are shown as follows.

$$MAAR_i=\alpha_0 + \beta_1(LNTA_i) + \beta_2(Age_i) + \beta_3(Ldays_i) + \beta_4(Underwriter_i) + \beta_5(P/E_i) + \beta_6(Lottery_i) + \beta_7(\text{Market Momentum}_i) + \beta_8(Manashare_i) + \beta_9(Large5_i) + \beta_{10}(Hightech_i) + \beta_{11}(Year09) + \beta_{12}(Year10) + e_i \quad (4)$$

$$MAAR_i=\alpha_0 + \beta_1(LNTA_i) + \beta_2(Age_i) + \beta_3(Ldays_i) + \beta_4(Underwriter_i) + \beta_5(P/E_i) + \beta_6(Lottery_i) + \beta_7(\text{Market Momentum}_i) + \beta_8(Legshare_i) + \beta_9(Large5_i) + \beta_{10}(Hightech_i) + \beta_{11}(Year09) + \beta_{12}(Year10) + e_i \quad (5)$$

The regression results are presented in Table 5. The coefficient standard errors are corrected for heteroskedasticity using White (1980). Model 1 shows the results of information asymmetry effects on IPO underpricing and this regression explains 22.4% of the variation in MAARs. The coefficients of LNTA and offering P/E are significantly negative as expected at the 1% level across all four models. The coefficient on Ldays is insignificant in Model 1, but significantly positive as expected at the 5% level in Models 2-4. The coefficient of Age has the opposite expected sign which contrasts to Ritter (1984)'s argument that younger firms underprice more relative to older firms. A possible explanation is that ChiNext investors may prefer firms with short operating history and perceive them as having high potential growth in the future. The underwriter dummy coefficient exhibits the expected negative sign but is insignificant.

[Insert Table 5 here]

When behavioural variables are added in Model 2 the regression's explanatory power increases from 22.4% to 33.8%. The significantly negative coefficient for Lottery is consistent with the behavioural literature, suggesting that firms with strong individual demand are subject to higher degree of underpricing. The coefficient of Market Momentum is also significantly positive. This provides fresh evidence supporting Loughran and Ritter (2002)'s argument that IPOs have higher first-day returns if they list following a rising

[11] Due to the size limitation, we do not provide these two tables in this paper.

market. It also implies that potential entrepreneurs can time their issues to coincide with periods of favourable market performance.

The impact of ownership structure on IPO underpricing is relatively weak as shown in Models 3 and 4. Only the coefficient of Manashare is negatively significant at the 10% level and the adjusted R^2s are only marginally higher than Model 2. The negative coefficient for Manashare suggests that the higher proportion of shares held by the management, the lower initial returns investors would require. This is consistent with the agency hypothesis that management ownership serves as a favourable signal to investors regarding firm quality and reduces agency costs.

Among all the models, the coefficients of high-tech dummy are negatively correlated with IPO underpricing at the 5% significance level, suggesting that IPOs in the information technology industries have lower underpricing than other IPOs. This is inconsistent with Chi and Padgett (2005a) that technology or internet related offerings exhibit higher level of underpricing on the Main Board.

3.3.4 Signalling hypothesis on IPO underpricing

The signalling hypothesis postulates that high quality firms attempt to differentiate themselves from low quality firms by generating costs which are not optimal for low quality firms to incur. Thus good quality firms will underprice more and have higher post-IPO earnings (Allen and Faulhaber, 1989). To test the signalling hypothesis we use earnings per share and return on assets one year after listing (EPS_{t+1} and ROA_{t+1}) as proxies for profitability measures. Following Jain and Kini (1994), we form two subsamples based on the median MAARs and test whether IPOs with greater underpricing experience superior post-listing operating performance.

Table 6 highlights that IPOs with underpricing greater than the median do not outperform those with lower underpricing. In fact, the opposite is true for EPS_{t+1} which suggests that firms with deeper underpricing experience poorer operating performance after listing. Therefore, we find no evidence supporting the signalling model. This result is consistent with Jain and Kini (1994) and Wang (2004), but differs from that of Su and Fleisher (1999) who

find some support for the signalling hypothesis in explaining IPO underpricing on the Main Board.

[Insert Table 6 here]

4.0 IPO long-run performance

4.1 Literature review and explanatory variables

The majority of international evidence shows excess initial returns of IPOs are followed by underperformance in the long-run with some exceptions (Omran, 2005). Loughran and Ritter (1995) find that IPOs significantly underperform relative to non-issuing firms for three and five years after listing. Hoechle and Schmid (2007) find that IPOs underperformance is significant during the first year and insignificant after two years of listing.

In explaining long-run underperformance Ritter (1991) and Bhabra and Pettway (2003) find that younger firms underperform relatively to older firms. Using total assets as a proxy for firm size, Brav and Gompers (1997) find that long-run performance is better for smaller firms than larger ones. Subsequently, we expect that IPOs with longer operating history and smaller size have better long-run performance.

Carter, Dark, and Singh (1998) argue that prestigious underwriters have a positive impact on the long-run returns of IPOs. They show that underperformance over a three-year holding period is less severe for IPOs issued by more reputable underwriters. In this study, we include underwriter as a dummy variable and expect the same result as that of Carter *et al.* (1998).

The offer P/E ratio is often used as a proxy for firm valuation with a high offering P/E ratio indicating good future prospects and high growth. Therefore, we expect a positive relationship between offering P/E ratio and the market-adjusted long-run return. IPOs with low online lottery winning ratios are regarded as hot issues with strong investor demand. Derrien (2005) argue that IPOs with high individual investors' demand experience a relatively large positive initial returns but negative long-run excess returns. In this study, we include online lottery winning ratio and expect a positive relationship between lottery winning ratio and IPO long-run performance. Aggarwal and Rivoli (1990) argue that IPO

underpricing is negatively related to long-run excess returns, and empirical studies such as Ritter (1991) and Levis (1993) support this inverse relationship. Subsequently, we expect that IPOs with larger underpricing perform less well in the long-run.

Chan *et al.* (2004) find that managers attempt to window-dress their accounting reports before going public, which leads to overstated pre-IPO performance and understated post-IPO performance. Kao, Wu, and Yang (2009) also report that firms may engage in more earnings management to attain better pricing-period accounting performance. As the managed earnings cannot persist, the post-IPO profitability suffers, which results in further deteriorating post-issue performance. In this study, we use the percentage change of returns on assets (Cha_ROA) from pre-issue to one-year after as a proxy for operating performance, and we expect that IPOs with better operating performance exhibit better long-run performance.

Chan *et al.* (2004) and Chi and Padgett (2005b) report that Main Board firms with higher proportion of non-tradable shares underperform relative to firms with more public shares. Therefore, we include the percentage of floating A-share at issue as a control variable and expect that it is positively related to the one-year IPO performance. In addition, we include the percentage change of floating shares from issuing to one year after issuing as a control variable. On ChiNext, shares held by pre-IPO investors, directors, supervisors and senior executives were subject to one-year lock-up period, and shares held by offline institutional investors were locked up for three months. Mohan and Chen (2001) argue that as corporate insiders possess information regarding the future prospects of IPO firms, abnormal trading activities occurring shortly after the expiration of the lock-up restrictions reflects market's perception of the firms' true value. They find that the market interprets heavy trading after the expiration date as insiders having lost their confidence in the IPO firm. Therefore, a significant increase in floating A-shares may signal poor-quality for an IPO firm. In addition, the large amount of restricted shares turning into floating shares would create huge uncertainty regarding the market's demand and supply, which may eventually lead to poor share performance.

IPO performance may differ significantly across industries. For example, Kooli and Suret (2004) report that IPOs from mining and gas industries underperform other industries, while Chi, Wang and Young (2010) find that Main Board firms with high-tech features perform

better over the long-run than other firms. Following Chi *et al.* (2010), we include a high-tech dummy to control for the high-tech effect. The description and expected signs of variables included in the study of long-run performance are shown in Table 7.

[Insert Table 7 here]

4.2 Method

We measure long-run performance using cumulative abnormal return (CARs) and buy-and-hold abnormal returns (BHARs) as suggested by Ritter (1991) and Levis's (1993). Instead of using calendar month, we follow Ritter (1991) and Chan *et al.* (2004) and assume there are 21 trading days in a month. Due to data availability, the sample size for the one-year aftermarket performance is smaller, including only 153 IPO firms listed during October 2009 and December 2010.

The average adjusted return on a portfolio of *n* stocks for month *t* (AR_t) is computed as the arithmetic average of market adjusted returns.

$$AR_t = 1/n \sum_{i=1}^{n} (r_{it} - r_{mt}), \quad (6)$$

where r_{it} = the return for stock *i* in the *t*th trading month, and r_{mt} = the market index return for the corresponding time period. The cumulative abnormal return (CAR) is the sum of monthly market-adjusted returns.

$$CAR = \sum AR_t \quad (7)$$

The market adjusted buy-and-hold abnormal return after listing is defined as follows.

$$BHAR_{it} = \prod_{t=1}^{12}(1 + r_{it}) - \prod_{t=1}^{12}(1 + r_{mt}) \quad (8)$$

The average BHAR for the entire sample is calculated as the arithmetic average of market adjusted BHAR.

$$\overline{BHAR} = \frac{1}{n} \sum_{i=1}^{n} BHAR_{it} \quad (9)$$

4.3 IPO long-run performance results

We initially present the CARs and BHARs along with descriptive statistics and then we examine the determinants of IPO long-run performance for ChiNext IPOs.

4.3.1 CARs and BHARs

Table 8 Panel A report the CARs and BHARs for ChiNext IPOs listed during the whole sample period, as well as, for 2009 and 2010 separately. At the end of 12 months after listing, both CARs and BHARs against the SZSE SME Price Index are significantly negative, indicating that ChiNext IPOs underperform the corresponding benchmark. The underperformance for 2009 ChiNext IPOs is more obvious.

[Insert Table 8 here]

Table 8 Panel B compares CARs and BHARs for IPOs across the markets during the whole sample period and for 2009 and 2010 respectively. The results show that the average CAR and BHAR for ChiNext IPOs for the entire sample are the lowest (-41.2% and -45.7%) in comparison with SME Board IPOs (-28.6% and -29.1%) and those listed on the Main Board (-0.3% and -2.4%), and the difference is statistically significant.

4.3.2 Descriptive statistics

Table 9 Panel A summarises descriptive statistics for variables included in the long-run performance analysis. The average ROA growth rate from one quarter before issuing to one year later is -67.7%, indicating significant deterioration of operating performance for ChiNext IPOs after listing. The mean and median percentage change in floating A-shares from issuing to one-year after issuing is 107.6% and 105.4%, respectively, indicating the strong sell-offs of the restricted shares after lock-up period.

Table 9 Panel B shows the comparison of variables in the long-run performance study between ChiNext and the other markets. The percentage change in return on assets is approximately -19.7% in the Main Board and -48.8% in the SME Board, whereas -67.7% on ChiNext, and the difference of Cha_ROA between ChiNext and the other markets is statistically significant at the 1% level. As for the ownership structure change, Main Board IPOs have higher percentage change in their fraction of floating A-shares from issuing to one year after only due to the non-tradable share reform. The significantly high percentage of high-tech firms on the ChiNext is consistent with the Chinese government's intention to improve financing environment for high technical firms.

[Insert Table 9 here]

4.3.3 IPO long-run performance regression analysis

We present the long-run performance regression results in Table 10. The complete ordinary least squares (OLS) regression models are shown as follows.

$$BHAR_{12}=\alpha+\beta_1\ (Underwriter_i) + \beta_2\ (Age_i) + \beta_3\ (LNTA_i) + \beta_4\ (P/E_i) + \beta_5\ (Lottery_i) + \beta_6\ (MAAR_i) + \beta_7\ (Cha\_ROA_i) + \beta_8\ (Floating\_A\_share_i) + \beta_9\ (Cha\_Floating\_A\_share_i) + \beta_{10}\ (Hightech_i) +\beta_{11}(Year09) + e_i.$$

Models 1-11 show how each explanatory variable individually contributes to explaining IPO underperformance. Model 12 includes all the variables except the year dummy (Year09), and the complete regression is shown in Model 13. As observed in Model 13, all independent variables collectively explain 35% of the variations in one-year BHARs.

The positive coefficient of offering P/E ratio is significant at the 1% level, which is consistent with our expectations that IPOs with high offering P/E ratio have better future prospects and thus higher growth opportunities. Like Ritter (1991) and Levis (1993), we also find that MAAR is significantly inversely related to the one-year BHARs. The results also show that the coefficient of Cha_ROA is statistically significant at the 5% level in Model 13, suggesting that IPOs with higher growth in ROA perform better compared to IPOs with low ROA growth rates. This is consistent with Jain and Kini (1994) and Chan *et al.* (2004) that the long-run IPO performance mirrors the operating performance during the aftermarket period. In addition, the change in the percentage of floating A-shares from issuing to one-year after (Cha_Floating_A_share) is found to be negatively associated with one-year BHARs at the 5% significance level. Many original owners and executives had been seen dumping their shares on the market after the lifting of share trading bans, trying to make the most of the current share prices. Olivia Chung, a senior Asia Times Online reporter, reports that in 2010 many executives even resigned their positions in apparently successful companies to get around sales restriction (Asia Times, 2010). Under the old ChiNext rules, executives of ChiNext firms were not allowed to sell their stocks for 12 months after IPO; however, if they resigned, they could sell their shares six months after resignation. Therefore by resigning executives could unload their shares much earlier resulting in investors losing confidence and trust in these firms.

Models 10, 12 and 13 show that high-tech firms significantly underperform relative to other IPO firms which contrasts to the positive relationship Chi and Padgett (2005b) find for Main Board IPOs. Finally, our results also show that IPOs listed in 2009 perform worse than IPOs listed in 2010.

In Model 13, Cha_ROA and Year09 dummy win the horse racing among all the independent variables. Previously, we find that the average Cha_ROA is -67.7% and the average 12-month BHAR is -45.7%. Kao *et al.* (2009) find that IPOs that report high pricing-period performance are more likely to engaged in income-increasing earning management, which has a negative impact on post-IPO performance. Our result implicitly echoes Kao *et al* (2009)'s argument that IPOs with large decline in ROA have lower long-run returns. In addition, the main reason for 2009 IPOs underperform more is that the ChiNext was surrounded by severe speculation and strong investor demand, especially during the initial trading period. This is in line with the window of opportunity hypothesis which argues that issuers that take advantage of high valuation periods have high underpricing but low long-run returns in the secondary market.

[Insert Table 10 here]

5.0 Conclusions

We examine the IPO underpricing and long-run performance of the ChiNext market which was established to enable smaller private firms with high-growth potential access to China's capital markets. We find that IPO underpricing and underperformance was particularly severe for IPOs listed in 2009 due to high speculation at the beginning of the setup of this market. ChiNext IPO underpricing is significantly higher than that of Main Board IPOs during the same sample period but not dissimilar to underpricing for listings on the SME Board. However, ChiNext IPO long-run performance is significantly lower compared to the other two Boards. Regression results support the information asymmetry hypothesis and behavioural theory of ChiNext underpricing. Further, long-run underperformance is consistent with the significant decrease of operating performance in the year following IPOs.

Based on our empirical findings, we suggest that investors should exercise caution before investing in this new market. Since the market was established, the Chinese authorities have focused on improving the regulatory environment governing ChiNext listing. As shown in

this study, the introduction of new polices appear to have played an important role in reducing the level of underpricing and underperformance.

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Table 1: Initial listing requirements for ChiNext, SME Board, and the Main Board

	ChiNext	SME Board	Main Board
Targets	Innovative and growing start-ups	Mature SMEs	Large and mature firms
Operating history (at least)	3 consecutive years	3 consecutive years	
Public held shares	25% of issued capital; **OR** 10% of issued capital if market capitalisation is larger than RMB 400m (US$61m)		
Financial and accounting requirements (i.e. profits, cash flows, revenue)	1. Shareholders' equity of no less than RMB 30m (US$4.8m) after IPO; 2. Net assets of no less than RMB 20 m (US$3.2m) in the end of the most recent year with no uncovered losses; 3. Profitable in the most recent 2 consecutive years, with accumulated profits of no less than RMB 10m (US1.6m); **OR** Net profit of more than RMB 5m (US$0.8m) and revenue of no less than RMB 50m (US$8.0m) in the most recent year and revenue growth rate of more than 30% for the two recent years.	1. Shareholders' equity of no less than RMB 30m (US$4.8m) before IPO and RMB 50m (US$8.0m) after IPO; 2. Intangible assets of no more than 20% of net assets (excluding land use rights, aquaculture rights, and mining rights); 3.1 Accumulated profits of no less than RMB 30m (US$ 4.8m) for last three fiscal years; **AND** either of the following criteria: 3.2 (i) Accumulated cash flows of more than RMB 50m (US$8.0m) for last 3 fiscal years; (ii)Accumulated revenue of more than RMB 300m (US$48.0m) for the latest three fiscal years.	

Source: From *Measures for the Administration of Initial Public Offering and Listing of Stocks*, *Interim Measures on the Administration of Initial Public Offerings and Listing of Shares on the ChiNext*, and the Shenzhen Stock Exchange official website.

Table 2: Variables in the study of IPO underpricing

Theory	Variable	Expected Sign	Description
Information Asymmetry	LNTA	-	LNTA is the natural log of total assets at issuing.
	Age	-	AGE is the number of years that the firm had existed before the IPO. It reflects the operating history of a firm.
	Ldays	+	Ldays refers to the time gap between day of offering and listing.
	Underwriter	-	Underwriter dummy: 1 if IPO are issued by top 8 underwriters, otherwise 0.
	P/E	-	P/E is the ratio of offer price to earnings per share.
Behavioural Theory	Lottery	-	Lottery is the online lottery winning ratio. It is the ratio of successful online subscribers to total valid online subscribers. Lottery = Successful online subscribers/total valid online subscribers.
	Market Momentum	+	Market Momentum refers to the market returns over 15 trading days before the issuing day. It is used as a proxy for general market sentiment.
Ownership Variables	Manashare	-	Manashare refers to the percentage of shares held by the general management (i.e. directors, supervisors, senior executives, general managers etc) at issue.
	Legshare	-	Legshare refers to the percentage of shares held by legal entities at issue.
	Large5	-	Large5 refers to the proportion of shares held by the largest 5 shareholders at time of issuing.
Industry Dummy	Hightech	+	Hightech is an industry dummy based on CSRC industry classification (1 for information technology, otherwise 0).
Year Dummies	Year09 Year10		Year09 and Year10 are both year dummies that take the value of one if a firm was listed in a particular calendar year and 0 otherwise

Table 3: Raw returns and MAARs

Panel A: Underpricing of the IPOs in ChiNext

This table reports the unadjusted (raw returns) and adjusted (MAARs) initial returns of ChiNext-listed IPOs during the period of October 2009-December 2011. It includes all the 281 firms listed on ChiNext during 2009-2011 except Suzhou Goldengreen Technologies (300060), which was suspended from listing due to invalid core patent and deceit listing. One sample t-test is used to test whether the average returns are significantly different from 0. The one sample Wilcoxon signed rank test is used to check whether the medians of the above returns are significantly different from 0. As observed, all the returns in this table are significant at the 1% level. ***,**,* represent significance at the 1%, 5% and 10% level, respectively.

		Raw Returns			MAARs		
	No. of IPOs	Mean	Median	t-stat for Mean	Mean	Median	t-stat for Mean
2009	36	92.67***	85.12	13.67	61.27***	66.36	8.37
2010	117	37.83***	33.44	20.82	36.36***	31.73	13.95
2011	128	22.59***	14.98	8.10	23.00***	15.97	8.81
Total: 2009-2011	281	37.91***	27.43	16.34	33.47***	26.04	16.77

Panel B: Underpricing of the IPOs in ChiNext, the SME Board and the Main Board

Panel B compares raw returns and MAARs for IPOs on the ChiNext, SME and Main Boards over the same sample period. Two sample t-test is used to test whether the mean differences are significantly different from 0.The Wilcoxon signed rank test is used to check whether the median difference is significantly different from 0. ***,**,* represent significance at the 1%, 5% and 10% level, respectively.

			Raw returns				MAARs			
		N	Mean	Mean diff	Median	Median diff	Mean	Mean diff	Median	Median diff
2009	ChiNext	36	92.67		85.12		61.27		66.36	
	SME Board	27	68.01	24.66**	46.52	38.60**	66.83	-5.56	48.03	18.33
	Main Board	4	35.37	52.30**	10.44	74.68**	36.22	25.05	9.77	56.59
2010	ChiNext	117	37.83		33.44		36.36		31.73	
	SME Board	204	45.13	-7.30	31.39	2.05	43.87	-7.51	32.54	-0.81
	Main Board	26	28.52	9.31	23.78	9.66*	28.37	7.99	28.30	3.43
2011	ChiNext	128	22.59		14.98		23.00		15.97	
	SME Board	115	29.67	1.94	14.75	0.23	21.09	1.92	13.80	2.17
	Main Board	39	17.40	5.18	10.56	4.42	18.46	4.54	13.27	2.70
Oct 2009-	ChiNext	281	37.91		27.43		33.47		26.04	
Dec 2011	SME Board	346	38.78	-0.86*	28.48	-1.05	38.09	-4.62	28.44	-2.40
	Main Board	69	22.64	15.27***	13.72	13.71***	23.22	10.24***	14.85	11.19***

Table 4: Descriptive statistics

Panel A: Summary characteristics of ChiNext IPOs

Panel A presents the summary statistics of firms listed on ChiNext. MAARs are the market-adjusted abnormal returns. Age is the number years that the firm had existed before IPO. Ldays are the number of days between the offering and listing dates. P/E ratio is the offering price to earnings per share ratio. Lottery winning ratio is the ratio of successful online subscribers to total valid online subscribers. ROA_{-1} is the return on total assets one-year before IPO. Market Momentum refers to the market returns over 15 trading days before the offer date. The total shares are generally held by four groups: the public, natural persons, legal-person institutions, and the State. *Floating_A_share* refers to the percentage of shares held by the public at issuing. Natural-person ownership refers to the percentage of natural person shares at the time of issuing; and Legal-entity ownership refers to the percentage of legal-person shares at time of issuing. Among natural person shares, shares held by independent directors, chairmen, supervisors, general managers are defined as management shares. Government ownership refers to the percentage of shares held by the State and State-owned institutions. Largest shareholder ownership refers to the percentage of shares held by the largest shareholder. Ownership concentration refers to the total proportion of shares held by the five largest shareholders.

	2009 (36 IPOs)		2010 (117 IPOs)		2011 (128 IPOs)		2009-2011 (281 IPOs)	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
MAARs (%)	61.27	66.36	36.36	31.73	23.01	15.97	33.47	26.04
Issue price	26.11	22.95	36.84	33.00	28.58	24.99	31.70	27.00
Gross proceeds(m)	566.92	476.00	823.37	660.00	618.33	498.75	697.12	570.23
Age	7.33	7.85	6.49	6.57	8.99	8.69	7.74	7.97
Ldays	19.72	17.00	12.50	11.00	9.78	9.00	12.19	10.00
Total assets(m)	308.58	243.43	370.75	295.76	368.02	296.10	361.54	284.21
P/E ratio	62.60	59.29	70.45	67.52	53.32	48.01	61.64	59.23
Lottery winning ratio[5]	0.73	0.70	0.73	0.64	1.51	0.99	1.09	0.73
Market momentum (%)	1.20	0.32	1.37	3.20	-2.96	-4.11	-0.62	-0.39
ROA_{-1}	0.19	0.16	0.17	0.17	0.17	0.16	0.18	0.16
Floating_A_share (%)	19.81	20.09	19.95	20.01	20.06	20.07	19.98	20.06
Natural-person ownership (%)	50.13	57.10	47.51	56.25	47.80	58.28	47.98	57.05
Legal-entity ownership (%)	23.08	16.94	31.65	23.42	30.78	20.66	30.15	20.60
Government ownership (%)	6.78	0.00	0.66	0.00	1.36	0.00	1.76	0.00
Management ownership (%)	40.17	40.97	39.75	44.11	38.74	45.97	39.34	45.28
Largest shareholder ownership (%)	30.50	29.13	34.31	33.58	35.02	32.90	34.14	32.12
Ownership Concentration (% LARGE5)	60.85	62.49	63.39	65.05	64.08	66.72	63.38	65.44

Note: We limit the online Lottery winning ratios to 1st and 99th percentile as there are two extreme values which may lead to non-normality issues. For example: Suzhou Electrical Apparatus Science Academy Co Ltd (Stock Code: 300215) and Ingenic Semiconductor Co. Ltd (Stock Code: 300223) have online lottery winning ratio of 18.69 and 10.14. We run the regression with and without winsorising the data and find that our regression results in table 9 are not affected by the extreme values.

Panel B: Industry classifications of ChiNext IPOs

Panel B displays the industry classification of 281 companies listed on ChiNext. We use the 4-digist industry classification system of the CSRC. There are no Utilities, Finance & Insurance, or Real estate IPOs listed on ChiNext, and the majority of companies belong to manufacturing industry.

	Number of IPOs	Percentage (%)
Farming, forestry, animal husbandry and fishing	6	2
Mining	4	1
Manufacturing	190	68
Construction	2	1
Transportation and warehouse	2	1
Information technology	52	18
Trade	1	0
Social services	13	5
Communications and cultural industries	10	4
Conglomerates	1	0
Total	281	100.00

Panel C: Comparison of IPO characteristics among ChiNext, the SME Board, and the Main Board

This table compares the characteristics among ChiNext, the SME Board, and the Main Board. The data covers from October 30 2009 to December 31 2011. We use the SZSE SME Price Index as the benchmark for both ChiNext-listed and the SME Board listed firms. For the Main Board, we use the SSE composite A-share Index as the Benchmark. Pooled t-test is used to compare the mean difference of the characteristics between ChiNext and the Main Board and the SME Board, whereas Wilcoxon test is applied to test the significance of median differences of the variables between ChiNext and the other two boards. Value marked with *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively. The primary data comes from the CSMAR Financial database, companies' interim and annual reports, and IPO prospectus.

		No. IPOs	Mean	Median	S.D.	Mean difference	Median difference
MAARs(%)	ChiNext	281	33.47	26.04	33.45		
	SME Board	346	38.09	28.44	41.63	-4.62	-2.40
	Main Board	69	23.22	14.85	30.43	10.24**	11.19***
Issue Price	ChiNext	281	31.70	27.00	16.48		
	SME Board	346	27.34	25.00	13.88	4.36***	2.00***
	Main Board	69	16.53	14.00	12.90	15.17***	13.00***
Total assets (million)	ChiNext	281	361.54	284.21	267.87		
	SME Board	346	1,081.69	606.14	3,004.29	-720.15***	-321.93***
	Main Board	68	34,413.18	4,064.89	148,988.73	-34051.64***	-3780.68***
Gross Proceeds (million)	ChiNext	281	697.12	570.23	441.72		
	SME Board	346	900.98	706.62	647.42	-203.86***	-136.39***
	Main Board	69	4813.01	2520.00	8774.27	-4,115.89***	1,949.77***
Age	ChiNext	281	7.74	7.97	4.58		
	SME Board	346	7.80	7.65	26.32	-0.06	0.32
	Main Board	69	7.84	7.46	5.38	-0.10	0.51

Ldays	ChiNext	281	12.19	10.00	5.89		
	SME Board	346	11.17	11.00	2.54	1.02***	-1.00
	Main Board	69	10.90	10.00	3.32	1.75*	0.00
ROA	ChiNext	281	0.15	0.14	0.09		
	SME Board	346	0.11	0.10	0.07	0.04***	0.04***
	Main Board	69	0.07	0.06	0.06	0.08***	0.08***
P/E ratio	ChiNext	281	61.64	59.23	22.42		
	SME Board	346	50.81	49.68	15.88	10.83***	9.55***
	Main Board	69	39.76	38.00	17.30	21.88***	20.81***
Lottery winning ratio	ChiNext	281	1.13	0.73	1.54		
	SME Board	345	1.06	0.67	1.52	0.07	0.06**
	Main Board	68	3.48	1.49	4.69	-2.34***	-0.76***
Floating A shares (%)	ChiNext	281	19.98	20.06	1.45		
	SME Board	345	19.32	20.03	3.08	0.66***	0.03**
	Main Board	68	15.44	16.37	6.61	4.54***	3.69***
Natural-person	ChiNext	281	47.98	57.05	25.57		
Ownership (%)	SME Board	346	37.94	41.81	29.37	10.04***	15.24***
	Main Board	69	16.88	0.00	25.22	31.10***	57.05***
State ownership (%)	ChiNext	281	1.76	0.00	6.88		
	SME Board	346	3.03	0.00	11.27	-1.27*	0.00
	Main Board	69	29.54	0.00	34.00	-27.77***	0.00***
Legal-entity	ChiNext	281	30.15	20.60	25.19		
Ownership (%)	SME Board	346	39.12	28.98	29.89	-8.97***	-8.38***
	Main Board	69	33.50	22.65	28.31	-3.34***	-2.05
Executive ownership	ChiNext	281	39.34	45.28	23.53		
(part of Natural-person	SME Board	345	30.26	29.73	98.02	9.08***	15.55***
Shares %)	Main Board	69	12.54	0.00	20.00	26.80***	45.28***
Largest shareholder	ChiNext	281	34.14	32.12	13.00		
Ownership (%)	SME Board	346	39.11	38.58	14.69	-4.97***	-6.46***
	Main Board	69	47.06	48.37	17.07	-12.91***	-16.25***

Table 5: Regression results for the underpricing of IPOs in ChiNext

This table reports the results of our cross-sectional regressions. The sample consists of 281 IPO firms during October 2009-December 2011. The complete regressions are as follows:

$MAAR_i=\alpha_0 + \beta_1(LNTA_i) + \beta_2(Age_i) + \beta_3(Ldays_i) + \beta_4(Underwriter_i) + \beta_5(P/E_i) + \beta_6(Lottery_i) + \beta_7(Market\ Momentum_i) + \beta_8(Manashare_i) + \beta_9(Large5_i) + \beta_{10}(Hightech_i) + \beta_{11}(Year09) + \beta_{12}(Year10) + e_i$

$MAAR_i=\alpha_0 + \beta_1(LNTA_i) + \beta_2(Age_i) + \beta_3(Ldays_i) + \beta_4(Underwriter_i) + \beta_5(P/E_i) + \beta_6(Lottery_i) + \beta_7(Market\ Momentum_i) + \beta_8(Legshare_i) + \beta_9(Large5_i) + \beta_{10}(Hightech_i) + \beta_{11}(Year09) + \beta_{12}(Year10) + e_i$

The dependent variable is the market adjusted abnormal return on the first trading day. LNTA is the logarithm of total assets at issuing. Age is the number years that the firm had existed before IPO. Ldays refers to the number of days between the offering and listing dates. Underwriter is a dummy variable (1=top 8, 0=otherwise). P/E ratio is calculated as offering price divided by earnings per share. Lottery refers to the online lottery winning ratio, and is calculated as the number of shares offered to public investors divided by number of shares in valid online subscription. Market Momentum refers to the market returns over 15 trading days before the issuing date. Shares held by independent directors, chairmen, supervisors, general managers are defined as management shares (Manashare). Legshare refers to the percentage of shares held by legal entities at time of issuing. Large5 refers to the percentage of shares held by the largest 5 shareholders. Hightech is an industry dummy (1=information technology industry, 0=otherwise). Year09 and Year10 are both year dummies that take the value of one if a firm was listed in a particular calendar year and 0 otherwise. Model 1 includes the five variables that represent information asymmetry as well as the high-tech dummy and the year dummies. Model 2 adds the two variables that represent the behavioural theory. Model 3 and 4 are the complete regressions. The expected signs are shown in the parentheses next to each independent variable. Numbers in parentheses below the coefficient estimates are t-values, computed using the White (1980) heteroskedasticity consistent standard error. ***, **,* represent significance at the 1%, 5%, and 10% level, respectively.

	1	2	3	4
Intercept	3.14***	2.95***	3.54***	3.35***
	(5.18)	(5.22)	(5.16)	(4.97)
LNTA(-)	-0.15***	-0.14***	-0.17***	-0.15***
	(-4.92)	(-4.77)	(-4.85)	(-4.66)
Age (-)	0.01*	0.01**	0.01**	0.01**
	(1.84)	(2.16)	(2.06)	(2.11)
Ldays (+)	0.01	0.01**	0.01**	0.01**
	(1.64)	(2.20)	(2.36)	(2.28)
Underwriter (-)	-0.05	-0.04	-0.04	-0.05
	(-1.38)	(-1.34)	(-1.33)	(-1.44)
P/E ratio (-)	-0.002***	-0.002***	-0.002***	-0.002***
	(-3.41)	(-2.77)	(-2.89)	(-2.91)
Lottery (-)		-0.03**	-0.02*	-0.02*
		(-1.98)	(-1.73)	(-1.78)
Market Momentum (+)		1.90***	1.92***	1.92***
		(6.76)	(6.87)	(6.82)
Manashare (-)			-0.14*	
			(1.73)	
Legshare (-)				0.08
				(1.13)
Large5 (-)			-0.20	-0.26
			(-1.18)	(-1.39)
Hightech (+)	-0.11**	-0.10**	-0.10**	-0.10**
	(-2.33)	(-2.35)	(-2.46)	(-2.47)
Year09	0.32***	0.20**	0.19**	0.20**
	(4.07)	(2.58)	(2.39)	(2.49)
Year10	0.18***	0.06	0.06	0.06
	(4.88)	(1.58)	(1.56)	(1.52)
Adjusted R^2	0.22	0.34	0.35	0.34
F stat	11.11	15.32	13.36	13.06

Table 6: Testing signalling hypothesis of IPO underpricing

This table tests whether signalling model explains IPO underpricing on ChiNext firms. ROA_{t+1} and EPS_{t+1} are used as performance measure. ROA_{t+1} is the return on assets one year after IPO and EPS_{t+1} refers to earnings per share one year after IPO. MAAR is the market-adjusted abnormal return on the first trading day. Median indicates the median of underpricing. The Z-statistics reported are based on the Wilcoxon two-sample signed rank test. ***, **,* represent significance at the 1%, 5%, and 10% level, respectively.

	ROA_{t+1}			EPS_{t+1}		
	MAAR<Median	MAAR>Median	z-stat	MAAR<Median	MAAR>Median	z-stat
Raw	0.06	0.06	1.01	0.61	0.48	-2.89***
No. of obs.	127	112		127	112	

Table 7: Variables in the study of IPO long-run performance

Variable	Expected Sign	Description
Underwriter	+	Dummy variable 1 is used as proxy for IPOs underwritten by the top 8 underwriters, and 0 otherwise.
Age	+	Age is the number of years that the firm had existed before the IPO.
LNTA	-	LNTA refers to the natural log of total assets. It is often used as a proxy for firm size.
P/E ratio	+	P/E ratio refers to the ratio of offering price to earnings per share. The P/E multiplier measures how much investors are willing to pay for a dollar earnings.
Lottery	+	Lottery indicates online lottery winning ratio. It is the ratio of successful online subscribers to total valid online subscribers.
MAAR	-	MAAR is the market-adjusted returns computed by Eq.(3). It estimates the abnormal returns earned by investors on the first trading day.
Cha_ROA	+	Cha_ROA refers to the percentage change in return on assets from pre-listing to one-year after. ROA is calculated as net income divided by total assets. $Cha\_ROA = ROA_{t+1}/ ROA_t - 1$ where ROA_t is calculated by using net income and total assets in the latest available periodic reports before offering, and ROA_{t+1} is obtained by using net income and total assets one year after that accounting period. This variable is used as a proxy for firms' operating performance during their one-year aftermarket period.
Floating_A_share	+	Floating_A_share refers to the percentage of floating A-shares at issuing. It is computed as the ratio of the number of public shares to total shares at issuing.
Cha_Floating_A_ share	-	Cha_Floating_A_share refers to the percentage change in the floating A-shares from the time of issuing to one-year after issuing. The equation is shown as follows: Cha_Floating_A_share= (Floating A-share at one-year after issuing/ Floating A-share at time of issuing) -1
Hightech	+	Hightech is a dummy variable which measures whether the company is belonging to information technology industry (1= information technology IPOs, 0 otherwise).
Year09		A year dummy is introduced to test whether the long-run performance is different for IPOs listed between 2009 and 2010. Dummy variable 1 is used as proxy for IPOs listed in 2009 while 0 for IPOs listed in 2010.

Table 8: Long run performance

Panel A: CARs and BHARs for ChiNext IPOs

Panel A shows the average one-year buy-and-hold abnormal returns (BHARs) and cumulative abnormal returns (CARs) for the 153 ChiNext IPOs listed during October 2009-December 2010. Instead of using calendar month, we follow Ritter (1991) and Chan *et al.* (2004) and assume that there are 21 trading days in a month. One-year holding period returns are calculated as $BHAR_{it} = \prod_{t=1}^{12}(1 + r_{it}) - \prod_{t=1}^{12}(1 + r_{mt})$ where r_{it} is the monthly return on stock i, and r_{mt} is the monthly return for the SZSE SME Price Index in event month t. The CAR is computed as the sum of monthly market adjusted abnormal returns (AR_t). $AR_t = 1/n \sum_{i=1}^{n} (r_{it} - r_{mt})$, where r_{it} is the total return for stock i in event month *t*, and r_{mt} is the total return on the SZSE SME Price Index. The formula for cumulative abnormal returns is defined as $CAR_t = \sum AR_t$. Value marked with *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively.

		BHARs (%)		CARs (%)	
	No. of IPOs	Mean	Median	Mean	Median
2009	36	-69.82***	-77.72***	-49.09***	-49.39***
2010	117	-38.33***	-39.43***	-38.73***	-39.20***
Total 2009-2010	153	-45.74***	-45.89***	-41.15***	-42.52***

Panel B: BHARs and CARs of the IPOs in ChiNext, the SME Board and the Main Board

Table 8 Panel B compares CARs and BHARs for IPOs across the markets during the whole sample period and for 2009 and 2010 respectively. Two sample t-test is used to test whether the mean differences are significantly different from 0.The Wilcoxon signed rank test is used to check whether the median differences are significantly different from 0. ***, **,* represent significance at the 1%, 5%, and 10% level, respectively.

			BHAR (%)				CAR (%)			
		N	Mean	Mean diff	Median	Median diff	Mean	Mean diff	Median	Median diff
2009	ChiNext	36	-69.82		-77.72		-49.09		-49.39	
	SME Board	27	-31.49	-38.33***	-42.14	-35.58***	-29.00	-20.09**	-35.60	-13.79*
	Main Board	4	25.64	-95.46***	28.65	-106.36***	1.69	-50.78***	2.17	-51.56***
2010	ChiNext	117	-38.33		-39.43		-38.33		-39.20	
	SME Board	204	-28.80	-9.53***	-32.53	-6.90***	-28.52	-9.81***	-31.38	-7.82***
	Main Board	26	-6.65	-31.68***	-12.34	-27.09***	-6.65	-31.68***	-0.85	-38.35***
Oct 2009-Dec 2010	ChiNext	153	-45.74		-45.89		-41.15		-42.52	
	SME Board	231	-29.12	-16.62***	-33.12	-12.77***	-28.57	-12.57***	-31.70	-10.82***
	Main Board	30	-2.35	-43.39***	-11.65	-34.24***	-0.25	-40.89***	-0.70	-41.82***

Table 9: Descriptive statistics for IPO underperformance

Panel A: Chinext IPO long-run performance variables

Panel A summarises the descriptive statistics of the regression variables. BHAR12 refers to the one-year buy-and-hold abnormal returns of ChiNext IPOs listed during 2009 - 2010. Age refers to the number of years that the firm had existed before the IPO; LNTA is the logarithm of total assets before the IPO; P/E is the offer price to earnings ratio; Lottery refers to the online lottery winning ratio at issuing; MAAR is the market-adjusted initial return of an IPO on the first trading day; Cha_ROA refers to the percentage change in return on assets from the quarter before IPO offering to one-year after that quarter; Floating_A _shares refers to the percentage of floating A shares at issuing; Cha_Floating_A_shares refers to the percentage change in floating A shares from listing to one year after listing; Underwriter is a dummy variable (1=top 8; 0 otherwise). Hightech represent the dummy variable for high-tech companies (1=information technology industry, 0=no). Year09 is a dummy variable for IPO activity period (1=firms listed in 2009, and 0 otherwise).

	2009 (36 IPOs)		2010 (117 IPOs)		2009-2010 (153 IPOs)	
	Mean	Median	Mean	Median	Mean	Median
$BHAR_{12}$ (%)	-69.82	-77.72	-38.33	-39.44	-45.74	-45.88
Age	7.33	7.85	6.49	6.57	6.69	7.12
LNTA	19.41	19.31	19.54	19.51	19.21	19.43
P/E	62.6	59.29	70.45	67.52	68.6	65.45
Lottery	0.73	0.70	0.73	0.64	0.73	0.65
MAAR (%)	61.27	66.36	36.36	31.73	42.22	35.58
Cha_ROA (%)	-69.93	-65.60	-69.18	-72.16	-67.71	-70.09
Floating A_share (%)	19.81	20.09	19.95	20.01	19.92	20.04
Cha_Floating_A_share (%)	119.86	124.25	103.78	94.24	107.57	105.36

	Underwriter	High-tech	Year09
No.IPOs for dummy value 1	70	29	36
Percentage (%)	46	19	24

Panel B: Comparison of variables in the long-run performance among ChiNext, the SME Board and the Main Board

This table compares the variables included in the long-run underperformance analysis among ChiNext, the SME Board, and the Main Board. Due to data availability, we only include IPOs listed between October 30th 2009 and December 31st 2010 for the long-run performance. Pooled t-test is used to compare the difference between the means of the characteristics, whereas Wilcoxon rank test is applied to test the differences between the median of the characteristics in the Main Board, SME Board and ChiNext. Value marked with *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively.

		Sample size	Mean	Median	S.D	Mean difference	Median difference
BHAR12(%)	ChiNext	153	-45.74	-45.89	27.91		
	SME Board	231	-29.12	-33.20	30.61	-16.56***	-12.69***
	Main Board	30	-2.35	-11.65	31.49	-43.39***	-34.24***
Age	ChiNext	153	6.69	7.12	4.24		
	SME Board	231	6.94	7.00	4.74	-0.25	0.12
	Main Board	30	5.99	2.49	5.39	0.70	4.63
Total assets	ChiNext	153	356.1	274.4	255.2		
	SME Board	231	939.8	578.6	1236.3	-583.69***	-279.64***
	Main Board	29	57235.0	8472.7	220319.3	-56878.95***	-8198.31***
P/E	ChiNext	153	68.60	65.45	19.70		
	SME Board	231	54.28	52.63	14.20	14.32***	12.82***
	Main Board	30	40.46	40.85	15.35	28.14***	24.60***
Lottery	ChiNext	153	0.73	0.65	0.33		
	SME Board	231	0.74	0.59	0.53	0.01	0.06**
	Main Board	30	2.15	1.29	2.90	-1.42***	-0.64***
Cha_ROA(%)	ChiNext	153	-67.71	-70.09	16.69		
	SME Board	229	-48.84	-50.76	20.92	-18.87***	-19.33***
	Main Board	30	-19.66	-22.85	30.81	-48.05***	-47.24***
Floating_A_share	ChiNext	153	19.92	20.04	1.70		
	SME Board	231	19.10	20.01	3.21	0.82***	0.03**
	Main Board	30	13.52	15.15	5.18	6.40***	4.89***
Cha_Floating_A_share	ChiNext	153	1.08	1.05	0.58		
	SME Board	231	1.11	0.88	0.89	-0.03	0.17
	Main Board	30	1.91	1.17	1.75	-0.83***	-0.12***

		Sample size	NO.IPOs	Percentage (%)
Hightech	ChiNext	153	29	18.95
	SME Board	231	25	10.52
	Main Board	30	0	0.00

Table 10: Regression results for the IPO underperformance

Table 10 shows the estimation results for the regression models. The complete equation is as follows: $BHAR_{12}=\alpha+\beta_1$ (Underwriter$_i$) + β_2 (Age$_i$) + β_3 (LNTA$_i$) + β_4 (P/E$_i$) + β_5 (Lottery$_i$) + β_6 (MAAR$_i$) + β_7 (Cha_ROA$_i$) + β_8 (Floating_A_share$_i$) + β_9 (Cha_Floating_A_share$_i$) + β_{10}(Hightech$_i$) +β_{11}(YEAR09) + e_i. The dependent variable is *BHAR$_{12}$*, which refers to the one-year buy-and-hold abnormal returns of ChiNext IPOs listed during October 2009 - December 2010. Among the independent variables, underwriter is a dummy variable (1=top 8; 0 otherwise). Age refers to the number of years that the firm had existed before the IPO; LNTA is the logarithm of total assets before the IPO; P/E is the offer price to earnings ratio; Lottery is the online lottery winning ratio at issuing; MAAR is the market-adjusted initial return of an IPO on the first trading day; Cha_ROA refers to the percentage change in return on assets from the quarter before IPO offering to one-year after that quarter; Floating_A_shares refers to the percentage of floating A shares at issuing; Cha_Floating_A_share refers to the percentage change in floating A shares from listing to one year after listing; Hightech represents the dummy variable for high-tech companies (1=information technology industry, 0=no). Year09 is a dummy variable for IPO activity period (1=firms listed in 2009, and 0=firms listed in 2010). The expected signs are shown in the parentheses next to each independent variable. Numbers in parentheses below the coefficient estimates are t-values, computed using the White (1980) heteroskedasticity consistent standard error. Value marked with *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively.

	1	2	3	4	5	6	7	8	9	10	11	12	13
Intercept	-0.49***	-0.45***	-1.29*	-0.76***	-0.45***	-0.37***	-0.34***	-0.32	-0.36***	-0.44***	-0.38***	-0.14	-0.65
	(-14.82)	(-10.97)	(-1.84)	(-11.56)	(-8.79)	(-10.49)	(-4.01)	(-0.88)	(-7.40)	(-16.51)	(-17.15)	(-0.16)	(-0.84)
Underwriter(+)	0.045											0.01	0.00
	(1.00)											(0.324)	(0.11)
Age(+)		-0.001										0.001	0.002
		(-0.13)										(0.21)	(0.39)
LNTA(-)			0.04									-0.01	-0.04
			(1.18)									(-1.45)	(-1.12)
P/E(+)				0.004***								0.005***	0.004***
				(4.69)								(4.77)	(4.33)
Lottery(+)					-0.02							-0.11	-0.05
					(-0.23)							(-1.34)	(-0.69)
MAAR(-)						-0.22***						-0.20***	-0.11**
						(-3.43)						(-2.97)	(-1.98)
Cha_ROA(+)							0.18					0.18	0.33**
							(1.56)					(1.47)	(2.56)
Floating_A_share(+)								-0.67				-0.70	-0.85
								(-0.36)				(-0.63)	(-0.82)
Cha_Floating_A_share(-)									-0.09**			-0.09**	-0.08**
									(-2.25)			(-2.38)	(-2.33)
Hightech(+)										-0.113**		-0.120**	-0.11**
										(-2.63)		(-2.408)	(-2.45)
Year09											-0.315***		-0.27***
											(-6.50)		(-5.01)
Adjusted R^2	0.00	-0.01	0.00	0.09	-0.01	0.07	0.01	-0.01	0.03	0.02	0.23	0.20	0.35
F-stat	0.97	0.02	1.19	16.74	0.05	11.75	1.77	0.25	5.39	3.96	45.26	4.73	8.26