

Investor Sentiment, Governance Mechanisms and Post-IPO Performance in China

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Abstract

This paper examines the determinants of post-IPO long-term return and operating performance of companies in China. We divide the determinants into two main groups: investor sentiment and governance systems. We find that investor sentiment is a major determinant of post-IPO performance. In particular, more underpriced IPOs and IPOs offered at a higher P/E ratio earn lower subsequent stock returns. However, the relation is the opposite when we examine the change in operating performance. We argue that the discrepancy is probably due to over-reaction of investors to the implications of the predicted change in performance. Governance mechanisms, such as reputable underwriters, block holders and managerial ownership also have significant impact on post-IPO performance, but only for the later sample period. We interpret this result as an evidence of China's stock market getting closer to the U.S. one, in terms of development of institutional settings.

1. Introduction

This paper examines the determinants of post-IPO long-term return and operating performance of companies in China. Most previous studies on IPO long-term performance focus on the U.S. market, where the legal and institutional settings are considered to be well-developed. In contrast, the institutional settings of China's stock market are still evolving. In addition, there are still official rules preventing stock market from competitive. For example, the artificial division of ownership shares into tradable and non-tradable limits the supply of common stock in the market. This causes severe over-valuation of stock when too much capital is chasing too few investment opportunities. In addition, with majority control remains in the hands of the state and legal persons whose objectives are not necessary value-maximization, the US-styled market disciplines and corporate governance are ineffective in protecting minority shareholders' interests.

While China's stock market is still very different from stock markets of other countries, the gap has been taking much effort to narrow the gap, such as relaxation of B-share trading to local investors and further sales of non-tradable ownership to public investors in attempt to reduce the influence of the government to the market. Therefore, we expect China's stock market to become more rational and to behave more closely to the developed markets over time. This paper aims to examine if previous theories and empirical results on post-IPO performance of US companies applies also to the special institutional settings in China. In particular, we test if certain proxies of market sentiment, underwriter reputation and corporate governance explain post-IPO performance and if their explanatory powers are changing over time as the market becomes more developed. Post-IPO performance is well-studied for the US market. Ritter (1991) and Loughran and Ritter (1995, 1997) find that IPO firms underperform their benchmarks for three to five years post-IPO, in terms of both stock returns and operating performance. Brav and Gompers (1997), Carter, Dark and Singh (1998) and Field and Lowry (2005) show that certain sophisticated agents in the market, such

as venture capitalists, reputable underwriters and institutional investors play a certification role in the IPO process. However, recent studies by Fama (1998), Mitchell and Stadford (2000), Eckbo, Masulis and Norli (2000) and Eckbo and Norli (2005) point out the bad-model problems of previous long-term event studies. They show that abnormal performance disappears once risk factors are appropriately adjusted for.

Studies on IPOs in China are infant. Among them, Sun and Tong (2003) find that while firms generate more revenues after IPOs, the higher revenues do not turn into better operating performance. Indeed, most firms perform worse than they did before IPOs. Chan, Wang and Wei (2004) examine both stock and operating performance of IPOs in China. In contrast to the results for the US market, A-share IPOs in China only slightly underperform the size- and/or B/M-benchmarks while B-share IPOs outperform the benchmarks. In addition, post-IPO returns reflect the changes in operating performance. Therefore, post-IPO stock performance is not purely driven by speculation. Focusing on the effect of ownership structure as a corporate governance device, Wang (2005) show that legal-entity ownership and concentration of non-state ownership explain the change in performance of IPO firms.

We examine post-IPO stock performance using calendar-time Fama-French 3-factor regression and buy-and-hold return. To summarize, more underpriced firms and firms with higher P/E ratio at offering earn lower subsequent returns than other IPO firms, In other words, stronger investor sentiment at the time of offering predict negatively post-IPO stock performance. On the other hand, first-day tradable share turnover has mixed effects on post-IPO stock performance, depending on the measurement methods. This contrasts to the finding of Wang and Cheng (2004) that higher trading volumes are associated with significantly lower subsequent returns. Board size is related negatively but weakly to post-IPO returns in a calendar-time regression setting but the relation disappears in a multivariable regression setting. Non-tradable share ownership shows opposite effects on post-IPO returns in sub-period analysis. Non-tradable share ownership is negatively related to post-IPO

returns in the first sub-period but positively related to post-IPO returns in the second sub-period. Therefore, while state ownership is previously regarded as harmful to performance as state-appointed managers have to fulfill political objectives other than to maximize shareholders' value, the managers become more profit-oriented over time. Underwriter reputation also has stronger explanatory in the second sub-period. Underwriter reputation has insignificant explanatory power to post-IPO return in the first sub-period but positively explains post-IPO return in the second sub-period. It seems that over time, reputable underwriters can differentiate themselves from others by carefully selecting the deals they handle.

As opposed to the results for stock performance, both higher IPO underpricing and higher P/E ratio are associated with better post-IPO operating performance. The contradicting findings on stock performance and operating performance suggest that while investors give a higher value to firms that are likely to improve their profitability, they tend to overestimate the effect of IPOs on improving operating performance of issuing firms. As a result, stock price could drop while operating performance is improving and vice versa. Share turnover, board size and underwriter have little explanatory power to change in operating performance. Non-tradable share ownership explains positively to the change in operating performance, but the explanatory power is much stronger in the second sub-period than it is in the first sub-period, consistent with the finding on stock performance. Managerial ownership also has stronger positive effect to operating performance in the second sub-period and its effect is geared by the existence of lower non-tradable ownership. The finding seems to suggest that the incentive effect of managerial ownership is stronger when top managers are under fewer constraints by block holders.

Overall, the empirical results of our studies suggest that market sentiment variables, underwriter reputation and corporate governance variables explain post-IPO stock performance and operating performance. With stock market becomes more developed, the roles of underwriters and corporate managers on IPO performance in China become more important and more in line with the

U.S. case.

The rest of the paper is organized as follows: Section 2 describes China's state-owned enterprises reforms and the evolution of its primary market. In section 3, we review the related literature and develop our hypotheses. Section 4 describes the data and methodology. Section 5 reports summary statistics of key explanatory variables. Section 6 presents sub-group analysis on post-IPO returns in a calendar-time regression setting and examines the determinants of post-IPO stock performance and operating performance. Section 6 concludes the paper.

2. China's State-owned Enterprises (SOEs) Reform and IPO Market

The main objective of SOEs reform in China is to reform unprofitable, inefficient state-owned enterprises (SOEs) by ultimately separating the ownership from control. Except for some industries with strategic importance to the government, the Chinese government wants to float completely its ownership to the stock market. As an intermediate stage of the reform, the Chinese government retains a significant percentage of ownership to the SOEs in order to make sure certain social objectives, such as maintaining employment level, can be achieved. In particular, there are five types of shares. The first three types, namely state shares, legal-person shares and employee shares, are non-tradable. State shares are retained by the State Assets Management Bureau (SAMB) for central government or local government. Legal person shares are held by other SOEs and nonbank financial institutions. Employee shares are those sold to managers and workers and cannot be traded within the first 3 years. The last two types, namely domestic shares and foreign shares, are tradable on the two stock exchanges, Shanghai Stock Exchange and Shenzhen Stock Exchange. Domestic shares, or A shares, are those held and traded by individual investors in China. Foreign shares are those held and traded by foreign investors in stock exchanges in China (B shares), in Hong Kong (H shares), or in NYSE (N shares).

The Shanghai Stock Exchange and the Shenzhen Stock Exchange were founded in December

1990 and April 1991 respectively. By the end of 2004, there have been more than 1,300 companies going public. With few exceptions, most of the listed companies in China are formerly SOEs. In other words, central government or local governments usually retain substantial ownership to those listed companies after listing. Usually, the SOEs sell about one-third of ownership to the general public at the time of IPO. However, the application of going public is not available to all companies. There is a quota system which limits the number of firms to go public and the number of shares which can be sold to investors. Upon receiving an IPO application, the China Securities Regulation Commission (CSRC) will check if an applicant has fulfilled all the listing criteria before letting it sell shares to investors.

The pricing of IPOs in China is also regulated but evolving over time. Before 1999, the pricing method was stipulated as the multiplier method. The offer price is required to be the product of net earnings per share and a chosen multiplier, with the multiplier validated by the CSRC (Tian and Megginson, 2006). After 1999, in determining the offer price, the issuing firm should consider the industrial situation, the company development prospect and the P/E ratio in the secondary market. However, since the validated multiplier is usually set to a level significantly lower than the current market P/E, most IPOs are deeply underpriced.¹ The offer price is usually chosen months before the official listing date, a period much longer than the elapsed time for other countries.² The lack of feedback mechanism during the elapsed time contribute further contribute to speculation on IPOs.

IPO shares are allocated based on a lottery system. The lottery system has undergone several changes subsequently, from limiting the number of forms submitted by investors, to allowing unlimited forms submitted. In recent years, investors are allowed to bid on the quantity of shares they would buy but they are still not allowed to bid on offer price. Therefore, the system still lacks

¹ Chan, Wang and Wei (2004) and Tian and Megginson (2006) document that during 1993 and 1998, the IPO price was set around 15 times of the earnings per share.

² Su and Fleisher (1999) document that the typical elapsed time between the setting of offer price and the listing date is 1 day for the U.S., two weeks for Japan, one month for Hong Kong, Singapore and Taiwan and two months for Thailand.

feedback from market demand in setting offer price, as in the U.S. bookbuilding method.

3. Review on Related Literature and Development of Hypotheses

3.1 Investor sentiment and post-IPO performance

A large body of studies on IPOs has documented post-IPO performance for the U.S. market, but the evidence is far from conclusive. Early studies suggest IPO firms underperform their benchmarks for up to 5 years after their offerings. Examining post-IPO stock returns, Ritter (1991) and Loughran and Ritter (1995) find that IPO firms earn significantly lower returns than their benchmarks do. Similarly, Loughran and Ritter (1997) document that IPO firms also underperform their benchmarks in terms of operating performance. Furthermore, Loughran and Ritter (1995) find that IPO long-term underperformance is more significant following hot issues periods than cold issues periods. This suggests market sentiment and investor over-optimism probably explain the long-term underperformance phenomenon. Therefore, we hypothesize that *post-IPO stock performance is negatively related to investor sentiment at the time of IPO.*

There are three potential candidates which can proxy for investor sentiment in China's stock market. The first one is IPO underpricing. As tradable stocks in China are mainly held by less-sophisticated individual investors rather than institutions and short-sales are strictly prohibited (Wang and Cheng, 2004), it is reasonable to assume that stock prices in China's market are extremely volatile and likely to be inflated by individual investors. On the other hand, IPO shares in China are priced according to the earnings per share and the multiplier approved by the CSRC. In other words, even if shares of seasoned firms are overvalued by investors, IPO firms cannot take full advantage of the temporary mispricing in the stock market by selling the shares at a higher price. As a result, the first day returns of IPO shares could be extremely high if investors value IPO shares by

referring to the secondary market.³ Therefore, we expect IPO underpricing a good proxy for market sentiment.

The second proxy for investor sentiment is the P/E ratio as implied by the offer price and earnings per share. While the setting of offer price is regulated by the CSRC, the final offer price is a result of negotiations between the issuing company and the CSRC after referring to the industry prospect and current market P/E. Therefore, the P/E ratio can serve as a complementary proxy for market sentiment, in addition to underpricing.

The third proxy for investor sentiment is tradable share turnover on the first-day trading. Wang and Cheng (2004) shows a negative relation between tradable share turnover and subsequent stock returns and the relation cannot be accounted for by risk characteristics like size, B/M and past stock performance. They argue that their results are consistent with behavioral theories, given the features of China's stock market such as short-sales prohibition and the predominance of individual investors. Therefore, higher first-day share turnover should be associated with lower post-IPO stock performance.

The effect of investor sentiment on change in operating performance is likely to be mixed. On the one hand, investors could be right in assessing the prospect of an IPO firm. Therefore, they give a higher valuation to a firm for which they expect a greater improvement in operating performance. On the other hand, if investors over-react to the value implications of the expected change in performance, they will overpay/underpay for the stock, leading to subsequent reversal of stock prices. In addition, given the prevalence of financial packaging in China as a result of weak legal protection (Aharony, Lee and Wong, 2000), the operating performance of IPO firms are likely to revert after offerings. If investors are misled by the earnings management done by the IPO

³ For example, Su and Fleisher (1999) document a median underpricing of over 200% for IPOs in China between January 1987 and December 1995. Chan, Wang and Wei (2004) document a median underpricing of over 150% for IPOs between 1993 and 1998. The corresponding figure is about 15% for IPOs in the U.S. between 1990 and 1998.

companies, firms with higher valuation will have more negative change in operating performance when performance measures revert back to the original low levels. Therefore, *the effect of investor sentiment on post-IPO operating performance depends on the reasons that drive investors' valuation.*

3.2 Underwriter reputation and post-IPO performance

Later studies try to find out the reason for the divergence in post-IPO stock performance. Even though IPO firms underperform in general, it has been shown that there are huge variations in performance among firms. Several studies find that some sophisticated market participants, such as venture capitalists, underwriters and institutional investors can distinguish high-quality issuers which are more likely to outperform than low-quality ones. Brav and Gompers (1997) show that venture-backed IPOs outperform the non-venture-backed ones. Carter et al (1998) find that IPOs managed by more reputable underwriters outperform those led by less reputable underwriters. Field and Lowry (2005) show that IPOs with greater institutional shareholdings outperform those with smaller institutional holdings. The decisions of those agents could be profit-oriented (for institutional investors) or for preservation of reputation in the market (for venture capitalists and underwriters). Given the above results from previous studies on the U.S. market, we hypothesize that *post-IPO stock and operating performance is positively associated with underwriter reputation.*

Although Carter-Manaster (1991) rank is commonly used as underwriter reputation in the IPO literature for the U.S. market, it is not applicable to the China's market as underwriting businesses in China are dominated by local underwriters. Therefore, we decide to use an alternative measure of reputation of an underwriter based on (1) the number of IPOs (co-)managed by her and (2) her market share, the value of IPOs (co-)managed by her as a percentage of total value of offerings throughout the database, as in Kirkulak and Davis (2005) who examine the relation between underwriter reputation and IPO underpricing in Japanese stock market. We consider both lead

managers and co-managers in our measurement of underwriter reputation. If an IPO is co-managed by N underwriters, then the count (or the value) for an underwriter in this deal will be multiplied by 1/N. The underwriter reputation for an IPO is the average reputation (based on count or market share) of all lead- and co-managers.

3.3 Non-tradable share ownership and post-IPO performance

The classification of ownership shares into five distinct classes is a unique feature in China's stock market. The results are at best mixed in previous study regarding the effect of different types of ownership on post-IPO performance. Sun and Tong (2003) find that state ownership is negatively related to post-IPO operating performance while legal person ownership positively predicts post-IPO performance. On the other hand, Wang (2005) find that state ownership does not have significant explanatory power to change in performance around IPO but legal person ownership has a curvilinear effect on the change in performance.

In our study, we examine the effect of non-tradable ownership after IPO on change in post-IPO performance. Non-tradable shares have two possible opposing effects on post-IPO performance. Since non-tradable shares are mainly owned by the state government, local governments or other SOEs, the grabbing hand argument (Shleifer and Vishny, 1998) suggest that firms with higher government ownership are more likely to be ensnared by the government officials, given the weak property rights protection in China. From this point of view, non-tradable shares should be negatively related to firm performance. On the other hand, the existence of large block holders may improve corporate governance as large shareholders have better incentives to monitor the top managers and punish those incapable. In addition, the illiquid nature of non-tradable shares prevents block holders from selling their shares in the secondary market, thus providing further incentives for monitoring. From this angle, non-tradable share ownership should have positive effect on operating performance. Therefore, *the effect of non-tradable share ownership on post-IPO performance*

depends on the balance of the effects of the two opposing forces.

3.4 Management ownership and post-IPO performance

Morck, Shleifer and Vishny (1988) argue that insider ownership have both incentive effect and entrenchment effect on firm valuation. The incentive effect predicts that firm valuation will be higher when managers' interests are better aligned with small shareholders' interests. This would be the case when managers own more the shares of the companies. Therefore, a positive relation should exist between managerial ownership and change in operating performance. On the other hand, the entrenchment effect predicts that a manager who controls substantial ownership may have enough voting power to determine policies which are benefit to him at the expenses of other shareholders. In addition, with sufficient voting power, he can effectively defend against hostile takeover attempts. Therefore, managerial ownership could be harmful to shareholders' interests. Indeed, Morck et al find a nonlinear relation between managerial ownership and firm value.

The situation in China is further complicated by the non-tradable ownership. Since the state owner have political objectives to fulfill, the incentive effect of managerial ownership will be weakened if the state owner influence corporate decisions frequently. Therefore, *we expect non-tradable ownership to conflict with the incentive effect of managerial ownership.*

3.5 Board size and post-IPO performance

A number of studies suggest that excessive large boards may be dysfunctional. Yermack (1996) and Eisenberg, Sundgren and Wells (1998) show that eight or fewer members in the board would be optimal to firm value and performance. In addition, firms with larger board size are also slower in replacing CEOs in the face of declines in performance. Studying a set of Singaporean and Malaysian firms, Mak and Kusnadi (2005) also find an inverted U-shaped relationship between board size and firm valuation. Motivated by previous studies, we add board size and its quadratic terms to the

models explaining post-IPO performance and *an inverted U-shape is expected for the relation between board size and firm performance.*

4. Data and Construction of Variables.

We analyze all listed companies that conducted initial public offerings after 1993. We exclude IPOs prior to 1993 because in our firm-matching for performance measurement, we require the potential seasoned firms to exist at least two years in order to enter the matched sample. We exclude IPOs of B shares because Chan et al (2004) show that A-share and B-share IPOs behave very differently in terms of underpricing and post-IPO performance. Basic information on IPOs, financial information, stock returns, ownership information, board information and underwriter information are obtained from the Chinese Stock Market and Accounting Research (CSMAR) Database. Following Chan et al (2004), we exclude firms that have elapsed time between offering date and listing date longer than 360 days. The final sample consists of 1201 IPOs.

4.1 Construction of key explanatory variables

Key explanatory variables for our empirical works include the followings.

- (a) *Age of IPO firm in years (AGE)*, defined as the number of years between the establishment date and the listing date.
- (b) *Underpricing (UDPRC)*, defined as the percentage change between the offer price and the first trading-day closing price.
- (c) *PE ratio as implied by the offer price (PE_OFFER)*, defined as the PE ratio given by CSMAR, multiplied by offer price and divided by the first-day closing price.⁴ As PE ratio is meaningful only if earnings is positive, we set the PE ratio to a missing value if it is

⁴ The PE ratio given by the CSMAR is defined as the closing price on the first trading day divided by after-tax profit per share. To segregate the effect of underpricing and PE valuation, we use the PE ratio as implied by the offer price rather than by the first trading-day closing price.

negative. In addition, we set the PE ratio to a missing value if it is greater than 1000.

- (d) *First-day tradable share turnover (TURNOVER)*, defined as the number of shares traded on the first trading day divided by the total number of tradable shares at the end of listing month;
- (e) *Underwriter reputation measured by the number (REPUT_CNT) or the value (REPUT_MV) of IPOs (co-)managed by the underwriter* and the market share as defined in Section 3.2;
- (f) *Board size (BOARD)* defined as the number of directors in the board at the time of IPO;
- (g) *Percentage of non-tradable shares after IPO (PCT)*, defined as ONE minus the ratio of the market value of tradable shares to the market value of total shares at the end of the listing month;
- (h) *Managerial ownership (MANOWN)*, defined as the percentage of outstanding shares owned by the top management given by the CSMAR. Since *MANOWN* should be bounded by ZERO and ONE, *MANOWN* is set to a missing value if it is greater than ONE.

4.2 Stock performance measurement

We evaluate the IPO stock performance by two measurements: (1) buy-and-hold return and (2) the alpha from the Fama-French (1993, 1996) 3-factor model. To measure the buy-and-hold return, we buy the IPO stock at the end of the listing month and hold for a period of 12, 24 or 36 months. For each IPO firm, we find a matched firm based on size and B/M. To be included as a candidate for a matched firm, the seasoned firm has to have existed in the CSMAR database for at least 24 months at the timing of an IPO listing. Absolute percentage differences in size and B/M respectively are calculated between the IPO firms and all potential candidates. The one with the smallest sum of the two differences is the matched firm. In our regression analysis, we also put the buy-and-hold return of the matched firm as a control in the regression models that explain post-IPO buy-and-hold return.

Fama (1998) and Mitchell and Stadford (2000) argue that the traditional buy-and-hold return analysis in long-term event studies is seriously flawed because the positive correlations among long-term returns of different stocks leads to huge inflation of test statistics. They advocate the use of calendar-time regression method in long-term event studies. Specifically, for each month, firms that went public during previous 36 months are included for portfolio formation. A calendar-time portfolio is formed by those stocks with an equal weight assigned to each and monthly portfolio returns are calculated accordingly. Portfolio returns are then regressed on the Fama-French three factors to get the portfolio performance measure, alpha. In our study, we also sub-sample the IPO firms according to different firm characteristics in order to examine the effects of those characteristics on return performance.

We construct the three factors of the Fama-French model based on Wang and Chin (2004). Since the government bond market was developed much later than the stock market, we use the 12-month household deposit rate as a proxy for risk-free interest rate. Wang (2004) shows that the common return factors in China work in a similar way to those in broader financial markets, confirming the legitimacy of applying the 3-factor model to China's stock market. Our unreported result also shows that the average monthly returns of HML and SMB portfolio are 0.45% and 1.07% respectively.

4.3 Operating performance

Following Wang (2005), we measure change in operating performance around IPO in three ways: return on assets, operating income on assets and operating revenue (sales) on assets. Change in operating performance is defined as the percentage difference between (1) the mean value from year -3 to year -1 and (2) the mean value from year +1 to year +3, where year 0 is the fiscal year ended within 12 months from the listing date. We require at least two years of observations in both pre-IPO and post-IPO periods to measure the change in performance.

5. Summary Statistics and Univariate Analysis

5.1 Summary statistics

Panel A of Table 1 presents the summary statistics of the key explanatory variables for the full sample, from 1993 to 2004. The average age of the sample IPOs (*AGE*) is only 3 years. As many of the newly listed companies are carved out from the SOEs, the establishment date may not be the true establishment date of the business. The average underpricing (*UDPRC*) is 131.2%, a value similar to the figures from previous studies. The average PE ratio at the offering (*PE_OFFER*) is 35.4 and the median ratio is 25.5, higher than the value document in previous studies.⁵ On average, about 60% of tradable shares are changed hands on the first trading day, a turnover comparable to that for the U.S. market.⁶ The IPO underwriting business of China's is rather competitive. Even the largest player captures only 4.4% of the market, in terms of both the value of shares underwritten and the number of IPOs underwriter ($52.8/1191=4.4\%$). The value is lower than that from Tian and Megginson (2006).⁷ The median board size (*BOARD*) is 9. The average percentage of non-tradable shares (*PCT*) is 72.4%, consistent with other studies that the state, legal entities and employees usually altogether hold about 70% of the ownership of the privatized companies after listing. The average managerial ownership (*MANOWN*) is a 1.5% and most IPO firms do not have top managers owning shares, as shown by the median value of 0%.

Panel B of Table 1 reports summary statistics of key variables by sub-periods: 1993-1998 and 1999-2004. Compared to firms going public in the first period, firms going public in the second

⁵ Tian and Megginson (2006) document that the earnings multiplier for IPO pricing in China is 15.3 between 1992 and 2001. However, as Chan et al (2004) notice, the IPO pricing policies have been changed several times. Before, 1996, IPO pricing was based on the forecasted PE ratio. Afterward, the pricing formula has been changed several times. Therefore, the earnings multipliers in Tian and Megginson are not comparable to our PE ratio.

⁶ For example, Aggarwal (2003) finds that the trading volume as a percentage of total shares offered on the first two trading days is 82% for a sample of the U.S. IPOs in 1997 and 1998.

⁷ Using a different dataset, Tian and Megginson find that IPO underwriting business is more concentrated. One possibility for the difference is that some underwriters in the CSMAR database may be affiliated to the same parent but there is no information which can identify this relationship. However, there is no special reason to suggest this problem will bias our results to a particular direction.

period are older. Firms in the second period are priced at a higher PE ratio and they are less underpriced. There could exist causality relationship between the two variables but it is also possible that lower underpricings are driven by other factors such as firm age, size and so on. Underwriting business is less competitive in the second period, as shown by the lower mean values of the two reputation measures. The average board size in the second period is not much different from the board size in the first period. However, the state and legal persons keep a lower ownership at IPO in the second period, although they always still maintain a majority control to the privatized companies. Mean managerial ownership is also higher in the second period. However, there is still a majority of companies which do not have top managers owning shares.

[Insert Table 1 here]

5.2 Pair-wise correlations among key explanatory variables

Table 2 reports pair-wise correlations among key explanatory variables. The three measures of investor sentiment are correlated. More underpriced IPOs also have higher trading volume. One possibility is that more investors who were allocated IPO shares are flipping those shares for profits when the after-market stock prices are higher. Another possibility is that underpriced shares usually attract more subscriptions. When the allocated shares cannot meet the demand of investors, especially the institutional ones, they will buy additional shares in the secondary market, driving up the trading volume. PE ratio is negatively correlated to both underpricing and tradable share turnover, consistent with our above argument that a higher PE ratio means less underpricing of IPO shares.

IPOs led by more reputable underwriters are less underpriced, although the relationship is significant only between reputation measured by value market share (*REPUT_MV*) and underpricing. While it is tempting to suggest that more reputable underwriters help IPO firms to price the shares more aggressively because of the reputation effect, we find no significant relationship between PE

ratio and underwriter reputation. It is likely that the negative relation between underwriter reputation and underpricing reflects the strong effect of firm size on underpricing – IPOs of larger firms are usually less underpriced. In addition, unlike in the U.S. where IPO offer prices are determined solely by the issuers and the underwriters, IPO offer prices in China have to be approved by the CSRC. Therefore, the negative relation between underwriter reputation and underpricing is probably driven by other characteristics such as firm size and industry. The table also shows that more reputable underwriters also attract more investors to trade the shares, or they provide more liquidity to the secondary market trading and increase the trading volume.

There is no significant relationship between board size and our measures of investor sentiment. The firms of more underpriced IPOs usually have higher individual ownership (or lower non-tradable ownership) post-IPO. However, firms with higher individual ownership post-IPO offer shares at a higher PE ratio. There are probably multiple forces that drive the relation between ownership structure and IPO pricing. On the one hand, existing shareholders have incentives to minimize the costs of offering, including underpricing. Therefore, when they foresee that the shares to be offered are likely largely underpriced, they will sell few shares to the market. The positive relationship between individual ownership post-IPO and underpricing is inconsistent with this hypothesis. However, the positive relation probably reflects a stronger investor demand for some IPOs over others. If managers decide to sell more shares to meet a stronger demand, it is possible to observe a positive relation between individual ownership post-IPO and underpricing. In fact, Loughran and Ritter (2004) argue that existing shareholders may not consider underpricing a real cost of offering, as suggested by the prospect theory. Rather, existing shareholders probably consider share price run-up on the first trading day as a wealth gain. Finally, there is no significant relationship between ownership structure and tradable share turnover.

Underwriter reputation is positively associated with non-tradable ownership post-IPO but negatively associated with managerial ownership. Again, as the size of offering in China is

determined by a special quota system, a larger firm usually can only offer a smaller percentage of shares to public investors. In addition, given limited wealth of individual managers, large firms usually have lower managerial ownership. Therefore, the relationship between underwriter reputation and ownership structure is probably a reflection of this size effect, as given by the positive relation between firm size and underwriter reputation.

Board size has little relation with other key variables, except firm size. Same as the case in other countries, larger firms usually have more directors in the board in China.

[Insert Table 2 here]

6. Post-IPO Stock and Operating Performance

6.1 Summary statistics on post-IPO performance

Table 3 reports summary statistics on post-IPO stock performance and operating performance. For an IPO's stock performance, we calculate 36-month buy-and-hold returns starting at the end of listing month. The raw return is then subtracted by the return to a company matched by (1) size, (2) B/M and (3) size and B/M, as described in Section 4.2. The three measures for change in operating performance are also described in Section 4.3.

Panel A reports the statistics for the full sample. Notice that the numbers of observations for this table are much smaller than the numbers in Table 2 because the performance measures are based on several years of return / financial statement data. For stock performance, we essentially eliminate IPOs after 2001 because we need 36 months of returns for our calculations and our data ends at December 2004. For operating performance, we exclude IPOs before 1994 because there was a significant change in reporting standard in January 1994 (Wang, 2005). We also exclude IPOs after 2003 because we require at least two years of financial statements post-IPO to compare operating performance before and after IPOs. In general, the decisions to list on the exchanges do not create

value to shareholders, in terms of both stock performance and operating performance. IPO firms underperform their three benchmarks for at least three years after IPOs. Their assets turnover (sales-to-assets) ratios on average also drop by more than 40% after IPO, with a reduction in profitability by 8% to 9%.

Panel B and Panel C report sub-sample summary statistics. Comparing the two sets of statistics, we find that IPOs firms experience a drop in operating performance and they underperform their benchmarks in both sub-periods. But comparably speaking, the performance of IPO firms in the second period is slightly better – they experience a lower reduction in sales and profitability and they underperform less their benchmarks.

[Insert Table 3 here]

6.2 Post-IPO performance adjusted by Fama-French 3-factor model

While Table 3 shows that IPOs underperform their benchmarks for 36 months after their offerings. However, as Fama (1998) and Mitchell and Stafford (2000) argue, the test statistics tend to be largely inflated because of the correlations among overlapping return series. Therefore, they suggest using calendar-time portfolio approach to solve the problem. Specifically, for each calendar month, a portfolio is formed by a set of stocks which were listed within a 36-month period prior to the portfolio formation. Equally-weighted return is then calculated for the portfolio in each month. Monthly returns are regressed on the three factors.

Table 4 reports the coefficients of calendar-time regressions. Since the first IPO enters our sample in January 2003 and exits in January 2006, we exclude the calendar-time portfolios from January 2003 to December 2005, to avoid our results affected by those months with few observations. Therefore, each calendar time regression is performed on 108 observations, from January 1996 to December 2004.

The first column of Panel A reports the full sample regression. Unlikely in Table 3, the full sample regression shows that there is no significant underperformance of IPO firms, adjusted for Fama-French three factors. The next five columns report the calendar-time regressions for five groups of firms ranked by underpricing. For each year, IPO firms are sorted into five equal groups based on underpricing. Group 1 (5) contains firms with lowest (highest) underpricing. Across the groups, Group 1 IPO firms have positive and significant alpha while Group 5 firms have negative alpha, albeit insignificant. In addition, the hedging portfolio formed by taking a long position in Group 5 stocks and a short position in Group 1 stocks significantly underperformed the benchmark. The inverse relation between underpricing and long-term performance suggest that IPO underpricing could be a proxy for investor sentiment in China's stock market in which individual investors dominate. In addition, from the coefficients of SMB and HML of the last column, more underpriced firms are smaller and have a lower B/M than less underpriced firms, consistent with the results for the U.S. market that severely underpriced firms are usually small and have high growth opportunities.

Panel B and Panel C report results from regressions of sub-groups formed by offer P/E ratio and first-day tradable turnover. Across the P/E sub-groups, there is no significant abnormal performance for all sub-groups of firms, controlling for the three factors. Though lowest-P/E firms earn higher return than highest-P/E firms, the difference is not significant, as shown in the last column of Panel B. Lowest-turnover firms earn marginally positive and significant abnormal returns while highest-turnover firms earn insignificant abnormal return. This is consistent with Wang and Cheng (2004) that in China, high-volume stocks earn lower subsequent returns than low-volume stock and that high trading volume suggests investor over-optimism. However, the difference between the two groups is not statistically significant.

Panel D reports regressions of sub-groups formed by underwriter reputation (*REPUT_MV*). Consistent with Carter et al (1998), firms led by the most reputable underwriters earn significantly

positive abnormal returns. On the other hand, less prestigious underwriters do not lead to significantly better post-IPO performance. This suggests that even in China, where the stock market is still developing and investors are characterized as under-educated, underwriters are selective in conducting their businesses to preserve their reputation. However, the difference between the two groups is not statistically significant. The coefficients in the last column also suggest that more reputable underwriters tend to manage IPOs by larger firms and firms with better opportunities (low B/M).

Panel E reports regressions of sub-groups sorted by board size. Firms with smallest board size earn marginally positive abnormal returns and Firms with largest board size earns negative but insignificant returns. The difference between the two groups is significant at 10% level. This suggests that a larger board tends to destroy shareholders' value. While board size is positively correlated with firm size, the marginally significant coefficient of SMB in the last column suggests that size effect plays a little role in explaining the return difference between the two groups of firms.

We also perform similar analyses on non-tradable ownership and managerial ownership. However, it is not reported because we do not observe significant pattern in abnormal returns across sub-groups. One possibility for lacking significant pattern is that there is little variation for those two variables. For example, as we mentioned above, managerial ownership of at least half of the sample firms is zero. Therefore, instead of performing sub-group analysis here, we put these two variables in the regressions, to be described below.

[Insert Table 4 here]

6.3 Regression analysis for post-IPO stock performance

One shortcoming of calendar-time regression approach is that multiple-sorting of sample is impractical, especially for emerging stock markets where the number of listed firms is small.

Therefore, it is difficult to separate one effect from another and get a clean inference from the results. Therefore, we perform regression analysis for post-IPO stock performance, even the correlations among return series inflate the test statistics. All the variables have been defined in the previous sections. An interaction term between non-tradable ownership and managerial ownership is added because the incentive effect of managerial ownership should be stronger when managers are subject to fewer constraints (low state and legal person ownership). In addition, we add the return to a size- and B/M-matched firm as a further control for risk factors. For all the regressions in the following, the t-statistics are adjusted for time-clustering. Specifically, the residuals are assumed to be correlated for IPOs listed in the same month but uncorrelated for IPOs listed in different months.

Table 5 reports the results from the regressions of buy-and-hold returns of different periods (12-, 24, and 36-month). Panel A reports the results for the full sample. Depending on the holding periods, the numbers of observations are different for the three columns. The results are qualitatively the same for the three columns. Both underpricing and offer P/E ratio are negatively related to post-IPO stock performance, consistent with our previous argument that both variables are related to investor sentiment at the time of offering. On the other hand, stock turnover has only marginal effect on post-IPO stock returns. Underwriter reputation, board size, non-tradable ownership and managerial ownership also have insignificant effect on post-IPO stock performance. To conclude, the full sample regressions suggest that controlling for risk factors, investor sentiment is the most important determinant of post-IPO stock performance.

Panel B and Panel C of Table 5 report the sub-period regression results. The model specifications are identical to those of Panel A. Both underpricing and offer P/E ratio still have negative effect on post-IPO stock performance in both sub-periods. However, while other variables have little impact on stock performance in the first period, the coefficients of the second period regressions show differently. In particular, underwriter reputation have positive and significant effect on stock performance, consistent with the results for the U.S. market that reputable underwriters are

selective in conducting their businesses and they maintain their success by choosing IPOs that are likely to outperform in the future. Board size still has little effect on stock performance. In contrast to the general belief that state ownership destroys value, the positive coefficient of non-tradable ownership suggests that non-tradable ownership creates value. Therefore, the monitoring effect seems to be stronger than the entrenchment effect of block holding in China's stock market. Another interpretation of the result is that the incumbent shareholders are more alert of the prospect of the companies going for listing. If it foresees that a stock is likely to outperform, they will sell less ownership to individual investors. Managerial ownership, however, has negative impact on stock performance, though the coefficient is only significant for a 36-month holding period, inconsistent with the general belief that managerial ownership help align the interests between managers and shareholders.

[Insert Table 5 here]

To summarize, investor sentiment is the most important determinant to post-IPO stock performance in China's stock market. However, we also find evidence on the importance of some governance mechanisms, such as reputable underwriters and block holding, in the later period. This suggests over time, incumbent shareholders, corporate managers and investors become more aware of the performance of listed companies.

6.4 Regression analysis for post-IPO stock performance

One problem of stock performance evaluation for China's stock market is that the stock market is dominated by individual investors. Individual investor sentiment combined with the short-sale prohibition tends to result in stock overvaluation. Therefore, we also check if the operating performance of newly listed companies in China is related to the explanatory variables in the same way as is stock performance. Performance measures include sales-to-assets (assets turnover) ratio, operating income-to-assets ratio and return-on-assets (ROA) ratio. We measure the change in

operating performance between (1) year -3 to year -1 and (2) year 1 to year 3, where year 0 is the fiscal year ended with 12 months after listing. We also require at least two observations in both pre-IPO and post-IPO period to calculate the change in performance. The results are reported in Table 6.

Panel A reports the regression results for the whole sample. Inconsistent with the finding in stock performance analysis, both underpricing and offer P/E ratio are positively associated with the change in operating performance. This suggests investors indeed differentiate outperforming companies from underperforming companies. One way to reconcile the conflicting pieces of evidence is to suggest that investors over-estimate the implications of change in operating performance to firm valuation. If investors over-react, they will give too high values to outperforming firms and too low values to underperforming firm. A discrepancy in stock performance and operating performance then follows.

Stock turnover, underwriter reputation and board size have insignificant impact on operating performance. Consistent with the finding from stock performance regressions, firms with higher non-tradable ownership perform significantly better, suggesting the ability of incumbent shareholders to predict future performance. In contrast to the findings from stock performance regressions, managerial ownership has positive effect on operating performance. But the finding is consistent with the general belief that managerial ownership aligns the interests of managers and shareholders. In addition, the impact of managerial ownership is stronger when non-tradable ownership is lower, as shown by the negative coefficients of the interaction term. The finding suggests the incentive effect is stronger when managers are less constrained by block holders.

Panel B and Panel C report the sub-period regression analysis. In both periods, both underpricing and offer P/E ratio are mostly positively related to change in performance. Compared to the first period, non-tradable ownership and managerial ownership have stronger impact on

operating performance in the second period. Consistent with the results from stock performance regression, the result suggests that incumbent shareholders and managers are more aware of operating performance over time.

[Insert Table 6 here]

7. Conclusion

In light of rapid stock market development and evolving regulatory environment in China, this study examines different theories of IPO performance in China where the stock market is characterized by developing governance systems and under-educated investors. We find that investor sentiment is the most important determinant of post-IPO performance in China. High investor sentiment, measured by large underpricing and high P/E ratio at offering, is related to worse post-IPO stock performance. However, we find an opposite relation for post-IPO operating performance – large underpricing and high P/E ratio are associated with more positive change in performance. We argue that the difference is probably driven by over-reaction of investors to the implications of the predicted change in performance.

In addition, we show that some governance mechanisms, such as reputable underwriters, block holders and managerial ownership have stronger effects on post-IPO stock performance and operating performance in the second period than in the first period. This suggests incumbent shareholders, corporate managers and shareholders are more aware of corporate performance of IPO firms over time. Therefore, while China's stock market is still developing compared to the U.S. one and the stock markets in the two countries are operated under different institutional settings, many theories and findings for the U.S. market are also applicable to the case of China. It also seems that the explanatory power of those theories and findings is increasing over time.

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Table 1 Summary statistics for IPOs from 1993 to 2004.

Variables include (a) age of IPO firm in years (*AGE*), defined as the number of years between the establishment date and the listing date; (b) underpricing (*UDPRC*), defined as the percentage change between the offer price and the first trading-day closing price; (c) PE ratio as implied by the offer price (*PE_OFFER*), defined as the PE ratio given by CSMAR, multiplied by offer price and divided by the first-day closing price; (d) first-day tradable share turnover (*TURNOVER*), defined as the number of shares traded on the first trading day divided by the total number of tradable shares at the end of listing month; (e) underwriter reputation measured by the number (*REPUT_CNT*) or the value (*REPUT_MV*) of IPOs (co-)managed by the underwriter; (f) board size (*BOARD*) defined as the number of directors in the board at the time of IPO; (g) percentage of non-tradable shares after IPO (*PCT*), defined as ONE minus the ratio of the market value of tradable shares to the market value of total shares at the end of the listing month; (h) managerial ownership (*MANOWN*), defined as the percentage of outstanding shares owned by the top management given by the CSMAR.

Panel A: Full sample	Mean	Median	Min	Max	N
Age of IPO firm in years (<i>AGE</i>)	3.0	2.0	0.0	40.0	1199
Underpricing (<i>UDPRC</i>)	131.2%	109.9%	-73.3%	2100.0%	1200
PE ratio as implied by the offer price (<i>PE_OFFER</i>)	35.4	25.5	5.7	791.8	1159
First-day tradable share turnover (<i>TURNOVER</i>)	57.4%	59.1%	0.9%	198.1%	1199
Underwriter reputation measured by the number of IPOs (<i>REPUT_CNT</i>)	17.7	15.0	1.0	52.8	1191
Underwriter reputation measured by the value of IPOs (<i>REPUT_MV</i>)	1.4%	1.2%	0.0%	4.4%	1191
Board size (<i>BOARD</i>)	9.7	9.0	4.0	20.0	1177
Percentage of non-tradable shares after IPOs (<i>PCT</i>)	72.4%	72.8%	32.4%	99.1%	1201
Managerial ownership (<i>MANOWN</i>)	1.5%	0.0%	0.0%	74.8%	1196
Firm size in RMB millions (<i>SIZE</i>)	2129.3	888.3	47.4	365884.3	1200

Panel B: 1993 – 1998	Mean	Median	Min	Max	N
Age of IPO firm in years (AGE)	2.2	1.0	0.0	40.0	749
Underpricing (UDPRC)	140.4%	113.8%	-73.3%	2100.0%	749
PE ratio as implied by the offer price (PE_OFFER)	33.7	22.0	5.7	791.8	715
First-day tradable share turnover (TURNOVER)	56.9%	60.1%	0.9%	198.1%	748
Underwriter reputation measured by the number of IPOs (REPUT_CNT)	21.7	20.5	1.0	52.8	740
Underwriter reputation measured by the value of IPOs (REPUT_MV)	1.5%	1.4%	0.0%	4.4%	740
Board size (BOARD)	9.7	9.0	4.0	20.0	732
Percentage of non-tradable shares after IPOs (PCT)	74.4%	74.7%	32.4%	99.1%	750
Managerial ownership (MANOWN)	0.1%	0.0%	0.0%	3.6%	749
Firm size in RMB millions (SIZE)	1514.8	736.1	47.4	67276.6	749
Panel C: 1999 – 2004	Mean	Median	Min	Max	N
Age of IPO firm in years (AGE)	4.4	3.0	0.0	16.0	450
Underpricing (UDPRC)	115.9%	100.7%	-32.7%	476.8%	451
PE ratio as implied by the offer price (PE_OFFER)	38.2	30.7	10.0	339.8	444
First-day tradable share turnover (TURNOVER)	58.3%	58.1%	8.8%	88.4%	451
Underwriter reputation measured by the number of IPOs (REPUT_CNT)	11.2	8.5	1.0	48.0	451
Underwriter reputation measured by the value of IPOs (REPUT2_MV)	1.1%	0.8%	0.0%	4.1%	451
Board size (BOARD)	9.8	9.0	5.0	19.0	445
Percentage of non-tradable shares after IPOs (PCT)	69.1%	68.2%	39.7%	98.2%	451
Managerial ownership (MANOWN)	4.0%	0.0%	0.0%	74.8%	447
Firm size in RMB millions (SIZE)	3149.8	1097.6	300.0	365884.3	451

Table 2 Correlation coefficients of key variables

Pearson correlations are reported. All variables are defined in Table 1. *, **, and *** represent significant levels at 10%, 5% and 1% respectively.

	Ln (UDPRC)	AGE	Ln(PE _OFFER)	TURN- OVER	Ln(REPUT _CNT)	REPUT _MV	Ln (BOARD)	PCT	MANOWN
AGE	-0.04 (0.21)								
Ln(PE _OFFER)	-0.26*** (0.00)	0.03 (0.33)							
TURN- OVER	0.28*** (0.00)	-0.05 (0.11)	-0.13*** (0.00)						
Ln(REPUT _CNT)	-0.01 (0.69)	-0.20*** (0.00)	-0.03 (0.29)	0.10*** (0.00)					
REPUT _MV	-0.08*** (0.00)	-0.19*** (0.00)	0.03 (0.24)	0.08*** (0.01)	0.84*** (0.00)				
Ln (BOARD)	-0.02 (0.43)	0.02 (0.48)	-0.00 (0.95)	0.02 (0.58)	-0.00 (0.96)	0.02 (0.41)			
PCT	-0.15*** (0.00)	-0.11*** (0.00)	-0.07** (0.01)	-0.04 (0.19)	0.18*** (0.00)	0.20*** (0.00)	0.06* (0.06)		
MANOWN	-0.09*** (0.00)	0.14*** (0.00)	-0.02 (0.60)	-0.03 (0.38)	-0.18*** (0.00)	-0.13*** (0.00)	-0.00 (0.87)	-0.04 (0.19)	
Ln(SIZE)	-0.48*** (0.00)	0.04 (0.17)	-0.00 (0.98)	-0.10*** (0.00)	0.10*** (0.00)	0.19*** (0.00)	0.16*** (0.00)	0.41*** (0.00)	-0.01 (0.84)

Table 3 Summary statistics on post-IPO performance

Post-IPO stock performance and operating performance are reported. For each IPO, buy-and-hold return is measured over a 36-month period, starting at the end of the listing month. The buy-and-hold return to the IPO is adjusted for three different benchmark returns: (1) the return to a size-matched firm, (2) the return to a B/M-matched firm and (3) the return to a size- and B/M-matched firm, over the same period. Change in operating performance is evaluated based on three measurements: (1) sales-to-assets ratio, (2) operating income-to-assets ratio and (3) return on assets. Change in operating performance is defined as the percentage difference between (1) the mean value from year -3 to year -1 and (2) the mean value from year +1 to year +3, where year 0 is the fiscal year ended within 12 months from the listing date. It is required to have at least two years of observations in both pre-IPO and post-IPO periods to measure the change in performance. *, **, and *** represent significant levels at 10%, 5% and 1% respectively.

Panel A Full sample	Mean	Median	N
36-month stock return, size adjusted	-10.9%**	-6.2%***	950
36-month stock return, B/M adjusted	-5.0%	-6.8%**	851
36-month stock return, size and B/M adjusted	-10.4%*	-4.6%**	852
Change in sales to assets ratio	-41.0%***	-28.3%***	874
Change in operating income on assets	-7.8%***	-6.3%***	813
Change in return on assets	-8.8%***	-7.1%***	872
Panel B 1993/1994 – 1998	Mean	Median	N
36-month stock return, size adjusted	-15.6%**	-11.9%***	650
36-month stock return, B/M adjusted	-3.6%	-5.2%	563
36-month stock return, size and B/M adjusted	-13.7%	-7.9%*	563
Change in sales to assets ratio	-45.9%***	-34.2%***	507
Change in operating income on assets	-8.2%***	-6.8%***	449
Change in return on assets	-8.7%***	-7.2%***	506
Panel C 1999+	Mean	Median	N
36-month stock return, size adjusted	-0.5%	0.6%	300
36-month stock return, B/M adjusted	-7.8%*	-7.2%***	288
36-month stock return, size and B/M adjusted	-4.0%	-3.3%	289
Change in sales to assets ratio	-34.3%***	-22.9%***	367
Change in operating income on assets	-7.3%***	-5.4%***	364
Change in return on assets	-8.9%***	-6.9%***	366

Table 4 Fama-French 3-factor model to explain post-IPO stock return

For each month, firms that went public during previous 36 months are included selected for portfolio formation. A calendar-time portfolio is formed by those stocks with an equal weight assigned to each and monthly portfolio returns are calculated accordingly. Portfolio returns are then regressed on the Fama-French three factors to get the abnormal performance measure, alpha. The three factors of the Fama-French model are constructed based on Wang and Chin (2004). Since the government bond market was developed much later than the stock market, the 12-month household deposit rate as a proxy for risk-free interest rate is used instead. The calendar-time portfolios from January 2003 to December 2005 are excluded, to avoid the results affected by those months with few firm observations. The whole sample is also divided into sub-groups according to different firm characteristics in order to examine the effects of those characteristics on return performance.

*, **, and *** represent significant levels at 10%, 5% and 1% respectively.

Panel A: By IPO underpricing	Underpricing (1-lowest, 5-highest)						
	Full sample	Group 1	Group 2	Group 3	Group 4	Group 5	(5) – (1)
Excess market return	0.989 (55.38)***	0.964 (45.37)***	1.007 (39.43)***	1.015 (41.78)***	0.991 (44.92)***	0.966 (40.84)***	0.002 (0.08)
SMB	0.412 (11.45)***	0.188 (4.39)***	0.351 (6.82)***	0.510 (10.44)***	0.406 (9.13)***	0.567 (11.91)***	0.379 (6.18)***
HML	-0.066 (-2.17)**	0.120 (3.33)***	0.037 (0.84)	-0.016 (-0.40)	-0.258 (-6.87)***	-0.239 (-5.94)***	-0.359 (-6.93)***
Constant	0.001 (1.03)	0.004 (2.37)**	0.004 (1.73)*	0.000 (0.20)	0.002 (0.92)	-0.002 (-1.20)	-0.006 (-2.59)**
Observations	108	108	108	108	108	108	108
R-squared	0.97	0.96	0.95	0.95	0.96	0.95	0.40

Panel B: By offer P/E ratio (1 – low, 5 – high)	Group 1	Group 2	Group 3	Group 4	Group 5	(5) – (1)
Excess market return	0.982 (42.33)***	0.993 (42.07)***	1.013 (38.18)***	0.969 (43.96)***	0.987 (45.97)***	0.005 (0.23)
SMB	0.383 (8.20)***	0.339 (7.13)***	0.410 (7.67)***	0.371 (8.35)***	0.548 (12.69)***	0.166 (3.84)***
HML	-0.018 (-0.45)	0.039 (0.96)	-0.199 (-4.41)***	-0.096 (-2.55)**	-0.096 (-2.64)***	-0.079 (-2.16)**
Constant	0.003 (1.47)	0.002 (0.91)	0.003 (1.19)	0.000 (0.04)	0.001 (0.31)	-0.002 (-1.29)
Observations	108	108	108	108	108	108
R-squared	0.95	0.95	0.94	0.96	0.96	0.14
Panel C: By first-day tradable turnover (1 – low, 5 – high)	Group 1	Group 2	Group 3	Group 4	Group 5	(5) – (1)
Excess market return	0.996 (34.96)***	0.997 (47.64)***	1.004 (45.40)***	0.976 (46.88)***	0.971 (45.19)***	-0.025 (-0.77)
SMB	0.385 (6.72)***	0.487 (11.56)***	0.402 (9.03)***	0.399 (9.52)***	0.383 (8.85)***	-0.003 (-0.04)
HML	0.120 (2.48)**	0.025 (0.71)	-0.063 (-1.68)*	-0.166 (-4.68)***	-0.241 (-6.59)***	-0.361 (-6.55)***
Constant	0.004 (1.79)*	0.001 (0.40)	0.000 (0.26)	0.002 (0.99)	0.001 (0.35)	-0.004 (-1.34)
Observations	108	108	108	108	108	108
R-squared	0.94	0.96	0.96	0.96	0.96	0.33

Panel D: By underwriter reputation (1 – low reputation, 5 – high reputation)	Group 1	Group 2	Group 3	Group 4	Group 5	(5) – (1)
Excess market return	1.032 (31.86)***	1.010 (44.95)***	0.977 (44.15)***	0.958 (46.12)***	0.974 (46.52)***	-0.059 (-1.99)**
SMB	0.547 (8.39)***	0.549 (12.13)***	0.353 (7.91)***	0.251 (6.00)***	0.267 (6.34)***	-0.280 (-4.71)***
HML	0.046 (0.83)	0.004 (0.10)	-0.041 (-1.10)	-0.214 (-6.05)***	-0.161 (-4.53)***	-0.207 (-4.13)***
Constant	0.001 (0.29)	-0.000 (-0.23)	0.001 (0.79)	0.003 (1.48)	0.004 (2.17)**	0.003 (1.22)
Observations	108	108	108	108	108	108
R-squared	0.93	0.96	0.96	0.96	0.96	0.39
Panel E: By board size (1 – small, 5 – large)	Group 1	Group 2	Group 3	Group 4	Group 5	(5) – (1)
Excess market return	1.002 (36.99)***	0.996 (38.84)***	1.004 (49.09)***	0.988 (51.31)***	0.955 (52.25)***	-0.047 (-1.91)*
SMB	0.447 (8.19)***	0.473 (9.15)***	0.356 (8.65)***	0.442 (11.41)***	0.355 (9.63)***	-0.092 (-1.85)*
HML	-0.124 (-2.68)***	-0.018 (-0.42)	-0.071 (-2.05)**	-0.064 (-1.95)*	-0.100 (-3.21)***	0.024 (0.56)
Constant	0.004 (1.77)*	0.002 (0.98)	0.003 (1.51)	-0.001 (-0.43)	-0.000 (-0.06)	-0.004 (-1.98)*
Observations	108	108	108	108	108	108
R-squared	0.94	0.95	0.96	0.97	0.97	0.08

Table 5 Models explaining post-IPO stock return

The dependent variable is the buy-and-hold return to IPO firm, over a 12-, 24- or 36-month period. The buy-and-hold return to a size- and B/M-matched firm is also included to control for risk factors. All other variables are defined in Table 1. t-statistics, adjusted for time-clustering, are reported in parentheses. *, **, and *** represent significant levels at 10%, 5% and 1% respectively.

Panel A: Dependent variable	(1)	(2)	(3)
Ln(1+post-IPO return)	12 months	24 months	36 months
(Full sample: 1993+)			
Ln(UDPRC)	-0.343 (-4.82)***	-0.483 (-6.47)***	-0.541 (-6.11)***
Ln(PE_OFFER)	-0.157 (-6.11)***	-0.207 (-6.62)***	-0.307 (-8.84)***
First-day share turnover	0.204 (1.73)*	0.251 (1.88)*	-0.113 (-1.03)
REPUT_MV	1.960 (1.60)	2.218 (1.40)	1.758 (0.93)
Ln(board size)	-0.064 (-1.55)	-0.024 (-0.45)	-0.060 (-1.00)
Percentage of non-tradable shares	-0.165 (-0.89)	0.120 (0.50)	0.590 (2.47)**
Managerial ownership	-3.720 (-1.21)	-4.612 (-0.95)	-20.614 (-0.50)
Percentage of non-tradable shares × Managerial ownership	5.122 (1.15)	4.869 (0.74)	28.023 (0.50)
AGE	-0.007 (-1.50)	-0.002 (-0.30)	-0.009 (-1.29)
Ln(firm size)	-0.090 (-3.70)***	-0.169 (-5.90)***	-0.274 (-7.30)***
Book-to-market ratio	0.011 (0.07)	0.248 (1.05)	0.245 (1.06)
Ln(1+matched-firm return)	0.345 (9.46)***	0.391 (10.16)***	0.315 (8.57)***
Constant	1.567 (6.33)***	2.012 (6.67)***	3.150 (8.53)***
Observations	963	892	821
R-squared	0.32	0.46	0.49

Panel B: Dependent variable	(1)	(2)	(3)
Ln(1+post-IPO return)	12 months	24 months	36 months
(1993 – 1998)			
Ln(UDPRC)	-0.472 (-6.08)***	-0.443 (-5.20)***	-0.360 (-3.98)***
Ln(PE_OFFER)	-0.215 (-6.51)***	-0.196 (-5.00)***	-0.231 (-5.70)***
First-day share turnover	0.176 (1.41)	0.226 (1.43)	-0.026 (-0.22)
REPUT_MV	-0.102 (-0.06)	1.320 (0.66)	1.734 (0.85)
Ln(board size)	-0.054 (-0.99)	-0.039 (-0.59)	-0.157 (-2.16)**
Percentage of non-tradable shares	-0.596 (-2.10)**	-0.544 (-1.39)	-0.469 (-1.46)
Managerial ownership	4.165 (0.19)	-24.628 (-0.99)	-1.673 (-0.06)
Percentage of non-tradable shares × Managerial ownership	-5.684 (-0.17)	41.254 (1.01)	61.819 (1.25)
AGE	-0.001 (-0.09)	0.007 (1.10)	0.003 (0.34)
Ln(firm size)	-0.130 (-4.23)***	-0.175 (-4.69)***	-0.213 (-4.62)***
Book-to-market ratio	-0.109 (-0.61)	0.147 (0.57)	0.289 (1.03)
Ln(1+matched-firm return)	0.281 (6.26)***	0.336 (6.88)***	0.188 (3.90)***
Constant	2.481 (8.82)***	2.567 (7.46)***	3.384 (8.36)***
Observations	534	534	530
R-squared	0.32	0.34	0.30

Panel C: Dependent variable	(1)	(2)	(3)
Ln(1+post-IPO return)	12 months	24 months	36 months
(1999+)			
Ln(UDPRC)	-0.232 (-2.49)**	-0.615 (-4.71)***	-0.846 (-5.42)***
Ln(PE_OFFER)	-0.038 (-1.15)	-0.080 (-1.54)	-0.164 (-2.45)**
First-day share turnover	0.218 (1.67)	0.567 (3.48)***	0.370 (1.46)
REPUT_MV	5.978 (3.50)***	5.546 (2.48)**	6.141 (2.41)**
Ln(board size)	-0.003 (-0.05)	0.083 (1.08)	0.131 (1.42)
Percentage of non-tradable shares	0.755 (3.41)***	1.002 (2.48)**	1.055 (2.27)**
Managerial ownership	-2.104 (-0.71)	-1.309 (-0.27)	-64.755 (-2.59)**
Percentage of non-tradable shares × Managerial ownership	3.099 (0.74)	0.636 (0.10)	89.823 (2.66)**
AGE	-0.020 (-3.96)***	-0.015 (-2.58)**	-0.021 (-2.47)**
Ln(firm size)	-0.095 (-3.24)***	-0.176 (-4.41)***	-0.216 (-3.53)***
Book-to-market ratio	0.349 (1.74)*	0.487 (1.32)	0.747 (1.45)
Ln(1+matched-firm return)	0.402 (7.95)***	0.458 (8.76)***	0.195 (4.18)***
Constant	0.232 (0.75)	0.605 (1.23)	1.112 (2.01)*
Observations	429	358	291
R-squared	0.41	0.57	0.49

Table 6 Models explaining change in operating performance around IPO

The dependent variable is change in operating performance between pre-IPO period and post-IPO period. All the explanatory variables are defined in Table 1. t-statistics, adjusted for time-clustering, are reported in parentheses. *, **, and *** represent significant levels at 10%, 5% and 1% respectively.

Panel A: Dependent variable	(1)	(2)	(3)
Change in operating performance	Sales-	Op. income-	Return-
(Full sample: 1994+)	to-assets	to-assets	on-assets
Ln(UDPRC)	0.425 (2.80)***	0.073 (2.69)***	0.038 (1.54)
Ln(PE_OFFER)	0.090 (1.89)*	0.038 (5.83)***	0.031 (5.04)***
First-day share turnover	0.020 (0.18)	-0.023 (0.89)	-0.006 (0.26)
REPUT_MV	1.917 (0.84)	0.541 (1.53)	0.384 (1.14)
Ln(board size)	-0.032 (-0.43)	0.010 (0.80)	0.011 (0.88)
Percentage of non-tradable shares	0.597 (2.88)***	0.173 (3.97)***	0.137 (3.17)***
Managerial ownership	18.387 (3.67)***	2.250 (1.60)	1.721 (0.96)
Percentage of non-tradable shares × Managerial ownership	-29.052 (-4.33)***	-3.843 (-2.01)**	-3.165 (-1.30)
AGE	0.028 (2.07)**	0.004 (2.05)**	0.004 (2.16)**
Ln(firm size)	0.018 (0.59)	-0.017 (-3.20)***	-0.021 (-4.70)***
Book-to-market ratio	0.530 (1.57)	0.261 (3.39)***	0.127 (1.64)
Constant	-1.752 (-4.92)***	-0.355 (-5.12)***	-0.239 (-3.53)***
Observations	841	788	840
R-squared	0.05	0.09	0.08

Panel B: Dependent variable	(1)	(2)	(3)
Change in operating performance	Sales-	Op. income-	Return-
(1994 – 1998)	to-assets	to-assets	on-assets
Ln(UDPRC)	0.273 (2.42)**	0.050 (2.51)**	0.017 (0.95)
Ln(PE_OFFER)	-0.081 (-1.10)	0.027 (2.65)**	0.023 (2.78)***
First-day share turnover	-0.048 (-0.42)	-0.048 (-1.67)	-0.023 (-1.02)
REPUT2_MV	0.810 (0.39)	0.728 (2.27)**	0.480 (1.57)
Ln(board size)	0.093 (1.24)	0.022 (1.72)*	0.021 (1.64)
Percentage of non-tradable shares	0.782 (2.61)**	0.081 (1.35)	0.058 (1.00)
Managerial ownership	129.483 (1.88)*	6.756 (0.48)	-1.615 (-0.14)
Percentage of non-tradable shares × Managerial ownership	-145.048 (-1.67)	-2.755 (-0.15)	5.681 (0.38)
AGE	0.034 (2.75)***	0.006 (6.05)***	0.006 (5.15)***
Ln(firm size)	-0.060 (-1.54)	-0.030 (-4.45)***	-0.033 (-5.61)***
Book-to-market ratio	0.210 (1.16)	0.194 (3.29)***	0.065 (1.18)
Constant	-0.928 (-2.54)**	-0.161 (-2.40)**	-0.070 (-1.14)
Observations	487	436	486
R-squared	0.08	0.18	0.17

Panel C: Dependent variable	(1)	(2)	(3)
Change in operating performance (1999+)	Sales- to-assets	Op. income- to-assets	Return- on-assets
Ln(UDPRC)	0.835 (1.78)*	0.127 (1.85)*	0.132 (1.82)*
Ln(PE_OFFER)	0.206 (2.61)**	0.036 (2.89)***	0.037 (2.86)***
First-day share turnover	0.227 (0.58)	0.027 (0.46)	0.048 (0.79)
REPUT_MV	3.153 (0.84)	0.004 (0.01)	-0.124 (-0.20)
Ln(board size)	-0.165 (-0.84)	-0.012 (-0.39)	-0.005 (-0.17)
Percentage of non-tradable shares	1.262 (2.97)***	0.254 (3.11)***	0.252 (3.38)***
Managerial ownership	17.945 (3.06)***	2.560 (1.71)*	1.998 (1.09)
Percentage of non-tradable shares × Managerial ownership	-27.906 (-3.46)***	-4.211 (-2.06)**	-3.432 (-1.38)
AGE	-0.002 (-0.07)	-0.002 (-0.38)	-0.003 (-0.50)
Ln(firm size)	0.048 (0.70)	0.007 (0.71)	0.003 (0.34)
Book-to-market ratio	2.083 (1.68)	0.383 (1.97)*	0.413 (1.99)*
Constant	-3.267 (-3.23)***	-0.599 (-3.76)***	-0.624 (-3.73)***
Observations	354	352	354
R-squared	0.07	0.09	0.09