

The Long-run Performance of Chinese Private Firm IPOs

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Abstract

This paper examines the three-year long run performance of Initial Public Offerings (IPOs) in the Chinese stock markets from 2002 to 2012. We find that private firm IPO long-term returns are significantly higher than those of non-private firms, measured by both cumulative abnormal returns (CARs) and buy-and-hold abnormal returns (BHARs). Furthermore, the long-term performance of IPOs in the Chinese stock markets seems to have a significant upward tendency after the Non-tradable share (NTS) reform launched in 2005. However, private firm IPO long-run outperformance has experienced a diminishing increase after the NTS reform. This result indicates that state-owned enterprises turn to be more market-oriented after the NTS reform.

Keywords: Initial public offerings, Long-run performance, Private firms, Non-tradable share reform, China

JEL Codes: G32, G38

1. Introduction

Long-term performance of Initial Public Offerings (IPOs) has been a focus of finance research, and in general studies have found that IPOs underperform in the long-run up to three-year after listing (Ritter, 1991; Loughran & Ritter, 1995). However, different methods of measuring the long-run performance and different types of sample firms lead to different results (Lyon, Barber & Tsai, 1999; Megginson, Netter & Schwartz, 2000). IPOs in China, the second largest world economy, have their unique characteristics. Although most Chinese IPOs were Share Issue Privatizations (SIPs) of state-owned enterprises (SOEs) in 1990s after the establishment of the two Chinese stock markets, recently there is a new powerful group emerging - the private firm IPOs. Existing literature on Chinese IPO long-term performance mainly focuses on SIPs (Chan, Wang & Wei, 2004; Chi, Wang, & Young, 2010). To our knowledge, there is very limited research on the long-term performance of Chinese private firm IPOs. This paper fills in this gap.

This paper aims to investigate up to three-year long term performance of Chinese private and non-private IPOs which were listed between 2002 and 2012, using both buy-and-hold abnormal return (BHAR) and cumulative abnormal return (CAR) methods. The cross sectional analysis is used to examine the determinants of the IPO long-run performance. We particularly explore the impact of the Non-tradable share (NTS) reform on the IPO long-run performance, given that the NTS reform launched in 2005 is expected to change the ownership structure of Chinese listed firms significantly on one hand, and turn firms more market-oriented on the other. As most companies were state-owned companies before the establishment of the Chinese stock exchanges, to keep the control of these companies by the government, the majorities (roughly 60%) of the shares of Chinese listed firms were held by the government or by government controlled companies after SIPs. These government controlled shares are non-tradable shares, as they cannot be traded on the secondary markets. This split share structure has caused conflicts of interests between the controlling shareholders and minority shareholders and other problems in the Chinese markets, such as low liquidity, high volatility and difficulties of market innovation (Liu & Tian, 2012; Hou, Lee, Stathopoulos & Tong, 2013). The NTS reform launched in 2005 aims to make all the non-tradable shares become tradable gradually and provide further possibility of privatization (Liao, Liu & Wang, 2014).

We find that the long-run IPO performance of private firms outperforms that of non-private firms throughout one-, two- and three-year after listing. The results also show that IPOs which are listed on the venture board (also called ChiNext board) outperform those listed on the main board, while IPOs with high initial returns, high leverage and high P/E ratio at offering perform worse in the long-run. In addition, this paper provides evidence that the overall

Chinese IPO long-run performance increases significantly after the NTS reform. However, this increase is mainly driven by the non-private (or state-owned) firms, while the comparative performance advantage of private firm IPOs is disappearing after the reform.

This paper provides two major contributions to the literature. First, we compare the IPO long-run returns between private firms and non-private firms in China. To our knowledge, there is only limited study on this area, given that the development of private firm IPOs in China is a recent phenomenon. Second, we use the NTS reform as a natural shock on ownership arrangement and study the impact of the NTS reform on the IPO long-run performance of private vs. non-private firms. We find a positive impact of the reform on the IPO long-run performance, especially on non-private firm IPOs. This result is in line with the proposal that state ownership is less efficient at the firm-level (Shleifer & Vishny, 1997).

The remainder of this paper is organized as follows. Section 2 provides the literature review and hypothesis development. Section 3 describes the data and the methodology. Section 4 shows the empirical results and the impact of the NTS reform on the IPO long-run performance. Section 5 concludes.

2. Literature Review and Hypothesis Development

2.1 IPO Long Run Performance of Private and State-owned Firms in Other Countries

Many empirical studies report that the long run performance of IPOs is underperformed. Using a sample of 1,526 US IPOs over 1975-84, Ritter (1991) reports that investing in IPOs at the end of the first trading day and holding them for 3 years would leave investors only 83 percent relative to each dollar in comparison with investing in a group of matching firms. Ritter (1991) also finds that small offers, firms with high-excess initial returns and young firms underperform more in the long-run. Levis (1993) examines the long-run performance of 712 UK IPOs issued during 1980 and 1988 and finds that underperformance is between 8% and 23% depending on the benchmark used; that IPO long-run underperformance in the UK market extends beyond 36 months; and that the firms with the higher initial returns have the worse subsequent performance. Besides evidence on the US and UK markets, significant underperformance has also been documented in many other countries with the exception of Korea (Kim, Krinsky & Lee, 1995) and Sweden (Loughran, Ritter & Rydqvist, 1994) where IPO companies outperform the market by 91.6% and 1.2% respectively.

Other matters found in the recent literature which could increase the IPO long-run performance include venture backed features in the US from 1972-1992 in Brav and Gompers (1996), private equity backed features in London and Paris between 1994 and 2004 in Bergstrom, Nilsson and Wahlberg (2006), more financing opportunity after IPOs in Germany for the period from 1977 to 1995 in Bessler and Thies (2007), and high level of multinationality in the UK from January 1991 to June 1995 in Goergen, Khurshed and Mudambi (2007).

As for the long-run performance of privatization IPOs (PIPOs) or share issue privatizations (SIPs), researchers find a different picture from that of private IPOs. Boubakri and Cosset (2000) study 120 SIPs from 26 developing countries, and document significantly positive long-run returns. Megginson, Netter and Schwartz (2000) examine the long-run buy-and-hold returns on 158 SIPs from 33 countries from 1981-1997. They compute one, three, and five-year net returns with respect to a variety of benchmarks, and find statistically significant positive net returns for all the SIPs for all holding periods against all benchmarks.

The long-run stock performance of PIPOs is consistent with the significant improvement of the financial and operating performance of PIPOs found in Megginson, Nash and Randenborgh (1994), Boubakri and Cosset (1998) and D'Souza and Megginson (1999), which all document economically and statistically significant increase in sales (output), profitability, efficiency and capital spending, coupled with significant declines in leverage after privatization.

2.2 Chinese IPO Long Run Performance and Hypothesis Development

Although most of Chinese IPOs in the early stage of the stock market development were state-owned firms before listing, the long-run performance of Chinese IPOs is mixed and overall less positive than the results found on PIPOs in the developed and other developing countries.

Chan, Wang and Wei (2004) investigate the long-term performance of 570 A- and 39 B-share IPOs in China during the 1993 and 1998 period. Their results show that Chinese A-share IPOs are underperformed, while B-share IPOs are slightly outperformed compared to the benchmark portfolios. However, Chi, Wang, and Young (2010) study the long term performance of 897 Chinese IPOs from 1996 to 2002, using CARs, BHARs and the Fama-French three-factor model, and find consistent positive long-run returns of the sample IPOs. Liu, Uchida and Gao (2012) study the

long-run stock performance of Chinese IPOs between 2000 and 2007, and find that IPO firms with political connections experience better long term performance as connections could bring firms preferential benefits. Finally, using the calendar-time factor-regression method and 245 monthly IPO portfolios from July 1992 to December 2012, Shen, Chen and Sun (2014) find that their measure for post-IPO three-year abnormal returns (the alpha) can vary from -1.15% to 0.49% per month, depending on factor and weighting specifications in the portfolio formation, and almost all alpha estimates do not differ from zero after correcting for the new listing bias, showing that Chinese IPOs do not underperform in the long run compared with their non-IPO counterparts.

The mixed results on long-run stock performance of Chinese IPOs are similar to those on operating performance change of these firms after listing. Sun and Tong (2003) study 634 SIP firms from 1994 to 1998 and find that there are improvements in absolute earnings, real sales and employee productivity after SIPs, while both return on sales and earnings on sales decrease significantly, which is known as the “profitability puzzle” in China. Moreover, based on 149 SIP firms from 1998 to 2003, Jiang, Yue and Zhao (2009) confirm that the absolute level of SIP firm profitability decreases after the privatization.

In recent years, private firms have developed into an important part of China’s economy and more and more Chinese IPOs are private firms, rather than SIPs. From 2002 to 2010, the proportion of non-state controlled firms among all public companies in China increased from approximately 18% to more than 70% (Wang, Cao, Liu, Tang, and Tian, 2015). Although studies on these private firm IPOs are limited to our knowledge, some researchers investigate the performance of Chinese private listed firms and find in general private firms outperform state-owned listed firms.

Hess, Gunasekarage and Hovey (2010) study the relationship between the ownership structure and firm value (measured by Tobin’s Q) of Chinese listed firms during 2000 and 2004 and find a positive relationship between large private block-holdings and firm’s value. Tong and Junarsin (2013) examines the characteristics of board structure that affect Chinese listed firm’s financial performance using a sample of 871 firms with 699 observations of previously private firms and 1,914 observations of previously SOE firms. Their main finding is that previously private firms outperform previously SOE firms in China after IPOs, as previously SOE firms might face difficulties adjusting to professional business practices with less government support after listing. On the other hand, professional acumen, combined with efficiency and favorable business climate created by the government have probably led the previously private firms to improve their values stronger and faster after listing. Finally, using a sample of Chinese manufacturing firms from 2000 to 2005, Li, Lin and Selover (2014) compare the performance of Chinese SOEs and private firms in terms of rates of return, productivity, growth, costs and investment. They find that Chinese industrial SOEs are, indeed, less efficient than private firms and pay less attention to costs, inventories, accounts receivables, investment, employee welfare, financing and administration, leading to poorer performance of these SOEs.

Given that these papers find that private firms perform better and more efficiently than state-owned firms in China, we propose our null and alternative hypotheses as follows.

H₀: Private firm IPOs perform similarly in the long-run as state-owned IPOs in the Chinese stock markets.

H_a: Private firm IPOs perform better in the long-run than state-owned IPOs in the Chinese stock markets.

3. Data and Methodology

3.1 Data

The purpose of this research is to analyze the long run performance of Chinese private firms’ IPOs vs. non-private firms’ IPOs. Given the complexity of the ownership structure in Chinese listed firms, we want to make sure our private firm IPO sample is strictly privately owned. In this paper, we define a private firm as a firm’s largest shareholder at the IPO is an independent individual or a family which also remains as the ultimate controller of this firm at the end of 2013.

The sample consists of 1,408 IPOs firms in China from 2002-2012. The data is collected from the CSMAR (China Stock Market & Accounting Research) Database. The companies are listed on the Shanghai Stock Exchange (SHSE), the Shenzhen Stock Exchange (SZSE), the Small and Medium Enterprises (SME) board and the Venture Board (also called ChiNext). 121 firms are omitted due to missing data. The final sample consists of 1,287 IPOs.

Table 1. The distribution of our sample based on listing years, industries and listing boards

Panel A		Panel B	
Year-dummy	Numbers	Industry-dummy	Numbers
2002	55	Finance	24
2003	65	Utilities	195
2004	96	Real estate	38
2005	14	Integration	38
2006	60	Manufacturing	958
2007	121	Business	34
2008	72	Total	1,287
2009	94	Panel C	
2010	337	Broad-dummy	Numbers
2011	238	SHSE	287
2012	135	SZSE	1
Total	1,287	CHINEXT	659
		SME	340
		Total	1,287

Table 1 provides the distribution of our sample based on listing years, industries and listing boards. Panel A shows a rapid increase of IPOs after the year of 2009, which is due to the founding of the venture board in China. Panel C indicates the majorities of IPOs during the sample period are listed in the SME or ChiNext board. In comparison with the main board (SHSE and SZSE), SME and ChiNext boards have much higher proportion of private firms than state-owned listed firms.

3.2 Calculating IPO Long-run Performance

Following Ritter (1991), we first calculate three-year (36 months excluding the first trading month) cumulative abnormal returns and buy-and-hold abnormal returns for our sample firms. The monthly return is the difference between the closing price on the last trading day of the month and that of the previous month. The benchmark-adjusted return for stock i in event month t is defined as:

$$ar_{it} = r_{it} - r_{mt} \quad (1)$$

Where r_{it} is the monthly stock return; and the r_{mt} is the monthly corresponding market index return. We use the Shanghai and Shenzhen A-share composite indexes as our benchmarks. The average benchmark-adjusted return on a portfolio of n stocks for the event month t is the arithmetic average of the benchmark-adjusted returns:

$$AR_t = \frac{1}{n} \sum_{i=1}^n ar_{it} \quad (2)$$

The cumulative abnormal return from event month s to event month k is the sum of the average benchmark-adjusted returns:

$$CAR_{s,k} = \sum_{t=s}^k AR_t \quad (3)$$

The market adjusted buy-and-hold return is defined as:

$$BHAR_{it} = \prod_{t=1}^T (1 + r_{it}) - \prod_{t=1}^T [1 + r_{mt}] \quad (4)$$

The mean BHARs is considered as the arithmetic average of BHARs.

$$\overline{BHAR} = \frac{1}{n} \sum_{i=1}^n BHAR_{it} \quad (5)$$

3.3 The Regression Method

To examine the conceivable explanations for the long-run performance of Chinese IPOs, we use a cross-sectional model. The regression model we use to evaluate the long-run IPO performance is demonstrated as follows:

$$\text{BHAR}_i \text{ or } \text{CAR}_i = a_i + b_1 * \text{PRIVATE}_i + b_2 * \text{AGE}_i + b_3 * \text{IR}_i + b_4 * \text{LEV}_i + b_5 * \text{PE}_i + b_6 * \text{ROA}_i + b_7 * \text{OFFERING_SIZE}_i + b_8 * \text{CHINEXT}_i + b_9 * \text{SME}_i + b_{10} * \text{YEAR}_i + b_{11} * \text{INDUSTRY}_i + e_i \quad (6)$$

Table 2. Description of variables

Variables	Expected Sign	Description
PRIVATE	+	It equals to one when the firm is private, and equals to zero otherwise.
AGE	+	It is the number of years that the firm had existed before an IPO. It reflects the operating history of the IPO firm.
IR	-	It is the market adjusted initial return on listing day.
LEV	-	The amount of debt used to finance a firm's assets, which refers to debt divided by assets before the IPO.
PE	-	It refers to the P/E ratio of offering price.
ROA		It is return on assets in the year prior to an IPO; it equals to Net Income/Total Assets.
OFFERING_SIZE		It refers to the logarithm of the offering size (number of shares * offering price) of the IPO.
CHINEXT	+	It equals to one, when a firm is listed on the ChiNext board, otherwise equals to zero.
SME	+	It equals to one, when a firm is listed on the SME board, otherwise equals to zero.
Year dummy		It refers to the year of listing (from 2002 to 2013)
Industry dummy		It refers to the industry of a firm (Finance, Utilities, Real estate, Integration, Manufacturing, Business)
REFORM	+	It equals to one, when a firm is listed after 2006 (include 2006), otherwise equals to zero.

Table 2 reports the variable descriptions and their expected signs in the regression. The private dummy (PRIVATE) is our main variable in the regression, which equals to one when a firm is privately owned, and zero otherwise. Based on our alternative hypothesis, we believe that there is a positive relationship between the private dummy and the long run IPO performance.

The firm age (AGE) refers to the difference between the year of the founding and the year of going public. Ritter (1991) and Bhabra and Pettway (2003) find that younger firm IPOs perform worse than old firms in the long run as young firms generally have more ex ante risk than established firms. Similarly, we expect a positive relationship between AGE and the long-run IPO returns.

The initial returns (IR) on the listing day are utilized as a measure of over optimism. In general, researchers find a negative relationship between initial returns and long-term performance of IPOs (Ritter, 1991; Sahoo and Rajib, 2010), as the higher the initial returns, the more frequent is the subsequent correction in prices, resulting in lower long-run performance. Thus, we expect that initial returns are negatively related to the IPO long-run performance.

Leverage (LEV) measures the risk of firms. We measure leverage as total debt to total assets one year prior to IPOs. Obreja (2006) states that a high leverage would lead to a reduction of IPOs' long term returns, as it increases the firm risk and with high cost of capital the productivity of the firm would reduce. Therefore, we expect that the leverage of the sample firms would have a negative relation with the IPO firms' long term returns.

P/E ratio (PE) is a valuation ratio of a company's offering price compared to its per-share earnings, which represents investors' willingness to pay for per dollar earnings and their optimistic expectations on the growth of firms. Purnanandam and Swaminathan (2004) find that "overvalued" (high offer price - to - value) IPOs often generate low long-run returns. Therefore, we expect that there is a negative relation between P/E ratio and IPO long term returns.

We use return on assets (ROA) prior to IPOs and offering sizes (OFFERING_SIZE) to control for the operating performance and size effect of IPOs. However, given the stock returns are for three-year after IPOs, the relationship between ROA prior to IPOs and IPO long-run performance could be weak.

Other control variables include listing board dummies, year dummies and industry dummies. We use CHINEXT and

SME dummies to examine whether there is any difference of long run performance of IPOs which are listed on the ChiNext board or the SME board. The year dummies show the listing year of IPOs from 2002 to 2012, and the industry dummies control for the industry that an IPO belongs to.

4. Empirical Results and the Impact of the NTS Reform on IPO Long-run Performance

4.1 Empirical Results

We report the empirical results of the study in this section.

Table 3. A comparison of long-run performance (BHAR and CAR) of private vs. non-private firms in three-year after listing

	Variable	No.	Mean	Mean Difference (t-test)	Median	Median Difference (Wilcoxon test)
1-year						
BHAR	Non-private	880	-0.1122		-0.1237	
	Private	511	0.8955	1.0077***	0.7952	0.9189***
CAR	Non-private	880	-0.0063		-0.0094	
	Private	511	0.0007	0.0070***	-0.0037	0.0057***
2-year						
BHAR	Non-private	874	-0.0377		-0.1274	
	Private	502	1.1446	1.1823***	0.9994	1.1268***
CAR	Non-private	874	-0.0003		-0.0025	
	Private	502	0.0065	0.0068***	0.0032	0.0057***
3-year						
BHAR	Non-private	777	0.011		-0.1315	
	Private	411	0.4819	0.4709***	0.6004	0.7319***
CAR	Non-private	777	0.0022		0.0003	
	Private	411	0.0075	0.0053***	0.0061	0.0058***

A superscript *, ** or *** indicates significance at the 10%, 5% or 1% level, respectively.

Table 3 presents the mean and median BHAR and CAR during the three-year after listing for private and non-private IPOs. Due to some sample firms not having 36 months' returns, the observations reduce from the first year returns to the third year. We can see that most mean and median BHARs and CARs of our private IPO sample are positive, while those of our non-private sample are negative. It is evident that all the mean and median return differences between private and non-private IPOs are positive and statistically significant (we use t-test for mean difference and the Wilcoxon test for median difference), indicating our private IPO sample outperforms our non-private IPO sample in one-, two- and three-year after listing.

Table 4. Statistical summary of the independent variables from the period between 2002 and 2012

	Mean	Median	Maximum	Minimum	Std. Dev.
PRIVATE	0.3730	0	1	0	0.4838
AGE	7.4429	6.8137	27.4411	0.2247	4.6472
IR	0.6716	0.4499	6.0802	-0.1864	0.7666
LEV	0.5487	0.5615	1.1371	0.0465	0.1720
PE	61.9618	54.9	223.1100	7.2300	32.0149
ROA	0.1185	0.0977	0.7893	0.0009	0.0817
OFFERING_SIZE	8.7673	8.716	10.8359	7.5877	0.3933
CHINEXT	0.2642	0	1	0	0.4411
SME	0.5120	1	1	0	0.500
REFORM	0.8213	1	1	0	0.3833

Table 4 displays the statistical summary of the independent variables for the period between 2002 and 2012. The results show that the private IPOs account for 37.3 percent of the total sample. The average age of IPO firms is 7.44 years, and the average initial return is 0.67 with a minimum value of -0.19, indicating that not all firms have positive initial returns in China. The average leverage ratio is 0.55; the mean value of offering P/E ratio is 61.96 and the average ROA is 0.12.

Table 5. Correlation coefficients of the independent variables in the regression analysis

		A	B	C	D	E	F	G	H	I
AGE	A	1								
PRIVATE	B	0.079	1							
Initial returns	C	-0.156	-0.119	1						
P/E Ratio	D	-0.048	0.075	0.489	1					
LEV	E	-0.008	-0.098	-0.023	-0.065	1				
ROA	F	-0.036	0.224	-0.131	0.048	-0.561	1			
Offering size	G	0.100	-0.07	-0.386	-0.005	0.241	-0.021	1		
ChiNext	H	0.153	0.267	-0.257	0.161	-0.223	0.257	-0.027	1	
Reform	I	0.275	0.259	-0.132	0.168	0.018	0.136	0.282	0.280	1

A superscript *, ** or *** indicates significance at the 10%, 5% or 1% level, respectively.

Table 5 reports correlation coefficients of the independent variables. Our results show that there is no evidence of multicollinearity issue in our regression.

Table 6. Regression analysis of BHARs and CARs within three years after IPOs

Variable	BHAR1	BHAR2	BHAR3	CAR1	CAR2	CAR3
Constant	-1.2418	0.1693	0.5642	-0.0551*	0.0469***	0.0885***
PRIVATE	0.9985***	1.0585***	0.2808*	0.0054***	0.0042***	0.0011
AGE	-0.0029	0.0001	0.0057	0.0000	0.0000	0.0000
IR	-0.0364	0.0701*	-0.1083	-0.0014	-0.0023*	-0.0027**
LEV	-0.1790**	-0.3197**	-0.0851	-0.0067	-0.0061	-0.0067*
PE	-0.0017***	-0.0024***	-0.0010	-0.0001***	-0.0001***	0.0000
ROA	-0.0846	-0.6125**	-0.6572	0.0038	-0.0087	0.0047
OFFERING_SIZE	0.1537***	0.0462	-0.0037	0.0070**	-0.0025	-0.0071***
CHINEXT	0.1274**	0.4218***	0.9256**	0.0093**	0.0052**	0.0010
SME	0.0956	0.3060***	0.1600	0.0076**	0.0028	-0.0013
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.5245	0.5764	0.1203	0.1462	0.2170	0.1693
Observations	1,287	1,286	1,275	1,287	1,286	1,275

A superscript *, ** or *** indicates significance at the 10%, 5% or 1% level, respectively.

Table 6 demonstrates the regression results of the BHAR and CAR for one to three years after listing. BHAR1 (2, 3) stands for the BHAR of one (two, three) year(s) after listing, while CAR1 (2, 3) stands for the CAR of one (two, three) year(s) after listing. The coefficient standard errors of heteroscedasticity are all adjusted by the white test (1980). We can see that the coefficients of the private dummy are consistently positive and statistically significant, indicating that our alternative hypothesis is supported and private firm IPOs outperform non-private firm IPOs in one-, two- and three-years after listing measured by both BHARs and CARs. Our results are consistent with Tong and Junarsin (2013), although their focus is the financial performance of private vs. state-owned firms after IPOs.

Another variable with consistently significant and positive coefficients is the ChiNext dummy, showing that the IPOs listed on the ChiNext board outperform IPOs listed on other boards in China. The companies listed on the ChiNext board are mainly small or high-tech firms. With higher level of risk these firms face, the higher stock returns are expected. Our results are similar to Chi, Wang and Young (2010), which find that IPO companies that have high-tech features perform better in the long run than other companies in China. They attribute this result to the high risk and good future prospects related to high-tech firms.

In contrast, Table 6 shows that the coefficients of initial returns, leverage and offering P/E ratio variables are statistically negatively significant in most regressions, indicating that high initial returns, high leverage and high offering P/E ratio lead to low long-run performance of IPOs. These results are similar to our expectations and results in Ritter (1991), Obreja (2006) and Purnanandam and Swaminathan (2004).

4.2 The NTS Reform and Long-run Performance of Chinese IPOs

After obtaining the basic results on how private IPO firms perform in the long-run in comparison with non-private IPO firms and the factors that influence Chinese IPO long-run performance, we further study the impact of a recent important regulation change in the Chinese markets (the NTS reform) on IPO long-run performance.

In the Chinese stock markets, due to the features of partial privatization and partial trading of the first round SIPs, the shares of listed firms are classified into two types, tradable and non-tradable shares. Non-tradable shares normally refer to state-owned shares, legal-person shares, management shares and employee shares, which count for about two thirds in the early stage of the Chinese stock markets. As the purchasing value of non-tradable shares is much lower than that of tradable shares, the non-tradable shares cannot be traded in the secondary market, and they can only be transferred or auctioned with the approval of the government at discounted prices. Tradable shares count for one third of total shares of firms, and are owned by individual shareholders and institutional shareholders and can be traded in the secondary market. As the Chinese economy was centrally planned economy controlled by the government before the founding of the two stock markets in China, the government deliberately chooses to control listed companies through non-tradable shares in order to achieve some social or political goals (Hou and Lee, 2012). However, this split share structure leads to many problems in the Chinese markets. As Beltratti, Bortolotti and Caccavaio (2012) point out, there are several drawbacks of this split share structure: 1) the management decisions are made by few controlling shareholders who hold non-tradable shares; 2) due to the trading restriction, the non-tradable shareholders do not care much about the market price changes (or value maximization) of the tradable shares of this firm; 3) the split share structure causes excessive volatility and illiquidity in the Chinese stock markets; and 4) the poor market environment has led big companies issuing shares in overseas markets and choosing overseas listing. Therefore, to solve these severe problems in the Chinese stock markets, the Chinese government carried out the NTS reform in 2005 during which non-tradable shareholders pay certain compensations to tradable shareholders in exchange of the non-tradable shares becoming tradable gradually.

Some research finds that the NTS reform has improved market liquidity, corporate performance and corporate governance in the Chinese markets. Hou, Kuo and Lee (2012) claim that the asymmetric information risk has been reduced as the result of the NTS reform and investors of the Chinese listed firms benefit from this reform. Liao, Liu and Wang (2014) and Chi, Liao and Li (2014) compare the changes in output, profitability, employment and productivity of Chinese listed firms before and after the NTS reform, and both studies find that the NTS reform increases firm output, profitability and employment. Kuo, Ning and Song (2014) study the impacts of the NTS reform on Chinese firm corporate governance, and find that the reform creates an incentive alignment between the controlling and minority shareholders and strengthens the firm corporate governance in a weak investor protection environment.

Therefore, we believe that Chinese IPO long-run performance would overall increase after the NTS reform, due to the improvement of the firm corporate governance and operating performance and the development of the market orientation. However, we also expect that the increase of the IPO long-run performance will be more obvious among non-private firms than private firms, given that the main target of this reform is non-private (or state-owned) firms (Liao, Liu & Wang, 2014).

In order to test the relationship between the reform and the IPO long run performance, we employ a reform dummy, which equals one if firms issued IPOs in or after 2006, otherwise zero. We expect a positive coefficient for this reform dummy in the regression analysis. We also use an interaction variable (private \times reform) to see how private firm IPO long-run performance changes after the reform, and we do expect that private firm IPOs' long-run outperformance reduces after the reform.

The new regression model is demonstrated in the following. Taking into account of the multicollinearity issue, we exclude the year dummies in this model.

$$\text{BHAR}_i \text{ or } \text{CAR}_i = a_i + b_1 * \text{PRIVATE}_i + b_2 * \text{REFORM}_i + b_3 * (\text{PRIVATE} \times \text{REFORM}_i) + b_4 * \text{AGE}_i + b_5 * \text{IR}_i + b_6 * \text{LEV}_i + b_7 * \text{PE}_i + b_8 * \text{ROA}_i + b_9 * \text{OFFERING_SIZE}_i + b_{10} * \text{CHINEXT}_i + b_{11} * \text{SME}_i + b_{12} * \text{INDUSTRY}_i + e_i \quad (7)$$

Table 7. Regression analysis of BHARs and CARs within three years after IPOs (with added NTS reform dummy and the interaction)

	BHAR1	BHAR2	BHAR3	CAR1	CAR2	CAR3
Constant	-1.7583***	0.4373	1.785	-0.0722**	0.0460**	0.0744***
PRIVATE	0.7308***	1.3636***	3.3113***	0.0246***	0.0215***	0.0091**
REFORM	-0.1689**	0.2141*	0.3682	-0.0021	0.0097***	0.0126***
PRIVATE*REFORM	0.2944***	-0.2809	-3.2263***	-0.0195***	-0.0180***	-0.0073**
AGE	-0.0004	0.0062*	0.0132	0.0001	0.0002*	0.0002
IR	-0.0007	0.1654***	-0.0752	0.0014	0.0016	-0.0003
LEV	-0.143	-0.3177**	-0.2809	-0.0057	-0.007	-0.006
PE	-0.0019***	-0.0047***	-0.0036**	-0.0002***	-0.0002***	-0.0001***
ROA	0.0881	-0.4920*	-1.0284	0.009	-0.0067	0.0052
OFFERING_SIZE	0.1914***	-0.031	-0.1756	0.0075**	-0.0044**	-0.0075***
CHINEXT	0.1936***	0.2846***	0.6690**	0.0112***	0.004	-0.0001
SME	0.1353**	0.0787	-0.2399	0.0065**	-0.0012	-0.0042**
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.481	0.4685	0.1384	0.0534	0.1081	0.0873
Observations	1,287	1,286	1,275	1,287	1,286	1,275

A superscript *, ** or *** indicates significance at the 10%, 5% or 1% level, respectively.

Table 7 shows the regression results with the added reform dummy and the interaction variables. All coefficients of the private dummy variable still remain significantly positive at the 5% or 1% level. The results show that most coefficients of the reform dummy are positive and statistically significant, particularly in the two- and three-year return regressions, indicating that Chinese IPO long-run performance overall improves after the NTS reform. However, most coefficients of the interaction variable are significantly negative, showing that the comparative advantage of the long-run performance of private IPO sample disappears after the reform. These results are the same as our expectations.

Hou, Kuo and Lee (2012) claim that the NTS reform improves the informative-ness of share prices for firms with high state-owned shares and leads to a decline in the cost of capital and a better firm performance. Liao, Liu and Wang (2014) find that the NTS reform increases firm output, profitability and efficiency and the improvement was more obvious in the state-owned firms. Similar to their findings, our paper shows that the overall Chinese IPO long-run performance has increased after the NTS reform, and comparatively speaking, the improvement has shown more obviously within the non-private firms.

In addition, Table 7 shows that the results on other independent variables remain similar to those in Table 6.

5. Conclusion

This study examines the long run performance of 1,287 A-share Chinese IPOs which were listed during the period from 2002 to 2012. We find that the mean and median differences of BHARs and CARs between private firm IPOs and non-private firm IPOs in three-year after listing are all positive and statistically significant at the one percent level, indicating that private firms have significantly higher long-run returns than non-private firms after IPOs.

We further analyzed the determinants of the IPO long term performance. The results of the cross-sectional regression analysis show that the private and high-tech features of listed firms and the NTS reform launched in 2005 all have significant and positive impact on the three-year long run returns of Chinese IPOs measured by both BHARs and

CARs. However, initial returns, leverage and offering P/E ratios have partially significantly negative impact on the long run performance of Chinese IPOs. The results from this study also provide the evidence that private firms outperform non-private firms in the long term after IPOs, but this trend is lessening after the NTS reform. Our results indicate that state ownership is less efficient compared to private ownership, and the NTS reform has turned SOEs more market-oriented.

While we find some interesting results in this paper, there are several limitations which could be addressed in the future research. First, the measurements of IPO long-run performance can be various. Barber and Lyon (1997), Lyon, Barber and Tsai (1999), Loughran and Ritter (2000) and Cooli, L'Her and Suret (2006) argue that the size of the abnormal returns and the power of the statistical tests are affected by measurement techniques of IPO long-run performance, including CAR vs. BHAR, equally-weighted vs. value-weighted returns, and the use of portfolio or control firms. Future research can use alternative measurements to confirm the robustness of the results. Nevertheless, as pointed out by Fama (1998), all estimations of abnormal returns in the long-run are subject to problems arising from the poor specification of the models and there is no optimal method which can minimize all these problems. Second, with more data available, future research could consider investigating the impact of change of state-ownership after the NTS reform on IPO long-run performance to provide more detailed analysis on this research area.

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