Price Discovery in Share Lockups: Evidence from the Split-share Structure Reform in China*

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Abstract

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JEL Classification: G14 G30

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Abstract

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1 Introduction

Previous literature has been focusing on IPOs for examining the roles of share lockups (see, Field and Hanka, 2001; Brav and Gompers, 2003; Ofek and Richardson, 2000, among others). All these efforts center on an important question as whether there exists effective price discovery during lockups. In this paper, we look into the question by examining the abnormal equity price movements and volume changes around the lockup expirations in the Split-share Structure Reform in China. We relate our findings to the information asymmetry hypothesis and the role of lockups as firm commitment to mitigate moral hazard problems. Our findings are robust after controlling for the downward sloping demand curve (Ofek and Richardson, 2000) and the speculative bubble effect (Hong, Scheinkman, and Xiong, 2006).

In 2005, the China Securities Regulatory Commission (hereafter CSRC) initiated the Split-share Structure Reform to convert publicly listed firms' non-tradable shares to tradable shares. Each participating firm's reform plan contains a compulsory 365-day lockup of the non-tradable shares after the plan implementation day. The lockups in the reform have several favorable characteristics unavailable in an IPO setting as to examine price discovery.

First, in contrast to IPOs, there is no early lockup release prior to the scheduled lockup expirations in the reform. The observed stock price movements and volume changes will not be contaminated by insider trading before lockup expirations. In addition, for IPOs, there is very little public trading history and financial reporting available, typically for young companies, due to limited information flows from management and analysts per quiet period restrictions. This is not the case for the lockups in our setting. The availability of both pre- and post-reform trading and financial information enables us to establish convincing direct linkage between market reactions to firm characteristics. Thus we are able to use trading volumes as an additional market indicator to stock returns in our investigation. Moreover, we look into the shareholding of various types of institutional investors to answer the important question as who plays significant roles in the price discovery. Our experiment does not suffer self-selection and size bias given that the mandatory reforms were a market-wide event involving all publicly listed companies regardless of their characteristics.

We focus on examining lockups in a much longer time window – 120 days before and 20 days after lockups. We document a significant average 141-day abnormal stock return of -14% associated with an abnormal trading volume surge of 140% around the lockup expirations. The abnormal returns/volumes are significantly larger than those of 1-2% over 3-5 days around IPO lockup expirations (Field and Hanka, 2001; Brav and Gompers, 2003). Importantly, the largest portion of the price drop, associated with a significant surge in trading volume, incurs 40 days before the lockup expiration. The results imply that price discovery in IPO lockups could more efficient if outside investors are exposed to more pre-IPO financial information and when institutional investors are more involved in pre-lockup trading.

For most Chinese firms, the non-tradable shareholders include insiders who are endowed with more private information than tradable shareholders who are considered as outsiders (Yu, Xia, and Pan, 2007). The interest conflicts between non-tradable and tradable shareholders commonly exist (Lin, 2008; Wu, 2004, 2006). Therefore, we hypothesize that the significant abnormal stock returns and trading volumes are driven by a price discovery process that alleviates the information asymmetry between tradable and non-tradable shareholders. The price discovery hypothesis suggests that the tradable shareholders use lockups to assess managerial commitment to alleviate moral hazard problems and to evaluate firm performance improvement – they are more likely to quit the firm before lockup expirations to avoid being exploited if information flows remain limited or there lacks of indications for corporate governance improvement during the lockups.

We find that the abnormal stock returns (trading volumes) are significantly and positively (negatively) correlated to firm post-reform performance improvement. That yields direct evidence that firms use lockup to signal their quality (Leland and Pyle, 1977; Courteau, 1995). The abnormal stock returns (trading volumes) are positively (negative) correlated to firm information transparency. The results of stock returns and trading volumes are highly consistent with each other and confirm the predictions of our price discovery hypothesis. An analysis of the post-lockup transactions of non-tradable shares adds further support to this finding – the non-tradable shareholders of less transparent firms sell their shares more

aggressively after the lockup expirations. The firms of higher levels of agency problems tend to experience more negative abnormal stock returns associated with higher trading volumes. The evidence confirms that the lockups serves as a commitment device to alleviate moral hazard issues (Brav and Gompers, 2003). Overall, we present extensive evidence that there exists effective price discovery prior to lockup expirations. Our findings are robust after controlling for the downward sloping demand curve and the speculative bubble effects which constitute alternative explanations to the price and volume movements around lockup expirations (Field and Hanka, 2001).

To examine who plays significant roles in the price discovery process, we look into the relationships among the abnormal stock returns/trading volumes and the shareholding of various types of institutional investors. We find that institutional investors possess remarkable price discovery capabilities. They tend to hold high quality stocks and to adjust their holding positions prior to the lockup expirations. Among the institutions, mutual funds appear to be the most effective group, whereas foreign institutional investors display no price discovering capabilities. The results support the notion that local investors are better informed compared to foreign investors.

Beside the merits aforementioned, our work contributes to the literature in the following aspects. The Split-share Structure Reform is one of the most important milestones in the evolution of the Chinese capital markets. To the best of our knowledge this study constitutes the first empirical investigation of the lockup expirations in the reform. It helps to understand the price discovery dynamics and market efficiency in Chinese markets. On the other hand, we present new evidence on price discovery in share lockups that complements previous studies that mainly focus on the lockup expirations in IPOs as the reform involves lockup expirations of unique characteristics in an unprecedented scale and intensity.

The rest of the paper is organized as follows: Section 2 introduces the lockup expirations in the Split-share Structure Reform. Section 3 develops our hypothesis and describes the data and research methodology. Section 4 presents the empirical results and robustness checks. Section 5 concludes.

2 The Split-share Structure Reform

The split-share structure has been established since the inception of the Chinese domestic A-share market in the early 1990s.[1] Under such dual share structure, tradable and non-tradable shares of otherwise identical rights coexist for a company. Before the Split-share Structure Reform, 2/3 of the A-shares outstanding were non-tradable shares owned mainly by the Chinese government and its affiliates and legal persons. The transactions of the non-tradable shares were contract-based and subject to the approval of regulatory authorities. The tradable shares were largely held by institutional and individual investors. The purposes of establishing this dual share structure were to enable the state-owned enterprises to raise capital while the government to retain control. It however had fostered serious speculations and agency problems and tremendously hindered mergers and acquisitions (see, Allen, Qian, and Qian, 2005; Hwang, Zhang, and Zhu, 2006; Li, Liao, and Shen, 2008, among others).

In 2005, the Split-share Structure Reform was carried out in an effort to revitalize the Chinese stock markets that had been bearish since its inception. A central theme of the reform was to convert non-tradable shares to tradable shares. According to *The Measures for the Administration of the Share-trading Reform of Listed Companies*, each participating firm's reform plan should contain a compulsory 365-day lockup to restrict non-tradable shareholders from selling their shares after the plan implementation. In addition, a non-tradable shareholder cannot sell more than 5% of the total shares outstanding in each year after the lockup. The Chinese stock markets reacted positively to the reform and posted an average return of 20% in a 21-day window around the reform plan implementation days.

Figure 1 illustrates the typical process of unlocking a firm's non-tradable shares. On the reform plan implementation day, Day_0, the information of the lockup – lockup expiration date, the numbers of shares to be unlocked, and the non-tradable shareholder identities – becomes available to the public. After the initial 365-day lockup expiration on Day_1, a non-tradable shareholder can sell non-tradable shares up to 5% of the total shares outstanding.

[1] A domestically listed Chinese company may issue up to three types of shares. A-shares are the common shares priced in domestic current and traded on Shanghai or Shenzhen Stock exchanges. B-shares are listed on the domestic exchanges but priced in US dollar. H-shares are listed on Hong Kong Stock Exchange priced in Hong Kong dollar.

Twelve months later, on Day_2, this shareholder can start selling another batch of non-tradable shares up to 5% of the total shares outstanding. This process will continue till Day_k, on which all non-tradable shares held by this shareholder gain trading right.

3 Empirical Methodology

3.1 The Hypotheses

Jensen and Meckling (1976) state that a particular form of agency problems is the interest conflicts between controlling shareholders and minority shareholders in a market of high ownership concentration. Grossman and Hart (1988); Shleifer and Vishny (1997) show that controlling shareholders have incentives to abuse firm resources for private interest at the expense of minority shareholders. Empirically, there exists rich evidence of ownership concentration in global financial markets (see, LaPorta, de Siolance, and Shleifer (1999) for developed markets and Claessens, Fan, Djankov, and Lang (1999) for Asian markets excluding Japan, among others). In China, 80% of the publicly listed companies have controlling shareholders (Yu, Xia, and Pan, 2007).

For most Chinese companies, the controlling shareholders are non-tradable shareholders as well. Then the agency problems between majority shareholders and minority shareholders equate the agency problems between non-tradable shareholders and tradable shareholders. Yu, Xia, and Pan (2007) report that 77% of the Chinese companies in their sample have the Chinese government and/or its affiliates as controlling shareholders. Wu (2004, 2006) provide direct evidence on the interest conflicts between non-tradable and tradable shareholders. He shows that non-tradable shareholders care about the book values of assets, based on which the non-tradable shares are priced, but tradable shareholders value the market prices of their shares. As a result, two types of moral hazard problems could present in the reform. First, non-tradable shareholders might exaggerate firm values to reduce the compensation paid to tradable shareholders. Second, non-tradable shareholders might make the firm engage in operating activities that benefit themselves at the expense of tradable shareholders.[2]

[2]Even tradable shareholders were aware of the agency problems in (opaque) firms with a split-share structure, they might choose to hold their shares after reform plan implementation. 97% of the publicly

The mandatory lockups in the reform could be used as a commitment device to reduce the *ex post* moral hazard problems in order to attract tradable shareholders to accept proposed reform plans. The lockups provide tradable shareholders with additional time to better evaluate corporate governance and firm performance. Bushman and Smith (2003) argue that investors demand lower returns for more transparent companies because the risk of wrongly assessing the values of transparent firms is relatively low. It is easier to monitor transparent firms as well. In our setting, investors will be more likely to hold the shares of transparent firms before lockup expirations. That would reduce both negative price movements and abnormal trading volumes for the transparent firms around lockup expirations. Same story holds for firms with less agency problems. We propose our first hypothesis as

Hypothesis 1(A): the abnormal stock returns (trading volumes) around lockup expirations are positively (negatively) correlated to corporate information transparency;

Hypothesis 1(B): the abnormal stock returns (trading volumes) around lockup expirations are negatively (positively) correlated to the levels of firm agency problems.

Firm performance improvement during the lockups reflects non-tradable shareholders' commitment to improve corporate governance and operations. Tradable shareholders would be less likely to sell their shares when performance improvement is observed. That results in less negative stock returns and lower trading volume surges. We develop our second hypothesis as

Hypothesis 2: the abnormal stock returns (trading volumes) are positively (negatively) correlated to firm performance improvement during lockup period.

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listed firms in China have a dual-share structure before the reform. Limited by alternative investment opportunities, majority tradable shareholders might choose to hold their shares facing the risk associated with unlock events. The results of Split-share Structure Reforms were uncertain. Tradable shareholders could choose to withhold their shares because the risk of being expropriated might be low since non-tradable shareholders could not sell their shares before lockup expirations. The expectation of firm performance improvement due to improved corporate governance as a result of reduced managerial agency problems provided additional incentives for tradable shareholders to withhold their shares.

3.2 Data Description and Summary Statistics

The data on share lockups and stocks is obtained from WIND database, which contains information on lockup expiration dates, the identities of non-tradable shareholders, and the number of non-tradable shares to be unlocked. The data is cross-checked against the data in CSMAR to improve reliability. There are 586 firms had their lockup expirations during June 2006 and April 2007. We exclude 81 firms that had multiple unlock events during the sample period. Inactive and financial firms, and firms with abnormal price records are removed. Our final sample contains 482 firms, among which 284 (198) firms are listed on the Shanghai (Shenzhen) Stock Exchange. Firm characteristic data is obtained from Tsinghua University Financial Data Center.

Table 1 reports the summary statistics of the firm characteristics. Firms are sorted into five groups by their lockup expiration dates. There are 33 pilot firms whose lockups expired before October 2006. There are 110, 118, 209 and 118 firms' lockups expired during November and December 2006, January and February 2007, March and April 2007 and after May 1st 2007 respectively. Figure 2 depicts the temporal distribution of the lockup expirations.

The non-tradable shares constitute approximately 63% of the total number of shares outstanding before the reform. On average, 47 million non-tradable shares would be unlocked in each lockup expirations. Following the market convention in China, we classify a lockup expiration as a *major unlock event* that involved at least one non-tradable shareholder who owns non-tradable shares more than 5% of the firm's total shares outstanding. Otherwise, a lockup expiration is classified as a *minor unlock event*. Among the 482 lockup expirations, there are 286 *major unlock event*s. We measure the length of a lockup period using the number of days between the first trading day after the reform plan implementation and the lockup expiration day. The lockup periods have a mean of 365 days with small variations.

3.3 Empirical Implementation Strategy

Following Sharpe (1964); Lintner (1965), we compute CAPM-adjusted cumulative stock returns, denoted by CAR, as the abnormal returns around the lockup expiration dates.[3] We apply two different methods to compute the daily abnormal trading volumes. Following Field and Hanka (2001), we define the benchmark trading volume as the average trading volume in the day window [-230, -131]. The abnormal trading volume for stock i on day d_t is defined as

$$AV_{it} = \frac{V_{it}}{\frac{1}{100}\sum_{k=-230}^{-131} V_{ik}}. \tag{1}$$

The second approach is in the same spirit as Lynch and Mendenhall (1997) who take the market-wide momentum of trading activities into account so that their method is more suitable for a soaring market with rapid increases in overall trading volumes. The daily trading volume is measured using the natural log of share turnover

$$LMV_{it} = \frac{\log\left(1 + V_{it}\right)}{\log(1 + E_{it})} \tag{2}$$

where V_{it} is the trading volume of stock i in RMBs on d_t, and E_{it} represents the market value of the tradable shares for stock i. We then apply the method in Ajinkya and Jain (1989) to estimate the daily abnormal volume. The sensitivity of stock i's trading volume relative to the market trading volume, b_i, is estimated using the volume data in the day window [-230, -131]:

$$LMV_{it} = a_i + b_i LMT_{mt} + e_{it} \tag{3}$$

where $LMV_{mt} = \log\left(1 + V_{mt}\right) / \log(1 + E_{mt})$ and V_{mt} is the total trading volume of both the Shanghai Stock Exchange and Shenzhen Stock Exchange in RMB, and E_{mt} denote the aggregate market value. We adopt the Yule-Walker method to estimate the coefficients, a_i

[3]We also compute abnormal returns with market model and Fama-French model. Our results remain valid with those unreported measures of abnormal returns.

and b_i given that the residuals in Equation (2) may follow an AR(1) process. The abnormal trading volume for stock i on day d_t is

$$LMAV_{it} = LMV_{it} - a_i + b_i LMT_{mt}. \tag{4}$$

We define the average abnormal trading volume, denoted by AAV, for the $[d_1, d_2]$ day window as the mean of daily abnormal volumes

$$AAV_i = \frac{1}{d_2 - d_1 + 1} \sum_{t=d_1}^{d_2} LMAV_{it}. \tag{5}$$

We use three proxies for information asymmetry in our regression analysis. Information asymmetry problem should be less prominent for firms with low stock return volatilities, holding others equal (French and Roll, 1986; Leuz and Verrecchia, 2000). Therefore, we use stock return volatility, denoted by σ_i, as a proxy for information asymmetry. Following Vermaelen (1981), we use the market equity value, denoted as $SIZE$, as another proxy for information asymmetry. The idea is that large companies are under relatively stricter scrutiny by analysts and investors so that information asymmetry is negatively correlated to firm size. Furthermore, we include the number of non-tradable shareholders who involved in a lockup expiration, denoted by NUH, as our third information proxy – asymmetric information should be less an issue as diverse ownership increases information dispersion. We expect positive relationships among abnormal stock returns and firm sizes and diverse ownership, and a negative relationship between abnormal returns and stock volatilities.

We measure the level of agency problems between non-tradable and tradable shareholders with the ratio of the number of non-tradable shares over the number of tradable shares, denoted by NTT. A large NTT means that non-tradable shareholders have stronger bargaining power that induces more selfish incentives. We expect to observe relatively large price drops and more intense trading associated with the stocks of firms with large NTT.

Firm performance improvement is measured by firm quarterly earning per share changes, denoted by ΔEPS, as the difference between the EPS of the quarter before the lockup expiration and the EPS of the quarter before the reform plan implementation. Tradable

shareholders would be more willing to withhold their shares in case positive changes in EPS are observed. That translates into less negative price movements and smaller increases in abnormal trading volumes.

Among control variables, we include the cumulative returns in the [-140,0] day window around lockup expirations as a proxy for the run-up, denoted by $RUNUP$ (Odean, 1998). Industry dummies, denoted by IND, are the twelve industry classifications proposed by CSRC. SOE is a dummy variable for state-owned companies. An exchange dummy, denoted by EXC, is used to control for the exchange effect. EXC equals 1 (0) if a firm is listed in Shanghai (Shenzhen) Stock Exchange. We examine *Hypothesis 1* using

$$\begin{aligned} CAR_i &= a + b_1\sigma_i + b_2 SIZE_i + b_3 NUH_i + b_4 NTT_i + b_5 RUNUP_i + b_6 \Delta EPS_i \\ &\quad + b_7 Control_i + b_8 IND_i + b_9 SOE_i + + b_{10} EXC_i + \varepsilon_i, \end{aligned} \tag{6}$$

and $Hypothesis$ 2 using

$$\begin{aligned} AAV_i &= a + b_1\sigma_i + b_2 SIZE_i + b_3 NUH_i + b_4 NTT_i + b_5 RUNUP_i + b_6 \Delta EPS_i \\ &\quad + b_7 Control_i + b_8 IND_i + b_9 SOE_i + b_{10} EXC_i + \varepsilon_i. \end{aligned} \tag{7}$$

We include AAV_i in the CAR regression specified in equation (6) and CAR_i in the AAV regression specified in equation (7) as additional control variables in our benchmark regressions.

4 Empirical Results and Analysis

In this section, we carry out regression analysis and find that the abnormal stock returns (trading volumes) are significantly and positively (negatively) correlated to firm post-reform performance improvement. The abnormal stock returns (trading volumes) are positively (negative) correlated to firm information transparency. An analysis of the post-lockup transactions of non-tradable shares finds that the non-tradable shareholders of less transparent

firms sell their shares more aggressively after the lockup expirations. The firms of higher levels of agency problems tend to experience more negative abnormal stock returns associated with higher trading volumes. Details are as follows.

4.1 Abnormal Stock Returns and Abnormal Trading Volume

Let us first take a look at the abnormal stock returns and trading volumes around the lockup expirations. Figure 3 shows that the aggregate cumulative abnormal returns decrease dramatically between a [-120,+20] day window around the lockup expirations. The largest price drops take place during day [-120, -40] with a mean of -12.8% and a median of -13.6%. The CAR curve however does not revert its downward trend after the lockup expires, suggesting that the decreases are unlikely caused by noisy shocks.

Table 2 reports the statistics of CARs for different sub-sample periods. The average and median of the CARs between [-120, +20] day are -13.9% and -16.8% respectively. Both the two-tail t-test and signed rank test show that the negative CARs are economically and statistically significant. The average CAR for the day [-5, -1] window is significantly negative with a mean and median of -1.3% and -2.4% respectively. There are 69% companies suffered price drops, suggesting that the results are unlikely driven by extreme observations.

Figure 4 shows the temporal abnormal trading volumes around lockup expirations. Using the average daily trading volume during day [-230, -131] as the benchmark, we find that the number of shares traded daily increases significantly as the lock expiration date approaches. The trading volume on the lockup expiration day is approximately 150% higher than the benchmark volume. The trading volume continues to increase after the lockup expires to a peak of 166% higher than the benchmark. The trading volume remains 140% higher than the benchmark 20 days after the lockup expires, partially contributed by the trading of the unlocked non-tradable shares.

The significant increase in the trading volume might be partially explained by the new capital invested in the soaring Chinese stock markets during our sample period. To minimize the impacts of the trendy market movements on the trading volume, we use turnover rate to measure the trading volume as (Lynch and Mendenhall, 1997). As shown in Figure 4, the

average abnormal trading volume on the expiration date is -0.6% and statistically significant, indicating that only a portion of the unlocked non-tradable shares are sold after the lockup expirations.

4.2 Information Revelation and Price Discovery

Column 1 in Table 3 reports the results of *Hypothesis 1* regarding abnormal stock returns. We find that all three information asymmetry proxies are significantly correlated to abnormal stock returns at the 1% significance level. CAR decreases by 10.8% as stock return volatility σ increases by one standard deviation (1.03%). Larger companies tend to have higher CARs – an increase of one standard deviation of the market value (RMB 85.8 million) of the tradable shares will lead to an increase of 5.1% in CAR. Moreover, CAR will rise by 0.23% if there is one more non-tradable shareholder is involved for the firm. We also find that the stocks of firms suffering higher levels of agency problems have low CARs – an increase of one standard deviation in NTT results in a 1.84% decrease in CAR. All the results are consistent with the predictions of *Hypothesis 1*. Column 2 in Table 3 reports the testing results of *Hypothesis 2* regarding stock returns. CAR is positively correlated to ΔEPS, while negatively related to run-up. On average, an increase of one standard deviation in *EPS improvement (13.02 cents)* leads to an increase of 8.1% in CAR.

We find that run-up has an unexpected negative sign. Odean (1998) explains the results from a behavioral bias angle – investors are reluctant to realize their losses but eager to harvest gains. Run-up may have two opposite effects on stock returns. Tradable shareholders may be less willing to sell their shares when price run-up implies that the stocks they hold are good investment resulting in non-negative abnormal returns. On the other side, tradable shareholders may want to harvest profits, leading to negative returns.

Column 3 in Table 3 report the result of the regression with all control variables included. The results are qualitatively the same as those reported above. The signs and significance levels of the coefficients remain the same as those reported in Column 1 and 2. The adjusted R^2 indicate that the regressions explain 24.1% of the variations in CAR.

To examine whether our results are robust to the simultaneity between stock returns and

volumes,[4] we estimate equation (6) and (7) using a heteroskedasticity-robust two stage least square (2SLS) approach (Green, 2003). The results reported in Table 4 are highly consistent to those in Table 3.

As shown in Column 4-6 in Table 3, in the trading volume regressions, the coefficients of σ, $SIZE$ and NTT have unexpected signs but insignificant. That is due to the simultaneity between stock returns and trading volumes. In Column 2 in Table 4 we show that AAV is negatively correlated to firm size at 1% significance level. The sign of the coefficient of stock return volatility turns out to be positive as well.

Among the control variables, the coefficient of the exchange dummy is insignificant so that our results are not exchange-dependent. CAR (AAV) is negatively (positively) correlated to the state-owned firm dummy, indicating that the tradable shareholders of state-owned firms are more concerned than those of non-state-owned firms.

We study the relationships of firm performance improvement and stock price movements cross-sectionally and temporally. We select four measures of firm performance: EPS, ROA, ROE and operating income/total assets ratio. Compared to the first three measures, the last parameter is less prone to accounting earnings management. We sort firms by CARs into three equally-sized portfolios and compare the performance measures of the portfolio with the highest CARs ($PortfolioH$) against those of the portfolio with the lowest CARs ($PortfolioL$).

The results reported in Panel A in Table 5 confirm our conjecture that $Portfolio\ H$ outperforms significantly $Portfolio\ L$. Note that $Portfolio\ H$ and L perform almost the same in the reform implementation quarter – the ROA for $Portfolio\ L$ is even 0.09% higher than that of $Portfolio\ H$. However, in the lock expiration quarter, the EPS of $Portfolio\ H$ is 7.3 cents higher than that of $Portfolio\ L$. The ROA, ROE and operating income/total assets ratio of $Portfolio\ H$ are higher than those of $Portfolio\ L$ by 0.94%, 2.15% and 0.6% respectively. The differences are statistically significant. It is evident that stock returns

[4]Mulherin and Gerety (1998) document the relationships between price changes and trading volumes, using both hourly and daily data from 1900 to 1987. Hiemastra and Jones (1994) examine the dynamic interactions between Dow Jones stock returns and percentage changes in NYSE trading volume. They find evidence of significant bidirectional and nonlinear causality between returns and volumes.

reflect firm performance improvement, suggesting that there exists effective price discovery during the lockups.

Panel B paints the same picture with industry adjusted variables. Column 6 shows that $Portfolio\ H$ significantly outperforms $Portfolio\ L$ in the lockup expiration quarter. Especially, the average EPS for $Portfolio\ H$ is 5.4% higher than the industry average, while the average EPS for $Portfolio\ L$ is 1.7% lower than the industry average. The difference is statistically significant at the 1% level. The ROAs and ROEs of the two groups exhibit significant differences as well. In particular, the difference of the operating income/total assets ratios of $Portfolio\ H$ and L in the lock expiration quarter increases to 0.7% from 0.2% in the reform plan implementation quarter.

4.3 Post-lockup Sales of Non-tradable Shares

We examine a sample of the post-lockup sales of non-tradable shares to cross-examine the hypotheses. Intuitively, we should expect to observe that the non-tradable shareholders of less transparent firms sell more non-tradable shares after the lockups expire, consistent to our previous finding that the tradable shareholders of less transparent firms are more likely to sell their shares before during the lockups.

In answering the question, we hand-collect 93 post-lockup sales of the non-tradable shares of 32 firms.[5] We sort our sample into three groups by two information asymmetry proxies – equity return volatility σ_i and CAPM β_i – respectively. As reported in Table 6, the percentage of non-tradable shares sold are 2.8% (4.3%), 4.6% (4.4%) and 7.5% (6.3%) for the *low*, *medium* and *high* groups when sorted by β_i (σ_i). For β_i, the difference between the *high* and *low* groups is statistically significant at 5% confidence level. The average number of the post-lockup sales are 1.6 (2.4), 2.3 (2.3) and 3.5 (2.8) for the *low*, *medium* and *high* groups when sorted by β_i (σ_i). For β_i, the difference between the *high* and *low* groups is statistically significant at 5% confidence level. The evidence confirms that there exists effective price discovery before lockup expirations, although not imperfect in a statistical

[5]Our experiment is restricted by data availability – only transactions involving non-tradable shares over 1% of total shares outstanding were required to be reported by the Shenzhen Stock Exchange. We acknowledge that our best-available data could be incomplete and size-biased.

sense.

4.4 Institutional Investor Shareholding

In answering the important question as who leads the price discovery process in the lockups, we examine institutional investors' pre-lockup expiration shareholding and the changes in their shareholding in the lockups. We attempt to establish linkages between the abnormal stock returns/trading volumes and the shareholding of institutional investors.[6]

We first examine the relationships between CAR/AAV and pre-lockup expiration shareholding of different groups of institutional investors. We use a sub-sample that contains 448 firms whose institutional investor shareholding data is available. The institutional investors include mutual funds, investment banks, insurance companies, social security funds, qualified foreign institutional investors and other legal entities.

We employ both level and change variables in the analysis. The level variables include the number and percentage of tradable shares originally held by each group of institutions in the quarter prior to the lockup expiration dates. The institutional investors, who own a large number of stocks of a firm, are supposed to have stronger incentives to acquire information of the firm and monitor the firm performance in the lockup. So level variables reflect the magnetites of their incentives and efforts of price discovery and are expected to be positively (negatively) correlated to stock returns (trading volumes).

The change variable represents the difference between the numbers of shares held by institutional investors in the lockup expiration quarter and in the quarter before the lockup expiration quarter. The change variables enables us to examine how investors act on the information revealed during the lockups and, therefore, their price discovery capacities. We expect the change variables to be positively (negatively) correlated to the abnormal stock returns (trading volumes).

Panel A in Table 7 reports the results of regressing CAR (AAV) on the level and change

[6]We focus our attention on institutional investors since only their shareholding data is available. We are not able to draw direct inference about individual investors's price discovery since that requires individual trading account information. However, we by no means exclude the possibility that individual investors possess significant price discovery capability.

variables. For institutional investors as a single group, we find the level (change) variable is positively and 1% (5%) significantly correlated to the abnormal stock returns around lockup expirations. As reported in Panel B in Table 9, when investors' shareholding is measured as the percentage of tradable shares, the level variable is positively (negatively) correlated to the abnormal stock returns (trading volumes) at 1% level. The evidence suggests that institutional investors possess remarkable price discovering capabilities in the lockups.

We find that different groups of institutions exhibit significantly different price discovering capabilities. Table 7 shows that the shareholding and change in shareholding of insurance companies and mutual funds are positively (negatively) correlated to CAR (AAV) for both of the share number and percentage measures. Mutual funds have the strongest price discovery capabilities among all institutional investors. Both the shareholding and the change in shareholding of qualified foreign institutional investors are negatively correlated to CAR, suggesting no price discovery capabilities. Our results lend support to the notion that local investors are more informative than foreign investors.

Table 8 reports the results of a panel regression of the abnormal stock returns/volumes on the shareholding of all types of institutional investors. The key conclusions drawn from the results of the regressions reported in Table 7 remain valid. We find that the numbers of shares held by social security funds and mutual funds in the quarter before the lockup expiration quarter are positively and correlated to CARs, whereas the numbers of shares held by foreign institutional investors, non-financial firms and other legal entities are negatively correlated to CARs. The changes in the number of shares held by mutual funds are positively and 1% significantly correlated to CARs, confirming that mutual funds effectively discovered stock values and traded accordingly during the lockups. The results of the AAV regressions add further support to our conclusion.

4.5 Robustness Checks

In this subsection, we conduct a series of robustness checks that include controlling for the downward sloping demand curve and speculative bubble and the 365-day effects. Overall, we find our empirical results robust. Details are presented below.

4.5.1 Controlling for the Downward Sloping Demand Curve

A sudden increase in share supply may lead to price drops when the non-tradable shareholders sell their shares after the lockups expire.[7] That phenomenon has been well documented for the IPO lockup expirations (Field and Hanka, 2001; Ofek and Richardson, 2000).[8]

The downward sloping demand curve hypothesis predicts that CARs around the lockup expiration date are negatively correlated with the increase in share supply. In the reform, the scale of a supply shock depends on the number of non-tradable shares released after the lockup expires. In addition, a non-tradable shareholder who owns a large percent of non-tradable shares is usually better informed than other investors, so a *major unlock event* will send relatively stronger signal for share supply increase, resulting in more significant price drops in case the demand curve is downward sloping. Field and Hanka (2001) find that unexpected insider selling partially explains the negative CARs around IPO lockup expirations.

Column 1 and 2 in Table 9 report the regression results after controlling for the downward sloping demand curve effect. We first regress CARs on two supply shock proxies – the market value of the shares to be unlocked ($EXPCT$) and the *major unlock event* dummy (LUE) respectively. The coefficients of $EXPCT$ and LUE are significantly negative, confirming the predictions of the demanding curve hypothesis. The results of the benchmark regression with $EXPCT$ and LUE as control variables indicate that the price discovery hypothesis is robust after controlling for the demand curve effect. Including $EXPCT$ and LUE increase negligibly the overall explaining power as the adjusted R^2 increases by merely 0.4%. The evidence shows that downward sloping demand curve dose not change the conclusions of our analysis.

[7] The supply shock only occurs after the unlock dates. We control for its impact since that it may explain the price/volume dynamics for the period [0, 20]; and that investors could form an expectation of the increase of share supply with the information in the reform plan and make trading decisions before day 0. That influences the price/volume for the period [-120, 0].

[8] Among others, Bagwell (1992) finds a downward sloping demand curve for share repurchases. Shleifer (1986); Lynch and Mendenhall (1997) find similar results for the S&P500 index change. But Kandel, Sarig, and Wohl (1999) find a flat demand curve in the Israeli IPO market.

4.5.2 Controlling for Speculative Bubbles

Hong, Scheinkman, and Xiong (2006) finds that the price drops around IPO lockup expirations could be attributed to the speculative bubbles in share prices. Miller (1977); Chen, Hong, and Stein (2002) claim that stock prices reflect only the expectation of optimistic investors when investor beliefs are heterogeneous and when short sale is restricted. Harrison and Kreps (1978); Scheinkman and Xiong (2003) find evidence that investors are willing to pay prices higher than fundamental values if they expect to resell at even higher prices. That creates bubbles in stock prices. Hong, Scheinkman, and Xiong (2006) equate an increase in asset value to a rise in the strike price of a resale option. The value of an embedded resale option decreases as the underlying asset value increases, accompanied by a decrease in the asset price. The speculative bubble effect suggests that the share prices will fall on the lockup expiration dates.

The speculative bubble hypothesis is of close relevance to the Chinese stock markets, whose characteristics such as limited asset floats, restrictions on short sale and intense speculation fit in the assumptions made in Hong, Scheinkman, and Xiong (2006). The turnover rate for the Chinese stock markets was 224% in year 2002 (Allen, Qian, and Qian, 2005), compared to 160% for Nasdaq and 95% for NYSE (Hwang, Zhang, and Zhu, 2006). Mei, Scheinkman, and Xiong (2005) find that the premia of the A-shares over the USD denominated B-shares is partially explained by speculative trading.

Column 3 and 4 in Table 9 report the regression results after controlling for the speculative trading effect. Following Mei, Scheinkman, and Xiong (2005); Hwang, Zhang, and Zhu (2006), we use the average abnormal turnover and the average abnormal trading volume measured in the number of shares between day [-120,+20] as proxies for speculative trading. We find that the abnormal trading volume is positively and significantly correlated CAR. That contradicts the prediction of the speculation bubble hypothesis. There is no significant increase in the explanatory power as we include the proxies for speculation – the adjusted R^2 is slightly higher than the previous 24.1%. The speculative bubble effect appears to have no significant impact on the abnormal stock returns/volumes around the lockup expirations

in the Split-share Structure Reform.

4.5.3 The 365-day Effect

There is no major external shock during our sample period. The negative CARs are unlikely influenced by other market-wide issues around the lock expirations. For robustness check, we examine the CARs for the firms whose lockup periods are not exactly 365 days. We divide our sample into two sub-samples: one sub-sample contains 176 lockups with lock time of 365 ± 1 days. The other sub-sample contains the rest of 306 lockups. The difference between the average CARs for the two sub-samples is statistically insignificant. Another test using 365 ± 5 days as the grouping criterion does not find significant difference between the CARs in the sub-samples either. As reported in Panel A of Table 10, the CARs seem unlikely to be driven by the variations in lockup expiration time.

4.5.4 Cross-sectional Correlation of Errors

The 482 lockups in our sample are clustered in an 11-month period. That may cause potential cross-sectional correlations in the error terms in equation (6) and (7). The fact that we compute abnormal returns by adjusting stock returns with CAPM in a window of 141 trading days suggests that the sample periods of individual stocks overlap with each other. Then the model estimation errors could correlate with each other as well, resulting in potential inflated t-statistic for our pooled sample. We gauge the persistence of our results to assess the impact of potential estimation errors by analyzing the CARs for the five sub-groups by lock expiration dates. As reported in Panel B of Table 10, we find significantly negative CARs for the latest three sub-groups, whereas the CARs for the two early sub-groups are negative but insignificant. The highest and the lowest CARs for the latest three sub-groups are -14.2% and -16.8% respectively. The lockups associated with negative CARs account for more than 56% of the total lockups in each sub-group. Therefore the cross-sectional correlation errors is not an issue for our results.

5 Conclusions

We examine the price discovery in share lockups in the recent Split-share Structure Reform in China, focusing on an analysis of the abnormal stock returns and trading volumes around the lockup expirations. We find a prominent abnormal stock return of -14% associated with an abnormal trading volume surge of 140% during the [-120, +20] day window around 482 lockup expirations in the Split-share Structure Reform in China. The price drops/trading volume changes are of significantly larger magnitude over longer time periods compared to those in the IPO lockup expirations. The largest portion of the price drop, associated with a significant surge in trading volume, incurs 40 days before the lockup expiration.

The abnormal stock returns (trading volumes) are positively (negatively) correlated to firm information transparency and post-reform performance improvement during the lockup periods, suggesting the existence of effective information-based price discovery during the lockups. We present important evidence that institutional investors, especially mutual funds, lead the price discovery process. Our findings confirm the roles of lockups as a tool to signal firm quality and a commitment device to alleviate moral hazard problems. The results are robust to the downward sloping demand curve and the speculative bubble effects.

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Figure 1. The Process of Unlocking Non-tradable Shares

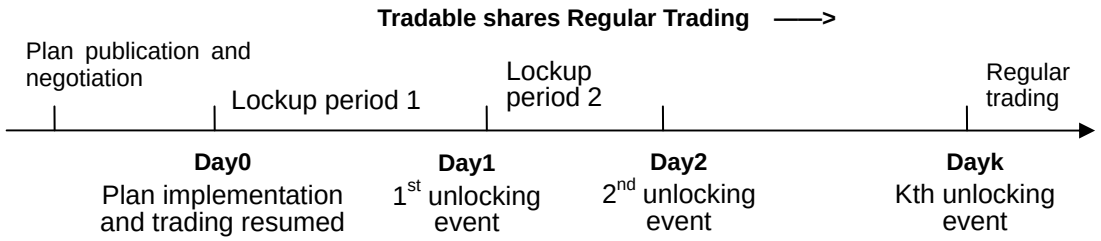

Figure 2. The Inter-temporal Distribution of the Share Lockup Expiration Events. The sample consists of 3,840 share lockup expiration events occurred on 1,113 different trading days on both the Shanghai Stock Exchange and Shenzhen Stock Exchange between 19 June 2006 and 4 August 2020.

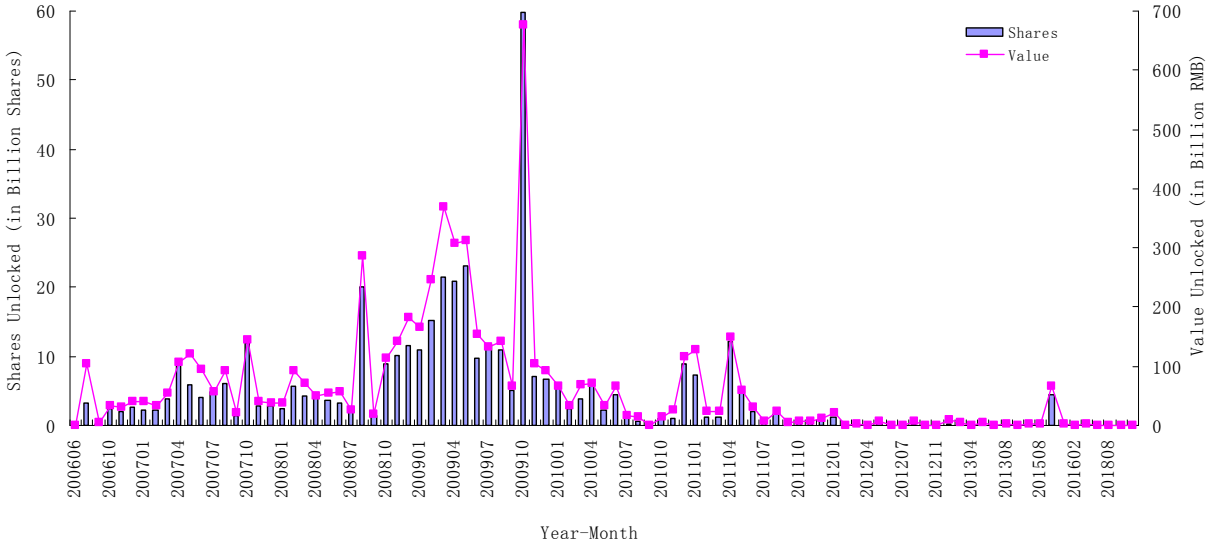

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Figure 3. The Average Cumulative Abnormal Returns around Unlock Days. The sample contains 482 share lockup expiration events occurred between June 2006 and April 2007. The CAR for each day is calculated as the average of the CARs of all stocks on the day relative to their individual lockup expiration dates.

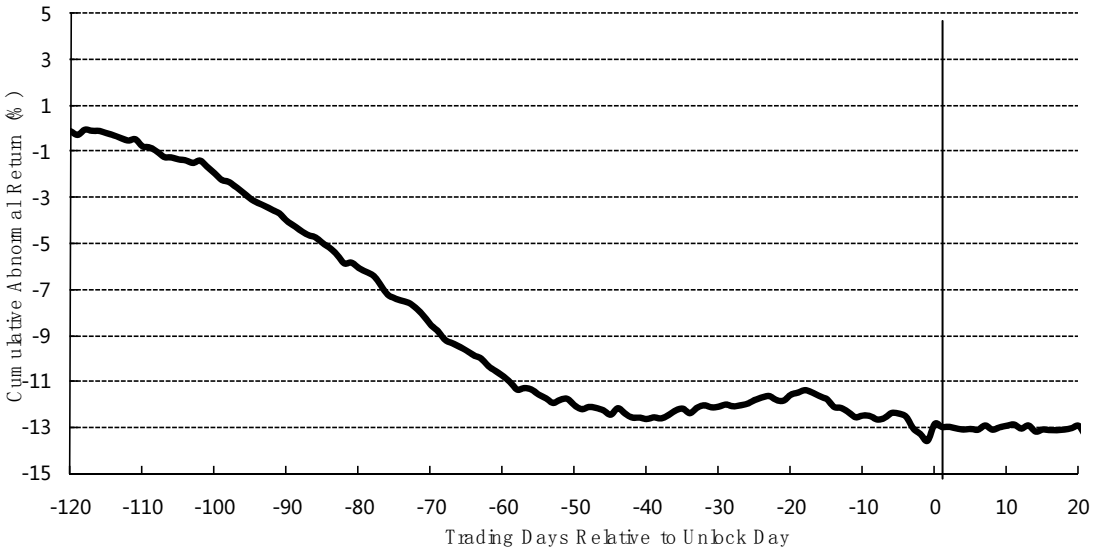

Figure 4. The Abnormal Trading Volume around Unlock Day. The sample contains 482 share lockup expiration events occurred between June 2006 and April 2007. The abnormal trading volume for each day is calculated as the average of the abnormal trading volumes of all stocks on the day relative to their individual lockup expiration dates.

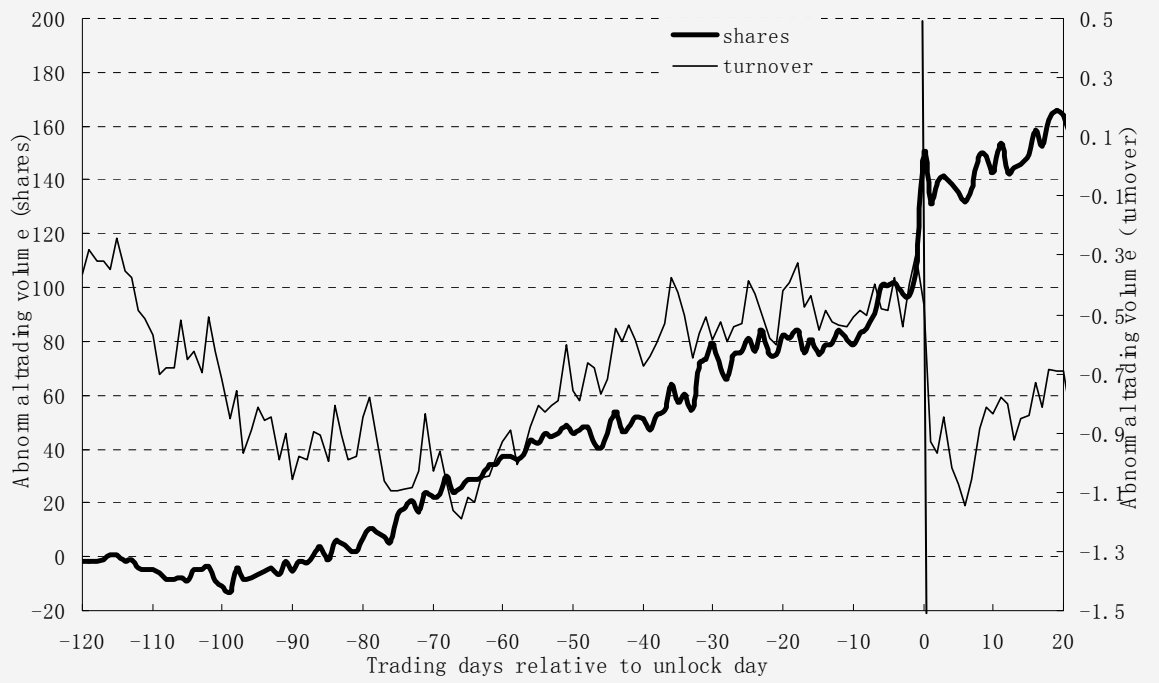

Table 1. Summary Statistics. The sample contains 482 share lockup expiration events occurred between June 2006 and April2007. The data on lockup expirations is from the WIND database. Firm Characteristic data is from THFD and Wind. The market value of unlocked shares is computed using share price on the unlock date. The length of a lockup period is counted on a '30/360' basis. We label an event as LUE if the number shares to be unlocked in the event exceeds 5% of the total shares. Otherwise, the event is labeled as SUE. The market value of tradable shares and total market cap are calculated as of the unlock date.

Panel A	**Split-share Structure Reform share lockups expiration**							
Time Period	Sample Size	Avg. No. of Shares Unlocked （in Millions）	Avg. Percentage of Unlocked Shares Out of Total shares (%)	Avg. Market Value Unlocked (in Million RMB)	Avg. Percentage of Unlocked Value Out of Total Market Cap (%)	Avg. No. of NTS Holders Involved	Avg. Length of Lockup Period (Day)	No. of LUE
2006/06-2006/08	25	80.4	12.7	579.6	21.7	8.5	362.5	11
2006/09-2006/10	20	26.0	12.6	209.1	19.9	10.4	364.9	10
2006/11-2006/12	110	33.0	10.3	268.0	19.2	6.8	364.4	68
2007/01-2007/02	118	36.6	9.9	351.1	18.7	7.3	364.0	68
2007/03-2007/04	209	58.1	10.1	640.8	18.9	11.7	365.8	129
Full sample	482	47.0	10.3	457.9	19.1	9.3	364.8	286

Panel B	**Firm Characteristics**							
Time Period	Sample Size	Avg. Percentage of NTS Out of Total Shares (%)	Avg. No. of Tradable Shares (in Millions)	Avg. Market Float of Tradable shares (in Billions RMB)	Avg. ROE (%)	Avg. ROA (%)	Avg. P/B Ratio	No. of Stocks Listed in Shanghai Exchange
2006/06-2006/08	25	67.8	408.9	2.7	13.0	5.7	2.9	18
2006/09-2006/10	20	61.1	211.9	1.4	9.6	5.7	2.4	6
2006/11-2006/12	110	63.6	224.4	1.8	9.2	5.1	3.0	56
2007/01-2007/02	118	61.7	197.3	2.0	7.6	3.9	3.9	77
2007/03-2007/04	209	61.8	289.6	3.3	1.0	2.0	4.8	127
Full sample	482	62.6	255.1	2.5	5.5	3.5	4.0	284

Table 2. The Abnormal Returns around Unlock Dates. This table reports the CAPM-adjusted cumulative abnormal returns for the 482 share lockup expiration events taking place between June 2006 and April 2007.

CAR (%)					
Window	**Mean**	**Median**	**Window**	**Mean**	**Median**
Day -120 to -40	-12.8***	-13.6***	Day +1	-0.2	-0.7***
Day -40 to +20	-1.2	-4.1**	Day 0 to +10	0.2	-1.0
Day -5 to -1	-1.3***	-2.4***	Day 0 to +20	0.3	-0.5
Day -1	-0.3**	-0.6***	Day -120 to +10	-13.9***	-17.1***
Day 0	0.7***	0.3***	**Day -120 to +20**	**-13.9*** **	**-16.8*** **
Fraction with negative CAR from Day -120 to +20				68.7%	

*, ** and *** represent 10%, 5%, 1% significance level respectively. Two-tail t-test for means and signed rank test for medians.

Table 3. OLS Regression Analysis – the Price Discovery Hypothesis. The sample contains 482 share lockup expiration events occurred between June 2006 and April 2007. The 141-day CAR refers to the cumulative abnormal returns from day -120 to day 20 adjusted by CAPM. The 141-day AAV is the average daily abnormal volume from day -120 to day 20. Run-up is computed as log(1+cumulative return from the implementation day to day -120). The volatility is the standard deviation of returns from day -230 to day -131 multiplied by $\sqrt{2.5}$. The average market cap is the average of the market value of tradable shares in million RMB between day -230 and day -131. Heteroskedasticity is corrected with White's (1980) method.

	141-day CAR（%）						141-day AAV（%）					
Dependent Variables	(1)		(2)		(3)		(4)		(5)		(6)	
	Estimate	T-statistic	Estimate	T-statistic	Estimate	T-statistic	Estimate	T-statistic	Estimate	T-statistic	Estimate	T-statistic
Intercept	-27.25	1.36	-13.09	1.55	-20.98	1.09	1.15	1.02	0.55	1.22	1.23	1.09
σ (%)	-10.50***	6.89			-10.90***	7.43	-0.19**	2.43			-0.20**	2.49
SIZE (in millions)	0.06***	3.54			0.05***	3.28	0.00	0.18			0.0001	0.12
NUH	0.23***	2.57			0.24***	2.62	0.004	0.74			0.004	0.48
NTT	-0.91**	2.05			-0.86**	1.97	0.01	0.36			0.01	0.37
Δ EPS (in RMB cents)			0.62***	4.78	0.63***	4.03			-0.72	1.29	-0.51	0.83
RUNUP (%)			-0.06**	2.08	0.01	0.20			0.00	0.19	0.00	1.11
SOE dummy	-3.25	1.18	-3.34	1.18	-2.95	1.12	0.20	1.27	0.19	1.27	0.19	1.25
EXC dummy	--3.82	1.32	-3.26	1.10	-3.55	1.28	0.24	1.58	0.25	1.69*	0.24	1.57
141-day CAR (%)							0.005*	1.80	0.008***	3.14	0.01*	1.93
141-day AAV (%)	1.76*	1.79	3.02***	2.99	1.83*	1.91						
Adjusted R-Square	18.4%		11.3%		24.1%		10.4%		9.8%		10.2%	
F-statistics	7.02***		4.83***		9.46***		4.09***		4.27***		3.74***	

*, ** and *** represent 10%, 5%, 1% significance level respectively.

Table 4. Heteroskedastic Simultaneous Equation (2SLS) Estimation. The sample contains 482 share lockup expiration events between June 2006 and April 2007. The average abnormal volume is the mean of abnormal trading volumes between day -120 and day 20. The 141-day CAR refers to the cumulative abnormal returns from day -120 to day 20 adjusted by CAPM. The 141-day AAV is the average daily abnormal volume from day -120 to day 20. Run-up is computed as log(1+cumulative return from the implementation day to day -120). The volatility is the standard deviation of returns from day -230 to day -131 multiplied by $\sqrt{2.5}$. The average market cap is the average of the market value of tradable shares in million RMB between day -230 and day -131. Heteroskedasticity in the model is corrected with heteroskedastic two-stage least squares regression.

	(1)		(2)	
Dependent Variables	141-day CAR（%）		141-day AAV（%）	
	estimate	t-statistic	estimate	t-statistic
Intercept	-4.70	0.20	2.07*	1.80
σ (%)	-12.30***	3.83	0.36	1.62
SIZE (in millions)	0.05	1.40	-0.37***	2.80
NUH	0.25*	1.68	0.00	0.13
NTT	-0.86	0.52	0.001*	1.75
Δ EPS (in RMB cents)	0.64***	4.09	-3.56***	2.76
RUNUP (%)			0.00	1.04
EXPCT (%)	-0.02	0.14		
LUE dummy	-3.25	0.40		
141-day AAV	6.51	0.26		
141-day AAVS (%)	-0.08	0.32		
141-day CAR			0.05***	2.89
SOE dummy	-2.40	0.63	0.47***	2.97
EXC dummy	-3.69	0.92	0.32*	1.93

* ,** and ***represent 10%, 5%, 1% significance level respectively.

Table 5. Cross-sectional and Inter-temporal Patterns of Firm Fundamentals. The sample contains 482 share lockup expiration events in the Split-share Structure Reform between June 2006 and April 2007. The Adjusted EPS/ ROA/ ROE/ Operating Income over Assets are computed as EPS/ ROA/ ROE/ Operating Income over Assets subtracting the industry averages. All sample stocks are sorted into 3 equally sized groups by 141-day CARs; Portfolio L contains stocks with the lowest returns (group mean = -48.0%, t=38.4), and Portfolio H contains stocks with the highest returns (group mean= 23.0%, t=12.7). The figures for the group with moderate CAR (group mean= -16.0, t=27.6) are not reported in the table. T-statistics are presented in parentheses.

	Quarter – Plan Implementation			Quarter – Unlock Event		
	Portfolio L	Portfolio H	Difference	Portfolio L	Portfolio H	Difference
	(1)	(2)	(3) = (2) - (1)	(4)	(5)	(6) = (5) - (4)
Panel A Unadjusted Average						
EPS	5.54***	5.85***	0.30	3.80***	11.10***	7.30***
(in RMB cents)	(8.75)	(7.44)	(0.30)	(3.61)	(10.81)	(4.96)
ROA (%)	0.85***	0.76***	-0.09	0.55***	1.50***	0.94***
	(8.42)	(6.71)	(0.59)	(4.00)	(10.75)	(4.80)
ROE (%)	1.65***	3.23*	1.58	1.15***	3.30***	2.15***
	(6.48)	(1.90)	(0.92)	(3.23)	(9.73)	(4.39)
Operating Income/Assets (%)	2.60***	2.79***	0.20	1.79***	3.18***	0.60***
	(8.19)	(8.40)	(0.43)	(5.87)	(11.64)	(3.40)
Panel B Indicators Adjusted by Industry Average						
Adj. EPS	4.84***	3.95***	-0.89	-1.7*	5.41***	7.1***
(In RMB cents)	(5.88)	(4.23)	(0.71)	(1.64)	(5.2)	(4.84)
Adj. ROA (%)	1.13***	0.82***	0.31	0.48**	1.38***	0.89***
	(7.25)	(5.31)	(1.39)	(2.23)	(6.49)	(2.94)
Adj. ROE (%)	1.19*	3.84**	2.66	-3.46***	0.29	3.76***
	(1.77)	(2.27)	(1.46)	(4.9)	(0.5)	(4.09)
Adj. Operating Income/Assets (%)	1.85***	2.01***	0.20	1.69***	2.43***	0.70
	(5.37)	(5.42)	(0.31)	(3.92)	(8.06)	(1.41)

*, ** and *** represent 10%, 5%, 1% significance level respectively.

Table 6. Post-unlock sales of non-tradable shares in Shenzhen Stock Exchange. Sales data is hand-collected for 32 SZSE stocks. There are 93 transactions within 91 days from unlock dates.

	Low	Medium	High	Difference (H-L)
Panel A Sum of all non-tradable shareholders' sale (in percentage of total shares)				
Rank by beta	2.8	4.6	7.5	4.7** (2.59)
Rank by std	4.3	4.4	6.3	1.9 (0.89)
Panel B Average number of sales				
Rank by beta	1.6	2.3	3.5	1.9** (2.33)
Rank by std	2.4	2.3	2.8	0.4 (0.41)

** represents 5% significance level.

Table 7. The influence of CARs and AAVs on different institutional investor holdings (separate regressions). The sample contains 448 firms for which the institutional investor holdings data are available. Results for major institutions, including insurance companies, qualified foreign institutional investors, mutual funds, investment banks, social security funds, and general legal entities are reported individually. Level refers to the number or percentage of tradable shares held by the institution in the quarter prior to unlock dates. Change represent the change in number of shares for institutional investor holdings between the quarter prior to unlock dates and the quarter in which unlocks took place. Heteroskedasticity is corrected with White's (1980) method.

	All Institutions		Insurance Company		QFII		Mutual Fund		Investment Bank		Social Security Fund		General Legal Entity	
	CAR	AAV	CAR	AAV	CAR	AAV	CAR	AAV	CAR	AAV	CAR	AAV	CAR	AAV
Panel A. *Institutional Investors' holding in 1,000,000 shares*														
Intercept	-12.50***	-0.64***	-11.06***	-0.62***	-11.47***	-0.63***	-12.61***	-0.62*.	-11.03***	-0.69***	-11.21***	-0.65***	-11.40	-0.65***
Level	0.03***	-0.0003	0.003*	-0.0001**	0.54	-0.02	0.05***	-0.001**	0.51	0.05*	0.35	0.002	0.04	0.00
Change	0.02**	0.0001	0.003	0.00	-0.06	-0.02	0.08**	0.002	0.47	0.05	0.07	0.001	0.02***	0.00
CAR		0.01***		0.01***		0.01***		0.01***		0.01***		0.01***		0.01***
AAV	3.39***		3.59***		3.42***		3.38***		3.36***		3.40***		3.40***	
Adj. R-square	5.33%	2.37%	4.18%	3.59%	3.47%	2.45%	6.76%	2.80%	2.56%	2.90%	2.87%	2.33%	3.13%	2.32%
F-statistic	9.4***	4.6***	7.5***	5.5***	6.4***	4.8***	11.8***	5.3***	4.9***	5.5***	5.4***	4.6***	5.8***	4.6***
Panel B. *Institutional Investors' holding in percentage of tradable shares*														
Intercept	-15.89***	-0.46***	-11.61***	-0.57***	-10.05***	-0.61***	-15.07***	-0.48***	-11.00***	-0..65***	-11.79***	-0.59***	-8.19***	-0.71***
Level	0.31***	-0.01***	2.60**	-0.15***	-0.64	-0.08***	0.47***	-0.02***	0.96	0.01	2.10***	-0.07**	-0.20	0.01
Change	0.11	0.00	0.20	-0.05	0.95	-0.07	0.50**	-0.00	-0.10	0.05	2.04	-0.06	-0.37**	0.01
CAR		0.01***		0.01***		0.01***		0.01***		0.01***		0.01***		0.01***
AAV	3.71***		3.63***		3.39***		3.70***		3.45***		3.59***		3.48***	
Adj. R-square	4.51%	3.83%	3.38%	3.58%	2.64%	3.14%	6.55%	4.18%	2.56%	2.42%	3.77%	3.02%	3.35%	2.50%
F-statistic	8.0***	6.9***	6.2***	6.5***	5.0***	5.8***	11.4***	7.5***	4.9***	4.7***	6.8***	5.6***	6.2***	4.8***

* ,** and ***represent 10%, 5%, 1% significance level respectively.

Table 8. The influence of CARs and AAVs on different institutional investor holdings (pooling regression). The sample contains 448 firms for which the institutional investor holdings data are available. Results for major institutions, including insurance companies, qualified foreign institutional investors, mutual funds, investment banks, social security funds, and general legal entities are reported individually. Level refers to the shares/percentage of tradable shares held by the institution in the quarter prior to unlock dates. Change represent the change in holding for institutional investors between the quarter prior to unlock dates and the quarter in which unlocks took place. Heteroskedasticity is corrected with White's (1980) method.

		In shares		In percentage	
		CAR	AAV	CAR	AAV
	Intercept	-13.89***	-0.67***	-13.51***	-0.48***
Insurance company	Level	-0.00	-0.00	1.84	-0.10*
	Change	-0.00	-0.0002**	0.25	-0.03
QFII	Level	-0.46	-0.01	-1.44	-0.05*
	Change	-0.44	-0.03	1.07	-0.07
Mutual fund	Level	0.10**	-0.001	0.40***	-0.01*
	Change	0.11***	0.001	0.43***	0.00
Investment bank	Level	0.44	0.06**	0.48	0.01
	Change	0.42	0.06*	-0.57	0.04
Social Security Fund	Level	0.64**	-0.01	1.03	-0.03
	Change	0.25	0.01	1.08	-0.05
Non-Financial Company	Level	-0.21**	0.01	-0.11	0.02
	Change	-0.27	0.00	-0.34	-0.01
General Legal Entity	Level	-0.04*	0.00	-0.11	0.00
	Change	0.01	0.00	-0.26	0.01
CAR			0.01***		0.01***
AAV		3.32***		3.79***	
Adj. R-square		6.53%	1.83%	6.38%	2.99%
F-statistic		3.1***	1.6*	3.0***	1.9**

Table 9. Robustness Checks – Demand and Speculation. The sample contains 482 share lockup expiration events between June 2006 and April 2007. If the unlock event involves at least one non-tradable shareholder who owns more than 5% of the firm's total shares, LUE=1. Otherwise, LUE=0. The average abnormal volume is the mean of abnormal trading volumes between day -120 and day 20. The 141-day CAR refers to the cumulative abnormal returns from day -120 to day 20 adjusted by CAPM. The 141-day AAV is the average daily abnormal volume from day -120 to day 20. Run-up is computed as log(1+cumulative return from the implementation day to day -120). The volatility is the standard deviation of returns from day -230 to day -131 multiplied by $\sqrt{2.5}$. The average market cap is the average of the market value of tradable shares in million RMB between day -230 and day -131. Heteroskedasticity is corrected with White's (1980) method.

	141-day CAR（%）							
Dependent Variables	(1) Demand Curve		(2) Eq. (8)+Demand Curve		(3) Speculative Bubble		(4) Eq. (8) + Speculative Bubble	
	estimate	t-statistic	estimate	t-statistic	estimate	t-statistic	estimate	t-statistic
Intercept	-3.74	0.42	-3.97	0.19	-15.39*	1.78	-14.52	0.74
σ (%)			-11.16***	7.58			-12.11***	7.37
SIZE (in millions)			0.04**	2.61			0.06***	3.55
NUH			0.26***	2.91			0.24***	2.77
NTT			-0.43	0.86			-0.94**	2.07
Δ EPS (in RMB cents)			0.63***	3.68			0.63***	3.96
RUNUP (%)			0.01	0.25			0.004	0.15
EXPCT (%)	-0.07*	1.66	-0.06*	1.76				
LUE dummy	-9.24***	2.74	-5.09*	1.70				
141-day AAV (%)					2.43**	2.05	3.16***	3.16
141-day AAVS (%)					0.02	0.45	-0.05*	1.84
SOE dummy	-2.10	0.71	-1.90	0.72	-3.83	1.30	-2.67	1.01
EXC dummy	-2.92	0.94	-3.08	0.27	-3.62	1.19	-3.33	1.20
Adjusted R-Square	5.9%		24.5%		5.1%		25.1%	
F-statistics	3.00***		8.45***		2.72***		8.68***	

* ,**,***represent 10%, 5%, 1% significance level respectively.

Table 10. Robustness Checks – 365-day Effect and Correlation of Errors. The sample contains 482 share lockup expiration events in the Split-share Structure Reform between June 2006 and April 2007. The CARs are 141-day cumulative abnormal returns in day window [-120, 20] around unlock dates.

Panel A Test for 12-month effect

	Lockup Period=12 Months			**Lockup Period≠12 Months**			
Criteria for 12 Months	No. of Obs.	CAR%	Negative CAR%	No. of Obs.	CAR%	Negative CAR%	**Difference in CAR%**
360±1 days	306	-14.3*** (8.1)	68.6	176	-13.2*** (4.7)	68.8	-1.1 (0.34)
360±5 days	392	-14.6*** (9.1)	68.9	90	-10.8** (2.5)	67.8	-3.8 (0.83)

Panel B Test for cross-sectional correlation of errors

Time Period	**No. of Obs.**	**% of the Sample**	**CAR%**	**t-statistics**	**Negative CAR%**
2006/6-2006/8	25	5.2	-1.1	0.16	56.0
2006/9-2006/10	20	4.1	-1.6	0.21	60.0
2006/11-2006/12	110	22.8	-16.8***	5.3	71.8
2007/1-2007/2	118	24.5	-15.4***	6.1	72.0
2007/3-2007/4	209	43.4	-14.2***	5.7	67.5
Full sample	482	100.0	-13.9***	9.1	68.7

* ,** and ***represent 10%, 5%, 1% significance level respectively.