

Privatization and Risk Sharing: Evidence from the Split Share Structure Reform in China*

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Abstract: A fundamental question in economics and finance is whether and how removing barriers is associated with efficiency gains. We study this question using share issue privatization in China that took place through the split share structure reform as our experimental setting. Prior to the reform, domestic A-shares are divided into tradable and non-tradable shares with identical cash flow and voting rights. Under the reform, non-tradable share holders negotiate a compensation plan with tradable share holders in order to make their shares tradable. We develop a general equilibrium model to help understand the determinants of compensation and the source of gains in the process of privatization. Our key predictions are: a) there is compensation made by the non-tradable share holders to the tradable share holders if and only if the bargaining power of the former is weaker than the bargaining power of the latter; and b) the size of the compensation is decreasing in firm performance. Our second prediction contradicts conventional wisdom that fails to account for improved risk sharing after the reform. Our empirical results are broadly consistent with our model's predictions. We conclude that better risk sharing is an important consideration in China's share issue privatization.

Keywords: bargaining power, compensation ratio, efficiency gain, risk sharing, share issue privatization

JEL Classification: G11, G12, G18, G32

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Abstract

A fundamental question in economics and finance is whether and how removing barriers is associated with efficiency gains. We study this question using share issue privatization in China that took place through the split share structure reform as our experimental setting. Prior to the reform, domestic A-shares are divided into tradable and non-tradable shares with identical cash flow and voting rights. Under the reform, non-tradable share holders negotiate a compensation plan with tradable share holders in order to make their shares tradable. We develop a general equilibrium model to help understand the determinants of compensation and the source of gains in the process of privatization. Our key predictions are: a) there is compensation made by the non-tradable share holders to the tradable share holders if and only if the bargaining power of the former is weaker than the bargaining power of the latter; and b) the size of the compensation is decreasing in firm performance. Our second prediction contradicts conventional wisdom that fails to account for improved risk sharing after the reform. Our empirical results are broadly consistent with our model's predictions. We conclude that better risk sharing is an important consideration in China's share issue privatization.

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1. Introduction

Financial liberalization and privatization have swept the world over the past three decades. In recent years, they both went from being the almost unanimous prescription for economic prosperity to being the most controversial policy advice. On one hand, the success stories lend further support to the basic economic theory that the removal of market frictions such as barriers to trade or government costly intervention can lead to more efficient allocations and improved productive efficiency for reasons such as better risk sharing and lower cost of capital.¹ On the other hand, some spectacular failures such as the Asian Financial Crisis give the critics the support for their argument that financial liberalization and privatization lead to instability and decline in GDP. The heated debate highlights the inadequacy in our understanding of how an economy with market frictions transits successfully to one without and points to the transition mechanism as one potential explanation for the failures in both financial liberalization and privatization (Stiglitz (2002, 2006)). A couple of specific issues raised in the debate are: Will every transition method lead to an allocation where everyone is better-off? Is one transition method as good as another as long as the end result of the transition is a more productively efficient economy? The main objective of this paper is to shed some light on the importance of transition mechanisms using the recent stock market privatization experience from China.

Many countries have embraced privatization on the ground of promoting efficiency, and large-scale privatization programs have taken place around the world. Yet, different countries adopted different privatization techniques. The combination of a claimed common objective and different approaches makes privatization an ideal place for studying how market frictions are removed and the role of transition mechanisms in achieving productive and allocative efficiency. There is a significant branch in the privatization literature that assesses various privatization methods.² Interestingly, a couple of the theory papers, , such as Perotti (1995), suggest that the commonly used method of

¹ See for example, Megginson and Netter (2001) and Sheshinski and Lopez-Calva (2003) for review of the theories.

² See Megginson and Netter (2001) for a review of the issue and some empirical evidence.

privatization, share issue privatization (SIP), is not necessarily motivated by efficiency considerations, but rather by political, revenue and possibly other considerations.³ The empirical evidence in Jones et al. (1999) seems to provide some support for that theory. However, there is no direct study of the transition mechanism that addresses the issues raised at the start of this introduction. Ideally, to better understand the role of transition mechanisms, one would like to have an experimental setting in which the same privatization reform could be implemented via two different transition methods and then one can compare various indicators of efficiency from the two experiments. In the real world, the stock market privatization experience in China is perhaps the closest to such an ideal experimental setting.

The Chinese stock market reform went through several phases. Its two securities markets, the Shanghai Stock Exchange and the Shenzhen Stock Exchange, were established in 1990 (see Figure 1 for the market performance since its inception). From the very beginning, there was a split share structure whereby around two-thirds of domestically listed A-shares were not tradable, even though the non-tradable shares entitled their holders exactly the same voting and cash flow rights as the tradable share holders. This split share structure was the outcome of partial privatization implemented in the early 1990s.⁴ Typical non-tradable share holders were the state and legal persons.⁵ Typical tradable share holders were institutional investors, and domestic and foreign individual investors.

The Chinese government recognized that the predominance of non-tradable shares in the stock market constituted a major problem for its proper development and expansion.⁶ In June 2001, the government started a process of gradually selling its holdings of non-tradable shares as in a typical

³ For example, Biais and Perotti (2002) show that share issue privatization can be used by the government to shift voters' political preferences.

⁴ The partial privatization in China took the form of share issue privatizations that were, in fact, virtually all pure primary issues. In most other countries, share issue privatizations were pure secondary offers, where the government sold its existing shares (Jones et al. (1999)). The Chinese government realized the problems with its partial privatization effort, in which the state was stuck with large holdings that they were unable to sell prior to the reform.

⁵ The state could be the central or local government and their affiliates, such as the state asset management companies and SOEs. The legal persons are typically corporations not directly controlled by the state.

⁶ Typically mentioned reasons are as follows. First, there was a severe incentive conflict between the tradable share holders and the non-tradable holders. Second, the typically small public float for a listed company on the stock market made shares relatively illiquid and vulnerable to market manipulation and insider trading. Finally, the predominance of non-tradable shares made the market for corporate control almost dormant, further entrenching incompetent corporate managers.

seasoned share issue privatization (SIP).⁷ The stock market reacted negatively to the change in ownership and the government had to suspend its attempt in October 2001 (see Figure 1).

In April 2005, the Chinese government initiated the split share structure reform with the goal of converting all non-tradable shares into tradable shares. One feature introduced in this reform is that the non-tradable share holders had to negotiate and implement a compensation plan with their counterparts holding tradable shares of the same company before their shares could be traded in the stock market. Such a reform is important in the history of privatization as it introduces a bargaining process into SIPs. Judging from the stock market's response during the reform, this reform was well received (see Figure 1).

The apparent failure of the first reform attempt in June 2001 and the successful completion of the second starting in April 2005 raise some interesting questions: Why has one transition method succeeded while the other failed? Why is there compensation from the non-tradable share holders to the tradable share holders and what determines the level of compensation? As the non-tradable share holders reduce their holdings, additional shares will come into the market, which will in general depress the stock price. Conventional wisdom thus suggests that compensation is introduced to offset the price drop experienced by the holders of tradable shares (see for example, Xin and Xu (2006), and Zhao and Liao (2006)). Is this conventional wisdom true? What is the importance of risk sharing? These questions are directly related to the general issues on transition mechanisms raised at the start of this introduction. The insight gained from our study of the experience in the Chinese stock market reform will enhance our understanding of the process and consequence of privatization and financial liberalization in general.

We develop a general equilibrium model to help understand the questions raised above. In our model, there are two groups of investors who can invest in the stock market and a risk-free bond.

⁷ In an initial SIP, shares of an SOE are offered to the public for the first time. Subsequent offerings of the firm's shares are called seasoned SIPs.

Initially, one group of investors is constrained to hold (and not to trade) the shares that they own (i.e., the non-tradable share holders), while the other group of investors is unconstrained to buy and sell their shares freely (i.e., the tradable share holders). After the reform, the non-tradable shares gain tradability, and the removal of trading restriction improves risk sharing among all shareholders. To be able to trade their shares, however, the constrained investors must bargain with the unconstrained investors. The result of this bargaining is a transfer of shares (captured by the compensation ratio in our empirical analysis) from the constrained investors to the unconstrained investors. The case of standard SIP is a special case of the model where the compensation ratio is set to zero. In the general model, we show that in equilibrium, an important determining factor of the compensation ratio is risk sharing, which is overlooked by the conventional wisdom mentioned earlier. The main implications of the model are: (a) when the standard SIP method of transition is adopted, the transition is not Pareto-improving as the tradable share holders are worse off; (b) the conventional wisdom ignores the effect of risk-sharing on equilibrium prices and compensation ratio; (c) compensation is positive if and only if the bargaining power of the non-tradable share holders is weaker than that of the tradable share holders, suggesting that, contrary to the general perception in China, the reform benefits the tradable share holders more than the non-tradable share holders; and (d) compensation is decreasing in firm performance, which is in stark contrast to the prediction from the conventional wisdom.

Using data collected from the reform, we test the key implications from our model. Implication (a) is consistent with the failure of the first reform attempt in June 2001. We then show that there is significant compensation from the non-tradable share holders to the tradable share holders, on the order of on average 30 shares for every 100 shares held by the holders of tradable shares, representing a significant transfer of wealth. This evidence is broadly consistent with the general thesis of the literature on financial liberalization that there is welfare gain potentially to all parties. Then in the more detailed test, we find that the compensation ratio is positively associated with the state's holding of non-tradable shares, which is our proxy for the weak bargaining power of the non-tradable share

holders, and is negatively associated with the fraction of tradable shares. Furthermore, the better performing the firm is, as captured by its ROA, the lower the compensation ratio is. This collection of empirical evidence rejects the prediction based on the conventional wisdom, while is broadly consistent with the predictions from our model.

The rest of the paper is organized as follows. The next section reviews the literature that motivates the current study. Section 3 describes the split share structure reform in China. Section 4 develops the model, discusses its testable implications, and introduces the conventional thinking on how compensation should be determined. Section 5 presents our empirical tests, and we conclude in Section 6.

2. Literature Review

There is a significant academic literature on privatization that examines various aspects of the process. See Megginson and Netter (2001) for an excellent survey. We review one strand of this literature that examines mechanism design in order to reallocate ownership rights and to maximize revenue. Schmidt and Schnitzer (1993) show that immediate privatization leads not only to strong management incentives to restructure but also to high social costs of bankruptcies and layoffs. Social costs will be lower if the government stays in control, but managers faced with a soft budget constraint will have less incentive to restructure. Roland and Verdier (1994) introduce the idea of a necessary critical mass of privatization induced by a positive externality related to the size of the private sector. They conclude that the existence of this externality provides an argument for massive privatization, while policy uncertainty slows down privatization. Further, free distribution of shares to the population as done in Eastern Europe to speed up the privatization process can credibly eliminate the incentive to renationalize. Perotti (1995) focuses on the possibility of a policy reversal as an explanation for the puzzles of partial sales and undrepricing observed in many privatization programs. He shows that in

the presence of uncertainty, the best privatization strategy for a committed government is to offer a small proportion of its equity as a signal that the government is willing to share the risk of an *ex-post* value redistribution. Strategic underpricing is only used when the efficient transfer of control calls for selling a large stake of the company. Blanchard and Aghion (1996) explore the role of management (insider) incentives in privatization and argue that depending on the details of insider privatization and the resale process, the wedge between the value of the firm to insiders and the value of the firm to outsiders may prevent resale by insiders and hence desirable restructuring from happening. Schmidt (2000) and Biais and Perotti (2002) examine the process of privatization in a political economy context. Schmidt (2000) shows that there will be less expropriation by the future governments the more shares are distributed for free to the population, and diversified mass privatization is better than insider privatization. Biais and Perotti (2002) focus on how privatization might support a right-wing government maximizing the utility of the rich to stay in power. They show that strategic rationing and underpricing is often necessary to induce median-class votes to buy enough shares to shift their political preferences. In the extreme, this may lead to free share distribution and voucher privatization. None of the theory papers reviewed above involves negotiation between the government and investors as with SIPs in China.

Using a 59 country sample of 630 SIPs, Jones et al. (1999) find that governments consistently underprice SIP offers, tilt their share allocation patterns to favor domestic investors, and impose control restrictions on privatized firms, supporting the argument that SIPs are designed by privatizing governments to achieve economic and political objectives. Megginson et al. (2004) examine the impact of political, institutional, and economic factors on the choice of privatization between SIPs and asset sales. Using data for privatizations of SOEs from 1977 to 2000, they show that SIPs are more likely in less developed capital markets, for more profitable SOEs, and where there are more protections for minority shareholders. Asset sales are more likely when there is less state control of the economy and when the firm is smaller.

The issue of mechanism design is also important for the literature on financial liberalization. There is a prevailing view that the removal of market frictions will lead to overall gains. However, there has been little study in the literature on how the transition from a frictional economy to a frictionless economy takes place and on the role of efficiency considerations in mechanism design. In a general equilibrium framework, Subrahmanyam (1975) and Errunza and Losq (1989) show that removal of investment barriers generally leads to an increase in the aggregate market value of affected securities, and all investors favor a move toward market integration. On the other hand, Sellin and Werner (1993), Devereux and Saito (1997), Bhamra (2005), and Soumare and Wang (2006) come to the conclusion that some countries might do better in a regime of incomplete asset trade than under complete markets depending on a trade-off between the price impact of removing investment restrictions and the loss due to lack of diversification and the presence of other market imperfections. A 2003 International Monetary Fund (IMF) study by Prasad, Rogoff, Wei, and Kose (2003) on the effect of financial globalization on developing countries concludes that “Thus, while there is no proof in the data that financial globalization has benefited growth, there is evidence that some countries may have experienced greater consumption volatility as a result.” This leads to some finance researchers to search for answers on the exact limitations of financial liberalization in a real world with various market imperfections (see, for example, Stiglitz (2004) and Stulz (2005)). These studies all employ comparative static analyses, but do not study the transition mechanism itself.

3. China’s Split Share Structure Reform

In April and June 2005, the China Securities Regulatory Commission (CSRC) announced two pilot batches involving 4 and 42 listed companies, respectively, to implement the split share structure reform. In August 2005, the reform was expanded to all listed firms. By the end of 2007, 1,254 firms completed the reform, representing over 97% of the market capitalization.

Figure 2, Panel A presents the timeline of a typical reform process. On day t_0 , a listed company announces the start of its split share structure reform and trading is suspended.⁸ The non-tradable share holders, as represented by the board, propose a tentative compensation plan to the tradable share holders. The forms of compensation include cash, asset restructuring, warrants, and, most frequently, additional shares. The board facilitates communication between the tradable share holders and non-tradable share holders over the details of the proposed compensation plan. Communication and negotiation can take place via the Internet, face-to-face meetings with investors, conference calls, institutional investor site visits, emails, faxes and investor feedback forms. If both groups agree on the proposed compensation plan, the board makes an announcement on the finalized compensation plan on day t_1 and trading resumes on the same day. If there is any disagreement, the board revises the plan (generally increase compensation) based on shareholders' feedback and releases the revised plan on day t_1 with trading resumes on the same day. Trading is suspended again from the day after the registration day (t_2) until the completion of the reform (t_3). Voting takes place during this period, and the compensation plan has to receive approval by at least two-thirds of voting tradable share holders before it is passed. On day t_3 , trading resumes after the voting outcome is known.⁹ Figure 2, Panel B presents a case study of Shanghai Auto's reform process.

We next introduce our model to help understand the rationale behind the compensation offered by the non-tradable share holders to the tradable share holders and its interaction with equilibrium asset prices.

4. The Model

⁸ The reform takes place in batches. For firms in the same batch, the announcement of the start of the reform takes place on the same day (t_0). Depending on how each firm progresses, firms of the same batch usually do not complete the reform at the same time.

⁹ According to the guidelines issued by the CSRC, non-tradable shares only become tradable one year after the completion of the reform, and the number of newly tradable shares cannot exceed 5 percent of the A-share float. Two years after the completion of the reform, the number of newly tradable shares cannot exceed 10 percent of the A-share float. Only three years after the completion of the reform, all the non-tradable shares prior to the reform become fully tradable.

In this section, we develop a simple general equilibrium model that captures the key features of the split share structure reform and derive its testable implications. The case of zero compensation will be a special case of the general model, which corresponds to the transition method used in the June 2001 stock market reform. We assume a two-period heterogeneous agent economy where one group of investors is constrained in their trading of the shares of a firm that they own. We model the reform as the removal of trading restrictions and the payment of compensation shares from the constrained investors to the unconstrained ones, taking place at the end of the first period. The compensation ratio is modeled as the outcome of a reduced-form bargaining process. The compensation ratio and the share price of the firm undergoing the reform will be jointly determined in equilibrium.

To make the model simple, we assume that there is one firm in the economy which lasts for two periods. Trading occurs at times, $t = 0$ and 1 . The firm is liquidated at time 2 . The firm is expected to implement the split share structure reform at $t = 1$. It pays a dividend d_1 per share at $t = 1$ and a liquidating dividend d_2 per share at $t = 2$. We assume that d_1 and d_2 are independently and normally distributed with common mean μ_d and standard deviation σ_d .¹⁰ Without loss of generality, let the total number of shares outstanding be 1 . We assume that there are two groups of investors. One group holds the tradable shares (TS) of the firm's stock and the other group holds the non-tradable shares (NTS). We will refer to the first group of investors as the TS holders and the second group as the NTS holders. The total number of shares of the firm's stock held by the TS holders is π . The remaining $(1 - \pi)$ shares are held by the NTS holders. We assume that the economy is populated by a continuum of investors. We normalize the size of the investor population to 1 , with λ of them holding the tradable shares of the firm and $(1 - \lambda)$ of them holding the non-tradable shares.

In addition to holding shares of the firm, investors can also invest in a risk free asset, and another risky asset called the market stock. These assets are exogenous to the equilibrating process of the economy. This assumption is admittedly simplistic, but it allows us to focus on the main forces that

¹⁰ The i.i.d. assumption is a simplifying assumption. The main results of our paper hold more generally.

affect the outcome of the reform process without having to deal with the price effects of an overall equilibrating process on the rest of the economy. Essentially, we assume that the firm under consideration is small relative to the entire financial market and that the change in the demand for and supply of its shares will not significantly affect the prices of the other assets in the economy. For simplicity, we assume that the risk free rate is a constant r and that the market stock, representing “the rest of the market,” has a return R_{1M} (R_{2M}) that is jointly normally distributed with the dividend d_1 (d_2). Furthermore the joint distribution is *i.i.d.* Let μ_M be its mean return, σ_M its standard deviation, and σ_{dM} its covariance with d_1 (d_2).

All investors are assumed to have identical preferences represented by

$$u(W) = -\frac{1}{\alpha} \exp(-\alpha W),$$

where α is the risk aversion parameter.¹¹ This may seem to be a non-standard assumption. One might object to it by arguing that in modeling the split share structure reform, one group of investors should be the state or its affiliates as they are controlling shareholders, and their objective function should not be a utility function but rather the objective function of a government, such as revenue from the sale.¹² That is, one might argue for an investor-versus-government approach.

There are two closely related reasons why we take an alternative approach. First, fostering efficiency has been one commonly cited argument for privatization. Under certain assumptions a competitive equilibrium is Pareto efficient. Since, in a Pareto efficient allocation, each individual’s utility is maximized, promoting efficiency is equivalent to maximizing utilities of all individuals in the

¹¹ Assuming different risk aversion parameters for the tradable and non-tradable share holders does not change the main prediction of our model.

¹² See Perotti (1995) for an example of modeling the government’s incentive in SIPs as maximizing issue proceeds. See Megginson and Netter (2001) for a survey on existing approaches to modeling the government’s objective in the context of privatization.

economy. Thus, directly modeling individual investors in the economy is equivalent to modeling the government itself as the second group of investors when the government is benevolent.¹³

The second reason is that the ultimate ownership behind SOEs is ownership by the public. Thus, under the benevolent government assumption, one should model the behavior of individual investors directly instead of through modeling the behavior of a government. Moreover, any *ad hoc* specification of a government's objective function may lead to incorrect modeling of the government as a representative of the public.

Of course, the challenge of modeling individual investors directly is that the TS holders are also part of the public, and are therefore also owners of SOEs. However, the investor-versus-government approach would not solve this problem either.¹⁴ To deal with this issue, we make one additional assumption: The TS holders, when bargaining with the state, ignore the fact that they are also owners of SOEs. This assumption is common and often implicitly made in the investor-versus-government approach. In summary, our approach of directly modeling individual investors is equivalent to modeling the behavior of a benevolent government.

Returning to our model setup, we assume that the initial wealth of a TS holder at $t = 0$ is W_0 while that of an NTS holder is Z_0 . We assume that the initial number of shares held by a TS holder is π/λ while that held by an NTS holder is $(1 - \pi)/(1 - \lambda)$. We assume that $\pi < \lambda$ so that the trading restriction on the NTS holder is non-trivial. As all investors have identical preferences, in an

¹³ Benevolent government assumption is at best an approximation to reality. The question is how well this assumption approximates reality. It can be argued that as long as the objective of privatization is to promote efficiency, it is a reasonable approximation. In the introduction, we have noted that the Chinese government has recognized the incentive problems and associated inefficiency due to the split share structure and has made effort to correct these problems. For this reason, we believe that the benevolent government assumption is a reasonable approximation at least for the split share structure reform under study.

¹⁴ Given that SOEs are owned by the public, privatization via SIPs always involves selling an enterprise by the government to a subset of its owners. There does not seem to be an easy way around this.

unconstrained economy, all investors will have identical shareholdings.¹⁵ The ratio $(1 - \pi)/(1 - \lambda)$ thus measures the extent of trading restrictions imposed on the NTS holder.¹⁶

Now we introduce the split share structure reform. At $t = 1$, the reform takes place. If the reform is successful, the TS holder will receive, for each share she held at $t = 0$, γ additional shares from the NTS holder. These additional shares are viewed as compensation. After the reform all shares of the firm become tradable.¹⁷ We assume that at $t = 0$ all investors know that the reform will take place at $t = 1$. Thus, all investors fully anticipate the impact of the reform and behave rationally in their investment decisions.

In the remainder of this section, we derive the equilibrium of the economy. We also derive the equilibrium of an economy without the reform. The compensation ratio is derived as the outcome of a bargaining process, based on overall welfare gains from the reform.

4.1 The Economy with the Reform

We first consider the investment decision of a TS holder. This shareholder solves her investment problem by dynamic programming. She first solves her utility maximization problem at $t = 1$ and then her maximization problem at $t = 0$ by backward induction. The first part of this subsection describes the backward induction process. The second part describes the equilibrium.

The Backward Induction Process

At $t = 1$, the TS holder's utility maximization problem is

$$U_{TS}(W_1) = \max E_1[u(W_2)],$$

¹⁵ For exponential utility, shareholdings are independent of initial wealth.

¹⁶ Before the reform, private transfer of the non-tradable shares already took place among a subset of listed firms. Both sellers and buyers could be the state, legal persons, and individuals. However, the transfer of state-owned shares can be highly restrictive (Chen and Yuan (2007)).

¹⁷ In reality, not all of the previously non-tradable shares can be traded immediately (see discussion in Section 3). We have chosen to abstract from this detail of the reform. It is worth noting that incorporating this detail into our model will not make any qualitative difference in our results.

subject to

$$W_2 = (1+r)W_1 + A_1 \left[\frac{d_2}{P_1} - (1+r) \right] + Y_1(R_{2M} - r),$$

where E_t is the conditional expectation given her information at $t = 1$, P_t is the price of the stock, A_t is the dollar amount invested in the stock, R_{2M} is the return on the market stock, and Y_t is her holding of the market stock.¹⁸ At $t = 1$, the reform is completed. The utility maximization problem is standard. Since the returns on the firm's stock and the market stock are jointly normally distributed, the demand for (the number of shares of) the firm's stock is

$$\frac{A_1}{P_1} = \frac{\sigma_M^2 [\mu_d - (1+r)P_1] - \sigma_{dM}(\mu_M - r)}{\alpha(\sigma_d^2 \sigma_M^2 - \sigma_{dM}^2)}, \quad (1)$$

To better understand what drives the demand of the investor for the firm's stock, it is important to note that our market stock is not the market portfolio, and, because of this, the demand function differs from that in a standard model with the market portfolio. Dividing both the numerator and the denominator of equation (1) by σ_M^2 , the numerator of equation (1) can be written as

$$[\mu_d - (1+r)P_1] - \frac{\sigma_{dM}}{\sigma_M^2}(\mu_M - r). \quad (2)$$

The first term of equation (2) is the excess share return of the firm's stock over that of the risk free asset. In the second term, the ratio σ_{dM}/σ_M^2 can be viewed as the systematic risk of the firm's stock with respect to the market stock, and the second term altogether as the systematic component of the excess share return of the firm's stock.¹⁹ In other words, the demand for the firm's stock in equation

¹⁸ The information at $t = 1$ is that the reform has been completed where γ additional shares have been paid to the TS holder for each share she owns. It has been argued that the effect of reform goes far beyond the distribution of compensation shares. For example it may lead to better corporate governance. Our study abstracts from these effects.

¹⁹ If the market stock were the market portfolio, then the ratio would be the beta in the CAPM and the second term would be the systematic excess share return of the firm's stock. Thus, under the CAPM, equation (2) would be equal to zero.

(1) depends not only on the excess share return of the firm's stock, but also on its systematic component with respect to the market stock.

Now we go one period back and consider her decision at $t = 0$. The TS holder's utility maximization problem at $t = 0$ is

$$U_{TS}(W_0) = \max E_0[U_{TS}(W_1)],$$

subject to her wealth constraint. Since the reform is completed at $t = 1$, if she has a holding of A_0/P_0 shares of the firm's stock coming into $t = 1$, then her wealth after the reform is²⁰

$$W_1 = W_0(1+r) + A_0 \frac{[d_1 + (1+\gamma)P_1 - (1+r)P_0]}{P_0} + Y_0(R_{1M} - r),$$

where Y_0 is her investment in the market stock. Her demand for the shares of the firm's stock is then

$$\frac{A_0}{P_0} = \frac{\sigma_M^2[\mu_d + (1+\gamma)P_1 - (1+r)P_0] - \sigma_{dM}(\mu_M - r)}{\alpha(1+r)(\sigma_d^2\sigma_M^2 - \sigma_{dM}^2)}.$$

The utility maximization problem of the NTS holder is similar to that of the TS holder, except that the NTS holder is restricted to hold $(1 - \pi)/(1 - \lambda)$ shares of the firm's stock prior to $t = 1$. At $t = 1$, as a condition for gaining tradability of her shares, the NTS holder has to compensate the TS holder at the ratio of γ . The total number of shares to be given to the TS holders is $\gamma\pi$, which is equally shared among all NTS holders. This means for each of the tradable shares, $\gamma\pi/(1 - \pi)$ shares have to be taken away and given to the TS holders. In other words, if the NTS holder is allowed to trade her shares at price P_1 , then her wealth is

$$Z_1 + P_1 \left(1 - \frac{\gamma\pi}{1 - \pi}\right) \frac{1 - \pi}{1 - \lambda}. \quad (3)$$

²⁰ Here we have assumed that the reform is completed after the dividend payment.

This total wealth of the NTS holder at $t = 1$ can be decomposed into two components: one is Z_1 , her liquid wealth coming into $t = 1$; and the other is the value of her shareholding, resulting from the reform which makes her non-tradable shares tradable after the compensation payment.

Taking equation (3) as her wealth, the NTS holder's utility maximization problem at $t = 1$ is exactly the same as that of the TS holder. Her demand for the firm's stock is

$$\frac{a_1}{P_1} = \frac{\sigma_M^2[\mu_d - (1+r)P_1] - \sigma_{dM}(\mu_M - r)}{\alpha(\sigma_d^2\sigma_M^2 - \sigma_{dM}^2)}.$$

Moving back to $t = 0$, although announced, the reform has not yet been implemented. The NTS holder cannot trade the shares she owns. Her liquid wealth coming into $t = 1$, but just before the reform is implemented, is

$$Z_1 = Z_0(1+r) + \frac{1-\pi}{1-\lambda}d_1 + y_0(R_{1M} - r).$$

As indicated by this wealth constraint, due to the trading restriction, the NTS holder benefits from holding the stock of the firm only by receiving the dividend.

The Equilibrium

All shares are tradable after the reform is implemented. Thus, at $t = 1$, all investors hold an identical number of shares of the firm's stock, which can be seen from the demand functions of the TS and NTS holders. The equilibrium share price P_1 is then determined from

$$1 = \frac{\sigma_M^2[\mu_d - (1+r)P_1] - \sigma_{dM}(\mu_M - r)}{\alpha(\sigma_d^2\sigma_M^2 - \sigma_{dM}^2)}.$$

which implies

$$P_1 = \frac{1}{1+r} \left[\mu_d - \frac{\sigma_{dM}}{\sigma_M^2}(\mu_M - r) - \alpha \left(\sigma_d^2 - \frac{\sigma_{dM}^2}{\sigma_M^2} \right) \right].$$

At $t = 0$, the only tradable shares are those held by the TS holders. The equilibrium price P_0 is determined from the demand function of the TS holders only and the total tradable shares,

$$\pi = \lambda \frac{\sigma_M^2 [\mu_d + (1 + \gamma)P_1 - (1 + r)P_0] - \sigma_{dM}(\mu_M - r)}{\alpha(1 + r)(\sigma_d^2 \sigma_M^2 - \sigma_{dM}^2)},$$

which implies

$$P_0 = \frac{1}{1 + r} \left[\mu_d + (1 + \gamma)P_1 - \frac{\sigma_{dM}}{\sigma_M^2}(\mu_M - r) - \alpha(1 + r) \frac{\pi}{\lambda} \left(\sigma_d^2 - \frac{\sigma_{dM}^2}{\sigma_M^2} \right) \right].$$

A straightforward calculation shows that the equilibrium utility of the TS holder is

$$U_{TS}(W_0) = -\frac{1}{\alpha} \exp \left\{ -\alpha(1 + r)^2 W_0 - F(\alpha(1 + r)\pi / \lambda) - F(\alpha) \right\},$$

where

$$F(\alpha) \equiv \frac{\alpha^2 (\sigma_d^2 \sigma_M^2 - \sigma_{dM}^2) + (\mu_M - r)^2}{2\sigma_M^2},$$

and that of the NTS holder is

$$U_{NTS}(Z_0) = -\frac{1}{\alpha} \exp \left\{ -\alpha \left[(1 + r)^2 Z_0 + (1 + r)P_1 \left(1 - \frac{\gamma\pi}{1 - \pi} \right) \frac{1 - \pi}{1 - \lambda} \right] - g \left(\alpha(1 + r) \frac{1 - \pi}{1 - \lambda} \right) - F(\alpha) \right\},$$

where

$$g \left(\alpha(1 + r) \frac{1 - \pi}{1 - \lambda} \right) = \alpha(1 + r) \frac{1 - \pi}{1 - \lambda} \left[\mu_d - \frac{\alpha(1 + r)}{2} \frac{1 - \pi}{1 - \lambda} \sigma_d^2 \right] + \frac{\left[\mu_M - r - \alpha(1 + r) \frac{1 - \pi}{1 - \lambda} \sigma_{dM} \right]^2}{2\sigma_M^2}.$$

These expressions for the equilibrium utility of the TS and NTS holders will be used later to derive the compensation ratio.

4.2 The Economy without the Reform

In the economy without the reform, shares held by the NTS holder can never be traded. This is reflected in the budget constraints of the NTS holder at $t = 1$,

$$z_2 = z_1(1+r) + \frac{1-\pi}{1-\lambda} d_2 + y_1(R_{2M} - r).$$

Except for the trading restriction at $t = 1$, the utility maximization problems of the two groups of investors in this economy are identical to those in the economy with the reform. And it can be readily verified that the equilibrium stock prices at $t = 0$ and 1 are given, respectively, by

$$p_0 = \frac{1}{1+r} \left[(\mu_d + p_1) - \frac{\sigma_{dM}}{\sigma_M^2} (\mu_M - r) - \alpha(1+r) \frac{\pi}{\lambda} \left(\sigma_d^2 - \frac{\sigma_{dM}^2}{\sigma_M^2} \right) \right],$$

and

$$p_1 = \frac{1}{1+r} \left[\mu_d - \frac{\sigma_{dM}}{\sigma_M^2} (\mu_M - r) - \alpha \frac{\pi}{\lambda} \left(\sigma_d^2 - \frac{\sigma_{dM}^2}{\sigma_M^2} \right) \right].$$

It is readily seen that $p_1 > P_1$. This is because at $t = 1$, the reform is completed and the NTS holders start to reduce their shareholdings. This additional supply of shares to the market depresses the stock price. The relationship between p_0 and P_0 is less clear. It depends on the size of the compensation ratio: for small γ , $p_0 > P_0$ because the reform is less likely to succeed and thus there is no prospect of improved risk sharing for the TS holders; and for large γ , $p_0 < P_0$ because the reform is likely to be completed and the TS holders will benefit from better risk sharing and hence are willing to pay more for the stock.

It can also be shown that the utility of the TS holder is

$$V_{TS}(w_0) = -\frac{1}{\alpha} \exp \left\{ -\alpha(1+r)^2 w_0 - F(\alpha(1+r)\pi / \lambda) - F(\alpha\pi / \lambda) \right\},$$

while that of the NTS holder is

$$V_{NTS}(z_0) = -\frac{1}{\alpha} \exp \left\{ -\alpha(1+r)^2 z_0 - g \left(\alpha(1+r) \frac{1-\pi}{1-\lambda} \right) - g \left(\alpha \frac{1-\pi}{1-\lambda} \right) \right\}.$$

4.3 The Reform of June 2001

With the model we have developed so far we are ready to address the failure of the first stock market reform in June 2001.

The sale of government owned enterprises in China took stages. The first stage was completed in the 1990s when many SOEs were listed on the stock exchanges. In June 2001, as the second stage of the sale, the Chinese government following the standard SIP approach, sold the state-owned shares directly in the stock market. In the terminology of our model, the compensation ratio is set to zero, $\gamma = 0$. The consequence of that attempt is that the percentage gain in the utility of TS holders, which is defined as the negative log of the ratio of their utility after the reform over that before the reform and given by

$$\alpha^2 \left(1 - \frac{\pi}{\lambda}\right) \left(\sigma^2 - \frac{\sigma_{dM}^2}{\sigma_M^2}\right) \frac{\pi}{\lambda} + \frac{\alpha^2}{2} \left(1 - \frac{\pi^2}{\lambda^2}\right) \left(\sigma^2 - \frac{\sigma_{dM}^2}{\sigma_M^2}\right) = -\frac{\alpha^2}{2} \left(1 - \frac{\pi}{\lambda}\right)^2 \left(\sigma^2 - \frac{\sigma_{dM}^2}{\sigma_M^2}\right),$$

is strictly negative. In other words, the TS holders were made worse-off by the reform. Then it is not surprising that the prices of the shares fell significantly after June 2001 and the government had to stop the reform by October 2001.

Looking back, this episode of the stock market reform in China offers an interesting piece of evidence on the debate over financial liberalization. Much of the financial liberalization has focused on whether the end result of financial liberalization is an economy with improved productive efficiency. Much less is devoted to whether the end result is a Pareto improvement for all members of the economy. Even less is devoted to the relevance of transition mechanisms for the end result. The analysis given above shows that in the case of the stock market reform in China, the approach adopted in the June of 2001 would not have led to a Pareto improvement for all members in the economy had it been completed. This may have been a major factor that led to the failure of the first reform attempt.

4.4 The Compensation Ratio

So far we have solved the equilibrium taking the compensation ratio γ as given. In the split share structure reform, the compensation ratio is the result of a bargaining process by the two parties: the TS holders and the NTS holders. Given that all investors in the economy are rational, the impact of the compensation ratio on the share price of the firm is fully anticipated. That is, the impact is taken into consideration in the bargaining process. In this sub-section, we model the bargaining process and solve for γ .

We assume that γ is the outcome of a bargaining process between an average TS holder and an average NTS holder over their respective percentage gain in utility, which as above is defined as the negative log of the ratio of their utility after the reform over that before the reform. And we take an agnostic view in assigning bargaining powers to both parties without imposing any prior on the range of the bargaining power parameter β .

It is readily seen that the gain to the NTS holder is given by

$$-\alpha(1+r)\gamma P_1 \frac{\pi}{1-\lambda} + \left[F(\alpha) - g\left(\alpha \frac{1-\pi}{1-\lambda}\right) + \alpha(1+r)P_1 \frac{1-\pi}{1-\lambda} \right].$$

The first term is her utility loss due to the compensation payment. The term in the square brackets is her utility gain due to improved diversification and liquidity when her shares become tradable. This expression is greater than zero for γ that is not too large. The intuition is that without compensation, the gain to the NTS holder is always positive because constrained utility maximization is always sub-optimal compared to unconstrained utility maximization. However, the existence of compensation reduces the wealth of the NTS holder post-reform. For large γ , the loss in her wealth can potentially overwhelm her gain from diversification and the increased liquidity of her shareholding.

The percentage gain to the TS holder is similarly defined and is given by

$$\alpha(1+r)^2(W_0 - w_0) + F(\alpha) - F(\alpha\pi/\lambda) = \alpha(1+r)^2(P_0 - p_0)\frac{\pi}{\lambda} + F(\alpha) - F(\alpha\pi/\lambda),$$

where the first term, $\alpha(1+r)^2(W_0 - w_0)$, captures the effect of the announcement of the reform on the initial wealth of the TS holder, and the second term, $F(\alpha) - F(\alpha\pi/\lambda)$, is the change in her utility due to improved risk sharing. The reform announcement causes a change in the stock price of the firm, which induces a change in the wealth of the TS holder. The first term can be further decomposed into

$$\alpha(1+r)\gamma P_1 \frac{\pi}{\lambda} + \alpha^2 \frac{\pi}{\lambda} \frac{\pi - \lambda}{\lambda} \left(\sigma_d^2 - \frac{\sigma_{dM}^2}{\sigma_M^2} \right) = \alpha(1+r)\gamma P_1 \frac{\pi}{\lambda} + \alpha(1+r)(P_1 - p_1) \frac{\pi}{\lambda},$$

where the first part is the change in the TS holder's utility due to her receiving the compensation, and the second part is her utility loss due to a fall in the stock price.

Given that the bargaining power of the TS holder is $1/(1 + \beta)$ and that of the NTS holder is $\beta/(1 + \beta)$, we assume that the compensation ratio is determined by

$$\alpha(1+r)P_1 \left(1 - \frac{\gamma\pi}{1-\pi} \right) \frac{1-\pi}{1-\lambda} + F(\alpha) - g \left(\alpha \frac{1-\pi}{1-\lambda} \right) = \beta \left[\alpha(1+r)^2(P_0 - p_0) \frac{\pi}{\lambda} + F(\alpha) - F(\alpha\pi/\lambda) \right]. \quad (4)$$

This equation says that the compensation ratio will be set such that in equilibrium each percent gain in utility by the NTS holder must be met by $1/\beta$ percent gain in utility by the TS holder. When β is equal to one, the TS and NTS holders have equal bargaining power. The percentage utility gains for the two parties are equalized in equilibrium. Given that there is no empirical evidence on the relative group size of the investor population, we assume that $\lambda/(1 - \lambda) = 1$.

Proposition: Let γ be the compensation ratio that solves equation (4). Assume $P_1 > 0$. Then

- a) $\gamma > 0$ if and only if $\beta < 1 = \lambda^2/(1 - \lambda)^2$.
- b) $\frac{\partial \gamma}{\partial \beta} < 0$.

$$\text{c) } \frac{\partial \gamma}{\partial \pi} < 0.$$

$$\text{d) } \frac{\partial \gamma}{\partial \mu_d} < 0.$$

$$\text{e) } \frac{\partial \gamma}{\partial (\sigma_d^2 - \sigma_{dM}^2 / \sigma_M^2)} > 0.$$

The first claim of this proposition says that as long as the bargaining power of the TS holders is greater than that of the NTS holders ($\lambda^2/(1 - \lambda)^2 = 1$ assumed), the NTS holders will compensate the TS holders. One implication of this claim is that, in a general equilibrium setting, it is not always true that the NTS holders gain more than the TS holders. In fact, when the bargaining powers of the two groups are equal ($\beta = 1$), both the NTS holders and the TS holders gain equally. In this case, the compensation ratio is zero.²¹ Thus the bargaining power of the NTS holders, β , becomes important. The compensation ratio is positive if and only if the bargaining power of the TS holders is greater than that of the NTS holders. Claim (b) says that the weaker the bargaining power of the NTS holders β , the more they have to compensate the TS holders. As the bargaining power is not observable, these two claims are not directly testable unless we use some proxy for it.

The other claims of the proposition are intuitive as well. For (c), the greater the percentage of tradable shares π , the less distorted is the economy before the reform, and, hence, there is less compensation. For (d), the greater the dividends the firm is expected to pay, μ_d , the better the firm's stock is as an investment. Therefore, the TS holders require less compensation to complete the reform so that they can hold more shares of the stock (an outcome of the reform is that the TS holders will eventually hold more of the firm's stock). For (e), noting that $\sigma_d^2 - \sigma_{dM}^2 / \sigma_M^2$ is the idiosyncratic risk, this claim says that the greater the idiosyncratic risk, the less attractive the firm's stock is as an

²¹ Even though in this case the compensation ratio is zero, it should be differentiated from the reform attempt in the June of 2001. Under the split share structure reform, bargaining was explicitly allowed, whereas in the June 2001 reform, there was no bargaining.

investment. Thus the TS holders are less eager to hold the stock and hence they demand more compensation to complete the reform.

The analysis above leads to the following testable implications of our model:

- There is a negative relation between the compensation ratio and the bargaining power of the NTS holders.
- There is a negative relation between the compensation ratio and the fraction of tradable A-shares.
- There is a negative relation between the compensation ratio and firm performance.
- There is a positive relation between the compensation ratio and firm idiosyncratic risk.

4.5 Comparison with the Conventional Wisdom

To gain further insight from our general equilibrium model, it is useful to contrast our model with an alternative model based on the conventional wisdom. In this section, we describe such a model and derive its empirical predictions.

Let P_N denote the estimated value of a non-tradable share before the split share structure reform. Let S denote the price of a tradable share before the reform, and S' denote the price of the same share after the reform. The conventional wisdom suggests that the compensation ratio γ is set such that the shareholding value of the TS (NTS) holders before and after the reform remains the same,

$$\pi \times S = (\pi + \gamma\pi) \times S', \quad (5)$$

$$(1 - \pi) \times P_N = (1 - \pi - \gamma\pi) \times S'. \quad (6)$$

Solving for γ yields

$$\gamma = \frac{(1 - \pi)(S - P_N)}{(1 - \pi)P_N + \pi S} = \frac{(1 - \pi)(S / P_N - 1)}{(1 - \pi) + \pi S / P_N}. \quad (7)$$

Assuming that the market price of a tradable share, S , is greater than the value of a non-tradable share, P_N , the model based on conventional wisdom implies the following comparative statics: (a) the compensation ratio γ is decreasing in the fraction of tradable shares, π , and b) it is increasing in firm performance S/P_N .

Clearly, the prediction from our general equilibrium model on firm performance is opposite to the prediction based on conventional wisdom. To gain some insight on the difference, comparing the model based on conventional wisdom with ours, we note that in our model, the utility gain to the TS holders can be written as

$$\alpha(1+r)(P_1 - p_1 + \gamma P_1) \frac{\pi}{\lambda} + F(\alpha) - F(\alpha\pi/\lambda), \quad (8)$$

where P_1 corresponds to S' and p_1 corresponds to S in the conventional model. According to the conventional model in equation (5), the first term in equation (8) equals zero, whereas in our model it may not. Similarly, the utility gain to the NTS holders based on our model is

$$[(P_1 - P_N)(1 - \pi) - \gamma\pi P_1] \frac{\alpha(1+r)}{1-\lambda} + \left[F(\alpha) - g\left(\alpha \frac{1-\pi}{1-\lambda}\right) + \alpha(1+r)P_N \frac{1-\pi}{1-\lambda} \right]. \quad (9)$$

According to the conventional model in equation (6), the first term in equation (9) equals zero. Regardless of whether the first terms in equations (8) and (9) are zero, the second terms in those equations which capture the effect of changes in the investment opportunity set on the utility of an investor are not captured in the model based on the conventional wisdom, and they are non-negative.

5. Empirical Analysis

In this section, we use the data from the split share structure reform in China to test the predictions from our model and from the conventional wisdom.

5.1 Our Sample

We start with 1,254 listed firms that completed their reform by December 31, 2007. We further require sample firms to have available data on the reform from WIND. This leads to our final sample of 1185 firms, which represents over 90% of A-share market capitalization by the end of 2007. To remove the effect of outliers, all variables are winsorized at the 1st and 99th percentiles.

Table 1 presents summary statistics for our sample. Our key variable of interest is the compensation ratio, which is defined as the number of shares or equivalent received by the TS holders from the NTS holders per tradable share held at the time of registration (day t_2 in Figure 2, Panel A). The data on compensation ratios is collected directly from the final version of the compensation plan by WIND. Panel A shows that the average (median) number of shares received by the TS holders is 0.301 (0.306) per share held. The interquartile range is 0.07, so there is some variation in the way the TS holders are compensated across our sample firms. Using the first 330 firms that completed the reform, Wu et al. (2006) report that the average compensation ratio is 0.325. Using data from 890 firms that finished their reform by July 2006, Jin and Yuan (2006) show that the average compensation ratio is 0.308. Our average based on a much larger sample is similar to those.

When testing the predictions from our model, we use the state NTS ownership as our proxy for the (weak) bargaining power of the NTS holders (β). We justify our choice as follows. In China, social stability is the ultimate goal of the Chinese government, and most TS holders are individual domestic investors. The Chinese government is most concerned about the success of the reform so that investors will not lose money by investing in the burgeoning stock market.²² In fact, as discussed in the

²² The Chinese experience is similar to the massive privatization implemented in the UK in the 1980s. In democratic countries like the UK, the buyers of privatized industries are also voters, and governments have enough trouble getting re-elected without having to contend with a mass of disgruntled investors who have lost money on their investment in

introduction, the Chinese government already made earlier attempts to reform the markets without success. It can be argued that the state has the strongest incentive to make the reform a success, even at the cost of high compensation to the TS holders. Hence, a higher level of state NTS ownership implies weaker bargaining power for the NTS holders. Panel A shows that before the reform, the average NTS ownership by the state is 33.6%.

An average firm in our sample has 37.1% of their listed A-shares tradable. Using a large sample of over 900 SIPs from 1977 through 2000, Megginson et al. (2004) show that in the average SIP, governments sell 35% of the SOE's capital. Thus, from the perspective of the level of state ownership post initial SIPs, the partially privatized SOEs in China are not unusual.

Firm operating performance is captured by return on assets (ROA). The sample average (median) is 4.9% (4.7%). Our measure of idiosyncratic risk is the standard deviation of the residual from the market model regression using daily stock returns over the period from 260 trading days before up to 60 trading days prior to the first announcement of the reform or from one day after the IPO to 60 days before the reform for new firms with less than one year of trading. The sample average is 2.2%.

The reform started in April 2005 with two pilot batches involving a total of 46 firms. Subsequently, the reform was in full swing with 65 regular batches by the end of 2007. It is possible that firms that implemented their reform later in the sample period may have learned from what had happened before them, and that shareholders could also have formed some expectations regarding compensation to the TS holders by the NTS holders. So we control for market learning by using the batch number in the basic model.²³ The average (median) batch number in our sample is 24 (22).

privatized entities. So the British government structured its offers so that it was unlikely that investors would lose (Menyah et al. (1995)).

²³ Note that singling out the two pilot batches does not change our main results. In particular, the coefficient on the pilot batch is significantly positive, while the coefficient on the rest of the batches is significantly negative.

About 84% of the sample firms have their initial compensation plans revised. In addition to the shares given to the TS holders, the NTS holders also make other promises to compensate them. *A priori*, we expect that the more additional promises made by the NTS holders, the lower the compensation ratio is. About 70% of the sample firms employ at least one additional promise.²⁴

Panel B presents the correlation matrix of the dependent variable and explanatory variables. As predicted by our model, there is a positive association between the compensation ratio and state NTS holdings, proxying for the weak bargaining power of NTS holders, and a negative association between the compensation ratio and the fraction of TS. Univariate correlation between the compensation ratio and firm performance is negative but not statistically significant. The correlation between the compensation ratio and firm idiosyncratic risk is positive and statistically significant. Overall, the extent of correlation among most pairs of variables raises little concern for multicollinearity in our regression analysis.

5.2 Main Test

We examine the testable implications from our model using the following baseline regression:

$$\begin{aligned}
 \text{Compensation Ratio}_i = & \alpha_0 + f_{\text{industry}} + f_{\text{year}} + \beta_1 \text{State NTS Holding}_i \\
 & + \beta_2 \text{Fraction of Tradable Shares}_i \\
 & + \beta_3 \text{ROA}_i + \beta_4 \text{Idiosyncratic Risk}_i + \beta_5 \text{Batch}_i + \beta_6 \text{Plan Change}_i \\
 & + \beta_7 \text{Additional Promise}_i + e_i.
 \end{aligned} \tag{10}$$

We include industry and year fixed effects, and our standard errors are robust to heteroskedasticity.

²⁴ We collect data on the following five measures of additional promises made by the NTS holders during the reform process. They are: lockup promise – the NTS holders promise to impose further restrictions on their trading in addition to the lockup required by the CSRC guidelines; dividend promise – the NTS holders promise to pay a fraction of future profits as dividends; incentive promise – the NTS holders promise to introduce stock- and option-based pay to corporate executives; performance promise – the NTS holders promise to distribute additional shares or cash to the TS holders if performance (stock price in particular) falls below the target in the next couple of years; and holding promise – the NTS holders promise to buy the company’s shares in the secondary market to stabilize the stock price and will retain the increased holdings for a period of six months.

Table 2 (first column) presents the regression result from our baseline model (model 1). Consistent with our predictions, as well as the univariate correlation, the compensation ratio is strongly and positively associated with state NTS holdings, consistent with the state's strong incentive to make the split share structure reform a success. That is, the weaker the bargaining power of the NTS holders, the higher the compensation ratio. The economic implication of this result is that an increase in state NTS holdings from the 25th percentile to the 75th percentile is expected to increase the compensation ratio by 0.027 shares. The compensation ratio is also strongly and negatively associated with the fraction of tradable shares and operating performance (ROA). The economic implication of our finding is that an increase in the tradable shares from the 25th percentile to the 75th percentile is expected to decrease the compensation ratio by 0.035 shares, and an increase in ROA from the 25th percentile to the 75th percentile is expected to decrease the compensation ratio by 0.013 shares. The compensation ratio is positively, albeit not statistically significantly associated with firm idiosyncratic risk. One possible reason for the insignificant result is that according to our model, the idiosyncratic risk is measured with respect to the market stock capturing "the rest of the market" while in our empirical implementation, we have to compute firm idiosyncratic risk using the market portfolio. Another possible reason is that our model is applicable to shares-only-compensation, while in our sample, only about 90% of the sample firms exclusively use shares as compensation to the TS holders. The positive association between the compensation ration and firm idiosyncratic risk becomes significant once we focus on the shares-only-compensation sample (see Table 4, Panel B). Overall, the results are broadly consistent with the predictions of our model.

There are other interesting findings that are not directly predicted by our model. We show that the later in the reform process, the lower the compensation ratio is. Plan change is positively associated with compensation, while additional promises made by the NTS holders reduce compensation. There are a total of 13 industries according to the CSRC's classification. Using industry 1 Agriculture as our baseline industry, we do not find any significant industry effects in determining compensation ratios.

Wu et al. (2006) is one of the first studies examining the determinants of the compensation ratio. They show that compensation is negatively associated with the bargaining power of the largest shareholder (as proxied by the Shapley index), institutional shareholdings, and the presence of other promises by the NTS holders, and is positively associated with the fraction of NTS. Zhang et al. (2006) find that compensation is increasing in the fraction of NTS, the fraction of state holding, the P/E ratio when the firm went IPO and leverage, and decreasing in the net asset per share and earning per share. Jin and Yuan (2006) focus on the role of corporate governance in determining the size of the compensation ratio, and show that there is a negative association between the quality of firm governance and the compensation ratio. Xin and Xu (2006) explore the role of regional development disparities in determining the compensation ratio, and conclude that firms in better development regions are associated with lower compensation ratios. Among these studies, Wu et al (2006) and Zhang et al (2006) are most related to our empirical research. However, both of them use a relative small sample. Wu et al (2006) use a sample of 330 firms which have finished the reform before February 2006 while Zhang et al (2006) use a smaller one with 227 firms that have completed the reform by the end of 2005. Since the reform is not almost finished until the end of 2007, a relative small sample is less representative. Moreover, their empirical design in choosing the main control variables is subjective and lack of theoretical support,

Motivated by these earlier studies, models 2 – 4 are extensions to model 1 by adding other firm characteristics and measures of corporate governance. Overall, the relationship between compensation ratio on the one hand and state NTS holdings, fraction of tradable shares, and ROA on the other holds strongly as in model 1. Moreover, we find that sales growth is negatively significantly associated with the compensation ratio. And large firms are associated with lower compensation. Firm size is frequently used as a measure of information asymmetry, with more information available for larger firms (Megginson et al. (2004)). Our result suggests that firms with less asymmetric information are able to pay lower compensation to the TS holders.

Under model 3, we add three measures of external governance mechanisms to model 2. We find that institutional TS holding is negatively associated with the compensation ratio. This result could be explained by institutions' ability to invest in good quality firms and the negative relation between firm quality and compensation as predicted by our model. The above explanation is supported by the strong positive correlation between institutional ownership and firm performance (unreported). Finally, access by foreign investors is significantly negatively associated with the compensation ratio, while listing on the Shenzhen Stock Exchange has no significant effect on the compensation ratio.

Under model 4, we add measures of internal governance mechanisms to model 3. Again, we find consistent evidence in support of our model's predictions, while board characteristics are not significantly associated with the compensation ratio.

5.3 Supplemental Test

We take a two-pronged approach to assess the validity of conventional wisdom. First, we compute the compensation ratio based on equation (7) by assuming the value of NTS (P_N) to be either the net asset value per share (compensation ratioB) or at 20% of the value of TS (compensation ratioC) according to Chen and Xiong (2001). Table 3, Panel A presents descriptive statistics on the derived compensation ratio based on the conventional wisdom in equation (7). The average value for the alternative measures of compensation ratios ranges from 0.496 to 1.086 while the average for the actual compensation ratio is 0.301. Panel B shows that the correlation between the derived compensation ratio and the actual compensation ratio is as low as 0.089. This provides the first piece of evidence that the conventional wisdom might not be able to explain the magnitude of the compensation ratio.

Second, we explicitly test the predictions based on the conventional wisdom by running the following regression:

$$\begin{aligned}
\text{Compensation Ratio}_i = & \alpha_0 + f_{\text{industry}} + f_{\text{year}} + \beta_1 \text{Fraction of Tradable Shares}_i + \beta_2 (S/P_N) \\
& + \beta_3 \text{Batch}_i + \beta_4 \text{Plan Change}_i + \beta_5 \text{Additional Promise}_i + e_i.
\end{aligned} \tag{11}$$

We include industry and year fixed effects, and our standard errors are robust to heteroskedasticity.

Panel C reports the regression results. We find that the compensation ratio is negatively associated with the fraction of TS, consistent with the prediction from the conventional wisdom. However, we also find that there is no positive association between the compensation ratio and firm performance as measured by S/P_N . The compensation ratio is negatively (and sometimes statistically significantly) related to the firm performance S/P_N in models 1-4. The regression results in Panel C provide further evidence that the conventional wisdom fails to explain the magnitude of the compensation ratio.

5.4 Additional Investigation

We conduct extensive robustness checks on our main results and the analyses are reported in Table 4. First, we use an alternative compensation ratio measure constructed by WIND, instead of the compensation ratio disclosed in the compensation plan, to replicate our main analysis. The correlation between the two measures is close to 1 while the average compensation ratio from WIND is slightly lower than that compiled by the firm, suggesting that firms do have incentives to make the compensation ratio appear to be larger (unreported). Table 4, Panel A presents the results. The compensation ratio is positively associated with state NTS holdings, and negatively associated with the fraction of TS and firm performance. The coefficient on firm idiosyncratic risk is positive, but not statistically significant.

Second, we present tests of our model using different samples. The first column of Table 4, Panel B presents the results using a sample of firms where only additional shares are used to compensate the TS holders. Close to 90% of our sample exclusively use shares. Our main inference remains unchanged. Moreover, there is a statistical positive association between firm idiosyncratic risk

and the compensation ratio. Since 1998, the stock exchanges have given “special treatment” to firms with deteriorating performance, and/or firms whose net asset per share falls below its stock price, including imposing limits on daily stock price changes, and more stringent auditing requirements. The second column of Table 4, Panel B shows that removing these “special treatment” firms does not affect our main inferences. The third column of Table 6, Panel B presents the test results using a sample of firms excluding those with listed B-shares and H-shares. *A priori*, it is not clear whether holders of B-shares and H-shares should receive compensation or not. Nonetheless, removing them does not change our main results. The final column of Table 4, Panel B presents the test results excluding firms in the first two pilot batches. There are a total of 46 firms involved in the first two pilot batches and 35 of them meet our sample selection criterion. After excluding them, our main test results remain the same.

Finally, we also use alternative measures for the bargaining power of the NTS holders and add a measure of regional developmental disparity to our model specification. Table 4, Panel C reports the results. In Panel C, first column, our measure of the bargaining power of the NTS holders is the ratio of the state’s NTS holdings to the fraction of NTS so that this new measure has little correlation with the fraction of TS variable included in the model. Our main results are unchanged. The second column of Panel C reports the regression results when we use an indicator variable for the state being the largest NTS shareholder to proxy for the bargaining power of the NTS holders. In this way, we minimize the impact of measurement error in the state NTS holding on our estimation result. Our main results remain unchanged. Across all specifications, our measure for regional disparity has no significant effect on the compensation ratio.

In summary, our test results are broadly consistent with our model’s predictions that the compensation to TS holders is higher if the bargaining power of the NTS holders is lower, the fraction of TS is lower, or if firm performs poorly.

6. Conclusion

A fundamental question in economics and finance is whether removing market frictions enhance efficiency. It is well known from basic economic theory that when markets are complete and when there is no asymmetric information, the removal of market frictions enhances efficiency. When markets are incomplete and when there is asymmetric information, the answer to the question is no longer clear. The literature on the incomplete market theory and international finance has shown that when markets are incomplete, agents may in fact be worse-off when market frictions are removed (Sellin and Werner (1993), Devereux and Saito (1997), Bhamra (2005), and Soumare and Wang (2006)). This type of result is however comparative static in nature. The heated debate on the benefit of financial liberalization and privatization raised a more interesting issue. That is, will the transition method used in the process of removing market frictions make a difference? Anecdotal evidence suggests it does. This paper is an attempt to address the issue using the data from the recent privatization experience (split share structure reform) in China, which is essentially the sale of (remaining) state-owned shares left from privatization in the early 1990s.

This paper presents three sets of results: (a) a model with which one can assess the effect of transition method on the parties involved in the privatization. More specifically, we show that the standard SIP method when applied to the privatization case in China is not Pareto-improving, while the new form of SIP used in the privatization since April of 2005, which is essentially the standard SIP augmented with a compensation component is Pareto-improving; (b) the evidence on significant compensation; and (c) tests of the predictions of our model and of an alternative model based on conventional wisdom.

Our empirical findings are broadly consistent with the predictions from our model. The compensation ratio is found to be positively related to the weak bargaining position of the non-tradable share holders, while negatively related to the fraction of tradable shares. Firm performance as captured by returns on assets is negatively associated with the compensation ratio. Our main results are robust

after controlling for other aspects of the reform and governance mechanisms. And our main inferences remain unchanged using different measures of the compensation ratio and the bargaining power of the NTS holders, and using different samples.

Our paper should be of great relevance to researchers and policy-makers who are interested in how an economy with any sort of market friction transits into a frictionless economy. As such, our paper contributes to the debate on whether financial liberalization and privatization are beneficial to their participants.

Appendix:

Proof of Proposition: The equation that determines the compensation ratio is

$$\alpha(1+r)P_1\left(1-\frac{\gamma\pi}{1-\pi}\right)\frac{1-\pi}{1-\lambda}+F(\alpha)-g\left(\alpha\frac{1-\pi}{1-\lambda}\right)=\beta\left[\alpha(1+r)^2(P_0-p_0)\frac{\pi}{\lambda}+F(\alpha)-F(\alpha\pi/\lambda)\right].$$

In equilibrium, the expression for $g(\alpha(1-\pi)/(1-\lambda))$, can be re-written as

$$\alpha\left(\mu_d-\frac{\alpha}{2}\frac{1-\pi}{1-\lambda}\sigma_d^2\right)\frac{1-\pi}{1-\lambda}+\frac{1}{2\sigma_M^2}\left[(\mu_M-r)^2-2\alpha\frac{1-\pi}{1-\lambda}\sigma_{dM}(\mu_M-r)+\alpha^2\left(\frac{1-\pi}{1-\lambda}\right)^2\sigma_{dM}^2\right].$$

Thus $g(\alpha(1-\pi)/(1-\lambda))-F(\alpha)$ is

$$\begin{aligned} & \alpha\left(\mu_d-\frac{\alpha}{2}\frac{1-\pi}{1-\lambda}\sigma_d^2\right)\frac{1-\pi}{1-\lambda}-\frac{\alpha^2}{2}\left(\sigma_d^2-\frac{\sigma_{dM}^2}{\sigma_M^2}\right)-\alpha\frac{1-\pi}{1-\lambda}\frac{\sigma_{dM}}{\sigma_M}(\mu_M-r)+\frac{\alpha^2}{2}\left(\frac{1-\pi}{1-\lambda}\right)^2\frac{\sigma_{dM}^2}{\sigma_M^2} \\ & =\alpha\left[\mu_d-\frac{\sigma_{dM}}{\sigma_M}(\mu_M-r)-\alpha\frac{1-\pi}{1-\lambda}\left(\sigma_d^2-\frac{\sigma_{dM}^2}{\sigma_M^2}\right)\right]\frac{1-\pi}{1-\lambda}+\frac{\alpha^2}{2}\left[\left(\frac{1-\pi}{1-\lambda}\right)^2-1\right]\left(\sigma_d^2-\frac{\sigma_{dM}^2}{\sigma_M^2}\right). \end{aligned}$$

It is readily verified that

$$\beta F(\alpha)-\beta F(\alpha\pi/\lambda)=\frac{\alpha^2\beta}{2}\left(\frac{\lambda^2-\pi^2}{\lambda^2}\right)\left(\sigma_d^2-\frac{\sigma_{dM}^2}{\sigma_M^2}\right),$$

and that

$$(1+r)^2(P_0-p_0)=(1+r)[(1+\gamma)P_1-p_1]=(1+r)\gamma P_1+\alpha\left(\sigma_d^2-\frac{\sigma_{dM}^2}{\sigma_M^2}\right)\frac{\pi-\lambda}{\lambda}.$$

Since

$$(1+r)P_1=\left[\mu_d-\frac{\sigma_{dM}}{\sigma_M}(\mu_M-r)\right]-\alpha\left(\sigma_d^2-\frac{\sigma_{dM}^2}{\sigma_M^2}\right),$$

the equation for the compensation ratio becomes

$$\gamma(1+r)\frac{\pi}{\lambda}P_1\left(\frac{\lambda}{1-\lambda}+\beta\right)=\frac{\alpha^2}{2}\left[\frac{\lambda^2(1-\pi/\lambda)^2}{(1-\lambda)^2}+2\beta\frac{(1-\pi/\lambda)\pi}{\lambda}-\beta(1-\pi^2/\lambda^2)\right]\left(\sigma_d^2-\frac{\sigma_{dM}^2}{\sigma_M^2}\right).$$

Thus γ is positive if and only if $\beta < \lambda^2/(1-\lambda)^2$. The proof for the rest of the claims is straightforward.

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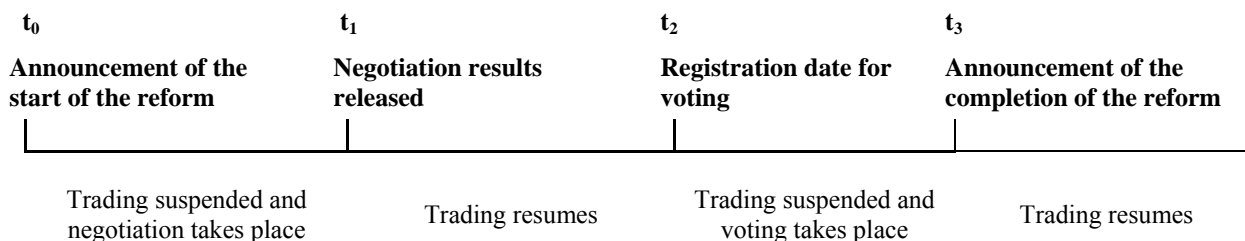
Figure 1
The Chinese Stock Market Performance from 1991 to 2007

Constituents for the Shanghai Stock Exchange (SSE) Composite Index are all listed stocks (including A-shares and B-shares) on the Shanghai Stock Exchange. The SSE Composite Index started on December 19, 1990, with its base value of total market capitalization on that day normalized to be 100.

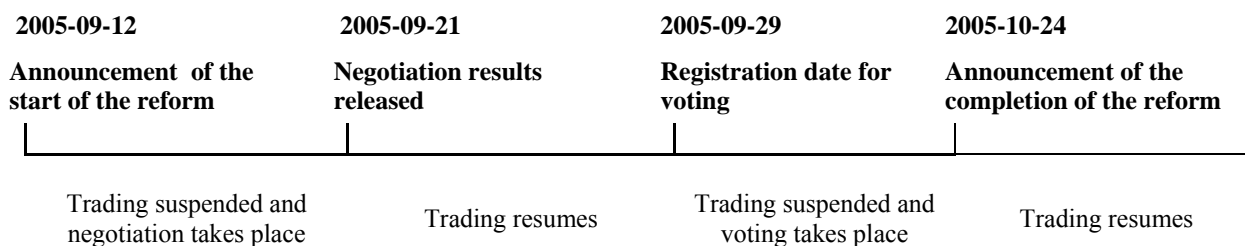


Figure 2
The Timeline of the Split Structure Reform

Panel A. The General Case



Panel B. A Case Study - Shanghai Auto's Split Share Structure Reform



On September 12, 2005 (t_0), Shanghai Auto announced that it would start the split share structure reform and the trading would be suspended from September 12, 2005. The compensation plan was disclosed on the same day. The tradable share holders were to receive 3.4 shares from the non-tradable share holders for each 10 shares they held. From September 12 to September 20, 2005, the tradable and non-tradable share holders negotiated over the details of the compensation plan. On September 20, 2005, Shanghai Auto announced that both groups have reached agreement over the originally proposed compensation plan. On September 21 (t_1), trading was resumed. The registration date for voting on the compensation plan at the special shareholder meeting was September 29, 2005. All investors who held shares of Shanghai Auto before or on September 29, 2005 (t_2) were eligible to vote. The shareholders could vote either in person at the meeting or via the Internet. Starting September 30, 2005 (the first trading day after t_2), trading of Shanghai Auto shares was suspended again. Internet voting took place from October 11 to October 13, 2005. The special shareholder meeting was held on October 13, 2005. On October 14, 2005, the voting results were disclosed and 97.7% tradable shareholders voted 'for', so the compensation plan was approved. On October 18, 2005, the implementation plan was announced. In particular, the payment of compensation shares from the non-tradable share holders to the tradable share holders was to be made on October 20, 2005. On October 24, 2005 (t_3), trading of Shanghai Auto shares resumed and the compensation shares received by the tradable share holders became tradable immediately.

Table 1

Summary Statistics

We start with 1,254 listed Chinese firms that completed their reform of the split share structure by December 31, 2007. We further require sample firms to have available data on the reform from WIND. This leads to our final sample of 1,185 firms. Compensation ratio is the number of additional shares received by the tradable share holders from the non-tradable share holders for each tradable share held, and directly obtained from the compensation plan. State NTS holding is the NTS ownership by the state and its controlled entities that initiated the reform and proposed the first compensation plan. Fraction of tradable shares is the number of tradable shares divided by the total number of A-shares outstanding before the reform. ROA is the return on assets. Idiosyncratic risk is the standard deviation of the residual from the market model regression. The split share structure reform took place in batches. There were two pilot batches and 65 regular batches during our sample period. Batch gives the sequence of the reforming firm in the process. Plan change is set equal to one if the proposed compensation plan is revised during the negotiation process between the tradable share holders and the non-tradable share holders, and zero otherwise. Additional promise is set equal to one if there is any additional promise made by the non-tradable share holders, and zero otherwise. Panel A presents descriptive statistics of the main variables. We report the mean, standard deviation, median, as well as the 25th and 75th percentile values. Panel B presents the correlation matrix for the main variables. Correlations significant at the 10 percent level are highlighted in boldface while the corresponding p-values are reported in italic.

Panel A: Summary statistics

| Variable | N | Mean | Std Dev | 25 th Percentile | Median | 75 th Percentile |
|-----------------------------|------|--------|---------|--------------------------------|--------|--------------------------------|
| Compensation ratio | 1185 | 0.301 | 0.074 | 0.270 | 0.306 | 0.340 |
| State NTS holding | 1185 | 0.336 | 0.266 | 0.012 | 0.371 | 0.584 |
| Fraction of tradable shares | 1185 | 0.371 | 0.114 | 0.298 | 0.364 | 0.435 |
| ROA | 1185 | 0.049 | 0.086 | 0.021 | 0.047 | 0.086 |
| Idiosyncratic risk | 1185 | 0.022 | 0.007 | 0.017 | 0.021 | 0.024 |
| Batch | 1185 | 24.041 | 15.877 | 12.000 | 22.000 | 33.000 |
| Plan Change | 1185 | 0.835 | | | | |
| Additional promise | 1185 | 0.695 | | | | |

Panel B: Correlation matrix for key variables

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-----------------------|
| 1 Compensation ratio | 1.000 | | | | | | |
| 2 State NTS holding | 0.261 <i>0.000</i> | 1.000 | | | | | |
| 3 Fraction of tradable shares | -0.468 <i>0.000</i> | -0.255 <i>0.000</i> | 1.000 | | | | |
| 4 ROA | -0.017 <i>0.564</i> | 0.097 <i>0.001</i> | -0.142 <i>0.000</i> | 1.000 | | | |
| 5 Idiosyncratic risk | 0.078 <i>0.007</i> | -0.126 <i>0.000</i> | -0.137 <i>0.000</i> | -0.075 <i>0.010</i> | 1.000 | | |
| 6 Batch | -0.259 <i>0.000</i> | -0.018 <i>0.538</i> | 0.147 <i>0.000</i> | -0.486 <i>0.000</i> | 0.062 <i>0.034</i> | 1.000 | |
| 7 Plan change | 0.113 <i>0.000</i> | 0.212 <i>0.000</i> | -0.037 <i>0.203</i> | -0.028 <i>0.337</i> | -0.091 <i>0.002</i> | 0.087 <i>0.003</i> | 1.000 |
| 8 Additional promise | -0.088 <i>0.002</i> | 0.025 <i>0.383</i> | 0.072 <i>0.013</i> | 0.167 <i>0.000</i> | -0.173 <i>0.000</i> | -0.182 <i>0.000</i> | 0.033 <i>0.262</i> |

Table 2

Explaining Compensation Ratio

We start with 1,254 listed Chinese firms that completed their reform of the split share structure by December 31, 2007. We further require sample firms to have available data on the reform from WIND. This leads to our final sample of 1,185 firms. The dependent variable, compensation ratio, is the number of additional shares received by the tradable share holders from the non-tradable share holders for each tradable share held. State NTS holding is the non-tradable share ownership by the state and its controlled entities that initiated the reform and proposed the first compensation plan. Fraction of tradable shares is the number of tradable shares divided by the total number of A-shares outstanding before the reform. ROA is the return on assets. Idiosyncratic risk is the standard deviation of the residual from the market model regression. The split share structure reform took place in batches. There were two pilot batches and 65 regular batches during our sample period. Batch gives the sequence of the reforming firm in the process. Plan change is set equal to one if the proposed compensation plan is revised during the negotiation process between the tradable share holders and the non-tradable share holders, and zero otherwise. Additional promise is set equal to one if there is any additional promise made by the non-tradable share holders, and zero otherwise. Institutional TS holding is the tradable share ownership by institutional investors. Shenzhen listing is set equal to one if the stock is listed on the Shenzhen Stock Exchange, and zero otherwise. Foreign investor is set equal to one if the firm issues B-shares and/or cross-lists overseas, and zero otherwise. CEO is COB is set equal to one if the CEO of the company is also the chairman of the board (COB), and zero otherwise. Board independence gives the fraction of independent non-executive directors on the board. Board size is the number of directors on the board. Year and industry dummies are included in the regressions and the standard errors are robust to heteroskedasticity. Superscripts ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively. P-values are reported in brackets.

| | (1) | (2) | (3) | (4) |
|-----------------------------|----------------------|----------------------|----------------------|----------------------|
| State NTS holding | 0.048*** [0.000] | 0.057*** [0.000] | 0.054*** [0.000] | 0.055*** [0.000] |
| Fraction of tradable shares | -0.254*** [0.000] | -0.261*** [0.000] | -0.272*** [0.000] | -0.270*** [0.000] |
| ROA | -0.194*** [0.000] | -0.119*** [0.001] | -0.085** [0.023] | -0.084** [0.027] |
| Idiosyncratic risk | 0.348 [0.146] | 0.175 [0.594] | 0.366 [0.249] | 0.334 [0.294] |
| Batch | -0.001*** [0.000] | -0.001*** [0.000] | -0.001*** [0.000] | -0.001*** [0.000] |
| Plan change | 0.019*** [0.004] | 0.019*** [0.003] | 0.018*** [0.004] | 0.020*** [0.002] |
| Additional promise | -0.013*** [0.002] | -0.012*** [0.004] | -0.010** [0.010] | -0.010** [0.016] |
| M/B | | -0.003 [0.163] | -0.001 [0.529] | -0.001 [0.661] |
| Sales growth | | -0.009* [0.059] | -0.010** [0.039] | -0.009** [0.049] |
| Stock return | | -0.017* [0.056] | -0.002 [0.863] | -0.000 [0.964] |
| Leverage | | 0.028* [0.056] | 0.022 [0.154] | 0.022 [0.166] |
| Firm size | | -0.013*** [0.000] | -0.006** [0.038] | -0.006* [0.053] |
| Institutional TS holding | | | -0.082*** [0.000] | -0.083*** [0.000] |
| Shenzhen listing | | | 0.004 [0.259] | 0.004 [0.282] |
| Foreign investor | | | -0.021*** [0.002] | -0.021*** [0.002] |
| CEO is COB | | | | 0.006 [0.317] |
| Board independence | | | | 0.056 [0.211] |
| Board size | | | | 0.001 [0.500] |
| Intercept | 0.410*** [0.000] | 0.666*** [0.000] | 0.544*** [0.000] | 0.512*** [0.000] |
| Year and Industry dummies | YES | YES | YES | YES |
| Number of Observations | 1185 | 1171 | 1171 | 1147 |
| Adjusted R-squared | 0.339 | 0.366 | 0.387 | 0.389 |

Table 3
Testing the Conventional Wisdom

We start with 1,254 listed Chinese firms that completed their reform of the split share structure by December 31, 2007. We further require sample firms to have available data on the reform from WIND. This leads to our final sample of 1,185 firms. Compensation ratio is the number of additional shares received by the tradable share holders from the non-tradable share holders for each tradable share held, and directly obtained from the compensation plan. Compensation ratioB is computed based on equation (7) where the value of non-tradable shares is the net asset value per share in the fiscal year end before the reform, and the value of tradable shares is the average price between [-40, -20] trading days relative to the first announcement of the reform. Compensation ratioC is computed based on equation (7) where the value of non-tradable shares has a 80% discount of the value of tradable shares based on Chen and Xiong (2001), and the value of tradable shares is the average price between [-40, -20] trading days relative to the first announcement of the reform. State NTS holding is the non-tradable share ownership by the state and its controlled entities that initiated the reform and proposed the first compensation plan. Fraction of tradable shares is the number of tradable shares divided by the total number of A-shares outstanding before the reform. S/P_N is the measure of firm performance where S is the market price of the tradable shares (equal to the average price between [-40, -20] trading days relative to the first announcement of the reform) and P_N is the value of non-tradable share (equal to the net asset value per share in the fiscal year end before the reform). ROA is the return on assets. Idiosyncratic risk is the standard deviation of the residual from the market model regression. The split share structure reform took place in batches. There were two pilot batches and 65 regular batches during our sample period. Batch gives the sequence of the reforming firm in the process. Plan change is set equal to one if the proposed compensation plan is revised during the negotiation process between the tradable share holders and the non-tradable share holders, and zero otherwise. Additional promise is set equal to one if there is any additional promise made by the non-tradable share holders, and zero otherwise. Institutional TS holding is the tradable share ownership by institutional investors. Shenzhen listing is set equal to one if the stock is listed on the Shenzhen Stock Exchange, and zero otherwise. Foreign investor is set equal to one if the firm issues B-shares and/or cross-lists overseas, and zero otherwise. CEO is COB is set equal to one if the CEO of the company is also the chairman of the board (COB), and zero otherwise. Board independence gives the fraction of independent non-executive directors on the board. Board size is the number of directors on the board. Panel A presents descriptive statistics of the compensation ratio. Panel B presents correlation between different measures of the compensation ratio. Correlations significant at the 10 percent level are highlighted in boldface while the corresponding p-values are reported in italic. Panel C presents the regression results of testing the conventional wisdom. Year and industry dummies are included in the regressions and the standard errors are robust to heteroskedasticity. Superscripts ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively. P-values are reported in brackets.

Panel A: Summary statistics

| Variable | N | Mean | Std Dev | 25 th Percentile | Median | 75 th Percentile |
|---------------------|------|-------|---------|--------------------------------|--------|--------------------------------|
| Compensation ratio | 1185 | 0.301 | 0.074 | 0.270 | 0.306 | 0.340 |
| Compensation ratioB | 1185 | 0.496 | 0.547 | 0.142 | 0.383 | 0.684 |
| Compensation ratioC | 1185 | 1.086 | 0.418 | 0.826 | 1.037 | 1.282 |

Panel B: Correlation matrix for different compensation ratios

| | Compensation ratio | Compensation ratioB |
|---------------------|------------------------------|------------------------------|
| Compensation ratioB | 0.089 <i>0.002</i> | 1.000 |
| Compensation ratioC | 0.412 <i>0.000</i> | 0.521 <i>0.000</i> |

Panel C: Explaining compensation ratio

| | (1) | (2) | (3) | (4) |
|-----------------------------|----------------------|----------------------|----------------------|----------------------|
| Fraction of tradable shares | -0.282*** [0.000] | -0.290*** [0.000] | -0.304*** [0.000] | -0.304*** [0.000] |
| S/P _N | -0.003 [0.108] | -0.003* [0.080] | -0.002 [0.369] | -0.001 [0.494] |
| Batch | -0.001*** [0.000] | -0.001*** [0.000] | -0.001*** [0.000] | -0.001*** [0.000] |
| Plan change | 0.023*** [0.001] | 0.026*** [0.000] | 0.024*** [0.000] | 0.025*** [0.000] |
| Additional promise | -0.016*** [0.000] | -0.012*** [0.005] | -0.010** [0.011] | -0.010** [0.015] |
| Sales growth | | -0.013*** [0.003] | -0.013*** [0.005] | -0.013*** [0.006] |
| Stock return | | -0.021** [0.012] | -0.002 [0.868] | -0.000 [0.996] |
| Leverage | | 0.036*** [0.007] | 0.026** [0.049] | 0.027** [0.050] |
| Firm size | | -0.011*** [0.000] | -0.004 [0.145] | -0.004 [0.138] |
| Institutional TS holding | | | -0.096*** [0.000] | -0.096*** [0.000] |
| Shenzhen listing | | | 0.003 [0.411] | 0.003 [0.386] |
| Foreign investor | | | -0.026*** [0.000] | -0.027*** [0.000] |
| CEO is COB | | | | 0.003 [0.562] |
| Board independence | | | | 0.041 [0.367] |
| Board size | | | | 0.001 [0.345] |
| Intercept | 0.429*** [0.000] | 0.645*** [0.000] | 0.519*** [0.000] | 0.501*** [0.000] |
| Year and Industry dummies | YES | YES | YES | YES |
| Number of Observations | 1185 | 1183 | 1183 | 1149 |
| Adjusted R-squared | 0.285 | 0.322 | 0.353 | 0.356 |

Table 4

Robustness Check

We start with 1,254 listed Chinese firms that completed their reform of the split share structure by December 31, 2007. We further require sample firms to have available data on the reform from WIND. This leads to our final sample of 1,185 firms. The dependent variable, compensation ratio, is the number of additional shares received by the tradable share holders from the non-tradable share holders for each tradable share held. State NTS holding is the non-tradable share ownership by the state and its controlled entities that initiated the reform and proposed the first compensation plan. Fraction of tradable shares is the number of tradable shares divided by the total number of A-shares outstanding before the reform. ROA is the return on assets. Idiosyncratic risk is the standard deviation of the residual from the market model regression. The split share structure reform took place in batches. There were two pilot batches and 65 regular batches during our sample period. Batch gives the sequence of the reforming firm in the process. Plan change is set equal to one if the proposed compensation plan is revised during the negotiation process between the tradable share holders and the non-tradable share holders, and zero otherwise. Additional promise is set equal to one if there is any additional promise made by the non-tradable share holders, and zero otherwise. Institutional TS holding is the tradable share ownership by institutional investors. Shenzhen listing is set equal to one if the stock is listed on the Shenzhen Stock Exchange, and zero otherwise. Foreign investor is set equal to one if the firm issues B-shares and/or cross-lists overseas, and zero otherwise. CEO is COB is set equal to one if the CEO of the company is also the chairman of the board (COB), and zero otherwise. Board independence gives the fraction of independent non-executive directors on the board. Board size is the number of directors on the board. Panel A presents the regression results where compensation ratio compiled by WIND is used as dependent variable. Panel B presents the regression results using alternative samples. The first column presents the regression result using a sample of firms where only additional shares are used as the compensation to the tradable share holders. The second column presents the regression result by excluding the “special treatment” firms from our sample. The third column presents the regression result by removing firms with B-shares or H-shares from our sample. The final column presents the regression result by removing the two pilot batches from our sample. Panel C presents the regression results when alternative measures for the bargaining power of the non-tradable share holders are used and we also add a measure of regional developmental disparity to our model specification. In the first column, we use the ratio of state NTS holding to the fraction of non-tradable shares to proxy for the bargaining power of the non-tradable share holders. In the second column, we use the indicator variable state being the largest shareholder to proxy for the bargaining power of the non-tradable share holders. Year and industry dummies are included in the regressions and the standard errors are robust to heteroskedasticity. Superscripts ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively. P-values are reported in brackets.

Panel A: Explaining compensation ratio complied by WIND

| | (1) | (2) | (3) | (4) |
|-----------------------------|----------------------|----------------------|----------------------|----------------------|
| State NTS holding | 0.045*** [0.000] | 0.055*** [0.000] | 0.051*** [0.000] | 0.052*** [0.000] |
| Fraction of tradable shares | -0.262*** [0.000] | -0.274*** [0.000] | -0.284*** [0.000] | -0.283*** [0.000] |
| ROA | -0.187*** [0.000] | -0.112*** [0.002] | -0.079** [0.030] | -0.078** [0.037] |
| Idiosyncratic risk | 0.331 [0.170] | 0.140 [0.673] | 0.340 [0.288] | 0.304 [0.345] |
| Batch | -0.001*** [0.000] | -0.001*** [0.000] | -0.001*** [0.000] | -0.001*** [0.000] |
| Plan change | 0.024*** [0.000] | 0.025*** [0.000] | 0.024*** [0.000] | 0.025*** [0.000] |
| Additional promise | -0.014*** [0.001] | -0.013*** [0.003] | -0.011*** [0.006] | -0.011** [0.010] |
| M/B | | -0.004** [0.030] | -0.002 [0.231] | -0.002 [0.353] |
| Sales growth | | -0.007 [0.155] | -0.008 [0.112] | -0.007 [0.134] |
| Stock return | | -0.020** [0.037] | -0.006 [0.579] | -0.004 [0.684] |
| Leverage | | 0.028* [0.058] | 0.021 [0.170] | 0.021 [0.186] |
| Firm size | | -0.014*** [0.000] | -0.008** [0.010] | -0.008** [0.014] |
| Institutional TS holding | | | -0.076*** [0.000] | -0.079*** [0.000] |
| Shenzhen listing | | | 0.002 [0.532] | 0.002 [0.562] |
| Foreign investor | | | -0.021*** [0.002] | -0.022*** [0.002] |
| CEO is COB | | | | 0.004 [0.478] |
| Board independence | | | | 0.047 [0.289] |
| Board size | | | | 0.001 [0.344] |
| Intercept | 0.410*** [0.000] | 0.699*** [0.000] | 0.578*** [0.000] | 0.549*** [0.000] |
| Year and Industry dummies | YES | YES | YES | YES |
| Number of Observations | 1170 | 1156 | 1156 | 1132 |
| Adjusted R-squared | 0.340 | 0.373 | 0.390 | 0.392 |

Panel B: Alternative samples

| | (1) | (2) | (3) | (4) |
|-----------------------------|----------------------|----------------------|----------------------|----------------------|
| State NTS holding | 0.050*** [0.000] | 0.048*** [0.000] | 0.052*** [0.000] | 0.058*** [0.000] |
| Fraction of tradable shares | -0.288*** [0.000] | -0.272*** [0.000] | -0.265*** [0.000] | -0.263*** [0.000] |
| ROA | -0.111*** [0.001] | -0.145*** [0.000] | -0.088** [0.030] | -0.096** [0.012] |
| Idiosyncratic risk | 0.521* [0.097] | 0.455 [0.148] | 0.342 [0.277] | 0.135 [0.726] |
| Batch | -0.001*** [0.000] | -0.002*** [0.000] | -0.001*** [0.000] | -0.001*** [0.000] |
| Plan change | 0.026*** [0.000] | 0.022*** [0.000] | 0.019*** [0.004] | 0.023*** [0.001] |
| Additional promise | -0.009** [0.027] | -0.009** [0.031] | -0.009** [0.035] | -0.008** [0.042] |
| M/B | -0.001 [0.787] | -0.002 [0.573] | -0.001 [0.784] | -0.001 [0.674] |
| Sales growth | -0.007 [0.150] | -0.009* [0.051] | -0.010** [0.047] | -0.008* [0.094] |
| Stock return | 0.001 [0.933] | 0.010 [0.289] | -0.003 [0.803] | -0.004 [0.677] |
| Leverage | -0.003 [0.826] | 0.007 [0.618] | 0.015 [0.372] | 0.024 [0.137] |
| Firm size | -0.001 [0.632] | -0.006* [0.064] | -0.005 [0.187] | -0.006* [0.055] |
| Institutional TS holding | -0.082*** [0.000] | -0.079*** [0.000] | -0.081*** [0.000] | -0.080*** [0.000] |
| Shenzhen listing | 0.006* [0.085] | 0.003 [0.371] | 0.003 [0.422] | 0.004 [0.309] |
| Foreign investor | -0.026*** [0.000] | -0.021*** [0.001] | -0.004 [0.826] | -0.019*** [0.006] |
| CEO is COB | 0.005 [0.459] | 0.005 [0.373] | 0.005 [0.417] | 0.003 [0.560] |
| Board independence | 0.054 [0.214] | 0.093** [0.032] | 0.053 [0.263] | 0.046 [0.297] |
| Board size | 0.001 [0.264] | 0.001 [0.527] | 0.001 [0.585] | 0.000 [0.603] |
| Intercept | 0.407*** [0.000] | 0.504*** [0.000] | 0.481*** [0.000] | 0.511*** [0.000] |
| Year and Industry dummies | YES | YES | YES | YES |
| Number of Observations | 991 | 1048 | 1045 | 1110 |
| Adjusted R-squared | 0.429 | 0.420 | 0.360 | 0.386 |

Panel C: Alternative measures for the NTS holders' bargaining power

| | (1) | (2) |
|---------------------------------------------------|----------------------|----------------------|
| State NTS holding/Fraction of non-tradable shares | 0.038*** [0.000] | |
| State is the largest NTS holder | | 0.032*** [0.000] |
| Fraction of tradable shares | -0.297*** [0.000] | -0.298*** [0.000] |
| ROA | -0.084** [0.026] | -0.083** [0.027] |
| Idiosyncratic risk | 0.300 [0.345] | 0.253 [0.418] |
| Batch | -0.001*** [0.000] | -0.001*** [0.000] |
| Plan change | 0.019*** [0.003] | 0.018*** [0.003] |
| Additional promise | -0.010** [0.018] | -0.009** [0.024] |
| M/B | -0.001 [0.679] | -0.001 [0.693] |
| Sales growth | -0.009** [0.049] | -0.009* [0.053] |
| Stock return | -0.001 [0.900] | -0.001 [0.887] |
| Leverage | 0.022 [0.161] | 0.021 [0.178] |
| Firm size | -0.006* [0.053] | -0.006* [0.058] |
| Institutional TS holding | -0.084*** [0.000] | -0.082*** [0.000] |
| Shenzhen listing | 0.004 [0.285] | 0.004 [0.257] |
| Foreign investor | -0.021*** [0.003] | -0.026*** [0.000] |
| CEO is COB | 0.006 [0.311] | 0.005 [0.393] |
| Board independence | 0.056 [0.205] | 0.057 [0.199] |
| Board size | 0.000 [0.583] | 0.000 [0.859] |
| Marketization | | -0.001 [0.435] |
| Intercept | 0.520*** [0.000] | 0.529*** [0.000] |
| Year and Industry dummies | YES | YES |
| Number of Observations | 1147 | 1147 |
| Adjusted R-squared | 0.396 | 0.398 |