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

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Abstract

A fundamental question in 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. Prior to the reform, domestic A-shares were 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 source of gains and the determinants of compensation in the process of privatization. Our key predictions are: a) the size of compensation made by the non-tradable share holders to the tradable share holders is negatively correlated with the bargaining power of non-tradable share holders; b) the size of compensation is positively correlated with the gain in risk sharing; and c) the size of compensation is negatively correlated with firm performance. Our empirical results are 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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1. Introduction

Market liberalization has swept across the world over the past three decades. In recent years, this phenomenon went from being the almost unanimous prescription for economic prosperity to being the most controversial policy advice. On the one hand, the success stories lend further support to the basic economic theory that the removal of market frictions can lead to more efficient allocations and improved productive efficiency for reasons such as better risk sharing and lower agency costs.[1] On the other hand, some spectacular failures such as the Asian Financial Crisis give critics evidence for the argument that market liberalization leads to instability and decline in national economic growth. The heated debate highlights the inadequacy in our understanding of how an economy with market frictions transitions successfully to one without and points to the transition mechanism as one potential explanation for the failures in market liberalization (Stiglitz (2002, 2006)).

There is large academic literature on the impact of market liberalization. However, the literature has not yet been able to provide a conclusive answer to the debate. Megginson and Netter (2001) survey the existing literature on privatization and find that the evidence is mixed. After assessing the more recent studies on financial globalization, Prasad, Rogoff, Wei, and Kose (2004) conclude that "it is difficult to establish a robust causal relationship between financial integration and economic growth." In some sense, these findings are not surprising. Market liberalization, be it in the form of privatization or financial integration, is a complicated process. It involves not only a specific market friction, but also the financial and legal institutions of the country. As a result, the benefit of market liberalization hinges on the interaction of the particular market friction and the institutional environment. The transition method becomes crucially important. Even for the same market friction, if alternate transition methods are adopted, the final outcome can be significantly different. Recognizing the complexity of market liberalization, one issue raised is whether one transition is as appropriate as another provided the end outcome is a more productively efficient economy. The majority of the

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

literature focuses on the outcome and does not address this question sufficiently. The main objective of this paper is to shed some light on the transition mechanism issue by using China's recent stock market privatization experience.

Many countries have embraced privatization with the goal of promoting efficiency, and large-scale privatization programs have taken place around the world. However, different countries have adopted different privatization techniques. The combination of a claimed common objective and different approaches makes privatization an ideal setting 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, theories in the literature, such as Perotti (1995), suggest that the commonly used method of 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) provides support for that general claim, although it contradicts some other predictions of Perotti.

To better understand the role of transition mechanisms, it would be ideal to have an experiment in which the same privatization reform could be implemented via two different transition methods, enabling the comparison of various efficiency indicators from the two experiments. 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

[2] See Megginson and Netter (2001) for a review of the issue and some empirical evidence. See also Section 2 for our review of the literature.
[3] For example, Biais and Perotti (2002) show that share issue privatization can be used by the government to shift voters' political preferences.

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, as well as 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 reducing its holding of listed company shares as in a typical seasoned SIP.[7] The stock market reacted negatively 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 was 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 by investors (see Figure 1).

The apparent failure of the first reform attempt in 2001 and the successful completion of the second starting in 2005 raise some interesting questions: Why has one transition method worked while the other failed? Why is there compensation from the non-tradable share holders to the tradable share

[4] The partial privatization in China taking the form of SIPs was comprised of virtually all pure primary issues. In most other countries, SIPs 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.

[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.

[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.

holders? 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, Zhao, Liao, and Li (2006), and Xin and Xu (2007)). Is this conventional wisdom supported by the data? What is the importance of risk sharing in the reform? These questions are directly related to the general issue on transition mechanisms raised earlier in this introduction. The insight gained from our study of the Chinese stock market reform will enhance our understanding of the process and consequence of privatization and market 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 asset. 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 restrictions 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, defined as the number of shares received by the tradable share holders from the non-tradable share holders per tradable share held at the time of registration) from the constrained investors to the unconstrained investors. The standard SIP is a special case of the model where the compensation ratio is set to zero. In the general model, we show that an important determining factor of the compensation ratio is risk sharing. The main implications of the model are: (a) during the stock market reform in 2001, the transition is not Pareto-improving as the tradable share holders are worse off; (b) the compensation ratio is negatively correlated with the bargaining power of non-tradable share holders; (c) the conventional wisdom ignores the effect of risk-sharing on equilibrium prices and compensation

ratios; and (d) the compensation ratio is negatively correlated with firm performance, which is in stark contrast to the prediction from the conventional wisdom.

Using data collected from the 2005 reform, we test the key implications of our model. Implication (a) is consistent with the failure of the first reform attempt in 2001. We then show that in the 2005 reform, there was significant compensation from the non-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. 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. The compensation ratio is also positively associated with the gain in risk sharing. Furthermore, the better performing the firm is, as captured by its ROA, the lower the compensation ratio is. Finally, the size of compensation is negatively associated with the fraction of tradable shares. The collective evidence is 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 is determined. Section 5 presents our empirical tests, and we conclude in Section 6.

2. Literature Review

There is 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 is related to the transition process. On the theory side, Schmidt and Schnitzer (1993) show that a mass privatization scheme with free distribution of shares 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 privatization process is gradual and the government remains in control. But managers, knowing that their firms are less likely to go bankrupt under government control, will not carry through with restructuring. 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 show that the existence of this externality provides an argument for massive privatization, while policy uncertainty slows down privatization. Further, free and equal distribution to the population of shares in the privatized enterprises as done in Eastern Europe to speed up the privatization process may eliminate the government's incentive to renationalize. Perotti (1995) focuses on the possibility of a policy reversal as an explanation for the puzzles of partial sales and underpricing observed in many privatization programs. He shows that in the presence of policy 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 the wedge between the value of the firm to insiders and the value of the firm to outsiders may prevent incompetent insiders from selling shares of their firms and hence prevent 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 the threat of expropriation is more severe if the country is poor, if income disparities are large, and if there is a strong socialist mentality. He concludes both that the more shares are distributed for free to the population, the less expropriation by future governments, and that diversified mass privatization is better than insider privatization. Biais and Perotti (2002) focus on the role of political goals in the privatization process. They show that strategic rationing and underpricing are often necessary to induce low-income median-class voters 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 or its proxy and investors, which is seen in China's split share structure reform.

On the empirical side, using a sample of 630 SIPs from 59 countries, Jones et al. (1999) find that governments consistently underprice SIP offers, tilt their share allocation patterns to favor domestic investors and employees, and impose control restrictions on privatized firms. Their evidence is consistent with the argument that SIPs are designed by privatizing governments to achieve both economic and political objectives (Perotti (1995)). Megginson et al. (2004) examine the impact of political, institutional, and economic factors on the choice of privatization methods between SIPs and asset sales. Using data for privatizations of SOEs from 1977 to 2000, they show that SIPs are more likely to take place 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 transition mechanisms 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 have been few studies 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 the removal of investment barriers generally leads to an increase in the aggregate market value of affected securities, and that all investors favor a move toward market integration. On the other hand, Sellin and Werner (1993), Devereux and Saito (1997), Bhamra (2005), and Soumaré 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. An International Monetary Fund study by Prasad, Rogoff, Wei, and Kose (2004) on the effect of financial globalization in 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 a search for the exact limitations

of financial liberalization in a real world with various market imperfections (see, for example, Stiglitz (2004) and Stulz (2005)). This line of research employs comparative static analyses, but does not study the transition mechanism itself. What is unique about the recent privatization experience in China is that two different transition mechanisms were used which makes possible such a direct comparison.

3. China's Split Share Structure Reform

In April and June 2005, to implement the split share structure reform, the China Securities Regulatory Commission (CSRC) announced two pilot batches involving 4 and 42 listed companies respectively. 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 at the time.

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 by increasing compensation) based on shareholders' feedback and releases the revised plan on day t_1 with trading resuming on the same day. Trading is suspended again from the day after the

[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). Firms of the same batch typically do not complete the reform at the same time, although this depends on how each firm progresses.

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 detailing the reform process.

We next introduce our model to help understand the importance of transition methods and risk sharing in privatization, and the rationale behind the compensation offered by the non-tradable share holders to the tradable share holders in the 2005 reform.

4. The Model

In this section, we develop a simple general equilibrium model that captures the key features of the split share structure reform in 2005 and derive its testable implications. 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. The case of zero compensation will be a special case of the general model, which corresponds to the transition method used in the 2001 stock market reform.

To simplify the model, 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

[9] According to the guidelines issued by the CSRC, the 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.

distributed with common mean μ_d and standard deviation σ_d.[10] In keeping with the simplified model, 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 affect the outcome of the reform process without having to consider 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

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

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

where α is the risk aversion parameter.[11] This may seem to be a non-standard assumption. One might argue 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 revenues from the sale.[12] The above argument supports an investor-versus-government approach.

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

[11] Assuming different risk aversion parameters for the TS and NTS holders does not change the main predictions 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.

[13] The 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.

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 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.

[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.
[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.

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 the investment problem by dynamic programming. She first solves the utility maximization problem at t = 1 and then the maximization problem at t = 0 by backward induction. The first part of this section 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

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

subject to the budget constraint

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

where E_1 is the conditional expectation given her information at t = 1, P_1 is the price of the stock, A_1 is the dollar amount invested in the stock, R_{2M} is the return on the market stock, and Y_1 is the dollar amount of 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 can be shown as

[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.

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

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 that, the demand function differs from that of 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 (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 the 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 is[20]

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

[19] If the market stock were the market portfolio, then the ratio would be the CAPM beta 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.
[20] Here we assume that the reform is completed after the dividend payment.

where Y_0 is the TS holder's investment in the market stock. It can be readily shown that 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 shown as

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

This total wealth of the NTS holder at t = 1 can be decomposed into two components: one is Z_1, the NTS holder's 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. The NTS holder's demand for the firm's stock is shown as

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

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

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

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. As the total number of investors is assumed to be 1, the equilibrium share price P_1 is 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

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

To compare utility gains, we need the equilibrium levels of utility of both the TS and NTS holders. A straightforward calculation shows that the equilibrium utility of the TS holder is

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

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. 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 lower future price P_1 leads to the lower price P_0 today. One implication of this result is that in the 2001 reform, the wealth effect for the TS holder was negative. For large γ, $p_0 < P_0$ because the large compensation under the reform increases the value of the stock for its current holders.

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 Change in Utility

Now we examine the change in utility of the TS and NTS holders due to the reform, which is defined as the negative log of the ratio of their utility with the reform over that without the reform.

It is readily shown that the gain to the TS holder is given by

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

The reform announcement causes a change in the stock price of the firm, which induces a change in the wealth of the TS holder. This is captured by the first term on the left hand side of the expression

above. The change in wealth can also be expressed in terms of price changes as given in the first term of the right hand side of the expression above. It is readily seen that

$$\alpha(1+r)^2(P_0 - p_0)\frac{\pi}{\lambda} = \alpha(1+r)(P_1 - p_1)\frac{\pi}{\lambda} + \alpha(1+r)\gamma P_1\frac{\pi}{\lambda},$$

where the first part on the right hand side of the expression above is the TS holder's utility loss due to a fall in the stock price, and the second part is the change in the TS holder's utility due to the receipt of compensation.

The second term in the TS holder's percentage utility gain, $F(\alpha) - F(\alpha\pi/\lambda)$, is the change in utility due to improved risk sharing. Clearly, if π were equal to λ, both the TS and NTS holders would already be holding their desired level of the stock. The removal of the trading restriction would not improve the investment opportunity set for the investors and hence would not improve risk sharing between the TS and NTS holders.

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

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

The first term is utility loss due to the compensation payment. The term in the square brackets is utility gain due to improved diversification when the stock becomes tradable after the reform. It can be shown that it is always positive. The third term is utility gain due to the liquidity of shares after the reform. This total utility change 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 the NTS holder's wealth can potentially overwhelm the gain from diversification and the increased liquidity of holdings.

4.4 The 2001 Reform

With the model we have developed so far we can gain some insight from 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 zero compensation is that the percentage gain in the utility of TS holders, which is defined as above and given by

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

is strictly negative. In other words, the TS holders were made worse-off by the 2001reform.

Looking back, this episode of the stock market reform in China offers an interesting perspective on market liberalization. Much of the literature on market liberalization has focused on whether the end outcome is an economy with improved productive efficiency. Much less is devoted to examining whether the outcome is a Pareto improvement. Even less is devoted to the relevance of transition mechanisms for achieving the end result. The analysis given above suggests that in the case of the stock market reform in China, the 2001 reform would not have led to a Pareto improvement for all investors had it been completed. This may have been a major factor that led to the failure of the 2001 reform.

4.5 Determination of the Compensation Ratio

So far we have solved the equilibrium with 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 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 with the reform over that without the reform. And we take an agnostic view in assigning bargaining powers to the two parties without imposing any prior on the range of the bargaining power parameter β.

Let the bargaining power of the TS holder be $1/(1+\beta)$ and that of the NTS holder be $\beta/(1+\beta)$. We assume that the compensation ratio is determined by

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

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/β 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.

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

a) $\gamma > 0$ if and only if $\beta < \lambda^2/(1-\lambda)^2$.

b) $\frac{\partial\gamma}{\partial\beta} < 0$.

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

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

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

The first claim of this proposition says that as long as the ratio of bargaining power of the NTS holders over that of the TS holders is less than $\lambda^2/(1-\lambda)^2$, 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 do the TS holders. In fact, when the ratio of the bargaining powers is equal to $\lambda^2/(1-\lambda)^2$, both the NTS holders and the TS holders gain equally. In this case, the compensation ratio is zero.[21] Claim (b) says that the weaker the bargaining power of the NTS holders β, the more they have to compensate the TS holders. Given that the bargaining power is not observable, these two claims are not directly testable unless we use some proxy for it.

Claim (c) says that there is a positive correlation between the compensation ratio and firm idiosyncratic risk $\sigma_d^2 - \sigma_{dM}^2 / \sigma_M^2$. As demonstrated in the appendix, this relation is equivalent to the positive correlation between the compensation ratio and the gain in risk sharing. The intuition is that, before the reform, the NTS holders have too many shares of the stock. Thus the higher the idiosyncratic risk of the stock the higher the NTS holders' exposure to diversifiable risk. For the TS holders, before the reform, they have too few shares of the stock. Thus the higher the idiosyncratic risk ($\sigma_d^2 - \sigma_{dM}^2 / \sigma_M^2$) of the stock is, the less correlated (σ_{dM}^2) is the stock with the rest of the stocks in the economy, and hence the higher the benefit is of using the stock to diversify risk.

[21] Even though in the case that the compensation ratio is zero, it should be differentiated from the 2001 reform. Under the split share structure reform in 2005, bargaining was explicitly allowed, whereas in the 2001 reform, there was no bargaining.

The claims (d) and (e) of the proposition are intuitive as well. For (d), the greater the dividends the stock is expected to pay, μ_d, the better the 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 stock). For (e), the greater the percentage of tradable shares π, the less distorted is the economy before the reform, and, hence, the smaller compensation amount.

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

4.6 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. The first part of this section compares the utility change of TS (NTS) holders based on the conventional wisdom and our model. The second part compares the predictions on compensation ratio.

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,

$$\pi \times S = (\pi + \gamma\pi) \times S', \tag{5}$$

$$(1-\pi)\times P_N = (1-\pi-\gamma\pi)\times S'. \tag{6}$$

To gain some insight on different model predictions, we note that in our model, the utility gain to the TS holders can be written as

$$\alpha(1+r)(P_1 - p_1 + \gamma P_1)\frac{\pi}{\lambda} + F(\alpha) - F(\alpha\pi/\lambda), \tag{7}$$

where P_1 corresponds to S' and p_1 corresponds to S in the conventional wisdom model. According to the conventional wisdom model in equation (5), the first term in equation (7) equals zero, whereas in our model it may not. And there is no such term as the second term in (7). Similarly, the utility gain to the NTS holders based on our model can be written as

$$\left[(P_1 - P_N)(1-\pi) - \gamma\pi P_1\right]\frac{\alpha(1+r)}{1-\lambda} + \left[F(\alpha) - g\left(\alpha\frac{1-\pi}{1-\lambda}\right)\right] + \alpha(1+r)P_N\frac{1-\pi}{1-\lambda}. \tag{8}$$

According to the conventional wisdom model in equation (6), the first term in equation (8) equals zero. And again, there are no such terms as the second and third terms in (8). As discussed in Section 4.3, the second terms in equations (7) and (8) capture the effect of improved diversification and they are non-negative. The conventional wisdom model misses that important effect on risk sharing of the split share structure reform.

The Compensation Ratio

Based on equation (5) and (6) of conventional wisdom, solving for γ yields

$$\gamma = \frac{(1-\pi)(S/P_N - 1)}{(1-\pi) + \pi S/P_N}. \tag{9}$$

Assuming that the market price of a tradable share, S, is greater than the value of a non-tradable share, P_N, which is often set as the net asset value of the firm, the model based on conventional

wisdom implies the following comparative statics: (a) the compensation ratio γ is positively correlated with the market to book ratio, S/P_N; and b) the compensation ratio is negatively correlated with the fraction of tradable shares, π. These two implications will be the basis of our empirical examination of the conventional wisdom model.

5. Empirical Analysis

In this section, we use 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 the 1,254 listed firms that completed the reform by December 31, 2007. Since our model only applies to cases where shares are used exclusively as compensation to the TS holders, our empirical results will focus on such a sample.[22] We further require sample firms to have available data on our key variables. This leads to our final sample of 992 firms, representing 70% of A-share market capitalization by the end of 2007. To remove the effect of outliers, all continuous 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 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 0.305 (0.310) 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 227 firms that completed the reform by

[22] Over 85% of the reformed firms used only shares as compensation.

December 31, 2005, Zhang, Wang, and Xia (2006) report that the average compensation ratio is 0.330, with a minimum at 0.100 and a maximum at 1.100. If only shares are used for compensation, the average compensation ratio for a sample of 206 firms is 0.337. Using data from 947 firms that finished their reform by July 31, 2006, Jin and Yuan (2006) show that the average (median) compensation ratio is 0.308 (0.314) with an interquartile range of 0.07. Our compensation statistics, which are based on a larger sample, are similar to those in prior research.

When testing the predictions of 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 completion of the reform so that investors will not lose money by investing in the burgeoning stock market.[23] In fact, as discussed in the introduction, the Chinese government already made earlier but failed attempts to reform the markets. It can be argued that the state has the strongest incentive to complete the reform this time, even at the cost of making high compensation to the TS holders. Hence, a higher level of state NTS ownership implies weaker bargaining power of the NTS holders. Panel A shows that before the reform, the average NTS ownership by the state is 34.5%.

Our measure of idiosyncratic risk is the standard deviation of residuals from a market model regression. To estimate the model, we use daily stock returns over the period from 260 trading days prior to up to 60 trading days prior to the first announcement of the reform. Or from, for new firms with less than one year of trading, one trading day after the IPO to 60 trading days prior to the announcement of the reform. The sample average is 2.1%. Firm operating performance is captured by return on assets (ROA). The sample average (median) is 5.0% (4.7%).

[23] 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 investments in privatized entities. So the British government structured its offers so that it was unlikely that investors would lose (Menyah, Paudyal, and Inyangete (1995)).

An average firm in our sample has 36.6% of their listed A-shares tradable (i.e., public float). Using a sample of over 900 SIPs around the world from 1977 through 2000, Megginson et al. (2004) show that in an average SIP, governments sell 35% of the SOE's capital. Thus, from the perspective of the extent of privatization during initial SIPs, the partially privatized SOEs in China before the reform are not unusual.

The 2005 reform started 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 reforms later in the sample period may have learned from what had happened before them, and that shareholders could also have formed some expectations regarding the size of compensation ratios. So we control for market learning by including the batch number in our baseline model in addition to year fixed effects.[24]

About 84.6% 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.[25]

Panel B presents the correlation matrix of the dependent variable and explanatory variables. As predicted by our model, there is a positive and significant association between the compensation ratio and state NTS holdings, a proxy for the weak bargaining power of NTS holders. There is also a positive and significant association between the compensation ratio and firm idiosyncratic risk, a proxy

[24] 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.

[25] 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 a 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.

for gains due to improved risk sharing. The correlation between the compensation ratio and firm performance is negative but not statistically significant. The correlation between the compensation ratio and the fraction of TS is negative and statistically significant. Overall, the extent of correlation among most pairs of control 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:

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

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

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 complete the split share structure reform. 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 positively and significantly associated with firm idiosyncratic risk. The economic implication of our finding is that an increase in firm idiosyncratic risk from the 25th percentile to the 75th percentile is expected to increase the compensation ratio by 0.005 shares.[26] The compensation ratio is strongly and negatively associated with firm operating performance (ROA) and the fraction of tradable shares. The economic implication of our finding is that an increase

[26] Although the economic significance of firm idiosyncratic risk on compensation ratios is small, it is worth noting that firm idiosyncratic risk is only our proxy for the potential gain in risk sharing due to the 2005 reform. As a result, it is more important to note the positive correlation between the compensation ratio and our proxy for the gain in risk sharing as predicted by our model, and is less of concern on the extent of the correlation.

in ROA from the 25th percentile to the 75th percentile is expected to decrease the compensation ratio by 0.008 shares, and an increase in the fraction of tradable shares from the 25th percentile to the 75th percentile is expected to decrease the compensation ratio by 0.039 shares. Overall, the results provide strong evidence in support 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. 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 classification. Using industry 1, Agriculture, as our baseline industry, we do not find any significant industry effects in determining compensation ratios.

Zhang, Wang, and Xia (2006) conduct one of the first studies examining the determinants of the compensation ratio. They find that the size of compensation is increasing in the fraction of NTS, the P/E ratio at the firm's IPO, and leverage, while decreasing in the net asset value per share. Wu et al. (2006) show that the compensation ratio is positively associated with the control power of the largest shareholder (measured by a nonlinear transformation of the largest shareholder holdings), ROA, and the fraction of NTS, and is negatively associated with institutional shareholding, and additional promises made by the NTS holders. Jin and Yuan (2006) focus on the role of corporate governance in determining the size of the compensation ratio, and find that there is a negative association between the quality of firm corporate governance structure (measured by a composite index) and the compensation ratio. They also demonstrate that the corporate governance effect is not through better board governance. Xin and Xu (2007) explore the role of regional development disparities in determining the compensation ratio, and conclude that firms in better developed regions are associated with lower compensation ratios. Despite different sample periods and samples, our key findings are consistent with prior work that the size of compensation is decreasing in firm performance measured in a variety of ways, and there is a negative (positive) association between compensation ratios and the fraction of TS (NTS).

Motivated by these earlier studies, models 2 – 4 are extensions to model 1 by adding other firm characteristics and measures of corporate governance. Under model 2, we add the market-to-book ratio, firm stock return over the year prior to the reform, and leverage, to our baseline specification in equation (10). Overall, the predicted relations between compensation ratios and state NTS holdings, firm idiosyncratic risk, ROA, and fraction of tradable shares, are supported by the data. Moreover, we find that the compensation ratio is negatively associated with stock return.

Under model 3, we add two measures of external governance mechanisms to model 2. All our model predictions are supported by the data. We also find that the compensation ratio is negatively associated with institutional TS holding, consistent with the findings in Wu et al. (2006), and Jin and Yuan (2006). 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). Further, we show that the compensation ratio is significantly and negatively associated with foreign investor access.

Under model 4, we add three measures of internal governance mechanisms to model 3. Again, we find consistent evidence in support of our model's predictions, although none of the three board characteristics is significantly associated with the compensation ratio. Jin and Yuan (2006) also obtain similar findings and suggest that the role of board governance is insignificant because independent directors in China are viewed as "trophy directors."

5.3 Supplemental Test

We take a two-pronged approach to assess the validity of conventional wisdom. First, we compare the compensation ratio based on the conventional wisdom using equation (9) with the actual compensation ratio. To estimate equation (9), we assume 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 (9). The average value for these alternative measures of the compensation ratio ranges from 0.476 to 1.101 while the average for the actual compensation ratio is 0.305. Panel B shows that the correlation between one of the derived compensation ratios and the actual compensation ratio is as low as 0.095. This provides the first piece of evidence that the conventional wisdom might not be able to explain the size of compensation ratios.

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

$$\begin{aligned} Compensation\ Ratio_i = {} & \alpha_0 + f_{industry} + f_{year} + \beta_1 (S / P_N) + \beta_2 Fraction\ of Tradable\ Shares_i \\ & + \beta_3 Batch_i + \beta_4 Plan\ Change_i + \beta_5 Additional\ Promise_i + e_i . \end{aligned} \tag{11}$$

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 a negative (and sometimes statistically significant) association between the compensation ratio and firm performance as measured by S/P_N, contradictory to the prediction of the conventional wisdom. The regression results in Panel C provide further evidence that the conventional wisdom fails to explain the size of compensation ratios.

5.4 Additional Investigation

We conduct extensive robustness checks on our main results and these analyses are reported in Table 4. We first present tests of our model using different samples. Since 1998, the stock exchanges have given "special treatment" to firms with deteriorating performance, and/or firms whose net asset value per share falls below its stock price, including imposing limits on daily stock price changes, and more stringent auditing requirements. The first column of Table 4, Panel A shows that removing these "special treatment" firms does not affect our main inferences. The second column of Panel A 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 third column of Panel A 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 36 of them meet our sample selection criterion. After excluding them, our main test results remain the same. The final column of Panel A presents the results using the full sample of firms where not only additional shares but other forms of compensation such as warrants, cash, and asset restructuring are used to compensate the TS holders. Our main inference remains unchanged with the exception that the positive association between compensation ratios and firm idiosyncratic risk is not statistically significant in models 2 and 3.

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 as suggested by Xin and Xu (2007). Table 4, Panel B reports the results. In the first column, we measure the bargaining power of the NTS holders using 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 B reports the regression results when we use an indicator variable for the state being the largest NTS holder 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 contrast to the findings of Xin and Xu (2007). We attribute the difference in results to the use of very different samples, and our inclusion of year and industry fixed effects, as well as the batch effects.

In summary, our test results provide strong support for our model's predictions that the compensation to TS holders is higher if the bargaining power of the NTS holders is lower, the gain in risk sharing is higher, if the firm performs poorly, or the fraction of TS is lower.

6. Conclusion

A fundamental question in finance is whether removing market frictions enhances efficiency. While basic economic theories predict efficiency gains after the removal of frictions, the heated debate on the benefit of market liberalization suggests that the use of inappropriate transition mechanisms may hurt the cause of market liberalization. This paper makes a rare comparison of different transition mechanisms by employing a general equilibrium model and using China's recent privatization experience (through the split share structure reform).

We first present a simple general equilibrium model with which we can assess the role of transition methods in privatization. We show that the standard SIP method applied to China in 2001 is not Pareto-improving. In contrast, the split share structure reform in 2005, which is essentially the standard SIP augmented with a compensation component, is Pareto-improving.

We then test the predictions of our model and of an alternative model based on conventional wisdom. Our empirical findings are consistent with our model predictions, while reject the key prediction from the conventional model. The compensation ratio is found to be positively related to the weak bargaining position of the non-tradable share holders and firm idiosyncratic risk, while negatively related to ROA and the fraction of tradable shares. Our main results are robust after controlling for other aspects of the reform and governance mechanisms. And our main inferences remain unchanged using different samples and different measures of the bargaining power of the NTS holders.

Our paper should be of great interest to researchers and policy-makers who are interested in how an economy with any sort of market friction transitions into a frictionless economy. As such, our paper contributes to the debate on whether and how market liberalization may benefit 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

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

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

It is readily verified that

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

and that

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

Since

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

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.

Proof for the claim that the gain from risk sharing is positively correlated with firm's idiosyncratic risk:

It is readily seen that

$$\frac{\partial[F(\alpha)-F(\alpha\pi/\lambda)]}{\partial\left(\sigma_d^2-\frac{\sigma_{dM}^2}{\sigma_M^2}\right)}=\frac{\alpha^2}{2}\left(\frac{\lambda^2-\pi^2}{\lambda^2}\right)>0,.\quad \frac{\partial\left[F(\alpha)-g\left(\alpha\frac{1-\pi}{1-\lambda}\right)\right]}{\partial\left(\sigma_d^2-\frac{\sigma_{dM}^2}{\sigma_M^2}\right)}=\frac{\alpha^2}{2}\left[\left(\frac{1-\pi}{1-\lambda}\right)^2+1\right]>0$$

Thus

$$\frac{\partial\gamma}{\partial[F(\alpha)-F(\alpha\pi/\lambda)]}=\frac{\partial\gamma/\partial\left(\sigma_d^2-\frac{\sigma_{dM}^2}{\sigma_M^2}\right)}{\partial[F(\alpha)-F(\alpha\pi/\lambda)]/\partial\left(\sigma_d^2-\frac{\sigma_{dM}^2}{\sigma_M^2}\right)}>0,$$

if and only if

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

Similarly,

$$\frac{\partial\gamma}{\partial\left[F(\alpha)-g\left(\alpha\frac{1-\pi}{1-\lambda}\right)\right]}>0,$$

if and only if

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

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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.

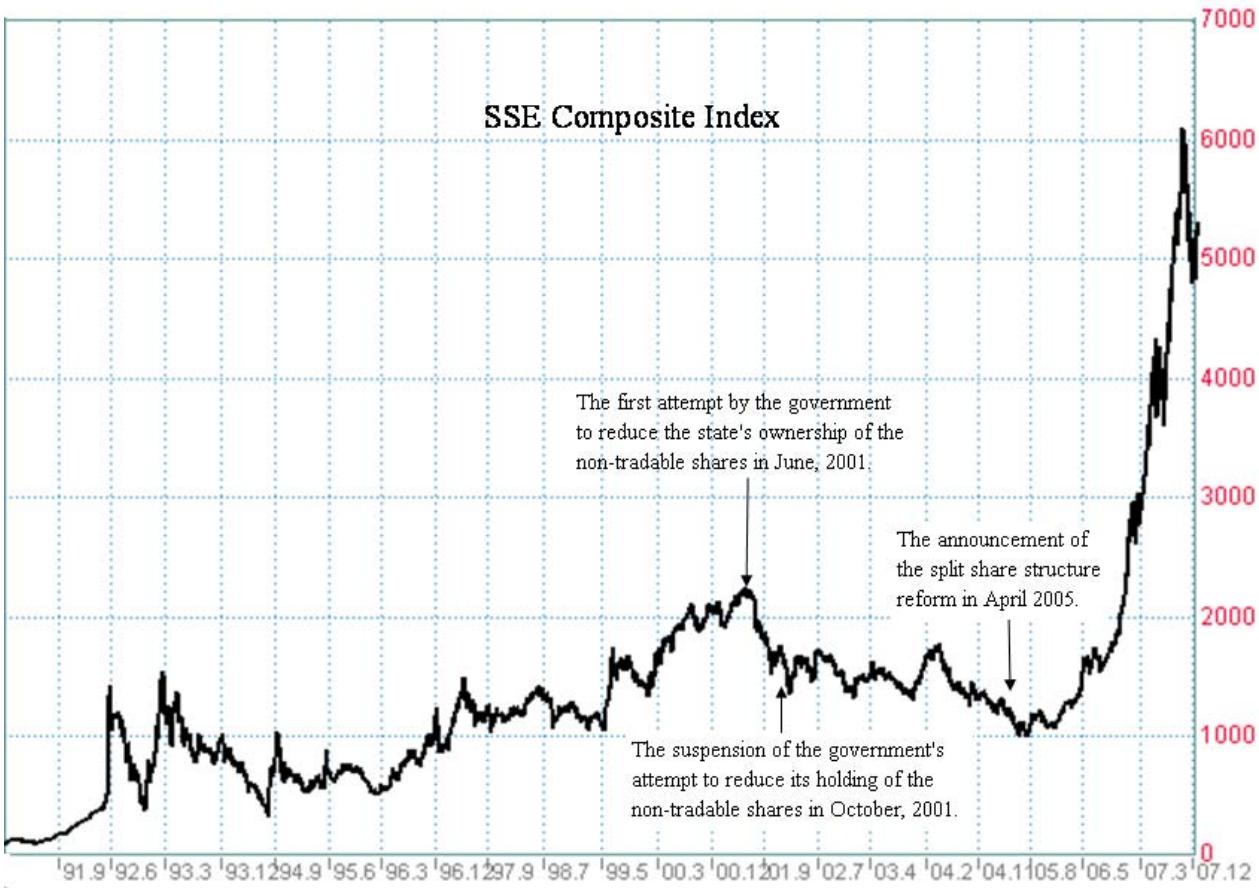
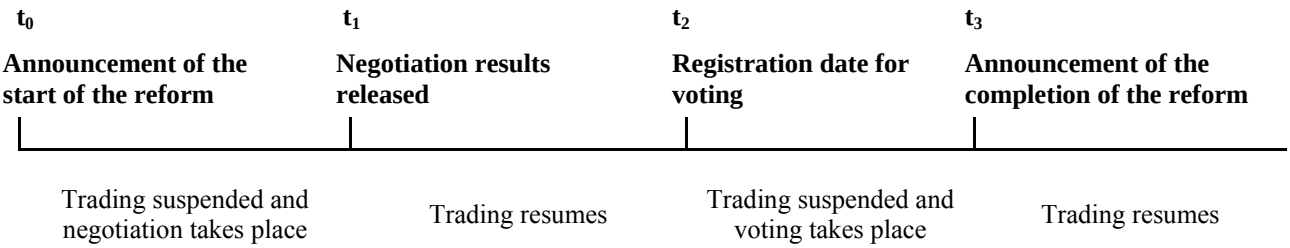
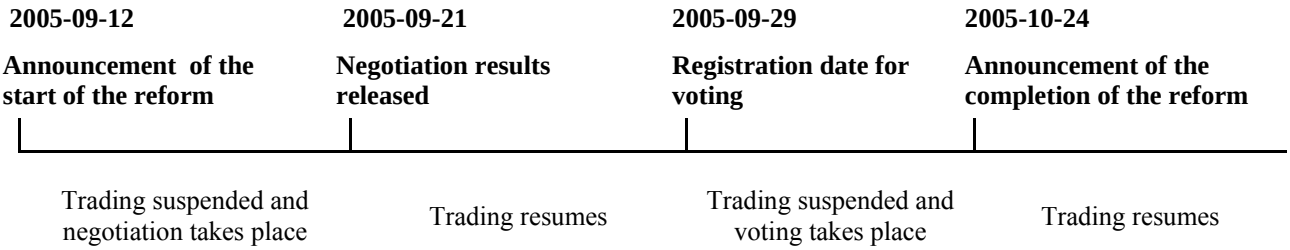


Figure 2
The Timeline of the Split Share Structure Reform

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 had 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 on or before 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 share holders 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 our key variables and only use additional shares as compensation to the TS holders. This leads to our final sample of 992 firms. Compensation ratio is the number of additional shares received by the TS holders from the NTS 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. Idiosyncratic risk is the standard deviation of the residual from the market model regression. ROA is the return on assets. Fraction of tradable shares is the number of tradable shares divided by the total number of A-shares outstanding before the reform. 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 key variables. We report the mean, standard deviation, median, as well as the 25^{th} and 75^{th} percentile values. Panel B presents the correlation matrix for the key 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	25th Percentile	Median	75th Percentile
Compensation ratio	992	0.305	0.070	0.280	0.310	0.350
State NTS holding	992	0.345	0.266	0.024	0.383	0.593
Idiosyncratic risk	992	0.021	0.006	0.017	0.020	0.024
ROA	992	0.050	0.081	0.022	0.047	0.084
Fraction of tradable shares	992	0.366	0.112	0.294	0.361	0.431
Batch	992	22.905	15.346	12.000	22.000	32.000
Plan change	992	0.846				
Additional promise	992	0.697				

Panel B: Correlation matrix for key variables

		1	2	3	4	5	6	7
1	Compensation ratio	**1.000**						
2	State NTS holding	**0.296**	**1.000**					
		0.000						
3	Idiosyncratic risk	**0.088**	**-0.133**	**1.000**				
		0.006	*0.000*					
4	ROA	**-0.024**	**0.061**	**-0.109**	**1.000**			
		0.449	*0.054*	*0.001*				
5	Fraction of tradable shares	**-0.504**	**-0.258**	**-0.134**	**-0.138**	**1.000**		
		0.000	*0.000*	*0.000*	*0.000*			
6	Batch	**-0.244**	**0.007**	**0.116**	**-0.475**	**0.143**	**1.000**	
		0.000	*0.834*	*0.000*	*0.000*	*0.000*		
7	Plan change	**0.147**	**0.223**	**-0.034**	**-0.087**	**-0.006**	**0.155**	**1.000**
		0.000	*0.000*	*0.282*	*0.006*	*0.841*	*0.000*	
8	Additional promise	**-0.089**	**0.014**	**-0.206**	**0.198**	**0.069**	**-0.195**	**0.028**
		0.005	*0.664*	*0.000*	*0.000*	*0.029*	*0.000*	*0.382*

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 our key variables and only use additional shares as compensation to the TS holders. This leads to our final sample of 992 firms. The dependent variable, compensation ratio, is the number of additional shares received by the TS holders from the NTS 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. Idiosyncratic risk is the standard deviation of the residual from the market model regression. ROA is the return on assets. Fraction of tradable shares is the number of tradable shares divided by the total number of A-shares outstanding before the reform. 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. M/B is the market capitalization divided by the book value of equity. Stock return is the buy-and-hold return over [−260, −60] trading days prior to the announcement of the reform or from one trading day after the IPO to 60 trading days before the reform for new firms with less than one year of trading. Leverage is total debt divided by total assets. Institutional TS holding is the tradable share ownership by institutional investors. 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 fixed effects 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***	0.048***	0.048***	0.049***
	[0.000]	[0.000]	[0.000]	[0.000]
Idiosyncratic risk	0.570*	0.682**	0.654**	0.671**
	[0.082]	[0.049]	[0.038]	[0.033]
ROA	-0.178***	-0.169***	-0.121***	-0.122***
	[0.000]	[0.000]	[0.000]	[0.000]
Fraction of tradable shares	-0.263***	-0.268***	-0.286***	-0.285***
	[0.000]	[0.000]	[0.000]	[0.000]
Batch	-0.001***	-0.001***	-0.001***	-0.001***
	[0.000]	[0.000]	[0.000]	[0.000]
Plan change	0.028***	0.026***	0.026***	0.026***
	[0.000]	[0.000]	[0.000]	[0.000]
Additional promise	-0.012***	-0.012***	-0.010**	-0.009**
	[0.005]	[0.005]	[0.016]	[0.020]
M/B		-0.001	-0.000	-0.000
		[0.485]	[0.860]	[0.873]
Stock return		-0.016**	-0.001	-0.001
		[0.045]	[0.877]	[0.945]
Leverage		-0.014	-0.008	-0.009
		[0.249]	[0.500]	[0.446]
Institutional TS holding			-0.085***	-0.086***
			[0.000]	[0.000]
Foreign investor			-0.026***	-0.027***
			[0.000]	[0.000]
CEO is COB				0.006
				[0.345]
Board independence				0.051
				[0.237]
Board size				0.001
				[0.357]
Intercept	0.394***	0.397***	0.405***	0.379***
	[0.000]	[0.000]	[0.000]	[0.000]
Year and Industry fixed effects	YES	YES	YES	YES
Number of Observations	992	992	992	992
Adjusted R-squared	0.392	0.395	0.427	0.427

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 our key variables and only use additional shares as compensation to the TS holders. This leads to our final sample of 992 firms. Compensation ratio is the number of additional shares received by the TS holders from the NTS holders for each tradable share held, and directly obtained from the compensation plan. Compensation ratioB is computed based on equation (9) 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 (9) 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. 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). Fraction of tradable shares is the number of tradable shares divided by the total number of A-shares outstanding before the reform. The split share structure reform took 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. 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. Stock return is the buy and hold return over [−260, −60] trading days prior to the announcement of the reform or from one trading day after the IPO to 60 trading days before the reform for new firms with less than one year of trading. Leverage is total debt divided by total assets. Institutional TS holding is the tradable share ownership by institutional investors. Foreign investor is set equal to one if the firm issues B-shares and/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 fixed effects 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	25th Percentile	Median	75th Percentile
Compensation ratio	992	0.305	0.070	0.280	0.310	0.350
Compensation ratioB	992	0.476	0.505	0.136	0.381	0.662
Compensation ratioC	992	1.101	0.419	0.835	1.045	1.299

Panel B: Correlation matrix for different compensation ratios

	Compensation ratio	Compensation ratioB
Compensation ratioB	**0.095**	**1.000**
	0.003	
Compensation ratioC	**0.443**	**0.538**
	0.000	*0.000*

Panel C: Explaining compensation ratio

	(1)	(2)	(3)	(4)
S/P_N	-0.005**	-0.004*	-0.002	-0.002
	[0.012]	[0.061]	[0.235]	[0.245]
Fraction of tradable shares	-0.300***	-0.304***	-0.322***	-0.322***
	[0.000]	[0.000]	[0.000]	[0.000]
Batch	-0.001***	-0.000**	-0.001***	-0.001***
	[0.001]	[0.045]	[0.000]	[0.000]
Plan change	0.033***	0.033***	0.032***	0.032***
	[0.000]	[0.000]	[0.000]	[0.000]
Additional promise	-0.016***	-0.015***	-0.012***	-0.012***
	[0.000]	[0.000]	[0.004]	[0.004]
Stock return		-0.023***	-0.003	-0.002
		[0.003]	[0.734]	[0.789]
Leverage		0.007	0.008	0.007
		[0.570]	[0.520]	[0.576]
Institutional TS holding			-0.096***	-0.098***
			[0.000]	[0.000]
Foreign investor			-0.028***	-0.029***
			[0.000]	[0.000]
CEO is COB				0.003
				[0.614]
Board independence				0.033
				[0.458]
Board size				0.001
				[0.321]
Intercept	0.424***	0.414***	0.431***	0.412***
	[0.000]	[0.000]	[0.000]	[0.000]
Year and Industry fixed effects	YES	YES	YES	YES
Number of Observations	992	992	992	992
Adjusted R-squared	0.342	0.347	0.390	0.389

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 our key variables and only use additional shares as compensation to TS holders. This leads to our final sample of 992 firms. The dependent variable, compensation ratio, is the number of additional shares received by the TS holders from the NTS 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. Idiosyncratic risk is the standard deviation of the residual from the market model regression. ROA is the return on assets. Fraction of tradable shares is the number of tradable shares divided by the total number of A-shares outstanding before the reform. 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. M/B is the market capitalization divided by the book value of equity. Stock return is the buy-and-hold return over [−260, −60] trading days prior to the announcement of the reform or from one trading day after the IPO to 60 trading days before the reform for new firms with less than one year of trading. Leverage is total debt divided by total assets. Institutional TS holding is the tradable share ownership by institutional investors. 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 using alternative samples. The first column presents the regression result by excluding the "special treatment" firms from our sample. The second column presents the regression result by removing firms with B-shares or H-shares from our sample. The third column presents the regression result by removing the two pilot batches from our sample. The final column presents the regression result using the full sample where other forms of compensation are also used. Panel B 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 NTS holder to proxy for the bargaining power of the NTS holders. Year and industry fixed effects 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: Alternative samples

	(1)	(2)	(3)	(4)
State NTS holding	0.045***	0.046***	0.053***	0.051***
	[0.000]	[0.000]	[0.000]	[0.000]
Idiosyncratic risk	0.780**	0.496	0.452	0.670**
	[0.013]	[0.103]	[0.236]	[0.037]
ROA	-0.139***	-0.114***	-0.134***	-0.107***
	[0.000]	[0.001]	[0.000]	[0.004]
Fraction of tradable shares	-0.285***	-0.285***	-0.277***	-0.270***
	[0.000]	[0.000]	[0.000]	[0.000]
Batch	-0.001***	-0.001***	-0.001***	-0.001***
	[0.000]	[0.000]	[0.000]	[0.000]
Plan change	0.028***	0.027***	0.031***	0.019***
	[0.000]	[0.000]	[0.000]	[0.003]
Additional promise	-0.010**	-0.009**	-0.007*	-0.010**
	[0.010]	[0.028]	[0.058]	[0.011]
M/B	-0.001	-0.001	-0.000	-0.000
	[0.649]	[0.628]	[0.910]	[0.918]
Stock return	0.006	-0.004	-0.005	-0.000
	[0.485]	[0.674]	[0.547]	[0.989]
Leverage	-0.016	-0.011	-0.007	0.008
	[0.114]	[0.347]	[0.518]	[0.525]
Institutional TS holding	-0.086***	-0.080***	-0.081***	-0.097***
	[0.000]	[0.000]	[0.000]	[0.000]
Foreign investor	-0.026***	-0.015	-0.024***	-0.026***
	[0.000]	[0.473]	[0.000]	[0.000]
CEO is COB	0.004	0.005	0.002	0.008
	[0.531]	[0.430]	[0.673]	[0.191]
Board independence	0.070	0.040	0.039	0.046
	[0.110]	[0.375]	[0.361]	[0.303]
Board size	0.001	0.001	0.001	0.000
	[0.351]	[0.392]	[0.492]	[0.961]
Intercept	0.379***	0.387***	0.375***	0.387***
	[0.000]	[0.000]	[0.000]	[0.000]
Year and Industry fixed effects	YES	YES	YES	YES
Number of Observations	911	906	956	1148
Adjusted R-squared	0.457	0.403	0.433	0.384

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

	(1)	(2)
State NTS holding/Fraction of non-tradable shares	0.035***	
	[0.000]	
State is the largest NTS holder		0.031***
		[0.000]
Idiosyncratic risk	0.645**	0.583*
	[0.039]	[0.058]
ROA	-0.121***	-0.120***
	[0.000]	[0.000]
Fraction of tradable shares	-0.309***	-0.310***
	[0.000]	[0.000]
Batch	-0.001***	-0.001***
	[0.000]	[0.000]
Plan change	0.025***	0.024***
	[0.000]	[0.000]
Additional promise	-0.009**	-0.009**
	[0.023]	[0.027]
M/B	-0.000	-0.000
	[0.918]	[0.981]
Stock return	-0.002	-0.002
	[0.850]	[0.797]
Leverage	-0.009	-0.010
	[0.430]	[0.394]
Institutional TS holding	-0.087***	-0.086***
	[0.000]	[0.000]
Foreign investor	-0.026***	-0.032***
	[0.000]	[0.000]
CEO is COB	0.006	0.005
	[0.329]	[0.402]
Board independence	0.054	0.054
	[0.209]	[0.206]
Board size	0.001	0.000
	[0.403]	[0.655]
Marketization		-0.000
		[0.654]
Intercept	0.387***	0.395***
	[0.000]	[0.000]
Year and Industry fixed effects	YES	YES
Number of Observations	992	992
Adjusted R-squared	0.434	0.438