Property Rights Protection, Information Acquisition, and Asset Prices: Theory and Evidence*

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Abstract

We study comovement of Chinese A and B shares (restricted to foreigners). A-B shares within firms commove surprisingly less than B- shares of different firms. Investor property rights protection (PRP), and several firms' opaqueness measures, explains these patterns. A reform allowing domestic investors into B-shares increases A-B comovement, specially for firms in low PRP cities. We offer a model with segmented markets where foreigners face information acquisition costs. In equilibrium, B-share prices are disconnected from fundamentals, lowering comovement with A- shares. Reducing market segmentation increases informed trading and A-B comovement, the more so for firms with higher initial information costs.

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How do legal and economic institutions affect information efficiency and asset prices? In an influential study, Morck, Yeung, and Yu (2000) find that stocks in the countries with poor property rights protection (PRP) exhibit a higher degree of price comovement. They conjecture that agents from these countries have less incentive to acquire and capitalize firm-specific information, thus less firm-specific information diffuses into asset prices. In the presence of market-wide noise trader risk, higher uncertainty translates into a large price impact of these shocks, thus leading to excess comovement unrelated to fundamentals. In this paper, we theoretically formalize their intuitions and test the predictions from our model using a novel set of identifications based on the within-country variations of local city-level PRP.

In China, 90 firms have issued both A-shares and B-shares to investors as of December 2008. These two classes of shares have the same voting rights and cash flow rights. The only difference between these two share classes is that B-shares were available only to foreign investors before February 19, 2001, whereas A-shares are available to domestic investors throughout the sample period. After February 19, 2001, domestic investors are allowed to invest and trade in B-shares using their personal funds from their foreign currency saving accounts (i.e., "2001 B-share market reform"). In the absence of any market frictions, and under full investor rationality, classical theories predict that A- and B-shares should move in lockstep, and thus have return correlation close to one.

It turns out that they do not. We find a surprisingly low price comovement between A-shares and B-shares of the same issuer. In fact, the typical return correlation between A- and B-shares issued by *the same firm* is even lower than the average B-share return correlation between shares issued by *different firms*. The lack of comovement between A-B shares of the same firm is remarkably robust, regardless of the choice of sample periods, return sampling frequencies, benchmark adjustment models, and statistical methods to calculate return correlations. This is reminiscent of the classical studies of anomalous price behaviors of so-called "Siamese twin" shares of firms listed and traded on different international exchanges (see, Rosenthal and Young (1990); Froot and Dabora (1999)). As in the studies of "Siamese twin" shares, A- and B-share structure allows us to almost perfectly isolate the fundamental from non-fundamental price comovement, and identify mechanisms through which the lack of comovement may occur.

To explain the lack of comovement of A- and B-shares, we first develop a simple dynamic model of information aggregation for the Chinese A- and B-share markets. Theoretically, market segmentation introduces non-trivial correlation structures among different securities. Take for instance two classes of shares, A-share (traded by domestic investors) and B-share (traded by foreign investors), each giving rights to the same dividends of firm 1. Suppose there is another claim for dividends of firm 2, which has an equivalent market segmentation between A- and B-shares. How will the correlation structure of these four securities look like? The correlation depends on the nature of the shocks as well as the information structure in each market. Innovations in firm-specific fundamentals drives the correlation between A and B shares of the same firm, with a magnitude positively related to the amount of private information capitalized into prices. On the other hand, investor-specific shocks provide a common source of variation in asset prices of *different firms* held by these investors. In line with the argument in Morck, Yeung, and Yu (2000), we model these innovations as correlated noise trading (supply shocks), which could be interpreted as changes in the risk-bearing capacity of a particular investor class. The price impact of noise trading however is negatively related to the amount of private information aggregated into prices, since informative prices reduce uncertainty and lower the price impact of supply shocks.

Our model delivers several immediate predictions and the most important one is that the price comovement between A- and B-shares of the same firm is lower for firms with higher information acquisition costs.[1] To better understand the effects of PRP, we study the comovement between A- and B-shares after the B-share market was partially opened to domestic investors. In our model, this is captured by allowing the informed domestic traders to freely enter the B-share market after the reform. As domestic investors enter the B-share market, the fraction of traders with firm-specific information increases, leading to higher comovement between A-B shares of the same firm. This effect, however, is smaller for firms with lower information acquisition costs for investors. This result arises naturally in a standard rational expectation equilibrium (REE) setup in which price informativeness (the signal/noise ratio of prices) is a monotonically increasing and concave function of the mass of traders with private information. It follows that a discrete increase in the measure of

[1] Jin and Myers (2006) also study cross-country price synchronicity. They provide a model stressing how lack of transparency resulting from insider expropriation leads to excess comovement. In our model, there is no insider expropriation and the market friction is mainly costly information acquisition. There is a growing body of literature that examines similar issues. For example, Fox et al. (2003) investigate the effect of mandatory information disclosure on pricing efficiency. Li et al. (2004) find that greater capital markets openness is associated with higher pricing efficiency in emerging markets, whereas goods market openness has no effect on pricing efficiency.

informed traders resulting from the B-share market reform of 2001 will have proportionally larger effects among firms with higher information acquisition costs.

We empirically test the model in Chinese A- and B-share markets in both cross-sectional and time-series context. In view of our model, the key identification assumption is that the observed variation of city-level PRP captures the difference in information acquisition costs faced by foreign investors. We provide evidence that city-level PRP is indeed significantly correlated with accounting transparency proxies in firms incorporated in those cities. Moreover, our cross-sectional evidence shows that PRP at the city-level positively affects the comovement of A- and B-shares. Firms incorporated in a city with better PRP exhibit higher comovement between A- and B-shares. Conversely, B-share comovement between different firms is higher for firms incorporated in cities with low PRP. Our evidence is in line with the results in Morck, Yeung, and Yu (2000) that countries with low PRP exhibit higher return comovement across different firms in excess of what can assigned to common macro-level shocks. Time-series evidence also confirms the predictions of the model. After 2001 B-shares market reform, the return comovement between A- and B-shares increases from an average of 0.494 to 0.694. Moreover, we also find that the increase in comovement is much smaller for firms located in cities with better PRP. Taken together, our empirical evidence provides strong support to the model's predictions.

While it is not the main focus of our study, our model also explains another well-known but distinct puzzle concerning the relative pricing of A-B shares, in which B-shares are traded at a discount (see, Chan, Menkveld, and Yang (2008), among others). We show that, all else equal, the expected return (risk premium) required for holding stocks is larger in the B-share than in the A-share market, and monotonically increasing in information acquisition costs faced by foreign investors. Intuitively, larger information acquisition costs lower the fraction of foreign traders that become informed. This reduces the informativeness of B-share prices and increases the uncertainty regarding future dividends held by the average trader in the B-share market. In sum, we provide a unifying framework that relate PRP, information acquisition costs, and asset price dynamics (i.e., level and comovement of asset prices in both time-series and cross-section).

We discuss an alternative explanation, "cash flow hypothesis", which may explain our findings. The cash flow hypothesis emphasizes the distinction between *de jure* cash flow rights and *de facto* cash flow rights. According to the hypothesis, although foreign investors should have the same cash flow rights as domestic investors on the basis of corporate bylaws and charters, local court may discriminate against foreigners. To the extent that the enforcement-based discrimination would be more severe in cities with low PRP, one would expect to see the difference in the valuation of the underlying firm. While the cash flow hypothesis can potentially explain relative valuation of A- and B-shares, it does not generate a clear prediction of A- and B-share price comovement. Moreover, when we formally test the hypothesis, we find it is related to relative pricing of A-B shares, but not return comovement.

Our paper contributes to several strands of the literature. First, to the best of our knowledge, we provide the first piece of within-country firm-level evidence on the effect of PRP and transparency on return comovement. Perhaps more importantly, we are able to disentangle fundamental from non-fundamental comovement. This research design complements a large body of literature of cross-country studies. Disentangling both sources of comovement is important yet difficult, except for a few cases such as index addition, deletion, and rebalancing. However, such research design is not suited for studying the effects of PRP on asset price comovement. The prior literature analyzing this issue typically relies on variation at the cross-country level. Focusing on city-level data within the same country reduces the likelihood that unobservable institutional and cultural factors may be driving the cross-country results. Moreover, the B-shares market reform in 2001 provides an additional source of identification based on a difference-in-difference strategy.

Second, by showing that PRP matters for asset prices, our research complements Chan, Menkveld and Yang (2008). They examine the determinants of the A-B share discount and show that measures of information asymmetry estimated using high-frequency data can explain this discount. Yet what explains information asymmetry in the first place? Our theoretical model and empirical evidence suggest that PRP is related to information acquisition costs. By showing that variation in PRP affects A-B shares discount, we not only validate the information-based theory, but provide evidence about its driver - information acquisition costs. Our results suggest that PRP affects foreign investors' incentive to acquire information, which affects the information asymmetry between foreign investors and domestic investors.[2]

Third, our paper also contributes to the broad literature that investigates the real effect of

[2]See Brennan and Cao (1997), Choe, Kho, and Stulz (1999), and Hau (2001), Seasholes (2000), Grinblatt and Keloharju (2000), Froot and Ramadorai (2001), and Kang and Stulz (1997) among many others for references.

property rights in finance. Johnson, McMillan, and Woodruf (2002) show that property rights affect firm's investment decisions, in particular reinvestment decisions, even if firms are not credit constrained. Cull and Xu (2005) confirm this idea using data from China. Our results suggest that when investors are not well protected, firms tend to engage in activities like earnings management which make account numbers less meaningful to investors; this, in turn, will make the stock price less informative, which may lead to resource misallocation.

The rest of the paper is organized as follows. Section I introduces the background of the equity market in China. Section II describes our model and generates the key empirical predictions. Section III describes the data and provides some summary statistics. The main empirical analysis is presented in Sections IV and V. Section VI considers and tests an alternative explanation – the difference between *de facto* and *de jure* cash flows. Section VII concludes. Appendix A provides details of the model's solution. Appendix B reports the robustness check results.

1 Background of Equity Market in Mainland China

China embarked on a series of economic reforms after 1979, one of which was to partially privatize the former state-owned enterprises (SOEs) through share issue privatization (SIPs). As a result, the number of total IPOs in China, most of which are SIPs, rose from eight in 1990 to 1,551 in 2008. A typical listed firm in China has two classes of shares outstanding: non-tradable shares and tradable shares. Non-tradable shares accounts for 63% of all outstanding shares on average. They are mainly held by the controlling shareholder in blocks and they cannot trade in the secondary stock markets. There are different types of listed firms, depending on the nature of controlling shareholders. If the controlling shareholder is a private firm, we call the listed firm a privately controlled listed firm. If the controlling shareholder is a local government agency or an SOE, we call it a state-controlled listed firm. On the other hand, tradable shares, held by domestic institutional investors and individual investors, are traded in one of the two securities markets: the Shanghai Securities Exchange (SHSE) and the Shenzhen Stock Exchange (SZSE), which were established in December 1990 and July 1991, respectively. Foreign shares, which are called B-shares, have been offered by 111 listed firms since late 1991 as a way to attract indirect foreign investment. Originally these B-shares were sold only to foreign individuals and institutions, and

Mainland Chinese individuals and institutional investors could not invest in B shares due to strict regulation. These B-shares are traded on the Mainland Chinese stock exchanges in a market that is separate from A-shares. Among these B-share firms, 90 firms have also issued A-shares to domestic investors. The A-shares and B-shares of a listed firm, although are traded in different and segmented markets, are legally identical in terms of cash flow rights and voting rights. The main difference is that all transactions, dividends, and trades are quoted in foreign currencies U.S. dollars for the Shanghai B-shares and Hong Kong dollars for the Shenzhen B-shares. In the following empirical analysis, we converted prices and returns denominated in foreign currencies into prices and returns denominated in domestic currency, RMB (i.e., Ren Min Bi). On February 28, 2001, the China Securities Regulatory Commission (CSRC), the counterpart of the Securities and Exchange Commission (SEC) in the United States, announced that domestic individual investors in China can invest in the B-shares market. However, compared with the market participation in the A-share market by domestic individual investors, the market participation in B-shares was somewhat limited, because of control over foreign currencies. Despite various reforms in the past decade, domestic institutional investors are still not allowed to invest in B-shares. The main reason is that the Chinese regulators have been concerned about foreign exchange risk exposure of the domestic financial institutions, as well as losing control over foreign exchange rates policies (Zhao and Xu, 2000). Overall, the B-shares market reform is best viewed as a partial market integration.

2 Model

We build a dynamic rational expectations equilibrium model to capture the essence of the asymmetric information problem across A and B-shares arising from the market segmentation.

2.1 Basic Setup

2.1.1 Firms, Dividends and Investors

There are two firms in the economy: $i = 1, 2$. Each firm issues two types of shares, $j = A, B$, for two different pools of investors: A-shares traded by domestic investors; and B-shares traded primarily by foreign investors. In line with the B-share market reform in 2001, we begin by assuming that A- and B-share markets are completely segmented prior to the reform, but that domestic investors can participate in the B-share market after the reform.

At the beginning of period $t+1$, firm i pays a dividend θ^i_{t+1} given by

$$\theta^i_{t+1} = \bar{\theta} + \epsilon^i_{t+1} + \mu^i_{t+1}, \tag{1}$$

where $\bar{\theta}$ is the average dividend; $\epsilon^i_{t+1} \sim \mathcal{N}(0, \sigma^2_\epsilon)$ is a firm-specific dividend component that can be observed by traders at the beginning of period t at a cost; and $\mu^i_{t+1} \sim \mathcal{N}(0, \sigma^2_\mu)$ is an unobservable firm-specific disturbance. We assume shocks ϵ^i_{t+1} and μ^i_{t+1} are independent and identically distributed (i.i.d.) over time and across firms.

Each firm faces two investor groups, domestic and foreign (in relative masses of α and 1) and start with initial wealth of W_0. Agents live for two periods: investors born in period t trade the asset at their birth and consume the dividend θ^i_{t+1} at the beginning of period $t+1$. Following Veldkamp (2006), we assume that stocks last one period and are constantly reissued and purchased by a new generation of investors. All investors can save and borrow unlimited amounts at the gross risk free rate normalized at $R = 1$. To retain tractability, we consider exponential preferences for consumption for both groups, with CARA coefficients of risk aversion given by γ_d and γ_f for domestic and foreign investors, respectively.

Domestic investors can observe ϵ^i_{t+1} at the beginning of period t at zero cost, while foreign investor $n \in [0,1]$ can observe this information at a private cost $c^{i,n}_t \sim log\mathcal{N}(\bar{c}^i_t, \sigma^2_c)$. We allow the mean of the (log) cost $\bar{c}^i_t$ to vary across firms and time. Cross-sectional variation in information acquisition costs for foreign investors is motivated by our later discussion about the different degrees of PRP across different cities in China. We also allow for time variation in the average cost to reflect the fact that foreign investors might become increasingly familiar with opaque accounting practices as time goes by, partially overcoming the informational barriers that separate them from the better informed domestic investors. The additional heterogeneity across different foreign investors n is convenient to ensure a unique interior solution in the mass of traders who purchase information, but is not essential for our results.

2.1.2 Asset Markets

Firms issue amounts of α and 1 shares for domestic (A-share) and foreign (B-share) investors, respectively. In addition, each period there is an exogenous realization of "noise trading" supply corresponding to $\alpha\chi_t^{i,A}$ and $\chi_t^{i,B}$ in domestic and foreign markets, where

$$\chi_t^{i,A} = \chi_t^A + \eta_t^{i,A}, \quad \chi_t^{i,B} = \chi_t^B + \eta_t^{i,B}, \tag{2}$$
$$\text{with} \qquad \chi_t^A, \chi_t^B \sim \mathcal{N}(0, \sigma_\chi^2), \text{ and } \eta_t^{i,A}, \eta_t^{i,B} \sim \mathcal{N}(0, \sigma_\eta^2).$$

We assume the supply innovations χ_t^j, which are common across all shares traded in type-j markets (and i.i.d. over time), are perfectly observable by all traders. The firm-specific and share type-specific innovations $\eta_t^{i,A}$ and $\eta_t^{i,B}$ are i.i.d. across firms and share types, and are unobservable to all agents.

This rather general characterization of noisy supplies allows for both innovations in investor-specific characteristics (i.e., liquidity shocks or variation in risk-bearing capacity) which are likely to be at least partially correlated among investor belonging to the same class (i.e., domestic vs. foreign), as well as firm- and share type- specific innovations. At the same time, the assumption of observability in investor-specific noise trading and unobservabilty of firm-/share type- noise retains the partially revealing property of prices as signals within a simple signal extraction problem.

2.2 Equilibrium

Let $H(\theta_{t+1}^i|\mathcal{F}_t) : \mathbb{R} \to [0,1]$ denote investors' posterior cdf of θ_{t+1}^i, conditional on an information set $\mathcal{F}_t$. A *competitive rational expectations equilibrium* in market (i, A) consists of demand functions $T_{d,t}^{i,A}(\epsilon_{t+1}^i, P_t^{i,A})$ of type-A shares by domestic investors; a price function $P_t^{i,A}(\epsilon_{t+1}^i, \chi_t^{i,A})$; and posterior beliefs $H(\theta_{t+1}^i|\epsilon_{t+1}^i)$ such that (i) demand is optimal given beliefs; (ii) the asset market clears for all realizations of the noisy supply $\chi_t^{i,A}$; and (iii) beliefs satisfies Bayes' rule. Similarly, a *competitive rational expectations equilibrium* in market (i, B) consists of demand functions $T_{d,t}^{i,B}(\epsilon_{t+1}^i, P_t^{i,B})$ of type-B shares by a fraction β of domestic investors, $T_{f,t}^{i,B}(\epsilon_{t+1}^i, P_t^{i,B})$ by a fraction λ_t^i foreign informed investors, and $T_{f,t}^{i,B}(P_t^{i,A}, P_t^{i,B})$ by a fraction $(1-\lambda_t^i)$ foreign uninformed investors; a price function $P_t^{i,B}(\epsilon_{t+1}^i, P_t^{i,A}, \chi_t^{i,B}; \lambda_t^i)$; and posterior beliefs $H(\theta_{t+1}^i|\epsilon_{t+1}^i)$ by domestic and foreign informed investors, and $H(\theta^i_{t+1}|P^{i,B}_t, P^{i,A}_t)$ by domestic uninformed investors such that (i) domestic investors make optimal information acquisition decisions; (ii) demands are optimal given beliefs; (iii) the asset market clears for all realizations of the noisy supply $\chi^{i,B}_t$; and (iv) beliefs satisfies Bayes' rule. We provide details of the solution in appendix A, stating here only the main results.

Proposition 1 (Asset market equilibrium) *There exists a unique linear equilibrium in the markets of A and B shares of firm i, characterized by the price functions*

$$P^{i,A}_t = \kappa^A_0 + \kappa^A_\chi \cdot \chi^A_t + \kappa^A_\epsilon \cdot \epsilon^i_{t+1} + \kappa^A_\eta \cdot \eta^{i,A}_t, \tag{3}$$

$$P^{i,B}_t = \kappa^{i,B}_{0,t} + \kappa^{i,B}_{\chi,t} \cdot \chi^B_t + \kappa^{i,B}_{pA,t} \cdot p^{i,A}_t + \kappa^{i,B}_{\epsilon,t} \cdot \epsilon^i_{t+1} + \kappa^{i,B}_{\eta,t} \cdot \eta^{i,B}_t, \tag{4}$$

where $p^{i,A}_t \equiv \epsilon^i_{t+1} + \frac{\kappa^A_\eta}{\kappa^A_\epsilon} \cdot \eta^{i,A}_t$ *is informationally equivalent to price* $P^{i,A}_t$*, and* $p^{i,B}_t \equiv \epsilon^i_{t+1} + \frac{\kappa^{i,B}_{\eta,t}}{\kappa^{i,B}_{\epsilon,t}} \cdot \eta^{i,B}_t$ *is informationally equivalent to price* $P^{i,B}_t$.

The standard solution method conjectures a linear price equilibrium in each market (equations (3) and (4)), for a given fraction of foreign informed investors λ^i_t. We then solve the implied learning problem and optimal demand functions, and find the linear price coefficients by imposing the market clearing condition. For market (i, A), this condition is given by

$$\alpha \frac{\mathbb{E}[\theta^i_{t+1}|\epsilon^i_{t+1}] - P^{i,A}_t}{\gamma_d \mathbb{V}[\theta^i_{t+1}|\epsilon^i_{t+1}]} = \alpha(1 + \chi^{i,A}_t), \tag{5}$$

which gives $P^{i,A}_t = \bar{\theta} - \gamma_d\sigma^2_\mu - \gamma_d\sigma^2_\mu \cdot \chi^A_t + \epsilon^i_{t+1} - \gamma_d\sigma^2_\mu \cdot \eta^{i,A}_t$. This equation makes clear that equilibrium prices in market (i, A) will be partially revealing about the firm-specific component ϵ^i_{t+1}, since demands of domestic traders are increasing in this information. Full revelation is prevented by the presence of exogenous and unobservable trading motives $\eta^{i,A}_t$, which have price impact since domestic investors require price concessions to absorb the additional supply when they face residual dividend risk (σ^2_μ).

The corresponding expression for market (i, B) can be written as

$$\alpha\beta\frac{\mathbb{E}[\theta^i_{t+1}|\epsilon^i_{t+1}] - P^{i,B}_t}{\gamma_d \mathbb{V}[\theta^i_{t+1}|\epsilon^i_{t+1}]} + \lambda^i_t \frac{\mathbb{E}[\theta^i_{t+1}|\epsilon^i_{t+1}] - P^{i,B}_t}{\gamma_f \mathbb{V}[\theta^i_{t+1}|\epsilon^i_{t+1}]} + (1-\lambda^i_t)\frac{\mathbb{E}[\theta^i_{t+1}|P^{i,B}_t, P^{i,A}_t] - P^{i,B}_t}{\gamma_f \mathbb{V}[\theta^i_{t+1}|P^{i,B}_t, P^{i,A}_t]} = 1 + \chi^{i,B}_t \tag{6}$$

This expression provides the generic form of the equilibrium in market (i, B). Setting $\beta = 0$ corresponds to periods prior to the 2001 securities reform, and $\beta = 1$ corresponds to periods after the ban is lifted for domestic investors. Note that foreign investors in market (i, B) can be either informed (purchase information ϵ^i_{t+1}) or uninformed. Foreign informed investors (a fraction λ^i_t) have identical beliefs as domestic investors and make no use of the endogenous price signals $p^{i,A}_t$ and $p^{i,B}_t$, while foreign uninformed investors update beliefs about the component ϵ^i_{t+1} from the observation of these signals.

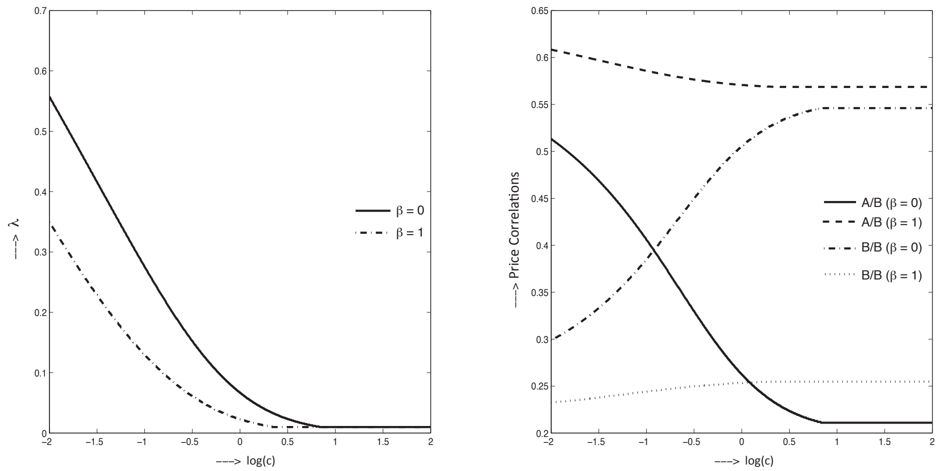
Whereas price $P^{i,A}_t$ is always informative about ϵ^i_{t+1}, price $P^{i,B}_t$ is only informative (above and beyond price $P^{i,A}_t$) to the extent that a positive measure of domestic investors purchase information ($\lambda^i_t > 0$). Moreover, the precision of the signal provided by price $P^{i,B}_t$ is increasing in λ^i_t. Grossman and Stiglitz (1980) show that whenever an interior solution for $\lambda^i_t \in]0, 1[$ is reached, the following relation must be satisfied:

$$\sqrt{\frac{\mathbb{V}[\theta^i_{t+1}|P^{i,A}_t, P^{i,B}_t; \lambda^{i,*}_t]}{\mathbb{V}[\theta^i_{t+1}|\epsilon^i_{t+1}]}} = \exp^{\gamma_f c^{i,*}_t}, \tag{7}$$

where $c^{i,*}_t$ is implicitly defined by $Prob(c^i_t \leq c^{i,*}_t) = \lambda^{i,*}_t$.

If the left hand side of equation (7) (the benefit of acquiring information) is lower than the right hand side (the utility cost of doing so) for a value $\lambda^i_t = 0$, then $\lambda^i_t = 0$ constitutes an equilibrium. If the inequality is reversed, then foreign investors will purchase information, and as the measure of informed investors grows larger the variance ratio shrinks. An equilibrium with an interior measure $0 < \lambda^i_t < 1$ is attained when the benefits are equated to the costs of information. If the benefits remain higher when all foreign investors have purchased the information, then $\lambda^i_t = 1$ constitutes an equilibrium. In our model, the assumed distribution for the costs of acquiring information for foreign investors ensures that an interior equilibrium is always reached, since there is always a positive mass of investors with costs arbitrarily close to zero, and always a positive mass of traders with arbitrarily high costs. It also follows immediately that the value of λ_t^i satisfying equation (7) is unique whenever the marginal cost of information is weakly increasing is the number of traders who acquire it.[3]

Figure 1: Market Segmentation and Asset Price Comovement



Notes: Panel (A) of Figure 1 plots the fraction of foreign traders deciding to purchase information (vertical axis) and the information acquisition costs (horizontal axis), during pre-reform period ($\beta = 0$) and post-reform period ($\beta = 1$). Panel (B) shows the correlation between A-B shares of the same firm (vertical axis) and the cost of purchasing information (horizontal axis), during pre-reform period ($\beta = 0$) and post-reform period ($\beta = 1$).

Panel a) of Figure 1 plots the equilibrium level of information acquisition (fraction $\lambda_t^{i,*}$) as a fraction of the mean (log) cost $\vec{c}_t^i$. As $\vec{c}_t^i$ increases, the fraction of foreign traders deciding to purchase information falls monotonically, and is higher for the pre-reform period ($\beta = 0$) for each value of $\vec{c}_t^i$. Intuitively, as domestic investors enter the B-share market, the informativeness of the price increases and the benefit of purchasing information falls. Panel b) shows the resulting correlations. The correlation between A-B shares of the same firm decreases monotonically with the cost of purchasing information, while the converse is true for the correlation between B-shares of different firms.[4] Compared with the pre-reform period, the correlation between A-B shares is higher after the securities reform at all levels of $\vec{c}_t^i$, while the correlation between B-B shares falls after the reform.

[3] Veldkamp (2006) focuses on the economies of scale in the market for information production, which generate multiplicity in the equilibrium mass of informed traders.

[4] The baseline assumption for the rest of the parameters are: $\bar{\theta} = 20$, $\sigma_\mu = 1$, $\sigma_\epsilon = 5$, $\sigma_\chi = 2.5$, $\sigma_\eta = 1.5$, $\gamma_d = \gamma_f = 1$, $\alpha = 1$. At each value of $\vec{c}_t^i$, the figure plots the implied correlation between B-B shares of firms with equal information costs.

2.3 Testable Predictions

2.3.1 Return comovement

Our dynamic model formalizes the prediction by Morck et al. (2000) that low PRP give little incentives to acquire firm-specific information, as firms operating in regions with opaque accounting practices (low PRP index) impose large information acquisition costs to foreign investors. This translates into lack of comovement between securities affected by the same fundamentals. The larger these costs, the lower the fraction of investors with firm-specific information, and hence the lower the comovement between A and B-type shares of the *same* firm. Moreover, noise trading shocks correlated across the same class of investors will induce comovement between the same type of shares of different firms held by these investors. The larger the information acquisition costs, the higher the uncertainty about firm-specific fundamentals and hence the larger the price impact of these correlated noise trading shocks. We now make these predictions explicit.

Prediction 1: *The correlation between A-B returns will be lower for firms operating in cities with low level of PRP.*

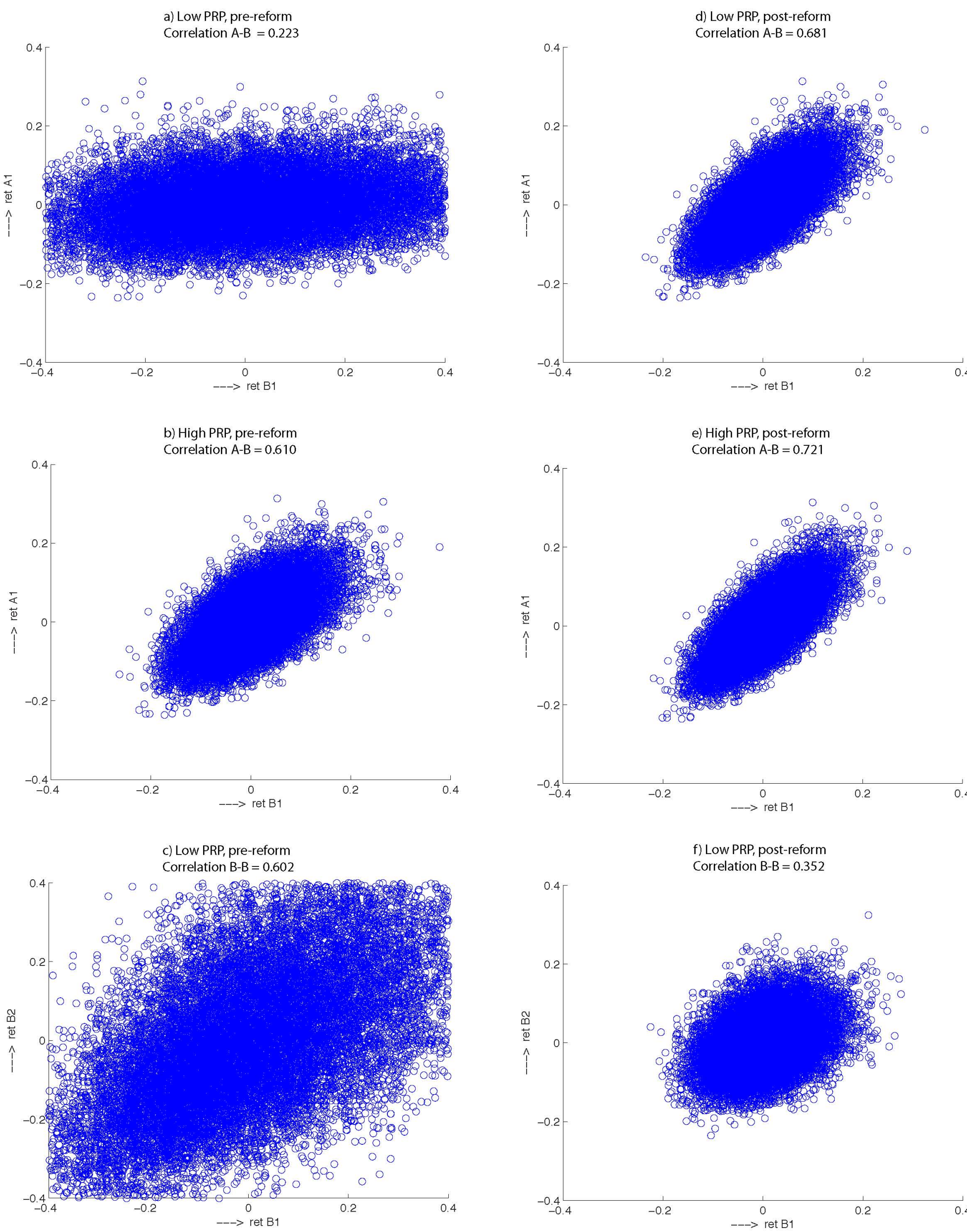
Prediction 2: *The correlation between A-B returns will increase for all firms after the B-share market reform of 2001, and it will increase more for firms operating in cities with lower level of PRP.*

Prediction 3: *The correlation between B-B returns will be higher for firms operating in cities with lower level of PRP.*

Prediction 4: *The correlation between B-B returns will decrease after the B-share market reform of 2001, and it will decrease more for firms operating in cities with lower level of PRP.*

Figure 2 is generated from a simulation of 20,000 period-returns. Panel a) through c) plot return correlations in different firms and markets before the securities reform of 2001 was passed ($\beta = 0$). Panel a) plots the joint returns of a given firm A and B shares, for the case of low property rights protection (i.e., high information acquisition (log) costs: $\bar{c}_t^i = 1$). Low property rights protection imply a low fraction of informed foreign traders in equilibrium, delivering a low correlation between A-B share of that firm. Panel b) shows how that correlation is higher for a firm in a high property rights protection city ($\bar{c}_t^i = -1.0$) as low average acquisition costs imply

Figure 2: Information Acquisition Costs, Market Segmentation, and Return Comovement



Notes: These figures plot simulated correlation between A- and B-shares return comovement with different combinations of information acquisition costs (i.e., different levels of property rights protection) and different fraction of domestic investors in B-shares market (i.e., before and after B-shares market return in 2001).

a large mass of informed foreign investors who capitalize firm-specific information into the share price in the B market. Hence, panels a) and b) together give rise to prediction 1. Panel c) shows that the return correlation between B-shares of two different firms, both located in zones with low PRP index, display relatively high correlation. Despite no fundamental links between these firms, correlated noise trading across them deliver large price correlation when uninformed domestic investors face considerable risk. Of course, the correlation is naturally lower for any two firms that have low information acquisition costs (not shown). This fact gives rise to prediction 2.

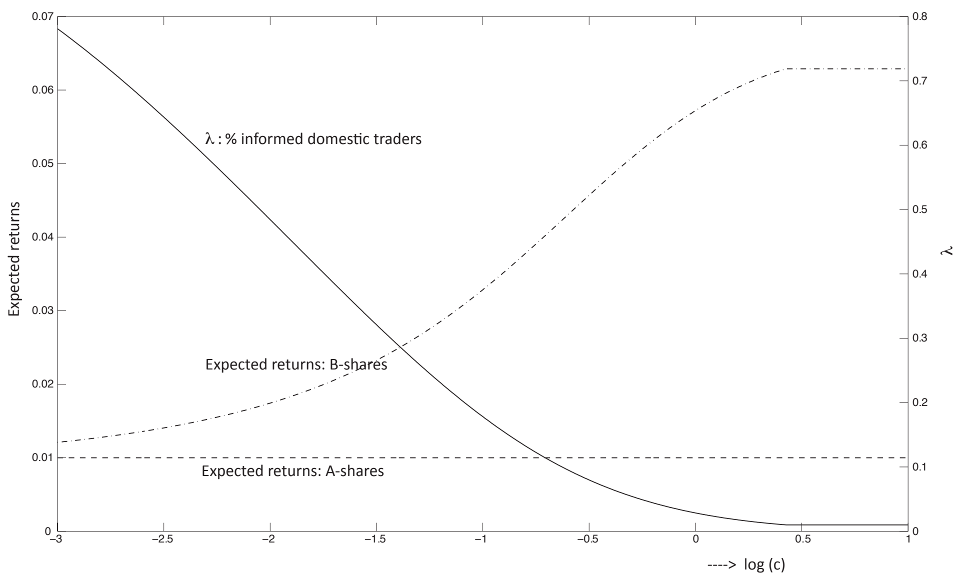
Panels d) through f) plot the correlations between the same firms and share types after the securities reform of 2001. In terms of the model, it corresponds to 20,000 simulations for a value of $\beta = 1$. Panel d) and e) show that the correlations between A-B shares increase for all firms, as stated in the first part of prediction 3, but the increase is relatively larger for firms initially located in regions with low levels of property rights protection (PRP), as stated in prediction 4. Panel f) shows how the correlation between B-B shares of different firms fall after the reform is passed and market segmentation is reduced, as suggested by the first part of prediction 4.

2.3.2 B-share Discount

Our model predicts that, all else equal, domestic investors will demand a larger premium for holding B-shares, as the conditional variance of dividends is higher for those investors which don't purchase the information ϵ_{t+1}^{i}. Chan et al. (2008) provide evidence consistent with this observation. The model also predicts that such discount should narrow in regions with high levels of property rights protection (PRP), as foreign investors find it cheaper on average to acquire information and bring their knowledge of future returns closer to domestic investors. Specifically, we calculate the ex-ante expected returns (risk premium) of holding different types of shares as the average difference between dividends and prices, divided by average dividends, or $(\bar{\theta} - \kappa_0^A)/\bar{\theta}$ for A-shares, and $(\bar{\theta} - \kappa_{0,t}^{i,B})/\bar{\theta}$ for B-shares.

It is straightforward to show that whenever the risk aversion of foreign investors is at least as large as that of domestic investors, κ_0^A is smaller than $\kappa_{0,t}^{i,B}$ for any firm i, whose underlying parameters in the model differ only in terms of the information acquisition costs (see, Appendix A). This is also illustrated in Figure 3 by comparing the horizontal dashed line which plots the return required for A-shares, and the returns required for B-shares. The level of risk aversion is set equal between domestic and foreign investors. Moreover, $\kappa_{0,t}^{i,B}$ is increasing in the mass of foreign traders that become informed, and therefore decreases monotonically in the level of information acquisition costs. Intuitively, as information acquisition costs increase (i.e., PRP declines), the fraction of foreign informed traders declines. Since there are fewer traders impounding information into the share price, the informativeness of prices is reduced and the uncertainty regarding forthcoming dividends increases for foreign traders that remain uninformed. In consequence, the required premium for holding the stock goes up. We formalize these comparative statics in the following prediction about A-B share relative price:

Figure 3: Fraction of Informed Investors, Information Acquisition Costs, and Expected Returns



Notes: Figure 3 plots the return required for A-and B-shares (vertical axis on the left), the fraction of foreign investors deciding to purchase information (vertical axis on the right), and the information acquisition costs (horizontal axis). The level of risk aversion is set equal between domestic and foreign investors.

Prediction 5: *The A-B share discount is positive whenever the risk aversion of foreign traders is larger or equal than the risk aversion of domestic traders, and larger for firms operating in cities with lower level of PRP.*

Prediction 6: *The A-B Share discount decreases after the B-share market reform of 2001, and it will decrease more for firms operating in cities with lower level of PRP.*

2.4 Summary

Our entire identification strategy exploits the fact that A-shares and B-shares issued by the same firm share the same fundamentals, thus allows us to cleanly quantify A-B share comovement and A-B share relative pricing that is unrelated to the differences in fundamentals. However, when we test the return correlation between one firm's B-shares with another firm's B shares, we do not enjoy such an advantage in perfectly isolating fundamental and market level macro shocks and other observed heterogeneities. Thus in our formal empirical tests, we focus on predictions 1, 2, 5 and 6.[5]

3 Data and Summary Statistics

Our sample consists of the 90 firms that have both A- and B-shares outstanding and are traded on the Shanghai and Shenzhen Stock Exchanges that have stock price data as well as basic financial information. Information on stock price, financial statement, and corporate governance structure is obtained from the China Stock Market and Accounting Research (CSMAR) database produced by GTA (i.e., "Guo Tai An") Information Technologies.

3.1 A measure of comovement

Following Morck, Yeung, and Yu (2000), we construct a non-parametric sign-based measure of return comovement between A- and B-shares issued by the same firm. It is defined as the number of times that the stock prices of A- and B-shares move in the same direction on the same day, divided by the total number of trading days in which both A- and B-shares move in either direction.[6]

Specifically, for A-share and B-share of firm i, we define:

$$\rho_{firm}(A_i, B_i) = \frac{\sum_t (I^{up}_{A,B} + I^{down}_{A,B})}{T_{A,B}}, \tag{8}$$

[5] In untabulated analysis, we find robust evidence that one firm's B share return correlation with other firms' B-shares is higher for the firm from cities with higher information acquisition costs, or low property rights protection (PRP), consistent with proposition (2). However, our empirical evidence on proposition (4) is not robust due to the identification issues discussed above.

[6] This measure has been widely used in the finance literature. Khanna and Thomas (2009) provide an up to date survey of recent work using this measure. Using conventional correlation statistics does not change our results. Appendix B presents results from these robustness checks. One advantage of this measure is that its estimate is less likely to be influenced by outliers and thus it is more robust.

where $I^{up} = 1$ if both returns are positive during a particular time period and $I^{up} = 0$ otherwise; I^{down} is defined analogously, and $T_{A,B}$ is the number of time periods in which both A- and B-shares stock prices move in any direction. $\rho_{firm}(A_i, B_i)$ is equal to zero if the two stock prices always move in opposite directions, and equals one if both stocks always move in the same direction.[7]

Because emerging markets typically have high market-wide comovement (Morck, Yeung and Yu (2000)), we adjust the A-B returns comovement by subtracting the market-wide comovement for each B-share firm. Moreover, adjusting A-B share return comovement by the market-wide comovement provides a natural benchmark, which makes the comparison among different pairs of A-B shares easier to interpret. In particular, for each listed firm i, we first calculate its B-shares comovement with any other B-shares, defined as $\rho(B_i, B_j)$, as follows:

$$\rho(B_i, B_j) = \frac{\sum_t (I_{i,j}^{up} + I_{i,j}^{down})}{T_{i,j}}, \tag{9}$$

To measure firm i comovement with the market, we take the median value of the pairwise comovement between firm i and firm j, $i \neq j$, which is defined as follows:

$$\rho_{market}(B_i) = median(\rho(B_i, B_j)), \quad i \neq j \tag{10}$$

Our key dependent variable, the market comovement adjusted for A- and B-shares comovement for firm i, is then defined as the logarithm of the one plus the difference between $\rho_{firm}(A_i, B_i)$ and $\rho_{market}(B_i)$, or

$$\rho(A_i, B_i) = log[1 + \rho_{firm}(A_i, B_i) - \rho_{market}(B_i)]. \tag{11}$$

The logarithmic transformation ensures that values of dependent variables are not bounded within by a finite interval, and the dependent variables have better econometric properties. However, our results are not sensitive to this transformation. Finally, using Tobit models and return comovement defined in equation (9) gives us similar results as well.

We further experiment a variety of alternative definitions. For example, we calculate the mean

[7] This sign-based measure is highly correlated with the conventional Pearson or Spearman correlation coefficients. For example, in our sample, the cross-sectional correlation of this sign-based measure and Pearson correlation measure is 0.73, while the correlation between this sign-based measure and Spearman correlation measure is 0.81.

value of pairwise comovement, the equally-weighted average of pairwise comovement, or the value-weighted average of pairwise comovement as the alternative measure of market-wide comovement for each listed firm, and our main results, reported in Appendix B are not qualitatively affected.

3.2 City-level property right protection index

The property rights protection index is taken from a survey conducted by the World Bank. In 2004, the World Bank, with the cooperation from the China National Bureau of Statistics, surveyed 12,400 industrial firms in 120 cities to evaluate the investment climate in each of these cities. Among the survey subjects, 8% are state-controlled firms, 28% are foreign invested firms, and the remaining 64% are domestic privately-controlled firms (Mako and Xu, 2006). To quantitatively assess property rights protection in each city, the survey asks respondents the following question:

> "... [a]mongst the commercial or other disputes that your company was involved with, what has been the likelihood (in terms of percentage) that your company's contractual and property rights (including enforcement) are protected?"

The outcomes from the survey are standardized to construct an index scaled between zero and one. A higher value of index means better property rights protection within the city. We adopt this index in our paper and use it to measure local city-level property rights protection.[8]

We will first make several general observations about the survey before discussing its application in our context. Institutional features like property rights protections are slow moving almost by definition. Therefore, in the same spirit of Acemoglu and Johnson (2005), it is reasonable to use the 2004 survey data to proxy for property rights protection over time in China. One concern, however, is that there have been a number of reforms in China over the past decade, so property rights protection may change over time. To partially alleviate this concern, we look into an earlier round of survey of 18 cities in China conducted by the World Bank. We then compare the survey results on property rights protection from two rounds of surveys.[9] The correlation between the

[8] Mako and Xu (2006) provide a detailed account of survey design, procedure, and implementation. To investigate the effect of contracting institutions on a firm's reinvestment decision, Cull and Xu (2005) use such an index from an earlier round of surveys conducted by the World Bank, which covers 18 cities in China.

[9] One caveat is in place. In the earlier round of survey, there was no question specifically designed to measure the property rights protection. However, in the early survey, there was one question very close to property rights protection: risk of expropriation by government (see, Cull and Xu (2005)).

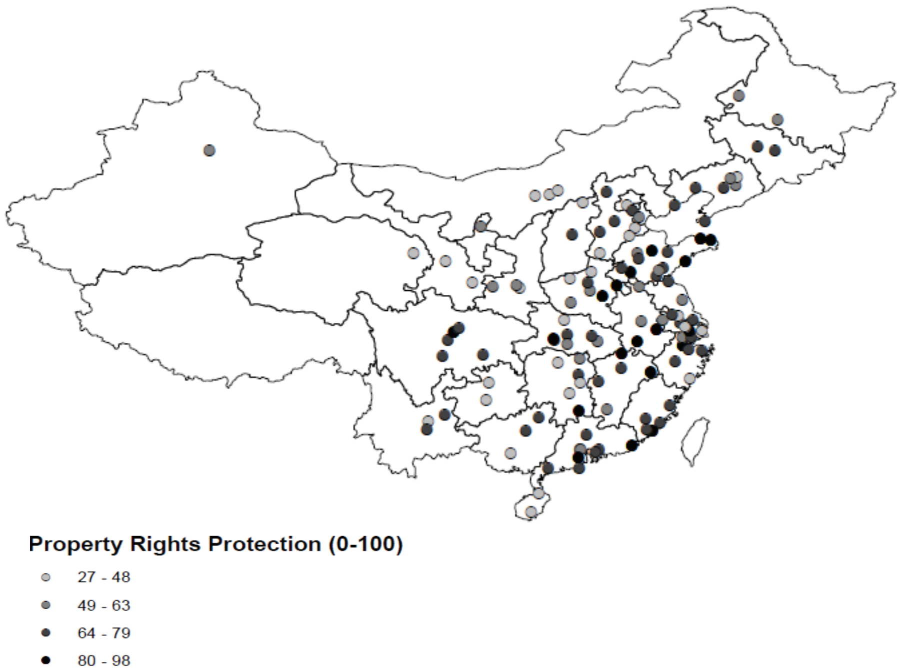
index values of the property rights protection measures from two rounds of surveys is 0.83. In addition, when we rank these 18 cities, we find that the correlation of rankings of city-level property rights protection from two rounds of surveys is 0.81. As the World Bank surveyed different sets of firms in two rounds of surveys, this correlation is strikingly high, and it illustrates the stability of institutional features such as property rights protections.[10]

Figure 4 plots the geographic distribution of the city-level property rights protection index values in Mainland China. The most striking feature is that there are considerable heterogeneities of property rights protections across geographic regions. If one compares inland versus coastal regions, it is easy to see that cities located within the "Pearl river delta" region adjacent to Hong Kong, or cities within the "Yangtze river delta" region adjacent to Shanghai and Nanjing usually have stronger property rights protections. In contrast, cities from inland areas such as Inner Mongolia, Ningxia, among others, usually have weaker property rights protections. However, there are quite number of exceptions. For instance, cities like Chengdu and Chongqing from the inland province of Sichuan have relative strong property rights protection; while cities like Haikou and Sanya from the coastal province of Hainan have relative week property rights protection.

We are able to match 94.4% (85 out of 90) of all firms issuing both A- and B-shares with corresponding city-level property rights protection index from the World Bank survey. The high coverage rate of World Bank survey of cities where the issuers of A- and B-shares are located is particularly comforting: it essentially eliminates potential sample selection bias. For instance, the median value of total assets for the full sample is 2.36 billion RMB, the median ROE is 5.66%, and the median independent director ratio is 23.4%. For the matched sample, the median total assets size is 2.38 billion RMB, the median ROE is 4.87%, and the median independent director ratio is 23.5%. All the differences are not statistically significant at conventional significance level. It is worthwhile to point out that the sample of cities covered by the World Bank survey and the sample of cities used in our study are very similar. Among 120 cities covered by the survey, the property rights protection index has a mean (median) value of 0.637 (0.667) on a scale between zero and one, and with a standard error of 0.168. In our matched sample, this index has a mean (median) value of 0.638 (0.665), with a standard error of 0.168. For the sample of cities covered

[10]We can only obtain 27 firms if we use early round of survey. It is not feasible to conduct meaningful cross-sectional analysis based on such a small sample.

Figure 4: Geographic Distribution of City-Level Property Rights Protection Index Values



Notes: This figure describes the geographic distribution of property rights protection index values based on the World Bank survey (Mako and Xu, 2006) within mainland China. Difference in shaded colors represents difference in the strength of property rights protection index values.

by the World Bank survey versus the sample of cities covered in our study, a simple nonparametric Wilcox rank test cannot reject the hypothesis that there is no significant difference between these two distributions at conventional statistical significance level. We conclude that potential sample selection bias is minimal in our sample of A- and B-shares.

3.3 Firm-level financial and corporate governance variables

From the GTA database, we collect several firm-level financial and corporate governance variables, including some standard variables such as return on equity (ROE), the percentage of independent directors to all directors, total assets (in logarithm, or *log(Total Assets)*), and state ownership status (*State Ownership* = 1, if it is a state-controlled listed firm; and 0, otherwise).

Special Profits is the ratio of non-operational profits scaled by total profits before taxes. We use *Special Profits* to measure possible earnings manipulation through related party transactions and other non-operational activities (see Bertrand, Mehta, and Mullainathan (2002), Chen and Yuan

(2004), and Jian and Wong (2010), among others). For example, a listed firm in China can sell assets at a huge premium to its related party (i.e., its controller or other firms controlled by the same controller), which may lead to high total pre-tax profits despite low operation profits.

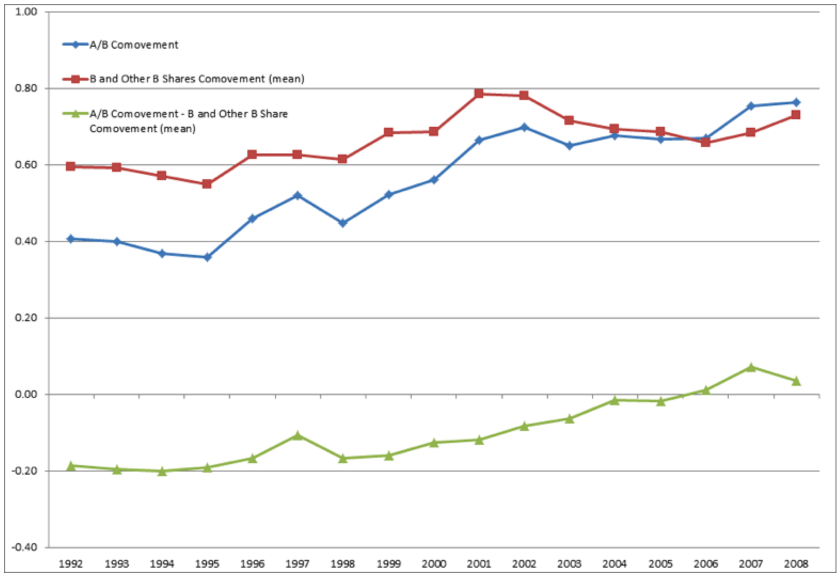
Following the procedure in Calomiris, Fisman, and Wang (2010), to construct a measure of personal political ties, we manually collected the resumes of senior managers for our 90 firms, which may be found on the website of SINA.COM (finance.sina.com.cn), a NASDAQ-listed internet content provider that provides comprehensive financial information on Chinese listed firms. These resumes provide details of career paths and, in particular, report whether the manager has served as the mayor or vice-mayor in the city where the company is located. Based on the text information, we define an indicator variable *Political Connection* that denotes companies that employ at least one such individual in its senior management. *Political Connection* equals one if the company is politically connected, and zero otherwise.

3.4 Discussion of Summary Statistics

Table 1 provides some summary statistics of these comovement measures. As shown in Panel A, during the whole sample period between 1992 and 2008, the mean (median) value of the A-B share comovement is 0.606 (0.603) with a standard error of 0.045, while the mean (median) value of comovement between the B-share and B-shares of other firms is 0.699 (0.704) with a standard error of 0.026. The mean (median) value of the market comovement adjusted A-B share comovement is -0.12 (-0.14) with a standard deviation of 0.05. One can reject the null hypothesis of $\rho(A_i, B_i) = 0$ at a 1% significance level, using either the t-test or the nonparametric Wilcoxon signed-rank test. In summary, the most striking pattern is that the comovement between A- and B-shares issued by *the same firm* is substantially lower than the average B-share correlations with B-shares issued by *different firms*.

The market-adjusted A-B share return comovement has considerable time-series and cross-sectional variation. Figure 5 plots the comovement between A-B shares of the same issuer, the comovement between B-share and B-shares issued by other firms, and the market-adjusted A-B share return comovement over the period between 1992 and 2008. Panel B in Table 1 illustrates the time-series patterns of the A-B share comovement around opening B-share market to domestic individual investors. Before opening B-share market to domestic individual investors on February

Figure 5: Time-Series A-B Share Average Comovement



Notes: This figure plots the year-by-year cross-sectional average of the A-B share return correlation, the cross-sectional average of the B-share return correlation with other B-shares, and the difference between the A-B share return correlation and B-share return correlation with other B-shares. The sample period is from 1992 to 2008.

19, 2001, the mean (median) of the market-adjusted A-B share return comovement is -018 (-0.18) with a standard deviation of 0.05. After opening the B-share market to domestic individual investors, the mean (median) of the market-adjusted A-B share return comovement increases to -0.03 (-0.03) with a standard deviation of 0.03. As one may have expected, the entry of domestic individual investors to the B-shares market coincides with the increase of the A-B share comovement, especially after 2004 when the average A-B share correlation approaches 0.80, and the average market-adjusted A-B share comovement essentially converges to zero.[11]

Panel C of Table 1 alludes to the main results of the paper: the market-adjusted A-B share return comovement is strongly affected by the local property rights protection of the cities where the firm is incorporated. The mean (median) value of the market-adjusted A-B share return

[11]Some readers may expect a much faster convergence after March 2001, when the China Securities Regulatory Commission (CSRC) allowed domestic investors to trade B-shares. However, Chinese domestic individual investors are not allowed to transact foreign currencies freely within the Chinese banking system. Before September 1, 2003, domestic individual investors can only buy up to $2,000 every year from the bank system, and additional purchases above this limit must be approved by the local Administration of Foreign Exchange, and purchases above $10, 000 must get approval from the State Administration of Foreign Exchange, which makes it almost impractical from an investor's perspective). After September 1, 2003, this limit was raised a bit higher to $5,000. On August 3, 2005, the government further loosened the restriction and raised the maximum to $8,000 per year. On May 1, 2006, this limit was again raised to $20,000 and then to $50,000 on February 1, 2007. In summary, the capital might have moved slowly toward the B-share market, which helps explain the slow convergence.

Table 1: Summary statistics

Panel A: Summary statistics, full sample

	Q1	Mean	Median	Std	Q3	N
A-B Share Comovement	-0.14	-0.1	-0.09	0.05	-0.06	80
Property Rights Protection	0.45	0.58	0.52	0.15	0.74	80
Log(GDP Per Capita)	10.02	10.02	10.25	0.5	10.32	80
GDP Growth Rate	8	18.38	18.38	19.01	18.38	80
ROE	-0.01	0	0.05	0.17	0.09	80
Log(Total Assets)	21.03	21.69	21.71	1	22.33	80
Log(Age)	2.2	2.3	2.4	0.2	2.44	80
log(Turnover Ratio)	1.18	1.38	1.38	0.33	1.59	80
Return Difference	-0.14	-0.08	-0.08	0.1	-0.01	80
Independent Director	0.21	0.25	0.24	0.06	0.27	80
State Ownership	0.08	0.27	0.26	0.2	0.43	80
Special Profits	0	0.39	0.12	0.74	0.49	80
Political Connection	0	0.14	0	0.35	0	80

Panel B: Summary statistics, by levels of city-level property rights protection

	Firm from cities with low property rights protection (N=40)					Firm from cities with high property rights protection (N=40)				
	Q1	Mean	Median	Std	Q3	Q1	Mean	Median	Std	Q3
A-B Share Comovement	-0.16	-0.12	-0.14	0.05	-0.09	-0.09	-0.07	-0.08	0.02	-0.06
Property Rights Protection	0.45	0.45	0.45	0.01	0.45	0.67	0.71	0.74	0.09	0.74
Log(GDP Per Capita)	10.25	10.15	10.25	0.3	10.25	9.59	9.88	10.32	0.62	10.32
GDP Growth Rate	18.38	22.8	18.38	20.43	18.38	8	13.96	8	16.56	14.7
ROE	-0.04	-0.02	0.03	0.18	0.07	0.01	0.03	0.08	0.16	0.11
Log(Total Assets)	21.05	21.69	21.76	0.97	22.33	20.96	21.69	21.63	1.05	22.3
Log(Age)	2.3	2.32	2.4	0.21	2.48	2.08	2.29	2.4	0.2	2.4
log(Turnover Ratio)	1.24	1.41	1.43	0.31	1.59	1.06	1.34	1.27	0.34	1.56
Return Difference	-0.17	-0.11	-0.1	0.07	-0.05	-0.11	-0.05	-0.03	0.12	0.02
Independent Director	0.21	0.25	0.24	0.07	0.26	0.22	0.25	0.24	0.05	0.28
State Ownership	0.11	0.29	0.3	0.18	0.44	0.04	0.26	0.24	0.21	0.4
Special Profits	0.04	0.58	0.19	0.88	0.78	0	0.19	0.05	0.51	0.23
Political Connection	0	0.2	0	0.41	0	0	0.08	0	0.27	0

Panel C: Summary statistics, by sub-sample periods

	Sample Period: 1992 to 2000 (N=73)					Sample Period: 2001 to 2008 (N=78)				
	Q1	Mean	Median	Std	Q3	Q1	Mean	Median	Std	Q3
A-B Share Comovement	-0.23	-0.18	-0.18	0.05	-0.14	-0.05	-0.03	-0.03	0.03	-0.02
ROE	0.03	0.05	0.08	0.14	0.12	-0.05	-0.01	0.03	0.2	0.1
Log(Total Assets)	20.78	21.29	21.31	0.76	21.86	20.96	21.84	21.77	1.12	22.55
Log(Age)	2.3	2.34	2.4	0.16	2.48	2.2	2.3	2.4	0.2	2.4
log(Turnover Ratio)	1.68	1.92	1.95	0.45	2.13	0.87	1.06	1.02	0.33	1.2
Return Difference	-0.14	-0.04	-0.04	0.21	0.1	-0.15	-0.09	-0.11	0.09	-0.03
Independent Director	0	0.01	0	0.04	0	0.42	0.48	0.46	0.08	0.52
State Ownership	0	0.31	0.36	0.25	0.53	0.09	0.26	0.26	0.19	0.42
Special Profits	0	0.25	0.1	0.49	0.24	-0.01	0.33	0.07	0.59	0.43
Political Connection	0	0.15	0	0.36	0	0	0.1	0	0.31	0

Notes: The market-adjusted A-B share return comovement is defined as the logarithm of one plus the A- and B-shares return correlation of firm i, minus the median of B-share return correlations with other B-shares of firm j, ji. Property Rights Protection is the city-level local property rights protection index value based on the World Bank Survey (2006). Log(GDP Per Capita) is the time-series average of inflation-adjusted city-level gross domestic product per capita in RMB. GDP Growth Rate is the time-series average of inflation-adjusted city-level gross domestic product per capita growth rate. ROE is the return on equity of the underlying issuer. Log(Total Assets) is the logarithm of the value of total assets in RMB. Log(Age) is the logarithm of the firm age since the founding date. Log(Turnover Ratio) is the logarithm of the A-shares turnover ratio to B-shares turnover ratio. Return Difference is the difference between A-share annual returns and B-share annual returns. Independent Director is the ratio of independent directors to all directors. State Ownership is the proportion of shares held by the state and state legal persons to total shares outstanding. Special Profits is the ratio of non-operating profits to total profits. Political Connection is an indicator variable denoting that the firm has at least one senior officer who was ever a mayor or vice mayor of a city (see Calomiris et al. (2010)). Firm-level control variables are all the time-series average values over the corresponding period. Panel A reports the summary statistics for the full sample; Panel B reports the summary statistics by levels of property rights protection of the city where the firm is incorporated; and Panel C reports the summary statistics by two subsample periods, 1992 to 2000 (before opening the B-share market to domestic investors), and 2001 to 2008 (after opening the B-share market to domestic investors).

comovement is −0.12 (−0.14) for firms incorporated in cities with weaker property rights protection, and −0.07 (−0.08) for firms incorporated in cities with stronger property rights protection.

Interestingly, compared with firms incorporated in cities with weaker property rights protection, firms incorporated in cities with stronger property rights protection seem to have higher return on equity (0.03 vs. −0.02), a lower likelihood of being controlled by the state (0.26 vs. 0.29), a lower fraction of non-operational profits to total profits (0.19 vs. 0.58), and weaker political connections (0.08 vs. 0.20). Firms incorporated in cities with strong and weak property rights protection do not differ significantly in terms of total asset size, age, and ratio of independent directors to the number of total directors. There is no significant difference in industry composition between these two subsamples (untabulated).

Our identification assumption is that PRP affects information acquisition costs. If firm-level transparency measures as more opaque accounting or managerial practices increases information acquisition costs, we expect to observe firms from cities with lower level of PRP should be less transparent. The above summary statistics are consistent with this observation. To explore this relationship more formally, we estimate the following two regressions:

$$Special\ Profits_i = \alpha + \beta \times PRP_i + \sum_j \gamma_j \times Controls_i + \epsilon_i \tag{12}$$

$$Political\ Connections_i = \alpha + \beta \times PRP_i + \sum_j \gamma_j \times Controls_i + \epsilon_i \tag{13}$$

Table 2 shows that PRP is negatively related to both *Special Profits* and *Political Connection*, i.e., in cities with lower PRP index, firms are more likely to be politically connected and they are more likely to be involved in earnings management via related party transactions. Thus these results provide indirect but consistent evidence that lower level of property rights protection (PRP) is likely to be associated with higher information acquisition costs.

4 Local Property Rights Protection and Return Comovement

In this section, we first present the full-sample evidence relating property rights protection and firm opaqueness to the A-B share return comovement. Then we present some robustness checks. Finally, we will present subsample evidence using the 2001 regulatory reform as an exogenous policy shock

Table 2: Correlation Between Firm-level Transparency and Local PRP

	(1)	(2)
VARIABLES	Special Profits	Political Connection
Property Rights Protection	-0.010***	-0.005**
	(0.003)	(0.002)
GDP Growth	0.063	0.058
	(0.120)	(0.045)
GDP/Capita	-0.001	-0.001
	(0.002)	(0.001)
ROE	-0.054	0.021**
	(0.033)	(0.008)
Log(Assets)	0.127	0.076*
	(0.101)	(0.041)
Log(1+Age)	0.28	-0.089
	(0.268)	(0.141)
Log(Turnover Ratio)	-0.069	0.016
	(0.065)	(0.048)
Return Difference	0.111	0.126
	(0.101)	(0.128)
State Ownership	-0.28	0.206
	(0.226)	(0.131)
Constant	-0.081	-1.454
	(2.183)	(0.887)
Clustering	Firm and Year	Firm and Year
Fixed Effects	Industry and Year	Industry and Year
Observations	157	155
Adjusted R-squared	0.099	0.059

Notes: Table 2 correlates two firm-level transparency measures (special profits (column 1) and political connections (column 2)) with the level of property rights protection of the city in which the firm is incorporated. Special Profits is the ratio of non-operating profits to total profits. Political Connection is an indicator variable denoting that the firm has at least one senior officer who was ever a mayor or vice mayor of a city (see Calomiris et.al. (2010)). Property Rights Protection is the city-level local property rights protection index value based on the World Bank Survey (2006). Log(GDP Per Capita) is the time-series average of inflation-adjusted city-level gross domestic product per capita in RMB. GDP Growth Rate is the time-series average of inflation-adjusted city-level gross domestic product per capita growth rate. ROE is the return on equity of the underlying issuer. Log(Total Assets) is the logarithm of the value of total assets in RMB. Log(Age) is the logarithm of the firm age since the founding date. Log(Turnover Ratio) is the logarithm of the A-shares turnover ratio to B-shares turnover ratio. Return Difference is the difference between A-share annual returns and B-share annual returns. State Ownership is the proportion of shares held by the state and state legal persons to total shares outstanding. Firm-level control variables are all the time-series average values over the corresponding period. The sample period is from 1992 to 2008. Robust standard errors are in parentheses, disturbance terms clustered by firm. *, **, and *** denote the coefficient estimates significant at the 10%, 5%, and 1% level, respectively.

that affects the composition of investors in the B-shares market.

4.1 Full Sample Evidence

Table 3 presents the main results of the paper by estimating the following regressions:

$$\rho(A_i, B_i) = \alpha + \beta \times PRP_i + \sum_j \gamma_j \times Controls_i + \epsilon_i \tag{14}$$

In all regression specifications, the dependent variable is the time-series average market-adjusted A-B share return comovement between January 1992 and December 2008, and the main variables of interests include the local property rights protection index of the city where the firm is incorporated, and two variables capturing the effects of firm opaqueness: non-operational profits to total profits and firm-level political connections. All regressions include industry-fixed effects.

Table 3: A-B share comovement and PRP

	Dependent Variables: Adjusted A-B Share Return Comovement								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Property Rights Protection	0.162***						0.117***	0.048***	0.044***
	(0.035)						(0.032)	(0.012)	(0.009)
Log(GDP Per Capita)	-0.019***						0.001	-0.013*	0.01
	(0.006)						(0.011)	(0.007)	(0.010)
Local GDP Growth Rate	0.0004*						0.0002	0.0005**	0.0004*
	(0.000)						(0.000)	(0.000)	(0.000)
ROE					0.009	-0.017	-0.027		-0.032*
					(0.024)	(0.025)	(0.019)		(0.017)
Log(Total Assets)					-0.003	-0.003	-0.001		0.0001
					(0.006)	(0.005)	(0.005)		(0.005)
Log(Age)					-0.161***	-0.156***	-0.141***		-0.161***
					(0.022)	(0.022)	(0.024)		(0.022)
Log(Turnover Ratio)				-0.0009		0.0138	0.00922		0.0135
				(0.024)		(0.018)	(0.016)		(0.016)
Return Difference				0.115*		0.0785*	0.0742**		0.0458
				(0.062)		(0.040)	(0.035)		(0.031)
Independent Director			0.185***			-0.027	-0.006		-0.043
			(0.061)			(0.080)	(0.069)		(0.062)
State Ownership			-0.0335			-0.0233	-0.0078		-0.0125
			(0.030)			(0.022)	(0.020)		(0.018)
Special Profits		-0.0260***				-0.0177***	-0.0127**		-0.0108**
		(0.006)				(0.007)	(0.006)		(0.005)
Political Connections		-0.0422***				-0.0390***	-0.0290**		-0.0308**
		(0.015)				(0.012)	(0.012)		(0.012)
Constant	-0.0076	-0.0818***	-0.135***	-0.0874***	0.336**	0.331**	0.172	-0.0016	0.147
	(0.074)	(0.006)	(0.019)	(0.032)	(0.148)	(0.130)	(0.133)	(0.081)	(0.117)
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	80	80	80	80	80	80	80	80	80
Adjusted R^2	0.245	0.167	0	-0.024	0.33	0.511	0.602	0.225	0.65

Notes: The dependent variables in all regressions are market-adjusted A-B share return comovement, defined as the A- and B-shares return correlation of firm i, minus the median of B-share return correlations with other B-shares of firm j, ji. Property Rights Protection is the city-level local property rights protection index value based on the World Bank Survey (2006). In columns (1) through (7), Property Rights Protection takes a continuous value. In columns (8) and (9), Property Rights Protection takes a value of one if the property rights protection index value is above the median value in the cross section, and zero otherwise. Reform is an indicator variable taking a value of one for all observations after 2001, and zero otherwise. Log(GDP Per Capita) is the time-series average of inflation-adjusted city-level gross domestic product per capita in RMB. GDP Growth Rate is the time-series average of inflation-adjusted city-level gross domestic product per capita growth rate. ROE is the return on equity of the underlying issuer. Log(Total Assets) is the logarithm of the value of total assets in RMB. Log(Age) is the logarithm of the firm age since the founding date. Log(Turnover Ratio) is the logarithm of the A-shares turnover ratio to B-shares turnover ratio. Return Difference is the difference between A-share annual returns and B-share annual returns. Independent Director is the ratio of independent directors to all directors. State Ownership is the proportion of shares held by the state and state legal persons to total shares outstanding. Special Profits is the ratio of non-operating profits to total profits. Political Connection is an indicator variable denoting that the firm has at least one senior officer who was ever a mayor or vice mayor of a city (see Calomiris et.al. (2010)). Firm-level control variables are all the time-series average values over the corresponding period. The sample period is from 1992 to 2008. Robust standard errors are in parentheses, disturbance terms clustered by firm. *, **, and *** denote the coefficient estimates significant at the 10%, 5%, and 1% level, respectively.

Regression in column (1) relates a set of city-level characteristics, including the city-level property rights protection index values, the logarithm of time-series average GDP per capita, and the time-series average of annual GDP growth rate, to the market-adjusted A-B share return comovement. Taken together, these variables explain about 24% of the cross-sectional variation in the market-adjusted A-B share return comovement. The local property protection index value is positively related to the market-adjusted A-B share return comovement. The coefficient estimate is significant at a 1% level. The relationship is also economically sizable. A one-standard-deviation increase of local property rights protection index is associated with 0.0243 ($= 0.162 \times 0.15$), or 0.486 ($= 0.0243/0.05$) standard deviation increase in A-B share return comovement. Though the local city-level GDP per capita, and city-level GDP growth rates are related to A-B share return comovement in regression (1), they are no longer statistically significant after controlling for firm-level characteristics.

The regression in column (2) considers two firm-level firm opaqueness measures: special profits and political connections, and the A-B share return comovement. Both variables are statistically significant at a 1% level. Two firm-level firm opaqueness measures explain about 17% of the cross-sectional variation in the market-adjusted A-B share return comovement. A one-standard-deviation increase of non-operational profits to total profits decreases the market-adjusted A-B share return comovement by 0.01 ($= -0.026 \times 0.0.39$), or 0.20 ($= 0.0243/0.05$) standard deviation of the A-B share return comovement. The market-adjusted A-B share return comovement among politically connected firms on average is lower than non-connected firms by 0.0422, or 0.844 standard deviation of the cross-sectional variation of the market-adjusted A-B share return comovement.

The regressions in columns (3), (4) and (5) relate some corporate governance attributes the fraction of independent directors and state ownership status, the A-B share return difference and relative liquidity, and firm-level characteristics (return on equity, size, and firm age) to the market-adjusted A-B share return comovement. Interestingly, the logarithm of firm age is negatively correlated with the A-B share return comovement and significant at a 1% significance level. One interpretation of the result is that firm age captures firm opaqueness. Among the listed Chinese firms, older firms are more likely to be firms traditionally owned by the state or local government, which are plagued by convoluted organizational, structural, and ownership problems. These problems collectively increase the firm opaqueness, thus making them particularly costly for investors to value and contributing to the lower return comovement.

Column (6) collects all firm-level variables and regresses them against the market-adjusted A-B share return comovement. The adjusted R-squared of this regression is 0.51. Among the set of firm-level variables, the logarithm of firm age, *Special Profits* and *Political Connection* remain statistically significant at a 1% level or higher. Taken together, these variables indicate that it is reasonable to argue that firm opaqueness contributes to the low return comovement between A-B shares.

Compared with the regression specification in column (6), the regression in column (7) adds the city-level local property rights protection, GDP per capita in logarithm, and GDP growth rates. City-level local property rights protection remains statistically significant at a 1% level, and it largely retains its economical magnitude as well. The point estimate decrease from 0.162 in column (1) to 0.117 in column (7), but still remains sizable in an economic sense. A one-standard-deviation increase of local property rights protection index increases the A-B share return comovement by 0.0176 ($= 0.117 \times 0.15$), or 0.351 ($= 0.0176/0.05$) standard deviation of the market-adjusted A-B share return comovement.

In regressions (1) and (7), the city-level local property rights protection index takes continuous values between zero and one. As a robustness check, we also consider a discrete specification of the city-level local property rights protection. Specifically, we create a dummy variable, which equals one for all cases in which the property rights protection index value is below the cross-sectional sample median, and zero otherwise. As shown in columns (8) and (9), this discrete specification of the city-level local property rights protection delivers very consistent results in both statistical and economic significance. For example, after controlling for firm-level characteristics, on average, a firm incorporated in a city with an above-median property rights protection index value has an A-B share return comovement of 0.0439, or 0.878 ($=0.0439/0.05$) standard deviation higher than a firm incorporated in a city with a below-median property rights protection index value.

In summary, Table 3 shows that local property rights protection as well as firm-level opaqueness contribute to the A-B share return comovement. Though local property rights protection and firm-level opaqueness are related, one does not completely assume the other. It suggests that firm-level opaqueness may be one channel whereby local property rights protection affects the information acquisition of investors, and consequently affects the A-B share return comovement.

4.2 Robustness Check

To check the robustness of the results presented in the previous section, we consider several alternative definitions of the A-B share return comovement. These alternative definitions differ along several dimensions. The first dimension is the return sampling frequencies - daily returns vs. weekly returns. Weekly returns further address concerns about market microstructure induced noise. The second dimension is about the adjustment model- the mean or median correlation with other B-shares, or with other A-shares, or without adjustment of its comovement with the market. The third dimension is the method of calculating return correlations - sign-based versus Pearson correlation coefficients.

Appendix B of the paper reports the results based on some of these alternative definitions of the A-B share return comovement. In each of these alternative specifications, city-level local property rights protection is always statistically significant at a 5% level or higher. Among the two firm-level opaqueness measures, *Special Profits* is always statistically significant at a 5% level or higher for all specifications, whereas *Political Connections* is statistically significant at a 10% level or higher for four out of six specifications. Overall, it is fair to say that applying alternative specifications of the A-B share return comovement does not significantly affect the main results of the paper.

4.3 Subsample Evidence

In this section, we consider a regulatory reform that allows domestic individual investors to access the B-share market beginning February 19, 2001. The regulatory change provides a unique opportunity to study the following two issues. First, the entry of domestic individual investors on average introduces market-wide information, which was only relevant to domestic investors (i.e., A-share market information). The aggregation of A-share market information into B-share prices should increase the average comovement between A- and B-shares. Second, stocks with relatively small information acquisition costs due to stronger property rights protection and less firm opaqueness will have stock prices aggregating more firm-specific information. The entry of domestic investors, and their associated information sets, becomes less important. Therefore, after partial opening of B-shares to domestic investors, those stocks experience a smaller increase in return comovement.

Empirical results from Table 4 are consistent with these ideas. We first estimate the regression models in a way similar to regression equation (5) in the previous section, but break the sample into two subsample periods: January 1992 to January 2001, and February 19, 2001 to December 2008. Regressions in columns (1) and (2) show that stronger property rights protection of the city in which the firm is incorporated increases the market-adjusted A-B share return comovement in

Table 4: A-B share comovement and PRP, before and after B-share market reform

	Dependent Variables: Adjusted A-B Share Return Comovement				
	(1)	(2)	(3)	(4)	(5)
Property Rights Protection	0.206***	0.0499*	0.246***	0.210***	0.0644***
	(0.040	(0.027)	(0.031)	(0.030)	(0.009)
Property Rights Protection x Reform			-0.165***	-0.162***	-0.047***
			(0.036)	(0.034)	(0.010)
Reform			0.245***	0.239***	0.173***
			(0.022)	(0.036)	(0.027)
Log(GDP Per Capita)	-0.007	0.010	-0.007	0.001	0.008
	(0.011)	(0.008)	(0.007)	(0.008)	(0.007)
Local GDP Growth Rate	0.000	0.000	0.000	0.000	0.0003*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ROE	0.026	-0.019		0.003	-0.002
	(0.031)	(0.021)		(0.016)	(0.016)
Log(Total Assets)	-0.008	0.002		-0.003	-0.002
	(0.006)	(0.004)		(0.003)	(0.003)
Log(Age)	-0.088**	-0.016		-0.036*	-0.049***
	(0.042)	(0.014)		(0.018)	(0.018)
Log(Turnover Ratio)	0.017*	0.006		0.011	0.011
	(0.009)	(0.009)		(0.007)	(0.008)
Return Difference	0.029	0.010		0.027	0.008
	(0.032)	(0.028)		(0.025)	(0.022)
Independent Director	0.075	0.039		0.038	0.022
	(0.210)	(0.035)		(0.060)	(0.050)
State Ownership	0.031	-0.004		0.016	0.010
	(0.020)	(0.016)		(0.013)	(0.012)
Special Profits	-0.018*	-0.018***		-0.017***	-0.015***
	(0.010)	(0.006)		(0.005)	(0.005)
Political Connections	-0.027**	-0.018		-0.020***	-0.023***
	(0.012)	(0.011)		(0.008)	(0.008)
Constant	0.11	-0.199*	-0.262***	-0.193*	-0.169*
	(0.176)	(0.118)	(0.078)	(0.106)	(0.096)
Industry FE	YES	YES	YES	YES	YES
Sample Period	BEFORE	AFTER	FULL	FULL	FULL
Observations	73	78	151	151	151
Adjusted R^2	0.503	0.305	0.854	0.87	0.875

Notes: The dependent variables in all regressions are market-adjusted A-B share return comovement, defined as the A- and B-shares return correlation of firm i, minus the median of B-share return correlations with other B-shares of firm j, ji. Property Rights Protection is the city-level local property rights protection index value based on the World Bank Survey (2006). In columns (1) through (4), Property Rights Protection takes a continuous value. In column (5), Property Rights Protection takes a value of one if the property rights protection index value is above the median value in the cross section, and zero otherwise. Reform is an indicator variable taking a value of one for all observations after 2001, and zero otherwise. Log(GDP Per Capita) is the time-series average of inflation-adjusted city-level gross domestic product per capita in RMB. GDP Growth Rate is the time-series average of inflation-adjusted city-level gross domestic product per capita growth rate. ROE is the return on equity of the underlying issuer. Log(Total Assets) is the logarithm of value of the total assets in RMB. Log(Age) is the logarithm of the firm age since the founding date. Log(Turnover Ratio) is the logarithm of the A-shares turnover ratio to B-shares turnover ratio. Return Difference is the difference between A-share annual returns and B-share annual returns. Independent Director is the ratio of independent directors to all directors. State Ownership is the proportion of shares held by the state and state legal persons to total shares outstanding. Special Profits is the ratio of non-operating profits to total profits. Political Connection is an indicator variable denoting that the firm has at least one senior officer who was ever a mayor or vice mayor of a city (see Calomiris et al. (2010)). Firm-level control variables are all the time-series average values over the corresponding period. The full sample period is from 1992 to 2008. The first sample period is from 1992 to 2000; and the second sample period is from 2001 to 2008. Robust standard errors are in parentheses, disturbance terms clustered by firm. *, **, and *** denote the coefficient estimates significant at the 10%, 5%, and 1% level, respectively.

both sample periods, albeit the effect is much stronger prior to the regulatory change. Prior to the regulatory reform, a one-standard-deviation increase in property rights protection increases the market-adjusted A-B share return comovement by 0.618 standard-deviations (significant at a 1% level) and by 0.250 standard deviations after February, 2001 (significant at a 10% level). Similar to the full sample evidence, more opaque firms have lower comovement.

To evaluate the interaction effect of regulatory reform and city-level local property rights protection, columns (3) to (5) estimate the following difference-in-difference specification:

$$\rho(A_{it}, B_{it}) = \alpha + \beta_1 \times PRP_i + \beta_2 \times PRP_i \times Reform_t + \beta_3 \times Reform_t + \sum_j \gamma_j \times Controls_{it} + \epsilon_{it} \tag{15}$$

The dependent variables are the market-adjusted A-B share return comovement. The regression in column (3) presents the baseline results without firm-level controls. Regressions in column (4) and (5) add firm-level controls. The difference between the regressions in column (4) and (5) is that the property rights protection index in column (4) takes continuous values, whereas the property rights protection index in column (5) is a binary variable, which equals one if the local property index value is above the cross-sectional median, and zero otherwise.

Several observations can be made from Table 4. First, after the regulatory reform, the market-adjusted A-B share return comovement increases by 0.173 to 0.245, depending on the specification. The change is large in an economic sense, about 3.5 to 4.9 standard deviations of the pre-reform cross-sectional variations in the A-B share return comovement, and significant at an 1% significance level. Second, though the regulatory reform on average increases A-B share return comovement, firms incorporated in cities with stronger property rights protection experience smaller increases. For example, the change in the A-B share return comovement for firms from cities with above-median property rights protection index values is 0.0467, or 0.934 (=0.0467/0.05) standard deviations, less than the change in the A-B share return comovement for firms from cities with below-median property rights protection index values. These observations are precisely what our model predicts.

5 Local PRP and A-B Share Discount

Although A- and B-shares entitle the shareholders the same shareholder rights, such as voting and cash-flow rights, B-shares are usually traded at a discount relative to A-shares. This is the so-called "B-share discount puzzle." We want to emphasize that the A-B share discount puzzle, which has been studied in the prior literature, is conceptually distinct from the lack of comovement between A- and B-shares discussed in this paper. The A-B share discount puzzle is about the relative pricing of A- and B-shares. Lack of comovement between the A-B shares is about the relative price changes. Empirically, the correlation between the A-B share discount and the A-B share return comovement range between 0.30 to 0.40 during the sample period between 1992 and 2008.

Several arguments have advanced to explain the A-B share discount puzzle.[12] In particular, Chan, Menkveld, and Yang (2008) show that information asymmetry, estimated using structural models (Glosten and Harris (1988), Easley and O'Hara (1987)), explains the cross-sectional variations in the A-B share discount. Since information asymmetry itself is an outcome variable, which describes the ease of acquiring and accessing information, as well as the probability of investors encountering share manipulation and insider trading, property rights protection is particularly relevant here. In our model, B-share discount arises naturally as the conditional variance of dividends is higher for B-share investors which don't purchase the information.

5.1 Full Sample Evidence

Table 5 relates the A-B share discount to local investor protection and other firm- and city-level characteristics by estimating following regression:

$$Discount_{it} = \alpha + \beta \times PRP_i + \sum_j \gamma_j \times Controls_{it} + \epsilon_{it} \tag{16}$$

In all specifications, the dependent variable is the time-series average of the daily A-B share discount, which is defined as the logarithm of one plus the B-share price ($P^{i,B}$) minus the A-share price ($P^{i,A}$) over the B-share price, or

$$Discount_{it} = log(1 + \frac{P^{it,B} - P^{it,A}}{P^{it,B}}) \tag{17}$$

Clear from the definition, the larger is the value of $Discount_{it}$, the smaller is the A-B share discount. For regressions in columns (1) through (7), the property rights protection is a continuous variable; and for regressions in columns (8) and (9), the property rights protection is a binary

[12]For example, see Fernald and Rogers (2002), Eun et al. (2001), Karolyi and Li (2003), Mei et al. (2003), Chakravarty et al. (1998), and Chen et al. (2001), among others.

variable, taking a value of one if the property rights protection index value of the city where the firm is incorporated is above the cross-sectional median, and zero otherwise. All regressions include industry-fixed effects.

Table 5: A-B share discount and PRP

	Dependent Variables: A-B Share Discount								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Property Rights Protection	0.442***						0.256**	0.137**	0.087**
	(0.166)						(0.119)	(0.054)	(0.037)
Log(GDP Per Capita)	-0.103**						-0.041	-0.084*	-0.025
	(0.042)						(0.042)	(0.046)	(0.043)
Local GDP Growth Rate	0.0004						-0.000	0.001	0.000
	(0.001)						(0.001)	(0.001)	(0.001)
ROE					0.191	0.138	0.100		0.091
					(0.143)	(0.110)	(0.107)		(0.107)
Log(Total Assets)					0.086***	0.079***	0.085***		0.087***
					(0.023)	(0.020)	(0.020)		(0.020)
Log(Age)					-0.361***	-0.259***	-0.192*		-0.233**
					(0.115)	(0.093)	(0.104)		(0.107)
Log(Turnover Ratio)				-0.076		-0.07	-0.074		-0.064
				(0.107)		(0.096)	(0.084)		(0.086)
Return Difference				0.812***		0.423***	0.397**		0.342**
				(0.245)		(0.154)	(0.159)		(0.164)
Independent Director			0.626*			0.615*	0.712**		0.637*
			(0.335)			(0.317)	(0.310)		(0.319)
State Ownership			-0.322**			-0.323***	-0.299***		-0.312***
			(0.136)			(0.083)	(0.083)		(0.079)
Special Profits		-0.126***				-0.062***	-0.048***		-0.045***
		(0.020)				(0.019)	(0.017)		(0.017)
Political Connections		-0.034				-0.015	0.014		0.009
		(0.065)				(0.046)	(0.047)		(0.046)
Constant	-0.063	-0.775***	-0.899***	-0.660***	-1.863***	-1.861***	-1.910***	-0.074	-1.912***
	(0.441)	(0.027)	(0.103)	(0.140)	(0.663)	(0.595)	(0.572)	(0.475)	(0.579)
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	80	80	80	80	80	80	80	80	80
Adjusted R^2	0.189	0.217	0.149	0.199	0.428	0.621	0.641	0.188	0.644

Notes: The dependent variables in all regressions are A-B share discount, defined as the logarithm of one plus the time-series average of B-share price minus A-share price to B-share price or $\log(1+\frac{P_B-P_A}{P_B})$. Property Rights Protection is the city-level local property rights protection index value based on the World Bank Survey (2006). In columns (1) through (7), Property Rights Protection takes a continuous value. In columns (8) and (9), Property Rights Protection takes a value of one if the property right protection index value is above the median value in the cross section, and zero otherwise. Reform is an indicator variable taking a value of one for all observations after 2001, and zero otherwise. Log(GDP Per Capita) is the time-series average of inflation-adjusted city-level gross domestic product per capita in RMB. GDP Growth Rate is the time-series average of inflation-adjusted city-level gross domestic product per capita growth rate. ROE is the return on equity of the underlying issuer. Log(Total Assets) is the logarithm of the value of total assets in RMB. Log(Age) is the logarithm of the firm age since the founding date. Log(Turnover Ratio) is the logarithm of the A-shares turnover ratio to B-shares turnover ratio. Return Difference is the difference between A-share annual returns and B-share annual returns. Independent Director is the ratio of independent directors to all directors. State Ownership is the proportion of shares held by the state and state legal persons to total shares outstanding. Special Profits is the ratio of non-operating profits to total profits. Political Connection is an indicator variable denoting that the firm has at least one senior officer who was ever a mayor or vice mayor of a city (see Calomiris et al. (2010)). Firm-level control variables are all the time-series average values over the corresponding period. The sample period is from 1992 to 2008. Robust standard errors are in parentheses, disturbance terms clustered by firm. *, **, and *** denote the coefficient estimates significant at the 10%, 5%, and 1% level, respectively.

Regressions in columns (1), (7), (8), and (9) from Table 5 show that stronger local property rights protection attenuates the A-B share discount, with or without firm-level characteristics. The effect is statistically significant at 1% to 5% significance level, depending on the exact specifications. The economic effect of local property rights protection is sizable. For example, the standard deviation of the A-B share discount in the full sample period is about 0.10. As shown in column (9), compared to firms with below median local property rights protection, firms with above median local property rights protection reduce A-B share discount by about 0.0865.

Between two proxies of firm opaqueness, special profits (to total income) and political connections, a higher level of special profits is associated with a higher A-B share discount (significant at a 1% level). A one-standard-deviation increase of special profits to total income increases the A-B share discount by 0.033, or 0.33 standard deviations.

Smaller firms (measured by total asset size) and older firms on average have a larger A-B share discount. The relative liquidity of underlying shares (measured by A-share turnover to B-share turnover) does not seem to explain the cross-sectional variations in the A-B share discount.

5.2 Subsample Evidence

Columns (1) and (2) of Table 6 relate the A-B share discount to local investor protection and other firm- and city-level characteristics in two subsample periods: (1) January 1992 to January 2001 and (2) March 2001 to December 2008, respectively. Strong property rights protection significantly reduces the A-B share discount in the first subsample period, but does not significantly affect the A-B share discount in the second subsample period.

Columns (3) to (5) of Table 6 estimate the following regressions:

$$\begin{aligned} Discount_{it} = \alpha + \beta_1 \times PRP_i + \beta_2 \times PRP_i \times Reform_t + \beta_3 \times Reform_t \\ + \sum_j \gamma_j \times Controls_{it} + \epsilon_{it} \end{aligned} \tag{18}$$

$Reform_t$ is a binary variable, which equals one for all observations after B-share market 2001 reform, and zero otherwise. In column (3), property rights protection is a continuous variable; and in columns (4) and (5), property rights protection is a binary variable, taking value of one if the property rights protection index value of the city where the firm is incorporated is above the cross-sectional median, and zero otherwise.

Table 6: A-B share discount and PRP, before and after B-share market reform

	Dependent Variables: A-B Share Discount				
	(1)	(2)	(3)	(4)	(5)
Property Rights Protection	0.738***	-0.004	0.927***	0.663***	0.192***
	(0.216)	(0.151)	(0.206)	(0.195)	(0.055)
Property Rights Protection x Reform			-0.631**	-0.608***	-0.156**
			(0.250)	(0.208)	(0.060)
Reform			1.015***	0.856***	0.600***
			(0.148)	(0.149)	(0.106)
Log(GDP Per Capita)	0.034	-0.004	-0.007	0.019	0.041
	(0.057)	(0.037)	(0.040)	(0.039)	(0.042)
GDP Growth Rate	0.002	0.0004	0.002	0.001	0.001
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
ROE	0.034	0.170*		0.076	0.056
	(0.145)	(0.095)		(0.077)	(0.077)
Log(Total Assets)	0.166***	0.061***		0.098***	0.101***
	(0.035)	(0.019)		(0.016)	(0.016)
Log(Age)	0.535***	-0.2		0.046	0.011
	(0.194)	(0.125)		(0.139)	(0.131)
Log(Turnover Ratio)	-0.023	0.011		-0.019	-0.017
	(0.066)	(0.079)		(0.056)	(0.057)
Return Difference	0.188	0.285		0.291**	0.240*
	(0.160)	(0.186)		(0.124)	(0.122)
Independent Director	0.464	-0.039		0.182	0.128
	(0.363)	(0.226)		(0.200)	(0.201)
State Ownership	-0.369***	-0.232**		-0.312***	-0.331***
	(0.103)	(0.094)		(0.075)	(0.072)
Special Profits	-0.080*	-0.071*		-0.069**	-0.063**
	(0.047)	(0.037)		(0.032)	(0.032)
Political Connections	-0.047	-0.012		-0.040	-0.047
	(0.085)	(0.051)		(0.051)	(0.052)
Constant	-6.655***	-1.315**	-1.749***	-3.871***	-3.787***
	(1.000)	(0.605)	(0.408)	(0.578)	(0.587)
Industry FE	YES	YES	YES	YES	YES
Sample Period	BEFORE	AFTER	FULL	FULL	FULL
Observations	73	78	151	151	151
Adjusted R^2	0.538	0.468	0.714	0.811	0.811

Notes: The dependent variables in all regressions are A-B share discount, defined as the logarithm of one plus the time-series average of B-share price minus A-share price to B-share price or $\log(1 + \frac{P_B - P_A}{P_B})$. Property Rights Protection is the city-level local property rights protection index value based on the World Bank Survey (2006). In columns (1) through (4), Property Rights Protection takes a continuous value. In column (5), Property Rights Protection takes a value of one if the property rights protection index value is above the median value in the cross section, and zero otherwise. Reform is an indicator variable taking a value of one for all observations after 2001, and zero otherwise. Log(GDP Per Capita) is the time-series average of inflation-adjusted city-level gross domestic product per capita in RMB. GDP Growth Rate is the time-series average of inflation-adjusted city-level gross domestic product per capita growth rate. ROE is the return on equity of the underlying issuer. Log(Total Assets) is the logarithm of the value of total assets in RMB. Log(Age) is the logarithm of the firm age since the founding date. Log(Turnover Ratio) is the logarithm of A-shares turnover ratio to B-shares turnover ratio. Return Difference is the difference between A-share annual returns and B-share annual returns. Independent Director is the ratio of independent directors to all directors. State Ownership is the proportion of shares held by the state and state legal persons to total shares outstanding. Special Profits is the ratio of non-operating profits to total profits. Political Connection is an indicator variable denoting that the firm has at least one senior officer who was ever a mayor or vice mayor of a city (see Calomiris et al. (2010)). Firm-level control variables are all the time-series average values over the corresponding period. The first sample period is from 1992 to 2000; and the second sample period is from 2001 to 2008. Robust standard errors are in parentheses, disturbance terms clustered by firm. *, **, and *** denote the coefficient estimates significant at the 10%, 5%, and 1% level, respectively.

The regulatory reform in 2001 reduces the A-B share discount by at least 0.600 (see column (5)) and the effect is significant at a 1% level. The pre-reform cross-sectional standard deviation of the A-B share discount is about 0.287. It is easy to see that the reform has an economically sizeable impact on the A-B share relative pricing. However, there are also cross-sectional variations in the regulatory reform impact on the A-B share discount. The decrease in the A-B share discount is less pronounced for firms incorporated in cities with stronger property rights protection (t-statistic = -2.59), but still sizable ($0.444 = -0.156+0.600$) and statistically significant at a 1% level (F-statistic = 17.83). Finally, consistent with the results in subsample tests, local property rights protection no longer impacts the A-B share discount after the regulatory reform of 2001. Collectively, the above evidence suggests that partial opening of the B-share market attracts domestic investors, and the influx of domestic individual investors significantly reduces the difference of average information acquisition costs between domestic and foreign investors in the B-share market. However, for firms from cities with stronger property rights protection, because of the relatively small information disadvantage in the first place, the attenuation of difference of average information acquisition costs between domestic and foreign investors is relatively small. This lends support to the idea that property rights protection, through the information asymmetry channel, may have a real impact on asset prices.

6 Alternative Explanations

An alternative explanation, "cash flow hypothesis", is based on the difference between *de facto* and *de jure* cash flow rights. There are two types of difference between *de facto* and *de jure* cash flow rights. The first type of difference between *de jure* and *de facto* cash flow rights arises if domestic investors (A-share investors) and foreign investors (B-share investors) receive less dividends. Because of effectively different dividend streams, valuation of shares by domestic and foreign investors will be different.

The second type of difference is mainly about liquidating dividend instead of regular dividend. Many firms do not pay cash dividends on a regular basis.[13] If regular dividends are not attainable, liquidation value of the firm (as the liquidation dividend) will be a significant source of cash flow for investors, especially for the firms with higher likelihood of default. According to the "cash flow hypothesis", although foreign investors should have the same cash flow rights as domestic investors on the basis of corporate bylaws and charters, local court may discriminate against foreigners during the bankruptcy process. If the enforcement-based discrimination would be more severe in cities with poor property rights protection, one shall see a large difference in the valuation of the

[13] Recent empirical evidence includes Fama and French (2001) on U.S. firms, Twite et al. (2011) on Chinese firms, among others.

underlying firm.

In summary, through the *de facto* and *de jure* cash flow channel, the “cash flow hypothesis” can potentially explain the relationship between the level of property rights protection and A-B share discounts. However, the “cash flow hypothesis” runs into difficulty explaining the effect of property rights protection on return comovement. If information acquisition costs are irrelevant, it is difficult to imagine that in the presence of the same set of information about future cash flow, discount, dividends and default likelihood, A- and B-shares should adjust to such value relevant news differently in a systematical way.

Nevertheless we carry out the following empirical exercises. First, for each stock in our sample, we carefully check the dividend payment history, both regular dividend and special dividend, for A- and B-shares. We cannot find a single incidence in which A- and B-share investors receive differential treatment in dividend payments. Second, if one argues that foreign investors may be discriminated by the local court in the bankruptcy process, then the effect of property rights protection on A-B share discount and comovement should be more pronounced among firms with higher likelihood of default.

To test this idea, we obtain firm-level expected default frequency (EDF) from Moody’s-KMV, and ask the question whether firms with higher EDF are likely to experience larger discount and lower return comovement when the local property right protection is weak, , i.e., this alternative story suggests a positive interaction effect between PRP and EDF.[14]

Specifically, we estimate the following regressions for the full sample, before the reform, and after the reform:

$$\rho(A_i, B_i) = \alpha + \beta_1 \times PRP_i + \beta_2 \times PRP_i \times High\_EDF_i + \beta_3 \times High\_EDF_i + \sum_j \gamma_j \times Controls_{ij} + \epsilon_i \tag{19}$$

[14]The EDF measure is estimated from a modified framework of the structural model in Merton (1974) to incorporate the complexity of capital structures in the real business environments. More importantly, the distance to default measures calculated from the modified Merton’s model are mapped to the physical probabilities of defaults, using the empirical distribution of the real defaults. For an overview of the EDF credit measure, see Crosbie and Bohn (2003). A recent study by Correia, Richardson, and Tuna (2011) compares different predictors of default, and find that EDF provided by Moody’s-KMV outperform other default predictors.

$$Discount_i = \alpha + \beta_1 \times PRP_i + \beta_2 \times PRP_i \times High\_EDF_i + \beta_3 \times High\_EDF_i + \sum_j \gamma_j \times Controls_{ij} + \epsilon_i \quad (20)$$

where $High\_EDF$ equals one if the firm's EDF value is above median, and zero otherwise. Estimation results are provided in Table 7. Columns (1) to (3) show that the interaction term between the level of PRP and $High\_EDF$ has no effect on return comovement no matter which sample period we use. This suggests that the difference between *de facto* and *de jure* cash flow rights does not explain the cross-sectional and time-series variation in return comovement.

Table 7: Tests of cash flow hypothesis

	Dependent Variables: Adjusted A-B Share Return Comovement			Dependent Variables: A-B Share Discount		
	(1)	(2)	(3)	(4)	(5)	(6)
EDF	-0.050	0.004	0.003	-0.173	1.683	-0.268
	(0.030)	(0.066)	(0.048)	(0.429)	(1.663)	(1.113)
Property Rights Protection	0.072	-0.058	0.0285	0.216	-3.415	0.258
x EDF	(0.046)	(0.112)	(0.091)	(0.806)	(3.124)	(2.119)
Other Variables	As in Column (7), Table 2	As in Column (7), Table 2	As in Column (7), Table 2	As in Column (7), Table 4	As in Column (7), Table 4	As in Column (7), Table 4
Sample Period	FULL	BEFORE	AFTER	FULL	BEFORE	AFTER
Observations	85	36	49	85	36	49
Adjusted R^2	0.865	0.587	0.323	0.51	0.017	0.271

Table 7 reports the tests of cash flow hypothesis as an alternative explanation. In regressions (1) to (3), the dependent variables in all regressions are market-adjusted A-B share return comovement, defined as the A- and B-shares return correlation of firm i, minus the median of B-share return correlations with other B-shares of firm j, ji. The other variables are the same as in Table 2. In regressions (4) to (6), the dependent variables in all regressions are A-B share discount, defined as the logarithm of one plus the time-series average of B-share price minus A-share price to B-share price or $\log(1 + \frac{P_B - P_A}{P_B})$. The other variables are the same as in Table 4. EDF is the firm-level average EDF provided by Moodys-KMV.

Moreover, this is not an artifact of lack of statistical power in our empirical tests. Interestingly, when we look at the B-share discount in columns (4) to (6), we find that the interaction term positively and significantly affects this discount before 2001, i.e., firms located in cities with worse PRP index have lower B-share price relative to A-share price, and this effect is stronger when the default likelihood is higher; while this effect disappears after 2001. A plausible interpretation is that before B-share reform in 2001, because there is a perfect segmentation of the market, it is easier for the local courts to discriminate against foreign investors. After the reform, because both domestic and foreign investors trade B-shares, it is technically more difficult for the local courts to discriminate against foreign investors.

Overall our evidence suggests that while the difference between *de facto* and *de jure* cash flow rights may explain relative pricing of A-B shares, it does not explain the pattern of return comovement.

7 Conclusions

Legal and economic institutions -such as property rights protection and accounting transparency - affect investors' incentives and costs of acquiring information. In this paper, we study the link between property rights protections (PRP) and asset prices. We build a simple dynamic REE model with market segmentation where asset prices depend on both innovations in firm-specific fundamentals and noise trading shocks, which are partially correlated across investor classes. The relative contribution of these shocks into price fluctuations, and thus the correlation between different securities, depends on the capitalization of firm-specific information into prices. The model predicts that firms from cities with low levels of PRP exhibit relatively low correlation between different class of shares issued by the same firm, and relatively high correlation among the same class of shares across different firms.

Empirically, relying on some unique institutional features in the Chinese stock market, we study the return comovement and relative pricing of two classes of shares with identical voting rights and cash-flow rights but for different investor clienteles. This design allows us to almost perfectly disentangle non-fundamental comovement from fundamental comovement. We first document a surprisingly low return comovement between the A- and B-shares of the same firm, which is even lower than the average B-share correlations with B-shares issued by a different firm.

We find that local investor PRP of the city where the issuer is incorporated, and several firm opaqueness measures such as special profits and political connections, explain the cross-sectional variations in the low A-B share return comovement. However, we find no evidence that either property rights protection or firm opaqueness can subsume one another to explain the cross-sectional variation in the A-B share return comovement. We interpret the evidence that supports the view that firm opaqueness is one channel through which investor protection affects investor acquisition of firm-specific information. The intra-country firm-level evidence complements prior cross-country evidence in Morck et al. (2000) and Jin and Myers (2006), and provides further empirical support for the proposed theoretical model. As an identification strategy, we exploit a regulatory change in

Chinese capital markets in 2001 that allows domestic investors to purchase B-shares and perform a difference-in-difference analysis. We find that after the partial market integration, comovement increases; further, the increase in comovement is more prominent for firms located in cities with poorer property rights protection, which is consistent with Veldkamp's (2006) information acquisition model: For firms that have relatively small information acquisition costs (i.e., in cities with better property rights protection), their prices already aggregated a large chunk of firm-specific information before the reform in 2001, thus the entry of domestic investors, and their associated information sets, become less important or valuable for pricing efficiency.

Finally, we also find that local investor property rights protection and firm opaqueness explain the relative pricing of A-B shares (i.e., the "A-B share discount puzzle"). The B-share discount is much less pronounced for firms incorporated in cities with stronger property rights protection and more transparent firms. The evidence presented in this paper complements the finding in Chan et al. (2008) and illustrates that property rights protection and firm opaqueness affect the relative pricing of A-B shares through the channel of information acquisition costs.

References

Bailey, Warren, 1988, The value of dual-class shares: further evidence on the market value of cash dividends, *Journal of Finance* 43, 1143-1160.

Barberis, Nicholas., Andrei Shleifer, and Jeffrey Wurgler., 2005, Comovement, *Journal of Financial Economics* 75, 283-317.

Bertrand, M., P. Mehta, and S. Mullainathan, 2002, Ferreting out tunneling: An application to Indian business groups, *Quarterly Journal Economics* 117, 121- 148.

Brennan, Michael J., and H. Henry Cao, 1997, International portfolio investment flows, *Journal of Finance* 52, 1851-1880.

Calomiris, Charles W., Raymond Fisman, and Yongxiang Wang, 2010, Profiting from government stakes in command economy: Evidence from Chinese asset sales, *Journal of Financial Economics* 96, 399 - 412.

Chan, Kalok A., Albert J. Menkveld, and Zishu Yang, 2008, Information asymmetry and asset prices: Evidence from the foreign share discount, *Journal of Finance* 63, 159-196.

Chaney, Paul K., Mara Faccio, and David Parsley, 2010, The quality of accounting information in politically connected firms, *Journal of Accounting and Economics* 51, 58 - 76.

Chakravarty, Sugato, Asani Sarkar, and Lifan Wu, 1998, Information asymmetry, market segmentation and the pricing of cross-listed shares: Theory and evidence from Chinese A and B shares, *Journal of International Financial Markets, Institutions and Money* 8, 325 - 355.

Chen, Kevin., and Yuan, Hongqi, 2004, Earnings management and resource allocation: Evidence from China's accounting-based regulation of rights issues. *Accounting Review* 79, 645-665.

Chen, Charles J.P., Zengquan Li, Xijia Su, and Zheng Sun, 2011, Rent-seeking incentives, corporate political connections, and the control structure of private firms: Chinese evidence, *Journal of Corporate Finance* 17, 229-243.

Chen, Gongmeng, Bong-soo Lee, and Oliver M. Rui, 2001, Foreign ownership restrictions and market segmentation in China's stock markets, *Journal of Financial Research* 24, 133-155.

Choe, Hyuk, Bong-Chan Kho, and René M. Stulz, 1999, Do foreign investors destabilize stock markets? The Korean experience in 1997, *Journal of Financial Economics* 54, 227-264.

Cull, Robert, and Lixin Colin Xu, 2005, Institutions, ownership, and finance: the determinants of profit reinvestment among Chinese firms, *Journal of Financial Economics* 77, 117 - 146.

DeAngelo, Harry, DeAngelo, Linda, 1985, Managerial ownership of voting rights: a study of public corporations with dual classes of common stock, *Journal of Financial Economics* 14, 33-69.

Doidge, C., 2004, U.S. cross-listings and the private benefits of control: evidence from dual-class firms, *Journal of Financial Economics* 72, 519-553.

Easley, David, Soeren Hvidkjaer, and Maureen O'Hara, 2002, Is information risk a determinant of asset returns?, *Journal of Finance* 57, 2185-2221.

Easley, David, and Maureen O'Hara, 1987, Price, trade size, and information in securities markets, *Journal of Financial Economics* 19, 69-90.

Eun, Cheol S., Sundaram Janakiramanan, and Bong-Soo Lee, 2001, The Chinese discount puzzle, Working paper, Georgia Tech University.

Faccio, Mara, 2006, Politically connected firms, *American Economic Review* 96, 369-386.

Fan, Joseph P.H., T.J. Wong and Tianyu Zhang, 2007, Politically connected CEOs, corporate governance, and Post-IPO performance of China's newly partially privatized firms, *Journal of Financial Economics* 84, 330-357.

John, Fernald, and John H. Rogers, 2002, Puzzles in the Chinese stock market, *Review of Economics and Statistics* 84, 416-432.

Raymond, Fisman and Yongxiang Wang, 2010, Trading favors within Chinese business groups, *American Economic Review, Papers and Proceedings* 100, 429-433.

Fama, Eugene F. and French, Kenneth R., 2001, Disappearing Dividends: Changing Firm Characteristics Or Lower Propensity To Pay?, *Journal of Financial Economics* 60, 3-43.

Fox, Merritt, Artyom Durnev, Randall Morck and Bernard Yeung, 2003, Law, share price accuracy and economic performance: The new evidence, *Michigan Law Review* 102, 331-353.

Froot, Kenneth A., and Emil M. Dabora, 1999, How are stock prices affected by the location of trade?, *Journal of Financial Economics* 53, 189-216.

Froot, Kenneth A., and Tarun Ramadorai, 2001, The information content of international portfolio flows, NBER Working Paper 8472.

Glosten, Lawrence R., and Lawrence E. Harris, 1988, Estimating the components of the bid-ask spread, *Journal of Financial Economics* 21, 123-142.

Greenwood, Robin, 2008, Excess comovement of stock returns: Evidence from cross-sectional variation in Nikkei 225 weights, *Review of Financial Studies* 21, 1153-1186.

Greenwood, Robin, 2005, Short- and long-term demand curves for stocks: Theory and evidence on the dynamics of arbitrage, *Journal of Financial Economics* 75, 607-649.

Grinblatt, Mark, and Matti Keloharju, 2000, The investment behavior and performance of various investor types: A study of Finland's unique data set, *Journal of Financial Economics* 55, 43-67.

Grossman, Sanford J., and Joseph E. Stiglitz., 1980, On the impossibility of informationally efficient markets, *American Economic Review* 70, 393-408.

Harris, Lawrence, and Eitan Gurel, 1986. Price and volume effects associated with changes in the S&P 500 list: New evidence for the existence of price pressures, *Journal of Finance* 41, 815-829.

Hau, Harald, 2001, Location matters: An examination of trading profits, *Journal of Finance* 56, 1959-1983.

Jian, Ming, and T. J. Wong, 2010, Propping through related party transactions, *Review of Accounting Studies* 15, 70-105.

Jin, Li, and Stewart C. Myers, 2006, R^2 around the world: new theory and new tests, *Journal of Financial Economics* 79, 257-292.

Johnson, Simon, John McMillan, and Christopher Woodruff. 2002. Property Rights and Finance, *American Economic Review* 92, 1335-1356.

Kang, Jun-Koo, and René M. Stulz, 1997, Why is there home bias? An analysis of foreign portfolio equity ownership in Japan, *Journal of Financial Economics* 46, 3-28.

Karolyi, G. Andrew, and Lianfa Li, 2003, A resolution of the Chinese discount puzzle, Working paper, Fisher School of Business, Ohio State University.

Khanna, Tarun, and Catherine Thomas, 2009, Synchronicity and firm interlocks in an emerging market, *Journal of Financial Economics* 92, 182-204.

Khanna, Tarun and Yishay Yafeh, 2007, Business groups in emerging markets: Paragons or parasites?, *Journal of Economic Literature* 45, 331-372.

Khwaja Asim and Atif Mian, 2005, Do lenders favor politically connected firms? Rent provision in an emerging financial market, *Quarterly Journal of Economics* 120, 1371-1411.

Leuz, Christian, Dhananjay Nanda, and Peter D. Wysocki, 2003, Earnings management and investor protection: an international comparison, *Journal of Financial Economics* 69, 505-527.

Li, Kan, Randall Morck, Fan Yang, and Bernard Yeung, 2004, Firm-specific variation and openness in emerging markets, *Review of Economics and Statistics* 86, 658-669.

Lynch, Anthony, and Richard R. Mendenhall, 1997. New evidence on stock price effects associated with changes in the S&P 500 index, *Journal of Business* 70, 351-383.

Mako, William, and Colin Xu, 2006, China governance, investment climate, and harmonious society: Competitiveness enhancements for 120 cities in China, Technical Report, Poverty Reduction and Economic Management, Financial and Private Sector Development Unit, World Bank.

Mei, Jianping, Jose A. Scheinkman, and Wei Xiong, 2003, Speculative trading and stock prices: An analysis of Chinese A-B share premia, Working paper, Bendheim Center for Finance, Princeton University.

Morck, Randall, Bernard Yeung, Wayne Yu, 2000, The information content of stock markets: Why do emerging markets have synchronous stock price movements?, *Journal of Financial Economics* 58, 215-260.

Nenova, T., 2003, The value of corporate voting rights and control: a cross-country analysis, *Journal of Financial Economics* 68, 325-351.

Rosenthal, L., Young, C., 1990, The seemingly anomalous price behavior of Royal Dutch/Shell and Unilever N.V./PLC, *Journal of Financial Economics* 26, 123-141.

Seasholes, Mark S., 2000, Smart foreign traders in emerging markets, Working paper, Harvard Business School.

Shleifer, Andrei, 1986, Do demand curves for stocks slope down?, *Journal of Finance* 41, 579-590.

Twite, Garry J., Shi, Jing, He, Xi and Li, Mingsheng, 2011, Stock Versus Cash Dividends: Signalling or Catering, Working Paper, Australian National University.

Veldkamp, Laura, 2006, Information markets and the comovement of asset prices, *Review of Economic Studies* 73, 823-845.

Vijh, Anand., 1994, S&P 500 trading strategies and stock betas, *Review of Financial Studies* 7, 215-251.

Zhao, Xijun and Rong Xu, 2000, Issues with the B-share market, *Studies in International Finance* 8, 18-25.

Appendix

Appendix A: Asset Market Equilibrium

Proof of proposition 1: We begin showing uniqueness of the linear equilibrium in the asset market for an exogenous level of information acquisition λ_t^i, and then show there exists a unique interior value $\lambda_t^{i,*}$ that characterizes the information acquisition equilibrium in equation (7). For the asset market, we start by characterizing trader's beliefs conditional on the conjectured price equations (3) and (4). It follows that ϵ_{t+1}^i and the endogenous signals $p_t^{i,A}$ and $p_t^{i,B}$ are jointly normally distributed according to

$$\begin{pmatrix} \epsilon_{t+1}^i \\ p_t^{i,A} \\ p_t^{i,b} \end{pmatrix} \sim \mathcal{N}\left(\begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}, \begin{pmatrix} \sigma_\epsilon^2 & \sigma_\epsilon^2 & \sigma_\epsilon^2 \\ \sigma_\epsilon^2 & \sigma_\epsilon^2 + (\frac{\kappa_\eta^A}{\kappa_\epsilon^A})^2\sigma_\eta^2 & \sigma_\epsilon^2 \\ \sigma_\epsilon^2 & \sigma_\epsilon^2 & \sigma_\epsilon^2 + (\frac{\kappa_{\eta,t}^{i,B}}{\kappa_{\epsilon,t}^{i,B}})^2\sigma_\eta^2 \end{pmatrix}\right).$$

From Bayes rule, the first two posterior moments of ϵ_{t+1}^i conditional on $p_t^{i,A}$ and $p_t^{i,B}$ are given by

$$\begin{aligned}
\mathbb{E}[\epsilon_{t+1}^i|p_t^{i,A}, p_t^{i,B}] &= p_t^{i,A}\frac{\sigma_\eta^{-2}(\frac{\kappa_\eta^A}{\kappa_\epsilon^A})^{-2}}{\sigma_\epsilon^{-2} + \sigma_\eta^{-2}((\frac{\kappa_\eta^A}{\kappa_\epsilon^A})^{-2} + (\frac{\kappa_{\eta,t}^{i,B}}{\kappa_{\epsilon,t}^{i,B}})^{-2})} + p_t^{i,B}\frac{\sigma_\eta^{-2}(\frac{\kappa_{\eta,t}^{i,B}}{\kappa_{\epsilon,t}^{i,B}})^{-2}}{\sigma_\epsilon^{-2} + \sigma_\eta^{-2}((\frac{\kappa_\eta^A}{\kappa_\epsilon^A})^{-2} + (\frac{\kappa_{\eta,t}^{i,B}}{\kappa_{\epsilon,t}^{i,B}})^{-2})}, \\
\mathbb{V}[\epsilon_{t+1}^i|p_t^{i,A}, p_t^{i,B}] &= (\sigma_\epsilon^{-2} + \sigma_\eta^{-2}((\frac{\kappa_\eta^A}{\kappa_\epsilon^A})^{-2} + (\frac{\kappa_{\eta,t}^{i,B}}{\kappa_{\epsilon,t}^{i,B}})^{-2}))^{-1}.
\end{aligned}$$

Replacing these moments in the market clearing condition (6) of market (i, B) , it is straightforward to compute the price coefficients of equation (4) (and those in equation (3)) through the method of undetermined coefficients:

$$\kappa_0^A = \bar{\theta} - \gamma_d \sigma_\mu^2, \;\; \kappa_\chi^A = \kappa_\eta^A = -\gamma_d \sigma_\mu^2, \;\; \kappa_\epsilon^A = 1;$$

$$\kappa_{0,t}^{i,B} = \bar{\theta} - \frac{\gamma_d \gamma_f \sigma_\mu^2 (\sigma_\mu^2 + 1/\tau_t^i)}{K_t^i}, \;\; \kappa_{\chi,t}^{i,B} = -\frac{\gamma_d \gamma_f \sigma_\mu^2 (\sigma_\mu^2 + 1/\tau_t^i)}{K_t^i},$$

$$\kappa_{\epsilon,t}^{i,B} = \frac{(\alpha\beta\gamma_f + \lambda_t^i \gamma_d)(\sigma_\mu^2 + 1/\tau_t^i) + (1-\lambda_t^i)\gamma_d \sigma_\mu^2 \tau_t^{i,B}/\tau_t^i}{K_t^i}, \;\; \kappa_{pA,t}^{i,B} = \frac{(1-\lambda_t^i)\gamma_d \sigma_\mu^2 \tau_t^{i,A}/\tau_t^i}{K_t^i},$$

$$\text{and} \;\; \kappa_{\eta,t}^{i,B} = \frac{-\gamma_d \gamma_f \sigma_\mu^2 (\sigma_\mu^2 + 1/\tau_t^i) + (1-\lambda_t^i)\gamma_d \sigma_\mu^2 \Delta_t^{i,B} \tau_t^{i,B}/\tau_t^i}{K_t^i},$$

$$\text{with} \;\; \Delta_t^{i,B} = \frac{-\gamma_d \gamma_f \sigma_\mu^2}{\alpha\beta\gamma_f + \lambda_t^i \gamma_d}, \;\; K_t^i \equiv (\alpha\beta\gamma_f + \lambda_t^i \gamma_d)(\sigma_\mu^2 + 1/\tau_t^i) + (1-\lambda_t^i)\gamma_d \sigma_\mu^2,$$

$$\tau^A \equiv \sigma_\eta^{-2}(\gamma_d \sigma_\mu^2)^{-2}, \;\; \tau_t^{i,B} \equiv \sigma_\eta^{-2}(\Delta_t^{i,B})^{-2}, \text{and} \;\; \tau_t^i \equiv \sigma_\epsilon^{-2} + \tau^A + \tau_t^{i,B}.$$

To show uniqueness of the information acquisition equilibrium, notice that the left hand side of equation (7) is strictly positive for $\lambda_t^{i,*} = 0$, while the right hand side approaches zero in the limit defined by $c_t^{i,*}$ such that $\text{Prob}(c_t^i \leq c_t^{i,*}) = 0$. Moreover, the left hand side is strictly decreasing in $\lambda_t^{i,*}$, while the right hand side is strictly increasing in the value of $c_t^{i,*}$ implicitly defined by $\text{Prob}(c_t^i \leq c_t^{i,*}) = \lambda_t^{i,*}$. Finally, since in the other limit defined by $\text{Prob}(c_t^i \leq c_t^{i,*}) = 1$ the right hand side of the equation tends to infinity, it follows that there exists a unique interior equilibrium in the market for information acquisition, i.e. $\lambda_t^{i,*} \in [0,1]$. This completes the proof.