Gate Fees: Shell Values and Regulatory Risk in Chinese Equity Markets*

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Abstract

During 2007-2015 unlisted Chinese firms paid an average of 3 to 4 Billion RMB (more than $400 Million USD) for each listed shell, an amount exceeding 2/3 of the median market capitalization of listed firms. This large shell premium varies over time and is sensitive to IPO-related regulatory shocks. In the cross-section, a portfolio that longs (shorts) the highest (lowest) expected-shell-value (ESV) firms earns substantial abnormal returns. Adding an ESV-based factor to five common factors improves return attribution and eliminates China's notoriously large Size premium. Consistent with theory, ESV also explains the sensitivity of prices to corporate earnings, and strongly predicts the likelihood of failing firms to undertake major asset restructurings (MARs). We conclude China's IPO regulations limit market access for start-ups, retard retirement of failed firms, and distort stock prices for all firms.

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1. Introduction

As the second largest equity market in the world by market capitalization, China features initial public offering (IPO) regulations that are strikingly different from those in other countries. Most countries follow a registration-and-disclosure system, wherein firms wishing to go public are required to file registration statements and issue a public prospectus. In this setting, investors monitor firm quality and market forces adjudicate firm value. Firms receiving sufficient support from the investment community can generally attain IPO status. The role of regulators is to ensure adherence to local ordinances, which are largely disclosure-centric.

In sharp contrast, the IPO process in China is heavily regulated. The China Securities Regulatory Commission (CSRC), a functional ministry of the central government, reviews every applicant. CSRC's Public Offering Review Committee (PORC) decides which companies will be allowed to make a public offering and the maximum allowable price-to-earnings (P/E) multiple to be received by the issuer. This process can be arduous and the outcome may not be determined solely based on economic merit.[1] More importantly, the total number of firms allowed to IPO in a given time period (the IPO "quota") is tightly controlled by central government policy, often leading to a large backlog of candidate firms awaiting review.[2]

The high regulatory hurdle involved in China's IPO process has incentivized some firms requiring public market access to explore other routes. In particular, reverse mergers (RMs) have emerged as an important alternative to the traditional IPO process. In a RM, a

[1] Studies that suggest political connections play a role in China's IPO allocation decisions include Fan, Wong, Zhang (2007), Francis, Hasan, Sun (2009), Piotroski and Zhang (2014), and Li and Zhou (2015). In particular, Piotroski and Zhang (2014) find that the impending turnover of local politicians can accelerate the pace of IPO from that region. Fan, Wong, and Zhang (2007) find that about 27% of the CEOs in a sample of 790 newly listed firms in China are former or current government bureaucrats and that firms with politically connected CEOs underperform those without politically connected CEOs in terms of post-IPO stock returns, earnings growth, and sales growth.

[2] For example, as of the end of October 2016, companies meeting China's pre-specified listing standards (including total revenue and profitability thresholds) and awaiting CSRC processing numbered 806. Between 2014 and 2017, the average wait time in this queue is 24.5 months (see our Online Appendix for details), historical wait times prior to 2014 are likely longer.

private company is merged into a public company, with the private company's ownership team ultimately taking over control of the combined publicly traded entity.

In this paper, we use a comprehensive sample of RM transactions to examine the economic cost of strict entry regulations on Chinese equity markets. Specifically, we estimate the marginal cost to access public equity markets by studying the prices paid for "shell companies" in reverse merger (RM) transaction.[3] The shell value in RM transactions reflects the scarcity and value of a public listing status in China. As a measure of the marginal benefit/cost to the firms engaged in a RM, they provide a "shadow price" for the economic cost of access to Chinese equity markets. We document the magnitude of these costs and examine the factors that affect their intertemporal and cross-sectional variations. We also evaluate their economic impact on stock prices, cross-sectional returns, as well as the financing and investing behavior of Chinese listed firms.

Our analyses are motivated by two competing theories on the role of laws and institutions in the functioning of markets. *Public interest theory* (Pigou 1938) holds that unregulated markets are prone to failures, and that regulations help protect investors from market failures, such as unscrupulous operators and various negative externalities. Conversely, *public choice theory* (Tullock 1967; Stigler 1971; Peltzman 1976) sees the government as less benign, and regulation as socially inefficient. In one particular form of public choice theory, the regulatory agency is "captured" (Stigler 1971) by industry and operates primarily for its benefit. In an alternative form, the regulatory agency operates a "tollbooth" primarily for the benefit of bureaucrats and politicians (McChesney 1987; De Soto 1989; Shleifer and Vishny 1998).

The IPO regulations in China provide an interesting setting in which to examine the predictions of these competing theories. One the one hand, the rationale for China's heavy IPO regulation can be framed in terms of Pigou's *public interest theory*. Given her weak

[3] At the time of the merger, the public company may be an empty "shell" (i.e., a dormant and non-operating entity) or it may have an existing set of assets and liabilities. We use detailed information on each RM transaction to extract the value paid for the public listing itself (the shell value) after adjusting for the value of other transferred assets and liabilities.

corporate governance structure and limited investor recourse through the court system (e.g., see Allen et al., 2005; Jiang, Lee, and Yue 2010), China may need stringent entry rules to protect investors against unscrupulous operators seeking access to public markets (e.g. Pistor and Xu 2005; Du and Xu 2009). On the other hand, these stringent rules may be better understood in the context *public choice theory*, wherein they exist and are maintained mainly for political/industrial purposes. Under this theory, the regulations actually provide minimal benefit to the investing public, and are kept in place primarily because they can bestow economic rent upon politicians, bureaucrats, and industry incumbents (e.g., Shleifer and Vishny 1998). We use shell values from RM transactions to document the impact of entry regulation, with a view toward distinguishing between these alternative theories on the role of these regulations in the functioning of China's security markets.

Our first key result is that Chinese unlisted firms engaging in RM transactions typically pay extremely large shell values to the incumbent listed firm. During 2007-2015, unlisted firms paid an average of 3 to 4 Billion RMB (or more than $400 Million USD) for each listed shell. Using three different estimation techniques, we find that even the most conservative estimation method yields an average shell value close to two-third (65.6%) the median market capitalization of a listed firm at the time of each RM transaction. In terms of relative magnitude, these numbers dwarf the price paid for a shell company in more developed financial markets.[4] Clearly the "gate fees" associated with access to Chinese public equity markets are extraordinarily high.

These large shell values show that, in China, a RM is not a low-cost channel through which to become publicly-listed. The high price paid for shell companies also raises the specter that Chinese IPO regulations may be too stringent and are socially inefficient. Rather than serving as an effecting screening mechanism for weeding out lower-quality firms, these policies may in fact be preventing healthy firms from accessing public equity markets.

The remainder of our study examines the impact of these high entry barriers on various

[4] Lee, Li, and Zhang (2014) report that the price for purchasing a shell company in the US is around $50,000 to $500,000.

aspects of the Chinese equity market. These examinations fall into three categories. First, we study the effect of these entry regulations on start-up companies and entrepreneurs seeking public financing. We provide descriptive evidence on the average wait time in the IPO queue as well as the proclivity of Chinese start-ups to seek alternative means of financing. We also provide corroborating evidence to Lee, Qu, and Shen (2018) that the firms listing through a RM are, on average, larger and healthier than those that list through IPOs.[5] These findings suggest China's stringent IPO policies are blocking even high-quality firms from accessing public markets.

In the second category of tests, we examine asset pricing implications of these regulations. Our main hypothesis is that China's IPO regulations will give rise to predicable price distortions among listed firms whose potential shell value is a significant part of firm value. For these tests, we define a firm's expected shell value (ESV) as the product of the average prevailing shell value and the predicted probability of shell (ESP), divided by each firm's market equity. We then examine the returns to a hedged-ESV portfolio that is long (short) firms with the highest (lowest) ESV. Our asset pricing results show that high ESV firms earn higher future returns, even after controlling for other firm characteristics known to be associated with expected returns in China. A long-short strategy based on extreme ESV deciles generates a raw return of 29% per annum and an abnormal return of 5.4% per annum after controlling for all five Fama-French factors. These findings establish the "shell effect," or the shell premium, as one of the most prominent predictive variables for equity returns in the Chinse stock market.[6]

If RMs are driven by IPO rationing, returns to the ESV factor should be responsive to regulatory shocks associated with policy changes affecting IPO and RM activities. In

[5] Lee, Qu, and Shen (2018) examine Chinese firms' choice to go public through RMs versus IPOs and show Chinese RM firms are typically larger and more profitable than IPO firms prior to public listing. Moreover, Chinese RM firms also have superior post-listing performance compared to IPOs matched on industry and size, both in terms of operations and in terms of stock returns. Unlike IPOs, Chinese RM firms do not underperform the market in the long run.

[6] Other predictive variables identified by prior literature include Size (e.g., Chen et al., 2015) and Trading Volume or Turnover (e.g., Pan et al., 2016). Liu et al. (2018) construct size and value factors for China. Notably, their size factor excludes the smallest 30% of firms based on similar arguments to ours – i.e., the fact that these firms are more likely to be trading on their potential shell value.

particular, we posit that regulatory changes that tighten (relax) the IPO quota would be associated with positive (negative) returns to the hedged-ESV portfolio. Conversely, regulatory changes that tighten (relax) access to RMs would be associated with negative (positive) returns to the hedged-ESV portfolio. Using a set of six event studies, we confirm that this is indeed the case. Specifically, the shell premium (i.e., the returns to high-EVS firms minus the returns to low-EVS firms) increases significantly around the announcement of tightened IPO regulations. The opposite result is observed around events that tightened RM regulations. Our results support the view that the ESV factor captures cross-sectional differences in firms' sensitivity to IPO-related regulatory risk.

If high-ESV firms trade primarily on their expected shell value, their stock price should be less sensitive to corporate earnings. We examine this proposition by regressing the book-to-market (BM) ratio of listed firms to their return-on-assets (ROA) for various subpopulations of firms sorted on ESV. Our results confirm these predictions. Specifically, for high-EVSM firms, we find a *negative* relation between reported earnings the market-to-book ratio. This negative relation stands in sharp contrast to the *positive* relation that exists between earnings and pricing multiples for low-ESV firms. Once again, the evidence suggests that China's IPO regulations have a distortive effect on the stock returns of its publicly listed firms. Specifically, high-ESV firm returns are much more likely to be detached from their operating results and business fundamentals.

To assess the usefulness of the hedged-ESV portfolio in explaining cross-sectional returns in China, we add the hedged-ESV portfolio return as a sixth factor in an asset pricing model (i.e. in addition to the five factors in Fama and French (2015)). Our results show that the addition of the shell factor largely eliminates the remaining size effect. In fact, among the six factors, the shell value factor has by far the strongest explanatory power. These findings suggest that regulatory risk, as captured by fluctuating shell values, is an important economic driver of the outsized returns earned by small firms in China.

In our third category of tests, we examine the effect of IPO regulations on publicly listed firms that are performing poorly. In the normal course of events, corporations that

perform poorly should become involuntarily delisted. However, given China's high shell value, we expect mortality rates among Chinese firms to be extremely low. Our results show that this is indeed the case. The average mortality rate for Chinese listed firms during our sample period (defined as an involuntary delisting for performance reasons) is 0.06%, or $1/40^{th}$ the mortality rate for U.S. public firms over the same time period.

Finally, we investigate the puzzling fact that so few RM transactions actually take place, despite such a high shell value. One explanation is that the owners of listed firms place an extremely high value on the private benefits of control (e.g., Dyck and Zingales, 2004). In the presence of such benefits the controlling shareholders of floundering businesses may seek alternative use for their listing status rather than surrender control through a RM. To investigate this possibility, we analyze the frequency of major asset restructurings (MARs) across the ESV deciles.[7] Specifically, we posit that high-ESV firms are more likely to try to "reinvent" themselves through MARs.

Our results strongly support this prediction. Remarkably, we find that close to 19% of the firms in the top-decile by ESV will undergo a MAR in the next 12-months, while less than 4% of the firms in bottom ESV decile will do the same. Evidently many prime shell targets are electing to retain control rather than surrendering their listing status. To the extent these floundering firms do not have the best managerial talent, these findings point to a further economic cost of the current IPO regulations – namely, the ability of poor managers to prolong their tenure by leveraging their listing status through MAR transactions. Our evidence shows that this option is being exercised with regularity among high-ESV firms.

Taken together, these findings are more consistent with the predictions of *public choice theory.* While China's IPO regulations may have been devised with *public interest* in mind, we find little evidence that these laws are functioning effectively in that capacity. On the

[7] The CSRC defines a MAR as an event where more than 50% of a firm's operating assets has changed, and requires firms engaged in a MAR to report such transactions. Asset swaps that do not result in a change in control will not give rise to a RM, but if the scale of the asset swap is large enough, it will result in a MAR filing.

contrary, they seem to impose a substantial cost on both business enterprises and the investors that wish to provide capital to these enterprises. Under these laws, innovative start-ups face long wait times and significant uncertainty in the IPO queue. Alternatively, they have to pay around $400 million USD to secure a listing status. These regulations also lead to predictable asset pricing distortions that are particularly acute among small floundering firms. Indeed, it appears that close to 30% of all publicly listed firms in China trade largely on their potential shell value rather than on their fundamental cash flows. Finally, we show that many failing firms that would otherwise sunset in the normal course of events are being propped up by their shell values. Rather than exiting at the shell value, owners/managers of these failing businesses maintain control by leveraging their listing status and "re-inventing" themselves through a major asset restructuring. In short, while we cannot rule out the possibility that these laws do confer benefits to the investing public, it is clear that whatever benefits they bring come at a substantial cost in terms of the "functional efficiency" (Tobin, 1984) of the country's financial system.

2. Related Literature

Our paper is broadly connected to the literature on law and finance. An extensive literature examines the effect of regulations on countries' financial systems. Most of these studies explore the origin and impact of investor protection laws. For example, La Porta et al. (1998) find that legal origin is strongly associated with legal protection to shareholders, and a strong legal protection to investors is associated with developed capital markets (La Porta et al., 1997), dispersed shareholder ownership (La Porta et al., 1999), effective corporate governance (La Porta et al., 2000a), large dividend payout (La Porta et al., 2000b), and high firm valuation (La Porta et al., 2002). Our paper focuses on the entry regulation, another important subset of a country's laws and institutions. Prior studies examine the effect of entry regulation on product markets (e.g. Klapper et al, 2006) or industry organization (Fisman and Allende, 2010). We extend this analysis to capital markets.

Our work is also related to studies that examine the IPO underpricing phenomenon.

Prior studies show that IPOs enjoy significant positive initial day returns in U.S. and most countries (Ritter, 1991; and Loughran et al., 1994). The IPO underpricing in China is especially large.[8] We extend this literature by providing an economic estimate ("shadow price") for the cost of a public listing in China. The shadow price we estimate is related to, but likely underestimates, the value of an IPO to the issuing firm, because unlike an IPO, a RM is not a financing event. However, much like the large initial day return to IPOs, the shell value estimate offers important insights into the frictions associated with accessing China's equity market. In the case of IPOs, the extent of the underpricing reflects the economic value that an issuer must surrender in order to secure financing and public listing. In the case of RMs, the shell value is a direct measure of the economic cost paid by the issuer for the listing status, even without the financing event.

Lastly, this paper contributes to the literature that examines reverse mergers. Lee, Li, and Zhang (2014) examine the long-term performance of Chinese RM firms listed in U.S. and find that Chinese RMs, as an investment basket, do not underperform their matched US peers. In fact, in the three years after their RM listing, these Chinese RM firms outperform their US counterparts in terms of operating performance, stock returns, as well as survival rates. Gleason, Rosenthal, and Wiggins (2005) and Floros and Sapp (2011) study RMs in U.S. and find that the RM announcement returns in the event window are significantly positive, the long run performance following a RM is generally poor. Different from previous literature, we study the RMs in a context of tight IPO rationing. Accordingly, our study reveals a unique mechanism in which the possibility of RMs affects future stock returns and drives size effect.

[8] For example, Chen et al. (2015) find that the average first day abnormal return is 127% and the median is 105% between 1999 and 2007. Chi and Padgett (2005) argue the large underpricing effect is attributable to the supply and demand imbalance caused by China's IPO quota system. Along similar lines, Song, Tan, and Yi (2014) separate the amount of IPO underpricing (defined as primary market underpricing) from overvaluation (defined as secondary market overvaluation). They conclude that primary market underpricing accounts for a minority portion (1/5 to 1/3) of the initial returns, while secondary market overvaluation explains a majority portion (2/3 to 4/5).

3. Shell Value and Sample

3.1 Computing the Shell Value

The Appendix provides the institutional background and the details of RM process in China. Three inputs are needed to compute the shell value in a RM transaction. First, we need the market value of the combined entity (MVCE) immediately after the announcement of the transaction. Second, we need the proportion of share ownership in the combined entity that the shell firm's owners eventually secure (SFS). Finally, we need to subtract the value of any other consideration (whether in cash, net assets, or share price concession) that the owners of the shell firm surrendered or transferred to the combined entity (OC). Given these three key inputs, the shell value of each transaction can then be computed as follows.

$$SV = (MVCE \times SFS) - OC \quad (1)$$

SFS, the eventual shell firm share ownership is computed as:

$$SFS = (S - TS) / (S + \Delta S), \quad (1a)$$

where S is the number of shares of the shell firm prior to the RM, ΔS is the number of additional shares issued by the listed firm and given to the unlisted firm as a part of the RM. In some cases, ΔS is not sufficient to give the unlisted firm control. In such instances, the shell firm gives an addition number of shares (TS) to the unlisted firm as part of the exchange. As a result, the shares retained by the shell firm are the original number of shares (S) minus the shares transferred to the unlisted firm (TS).

OC, the other considerations transferred by the owners of the shell firm, can be in the form of cash (C), the value of net assets given to the unlisted firm in an "Asset Swap" (V), or net assets that remain in the combined entity and are shared by both parties (W). In addition, in some RMs, rather than simply issuing new shares to the unlisted firm, the shell firm will transfer its shares to the unlisted firm at a pre-specified price (P'). This results in an additional cost to the owners of the unlisted firm to the tune of P' multiplied by the number of shares they received (TS).

Specifically, we compute OC as:

$$OC = C + V + W - (P' \times TS) \quad (1b)$$

Finally, we require an estimate of the value of the combined entity (MVCE). To reduce the contaminating effect of subsequent events occurring after the RM news is released, we want to get as close to the original announcement date as possible. At the same time, we want MVCE to fully reflect the likely value of the combined entity, which may only be partially captured by the initial price reaction. To mitigate these concerns, we compute the market value of the combined entity (MVCE) several ways, leading to three shell value estimates:

SV1, based on MVCE1, where MVCE1 = PE_Pre × E + W,

SV2, based on MVCE2, where MVCE2 = PE_Ind × E + W, and

SV3, based on MVCE3, where MVCE3 = P_Day1 × (S + ΔS)

In the first shell value estimate (SV1), we use the "peer-based PE ratio" supplied by the listed company in its preliminary proposal (PE_Pre). To estimate MVCE1, PE_Pre is multiplied by the net income of the unlisted company (E). For this purpose, E is based on the unlisted company's management earnings forecast for the first complete fiscal year after the RM.[9] This approach allows the listed company to define its own set of peer firms. SV1 can be computed as soon as trading resumes (at event B in Figure A1).

In the second shell value estimate (SV2), we use an "industry-based peer PE ratio" (PE_Ind). Specifically, we compute the mean PE for all the listed firms in the same CSRC industry code as the shell acquiring firm as of market close on the day of the resumption of trading (event B in Figure A1). This approach removes any potential upward bias introduced

[9] In theory, we wish E to proxy for the long-term sustainable earnings of the combined entity. The unlisted company generally provides one-, two-, and three- year-ahead earnings forecasts as part of the preliminary proposal. We use the one-year-ahead number because: (a) the unlisted firm is obligated to deliver the first year's guided earnings, subject to penalties spelled out in the proposal, (b) empirically, we compared the company's one-year-ahead earnings guidance to the actual reported earnings after the RM and find the two are typically quite close to each other, with a correlation coefficient of 0.88. In those few cases where a firm did not provide a one-year-ahead earnings forecast, we used current year earnings as a proxy for forward earnings.

by having the two transaction parties select the peer set. SV2 also can be computed as soon as trading resumes.

In the third shell value estimate (SV3), we use the price at the end of "Day 1" after the resumption of trading (P_Day1) to estimate the market value of the combined entity. Technically, the price we use is not the price at the close of the first day, because daily price moves in China are capped at 10%. When trading resumes in conjunction with the release of a preliminary RM proposal, the shell firm's stock price typically "caps out" for several days in a row. We define "Day 1" closing price as the price of the stock at the end of trading on the first day that the sequence of "capped out" days ended. MVCE3 is defined as the market value of the firm estimated using P_Day1 and the total shares that will be outstanding at the close of the RM transaction. V3 can be computed at the close of the first day after trading resumes where the firm's daily return is less than 10%. Presumably, MVCE3 is the most conservative estimate among the three, because the RM at that stage is still subject to the approval of CSRC and the first day return reflects a potential discount due to this uncertainty.

3.2 Data and Summary Statistics

The financial data and stock returns data of listed firms are from the China Stock Market and Accounting Research (CSMAR) Database. We exclude firms in Chinext board.[10] Variable definitions are provided in Appendix Table A1. All variables are winsorized at 1% level in each period.

The initial RM sample is from iFinD database provided by Tong Hua Shun (THS), a major financial data service company in China. THS collects the RM sample generally by following the CSRC definition for reverse mergers.[11] In particular, THS checks whether a

[10] ChiNext is an exchange established expressly for younger, riskier, start-up firms. CSRC regulations forbid firm listed in ChiNext from participating in RMs.

[11] We use several ways to cross-validate the THS sample. First, we get a RM sample from WIND, another major financial data vendor in China. We find that the RM in THS is more comprehensive and accurate. We also check the data from CSMAR. We find the CSMAR data often misclassify or miss the shell transactions. Second, we collect the financial analyst reports on shell firms, and we also consult practitioners at investment banks. We

proposed deal has the following two characteristics. First, the control right of the listed firm is changed. Second, the transaction value is larger than the book value of total assets of the listed firm prior to the announcement of the deal.

In some special cases, THS slightly modifies the CRSC criteria. First, if both the listed firm and the unlisted firm are ultimately owned by the state, THS looks at the change of the controlling shareholders instead the change of ultimate control right. This ensures a change in control from one branch of government to another will be reflected in the RM sample. Second, THS will include some deals in which the transaction value is only slightly less than the value of listed firms' total assets. This would be the case if the listed firm makes a clear statement that the deal is a RM and is subject to CSRC regulations.

We start with a sample of 249 RMs that are announced from January 1st, 2007 to April 30th, 2016.[12] We manually collect their RM proposals from www.cninfo.com.cn, a CSRC authorized information disclosure website that collects documents and filings of listed firms. These proposals, which are usually hundreds of pages, describe the RM transaction in detail. We read each proposal and extract the information needed to calculate shell value.

After reviewing the initial sample, we first drop 68 deals in which the unlisted firms had acquire shares of the listed firm over time before a RM announcement, because the shell value is difficult to estimate in such case. We also exclude 47 deals that are either still in process or have failed. In the end, we have 134 clean RMs which have the information needed to calculate the shell value. Panel A of Table 1 provides details on our sample selection process.

Figure 1 presents the number of clean RMs with the announcement date in the period

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find the THS sample is comprehensive and accurate.

[12] We start from 2007 for two reasons. First, the split-share reform was completed at the end of 2006. In many cases, major corporate restructuring was a necessary part of the split-share reform (see, e.g., Liao et al., 2014). Although some restructuring cases meet the RM definition, the nature of the transaction is different from a regular RM. Second, CSRC set up the Mergers and Acquisition Committee in July 2007 as a formal legal entity to supervise the mergers and acquisitions of listed firms, and it represents a major regime change in the regulation.

from 2007 to 2016, together with the number of IPOs over the same period. In October 2008, CSRC suspended the IPO, and this policy change sharply increased the number of RMs in 2009.[13] In July 2009, CSRC resumed the IPO, and the number of RM decreased in the following years. In November 2012, CSRC again suspended the IPO, and the number of RMs peaked in 2013 and 2014. From April 2014, CSRC gradually resumed the IPO process, only to suspend it again in July 2015, after the stock market crashed. Figure 1 suggests that the frequency of RM deals is closely related to the ebbs and flows in the IPO policy of CSRC.

Panel B of Table 1 shows the summary statistics of shell value determinants. The peer-based PE ratio (PE_Pre) provided in the RM proposal has an average of 47.7 and a median of 41.6, while the industry-based peer PE ratio (PE_Ind) has an average of 38.2 and a median of 34.2. As a point of reference, the CSRC currently caps the PE ratio at 23 when determining the maximum issue price allowed in an IPO.[14] The much higher PE ratios in Table 1 suggest that unlisted firms involved in RMs are from generally from high-growth sectors. Note also that MVCE1 estimates (based on PE_Pre) are higher than the MVCE2 estimates (based in PE_Ind). This finding suggests the two parties in the RM may inflate the value of the unlisted firm by choosing peers with higher PE ratios than the median industrial peer.

MVCE3 is based on the first day market reaction after the resumption of trading. The announcement of a RM does not guarantee its ultimate success. Therefore, this value reflects a discount due to the potential of failure, and is the most conservative estimate of shell value among the three measures. On average, the unlisted firms have to give up one thirds of the equity ownership in exchange for the public status. This cost to the unlisted firm in turn is the benefit to the listed firm, and constitutes the most significant part of the shell value. Other considerations transferred by the owners of the shell firm are about 2% of the MVCE.

[13] The specific time for IPO suspension and reboot can be found on a CSRC authorized website, http: //stock.cnstock.com/stock/smk_gszbs/201701/4013651.htm

[14] According to the Securities Law enacted in 1999, IPO price should be market based. CSRC cannot regulate the offering price explicitly due to the Law, so the PE ratio of 23 is implicitly imposed.

3.3 Shell Value

Table 2 reports summary statistics for each of the three shell value estimations. As shown in Panel A, the average shell value is about 4.4 billion based on the peer PE ratio in the RM proposal, and it is about 3.3 billion based on the industry average PE ratio. If the initial day return of post RM announcement is used, the shell value is about 2.9 billion.

One potential concern with SV3 is that the initial day return may reflect an overreaction. If the price at the end of the initial day is "too high" relative to the long-term value of the combined entity, SV3 would overstate the true value of shell. To address this concern, we examined the cumulative returns in the post RM period for our entire sample. The results, reported in the Online Appendix, show that the combined entity actually earns slightly positive risk adjusted returns in the post RM period. This result is in stark contrast to the IPO literature, and suggests that, if anything, SV3 is likely an understated estimate of shell value.

In Panel B, we report the shell value deflated by the average market value of equity of all listed firms in the sample on the announcement day of reverse merger. On average, shell value represents about 20% market value of equity of the listed firm. Because the firm size distribution in Chinese stock market is highly skewed, the average market value of equity is not representative for a large number of small stocks. In Panel C, shell value is deflated by the median market value of equity of all listed firms in the sample on the announcement day of reverse merger, and it is about 73% market value of a median firm.

Figure 2 depicts the shell value over time. The dotted line represents the shell value based on the peer PE ratio in the RM proposal, the dashed line represents the shell value based on the industry average PE ratio, and the solid line represents the shell value based on the first day market reaction after the announcement. In the upper (lower) panel, we deflate the shell value by the average (median) market value of all listed firms in the sample. In both panels, we report the average deflated shell value at the quarterly frequency. If there is only one RM in the most recent quarter, the average of value of the previous two quarters is used. If there is no RM in a quarter, the prior quarter's average shell value is used.

The three measures of shell value have fairly strong co-movement. The choice of peer in the RM proposal is subjective and is likely subject to sentiment of the market, and hence the dotted line has the largest variation. The solid and dashed lines are particularly high at the beginning of 2007, while the dotted line is moderate. This observation is driven by 2 RM of financial firms, which had exceptionally high valuations at that time. In subsequent years, the CSRC ruled that financial firms are no longer allowed to go public using a RM. In addition, the Mergers and Acquisition Committee that supervises RMs was set up in July 2007. Therefore, the initial few observations of shell value may not be representative.

Note that there was a market boom from January 2007 to October 2007, with the Shanghai Composite Index (SCI) going from 2675 to 6030, followed immediately by a sharp market decline that caused the SCI to fall to a low of 1871 in November 2008. The market then rebounded, with the SCI reaching 3300 by July 2009. These episodes of large variation in the market condition are reflected in the ebbs and flows of the deflated shell values, as the numerator is relatively slow-moving while the denominator fluctuated sharply. A similar stock market boom and bust cycle occurred between August 2014 and September 2015, with SCI moving from 2201 to a high of 5178 in June 2015, only to fall to 3052 by the end of the sample period. As expected, the deflated shell value also experienced a corresponding amount of variation over this time period.

3.4 IPO Waiting Time

The large size of shell values reflects the entry cost for a firm seeking public equity. RM firms would like to pay for this cost to speed up the process of going public. Therefore, we expect that the IPO waiting time would be long. We manually collect the data from the CSRC website and formally study the waiting time. Due to the disclosure policy of CSRC, we are only able to calculate the waiting time after 2013. Between 2014 and 2017, there are total 333 firms that submitted their initial IPO applications and also got a final decision from the CSRC. Among those firms, 113 are rejected and 220 are approved to go public. Among 220 approved firms, their average waiting time (from the initial submission date to the listed date)

is 24.5 months, with the shortest time of 7.4 month and the longest time of 35.4 month. The 333 firms do not include the firms that are still waiting.

The IPO waiting time between 2014 and 2017 is likely to be shorter than the historical average. First, we are only able to calculate the waiting time for firms that have got a final decision. Second, IPO suspensions can extend the waiting time. For example, there is an IPO suspension between July 2012 to April 2014. Under an IPO suspension, the CSRC may not accept, review, or authorize any applications. For a firm that submitted its IPO application at the end of June 2012, it had to wait for an average of 46.5 months, or close to 4 years. The Online Appendix provides institutional details of the IPO waiting time.

3.5 Are RM Firms Bad?

One important question is how firms that choose to list through a RM are different from the firms that list through an IPO. In the Online Appendix, we report results of a test in which we match IPO firms and RM firms by their size and industry prior to the IPO or RM. We then examine their firm characteristics and stock performance over time. These results show that unlisted firms electing to use a RM are extremely similarly to IPO firms from the same industry. In terms of their past profitability and capitalization profile, these firms are indistinguishable from each other. However, RM firms exhibit slightly stronger past sale growth and marginally higher return on assets. Overall, these tests suggest private firms that elect the RM route are not of a lower quality than those that access the equity market through an IPO.

4. Expected Shell Value and Stock Returns

4.1 Determinants of Expected Shell Value

To empirically measure the probability of RMs, we consulted the models in the existing literature (e.g., see, Cremers, Nair, and John, 2008) and also consider factors motivated by

our discussions with RM practitioners.[15] We include the following variables in our benchmark model.

Size (Rsize). When the listed firm is small, it is easy to sell off its assets and to transfer the control right to the unlisted firm. Therefore, a smaller market capitalization is associated with a higher probability of RM. Following Campbell, Hilscher, and Szilagyi (2008), we measure size as the logarithm ratio of the firm's market value to the median market equity of the market.

Profitability. When the listed firm has weak profitability and low fundamental value, the shell value becomes important and the listed firm would prefer a RM. Thus we expect lower profitability will be associated with a higher probability of RM.

Delisting pressure (ST). In China, a listed firm can become "special treated" (ST) for a number of reasons, the most common which are: (a) It has negative net earnings for two consecutive years; (b) Its shareholder equity is lower than its registered capital in the last fiscal year; or, (c) The firm's auditor has issued either a serious qualification or a denial of opinion. Such stocks must carry an "ST" warning before its ticker symbol, and are subject to various trading restrictions. Two consecutive years of special treated status will constitute grounds for delisting. Because of this delisting pressure, ST firms are more likely to become shell targets. Therefore, we predict that ST status increases the probability of RM.

Ownership concentration (ShrCon). When the ownership of the listed firm is dispersed, it is easier for the unlisted firm to become the new controlling shareholder of the combined entity. Therefore, we predict that low ownership concentration will increase the probability of RM. We measure ownership concentration by the percentage of shares held by the 10 largest shareholders.

Table 3 provides summary statistics for firms in the RM sample (in Panel A) as well as for firms in a broad control sample of listed firms (Panel B). A firm-year is included in the

[15] We consult many investment bankers who are specialized in RMs to understand how they search for shell targets and how the deals are completed.

RM sample if a firm announces a RM in the next year, so there are 244 observations. We do not focus on the 134 clean RM sample, because doing so would induce a forward-looking bias from the investors' perspective. However, the results are stronger if we only focus on the clean RM sample – i.e., if we only focus on announcements that lead to a successful RM.

There is a sharp difference in firm characteristics between Panels A and B. The firms in the shell group have a much lower profitability than firms in the non-shell group (0.003 vs. 0.047). 36.1% of the firms in the shell group have a ST status, while this number for non-shell group is only 6.5%. The shell group also has lower ownership concentration and higher book leverage ratio. The average size of non-shell group firms is about three times as large as the shell group firms. Panel C shows that the differences in the firm characteristics, between the shell group and the non-shell group, are statistically significant for both mean and median.

The summary statistics in Table 3 provide univariate results which suggest that those variables are important determinants of RM probability. We next perform multivariate regression analysis to estimate the RM probability. In particular, we estimate the following logit model,

$$\text{Prob}\left(Shell_{i,t} = 1\right) = \frac{1}{1+\exp(-\beta_0-\beta_1 X_{i,t-1})} \ ,$$

where the independent variables are based on financial information one fiscal year before the RM announcement. We assume all accounting information in fiscal year t-1 is available at the end of April in year t. The dependent variable equals to one if a firm announces a RM from May in year t to April in year t+1.

Table 4 reports logit regression results. The first column shows the expected sign for each independent variable. Column (1) contains the estimates from the benchmark model. All coefficients are significant with the expected sign. In Columns (2) to (4), we include leverage, cash holdings, and operating cash flow, all of which are considered as important predictors for the financial distress or financial constraint (see, e.g., Campbell et al., 2008; Kaplan and

Zingales, 1997; and Zmijewski, 1984). However, none of these variables is significant. The firms that want to realize the shell value are not in financial distress. In fact, at least partially due to the large shell value, there are few bankruptcy cases for the listed firms in China (see, e.g., Allen et al., 2015).

Our findings suggest that economic distress seems to drive firms' decision to sell their listing status through a RM. As the fundamental value from the main business diminishes, a RM can naturally become an optimal venue that maximizes firm value. In Columns (5) and (6), we show that our findings are also robust to the inclusion of a SOE dummy and an industry dummy.[16] The pseudo R^2 is also stable across different specifications, consistent with the finding that the additional variables in Columns (2) to (6) do not materially affect the likelihood of RMs.

4.2 Fama and MacBeth Regressions

To understand the asset pricing implications of an economically large shell value, we first calculate an "expected shell value" (ESV) variable for each firm at the beginning of May in each year. ESV is defined as ESP × Avg_SV2 / ME. Avg_SV2 is the average SV2 value at the beginning of the current quarter. ME is the market value of equity of the listed firm and is winsorized at 5% level for each tail every year in the ESV calculation. ESP is the expected shell probability, which is the predicted value from a rolling logit regression using past 4 years of data with the specification in Column (1) of Table 4. In each rolling regression, the dependent variable is a dummy that equals to one if a firm announces a RM from May in year t-3 to April in year t. The computation of the independent variables is the same as in Table 4. After the estimation, we use the accounting and stock market information at the beginning of

[16] In the later analysis, we use rolling logit regressions to construct a measure of expected shell probability. Therefore, the inclusion of time fixed effects does not fit our purpose.

May to predict ESP for the next 12 months.[17]

We perform Fama and MacBeth (1973) tests and regress stock returns on ESV with control variables. We consider standard controls in asset pricing tests such as size, book to market ratio, asset growth, earnings price ratio, profitability, turnover, and momentum. The dependent variable is monthly excess return from May 2011 to November 2016. In the regression, ESV, size, book to market ratio, asset growth, earnings price ratio, and profitability are updated at the beginning of May every year. Turnover is the last month stock turnover rate. We consider the return in the last month, as well as the cumulative return from month -2 to -12 as proxies for momentum.

Table 5 shows the result. In all columns, ESV significantly and positively predicts cross sectional stock returns. The coefficients on ESV range from 0.171 to 0.198 and are highly significant. One standard deviation increase in ESV leads to about 0.5% increase of stock return every month, or an annualized return of 6%. The regression coefficients on the control variables are generally consistent with previous literature. Size and last month return negatively predict cross sectional returns, consistent with the existing evidence of the size effect and short-term reversal effect in China. Profitability and earnings price ratio positively predict futures stock returns, but there is no statistical significance. Turnover negatively predicts cross section of returns, consistent with the speculative trading effect in Pan, Tang, and Xu (2016). The momentum of past returns from $t-12$ to $t-2$ negatively predicts cross section of returns. This result is consistent with previous studies on Chinese stock market momentum effects (see, e.g., Tian et al., 2014) but is different from the results found in many other stock markets (see, e.g., Asness et al., 2013).

In summary, the results of our Fama-MacBeth regressions suggest a strong positive premium on the ESV after controlling for well-known firm characteristics. In addition, in terms of the forecasting power, the shell effects, size effects, and short-term reversal effects

[17] Because we focus on the cross sectional implication of ESV, the Avg_SV2 variable, which is the same for each firm in the cross-section, does not affect our results. Our findings are robust if we use ESP, rather than using ESV.

are the three strongest ones in Chinese stock market.

4.3 Sorts on ESV

While the Fama-MacBeth regression provides a convenient way to control for and compare the effects of different firms' characteristics, it has some drawbacks. In this subsection, we address these issues by constructing value-weighted portfolios sorted on ESV and testing the hypothesis that ESV predicts average returns.

Table 6 shows the returns of value-weighted portfolios sorted on ESV. At the beginning of May in each year, firms are sorted into 10 portfolios based on their ESV. To ensure the resulting trading strategy is implementable, we exclude a stock in a portfolio if it was suspended from trading at the end of April and at the same time it was not included in the same portfolio in the prior year. The value-weighted excess monthly return for each portfolio is calculated for the next 12 months. The weight is the market value of equity at the end of year t-1. Group 1 (10) represents firms with lowest (highest) ESV. For each of the 10 portfolios, as well as the Highest-Lowest (10-1) portfolio, we report the alpha and estimated betas from a Fama and French (2015) 5-factor model.[18] Monthly portfolio returns are from May 2011 to November 2016. The t-statistics are adjusted for heteroscedasticity and autocorrelation by Newey-West method.

Table 6 results show that the excess monthly returns monotonously increase from 0.351% in the lowest ESV decile to 2.794% in the highest ESV decile. The long-short portfolio that buys the highest ESV decile and shorts the lowest ESV deciles earns an average monthly excess return of 2.442%. The significance of the long-short portfolio premium remains strong after risk-adjustment by the Fama and French 5-factor model. The long-short strategy based on the ESV achieves an abnormal return of 0.447% per month or 5.364% per annum. This abnormal return is large and is consistent with the evidence in Table 5.

[18] The Fama-French 5 factors in Chinese stock market are from CSMAR. The momentum factor is constructed closely following Carhart (1997).

4.4 ESV Portfolio and Alternative Factor Models

In Table 7, we further investigate the robustness of the hedged-ESV portfolio premium under alternative factor models. Specifically, we report the results of regressing long-short ESV strategy returns on market factor (CAPM), Fama and French (1993) 3-factor, Carhart (1997) 4-factor, and Fama and French (2015) 5-factor, respectively. The t-statistics are adjusted for heteroscedasticity and autocorrelation by the Newey-West method.

The hedged-ESV portfolio premium is robust to alternative risk-adjustment factor models. In all specifications, the abnormal returns are significant, with a magnitude ranging from 2.322% per month in the CAPM to 0.447% per month in the Fama and French (2015) 5-factor model. The negative factor return of momentum strategy is also consistent with the results in Table 5.

On the factor loadings, the long-short ESV return has a negative beta on market return, so this strategy provides a good hedge for market risk. The positive loading on SMB and the negative loadings on HML and RMW imply that the stocks with high ESV, or the shell stocks, are generally small, growth and nonprofitable stocks. Overall, these findings are consistent with the characteristics of the firms in the RM sample documented earlier.

5. ESV Portfolio and Regulation Risk

Because RMs are driven by IPO rationing, we conjecture that this shell effect should be connected to the regulatory risk associated with policy changes affecting IPO and RM activities. Many of China’s security market regulations are put in place to support the macroeconomic policies of the State Council rather than to enhance the functional efficiency of equity markets. For example, the CSRC may tighten IPO regulations when the State Council is particularly concerned about the dilutive effect of new share issuances on market valuations. Similarly, IPO regulations are more likely to be relaxed when the State Council wishes to dampen what it perceives as excessive market exuberance in the face of a pricing bubble. In either case, the decision-making process is typically opaque and the regulatory

changes are made with little public discourse. Both the opaqueness of the process and the suddenness of these regulatory changes contribute to the regulatory risk faced by equity market participants.

If the ESV reflects cross-sectional differences in firms' exposure to regulation risk, then the returns of a hedged-ESV portfolio should be sensitive to shocks in regulatory policy. Specifically, a tightened RM policy, or a negative RM shock that decreases the RM probability of listed firms, should result in negative returns for likely shell target stocks (i.e. high-ESV firms). Correspondingly, a tightened IPO policy, or a negative IPO shock, will push unlisted firms to choose RMs, and thus increase the RM probability of listed firms, leading to positive returns for likely shell target stocks.

Following Savor and Wilson (2013), we conduct an event study for six regulatory policy shocks, and compare the performance between stocks with high and low ESV in the trading days immediately surrounding each event. To identify these events, we first search for the policy documents on the CSRC website that contain the key words such as "reverse merger," "IPO," "regulation," "issuance," "shell," "listing," etc. We keep those policies that have direct implications for RM and IPO activities. We then exclude the events with confounding episodes including market crashes and changes in short selling policy. In the end, we are left with three negative RM shocks and three negative IPO shocks. The RM shocks are as follows.[19]

1. On May 13th 2011, CSRC released the document, *The Revised Regulations on the Assets Restructuring and Related Financing of Listed Firms*. It defines the scope, conditions, and methods of the regulations on RMs for the first time.

2. On November 30th 2013, CSRC released the document, *Strictly Implementing IPO Standards in the Audit of Reverse Mergers*. Under this new policy, the unlisted firms that

[19] The official documents for these three policy changes, in order, can be found at http://www.csrc.gov.cn/pub/zjhpublic/G00306201/201105/t20110513_195492.htm; http://www.csrc.gov.cn/pub/newsite/zjhxwfb/xwdd/201311/t20131130_239075.html; http://www.csrc.gov.cn/pub/zjhpublic/G00306201/201606/t20160617_299035.htm.

participate in RMs have to meet the IPO requirement.

3. On June 17th 2016, CSRC released the document, *The Revised Regulations on the Assets-restructuring of Listed Firms*, which further tightened the RM regulation.

The IPO shocks are as follows.[20]

1. On May 17th 2014, in a CSRC meeting of studying the State Council policy of *Several Opinions of the State Council on Further Promoting the Healthy Development of the Capital Market*, the chairman of CSRC, Xiao Gang, announced that CSRC will control the pace of IPOs to stabilize the market expectation. The market perceived it as a clear signal to tighten the IPOs.

2. On March 16th 2016, in the Fourth Plenary Session of the 12th National People's Congress, the plan to set up a Strategic Emerging Board was erased from the *Draft of the Thirteenth Five-Year Plan for National Economic and Social Development*, according to the suggestion of CSRC. It closes a door for many unlisted firms that want to go public.

3. On September 8th 2016, CSRC announced that it will give priority to and expedite the IPO applications of firms located in poverty area to implement policy of *The Decision of the CPC Central Committee and State Council to Win the Fight Against Poverty*. It resulted in large uncertainty and was perceived as a bad signal for most unlisted firms because they are not in the poverty area.

Table 8 shows the difference in excess returns between highest and lowest ESV firms around the events of regulatory shocks by CSRC. For each event, the cumulative excess return in a 3-day event window [-1, 1] is computed for each firm, and the differences of excess return between firms in the top decile and bottom decile of ESV are reported with the t-statistics in the parenthesis. The row labeled "Overall," reports the differences in excess

[20] The official documents for these three policy changes, in order, can be found at http://www.csrc.gov.cn/pub/newsite/zjhxwfb/xwdd/201405/t20140529_255106.html; http://news.xinhuanet.com/finance/2016-03/15/c_128802090.htm; http://www.csrc.gov.cn/pub/zjhpublic/G00306201/201609/t20160909_303259.htm.

return between firms in the top decile and bottom decile of ESV from all 3 events.

The RM and IPO shocks have an important influence on the hedged-ESV portfolio returns in the expected direction. When CSRC tightened RMs policies, on average, the ESV-hedged portfolio returns decrease by 2.482%. The second RM event had the largest impact, with the returns of high ESV stocks decreasing by 5.103% relative to the returns of low ESV stocks over the event window. Given the 10% daily return limits in China (5% for ST stocks), this negative return is large and economically significant. At the same time, when CSRC tightened IPO policies, on average the ESV-hedged portfolio returns increase about 1.769%. Figure 3 depicts in graphical form the cumulative abnormal returns (CAR) around policy shocks. These plots are consistent with, and collectively summarize, the results in Table 8.

To our knowledge, the link between these regulatory events and cross-sectional returns is new to the literature. Our results are connected to the literature that examines the implications of government induced uncertainty on asset prices. Sialm (2006), and Croce, Kung, Nguyen, and Schmid (2012) analyzes the effect of tax uncertainty on asset prices; Pástor and Veronesi (2013) and Kelly, Pástor, and Veronesi (2016) show that political uncertainty is an economically important risk factor for equities. Our study examines the effect of a specific form of policy risk – that is, the regulatory risk associated with China's IPO policies. In particular, we examine the proposition that this form of regulatory risk will be reflected in the pricing of firms, both over time and in the cross-section.

Although we establish the link between regulatory risk and cross-sectional returns, we acknowledge that there could be other channels that are at work. For example, an alternative behavioral-based explanation for the shell premium is that the value implications of ESV are not fully incorporated into stock prices in a timely manner. This may happen, for example, if a subset of investors has limited attention with respect to the pricing implications of ESV (e.g., Hirshleifer and Teoh, 2003; and Lim and Teoh, 2010). As this mispricing is corrected over time, high-ESV firms will earn higher subsequent returns than low-ESV firms. In

addition, Cremers, Nair, and John (2008) provide a risk based model and also empirically show that firms exposed to takeovers (the target firms) should have a higher rate of future return. Their mechanism is that takeover premiums arrive when aggregate fundamentals are high and investors least need the cash. Therefore, to disentangle different channels and provide a complete explanation for the shell premium is beyond the scope of this paper and left for future studies.

6. ESV and Size Premium

Prior studies (e.g. Chen et al., 2015) report that the small-minus-big (SMB), or Size, factor has strong ability to explain the cross-section of Chinese stock returns. In fact, the enormous premium associated with small firms is one of the largest known regularities in cross-sectional returns among China listed stocks. However, economic mechanism behind this large Size effect is unclear. Our paper provides a new perspective from which to understand the size premium.

Table 9 reports the alpha and estimated betas of 10 size portfolios when regressed on a 5-factor (Panel A) and a 6-factor (Panel B) model. To construct this table, at the beginning of May in year t, firms are sorted into 10 portfolio based on the market value of equity at the end of year t-1. We then compute the value-weighted excess return for each portfolio is for the next 12 months. Group 1 (10) represents firms with the smallest (largest) market value of equity. For each of the 10 size portfolios, as well as for the Smallest-Biggest (1-10) portfolio, we report the alpha and the estimated beta from 5-factor and 6-factor models.

Consistent with the previous literature, the size effect in Chinese stock market is phenomenal. As shown in Panel A, the firms in the smallest size decile earn an average excess (abnormal) return of 2.929% (0.722%) per month or about 36% (9.24%) per annum. The strategy that longs stocks in the smallest size decile and shorts stocks in the largest size decile earn an average excess (abnormal) return of 2.574% (0.50%) per month or about 31% (6%) per annum.

In Panel B, we include the hedged-ESV portfolio as the sixth factor. The ESV factor largely reduces the magnitude of size premium. The alpha for the smallest size decile decreases to 0.361% per month which is about half of the magnitude in Panel A. What is more striking, the alpha for the long-short strategy now becomes insignificant, and its magnitude is diminished by more than two thirds. The SV is highly significant with a t-statistics above 14. These results suggest that the expected shell value related plays a dominant role in driving the size premium – that is, much of the returns earned by small firms can be linked to their higher exposure to fluctuations in the shell value. Along the same line with our finding that RMs affect firm valuation, Liu et al. (2018) construct the size factor in China by excluding the smallest 30% of firms.

7. Mortality Rate and Future Major Assets Restructuring

In this section, we examine the effect of IPO regulations on publicly listed firms that are performing poorly. We first study the mortality rates of Chinese firms. In the normal course of events, corporations that perform poorly should become involuntarily delisted. However, given China's high shell value, we expect mortality rates among Chinese firms to be extremely low.

In the Online Appendix we formally investigate the delisting activities in China and compare them with those in U.S. We find that there are 42 involuntary delistings from 2001 to 2007, and they are all related to consecutive losses. There is no involuntary delisting from 2008 to 2012. From 2013 to 2017, there are 8 involuntary delistings, due to either accounting fraud or consecutive losses. The average mortality rate, which is the number of involuntary delisting over the number of firms at the beginning of the year, from 2007 to 2017, is 0.06%. To establish a benchmark, we also estimate the mortality rate in the U.S, and it is 2.47% between 2007 and 2017. The death rate of Chinese listed firms is at least two orders of magnitude smaller than that of the U.S. firms. It suggests that the death rate of Chinese listed firms is indeed abnormally low.

We next investigate the puzzling fact that so few RM transactions actually take place,

despite such a high shell value. Our sample of 244 RMs does not appear large in light of the 1500 IPOs that took place over the same time-period. The natural question is why there are so few shell transactions relative to IPOs. One possible explanation is that there are demand side constraints – i.e., important frictions that would discourage wider usage of RM as a method of listing by private firms. It is certainly the case that not every firm seeking an IPO is in a position to become a shell acquirer. For example, in an IPO the private firm receives financing as well as listing status, while in a RM the financing must take place as a separate event after the listing. This would certainly preclude some cash-strapped firms waiting in the IPO queue from being able to acquire a shell. However, our sense from discussions with investors and owners of private companies is that demand side constraints do not fully explain the rarity of RM events in China. There are plenty of firms that would, if the price is right, elect to become listed through a RM.

A second possibility is the presence of supply-side constraints due to the private benefits of control accruing to owners of listed firms. Despite the high average shell value, it is possible that the private benefits of control for many owners of small listed firms are even higher. As a result, the controlling shareholders of listed firms are reluctant to give up their control rights. For these owners, selling their firm in a RM is not the only way to realize the benefits of a listing status. For example, owners of potential shell firms may prefer to leverage their listing status by acquiring a smaller unlisted business in exchange for a minority ownership in the combined entity. Because such transactions do not involve a change in control, they would not be included in our RM sample.

In the scenario described above, firms with a high ESV value will most likely engage in a transaction that results in a substantial turnover in their operating asset base. In abandoning their existing operations and engaging in a new line of business, these firms would be undertaking what the CSRC calls a major asset restructuring (MAR). The CSRC requires firms that engage in a MAR to file a report identifying the event. According to the CSRC definition, a transaction is to be classified as a MAR if it meets any one of the following three

criteria:

(a) The value of the assets bought or sold is more than 50% of a firm's total assets.

(b) The assets bought or sold generate more than 50% of its total revenue.

(c) The value of the assets bought or sold is more than 50% of a firm's net assets and is above 50 million RMB.

If owners of high-ESV firms would prefer to "reinvent" their firm through some sort of asset swap with a private business, rather than sell their firm for its shell value through a RM, we should observe a higher likelihood of MARs among high-EVSM firms. To examine the relation between a firm's ESV ranking and the likelihood of a future MAR, we collected all the MAR events that were reported to the CSRC between May 2011 and April 2017. This data was available from three vendors: THS, WIND, and CSMAR. By combining their datasets, we were able to identify 1143 unique MAR events. Note that because a RM also involves a MAR, this sample of MAR events includes the RMs in our sample as a subset. However, all results are robust if we exclude the RMs from the MAR sample.

At the beginning of each May, we sort firms by ESV into 10 portfolios. We then calculate the proportion of firms in each ESV decile that undertakes a MAR in the next 12 months. Figure 4 reports the results. For firms in the top ESV decile at the beginning of May, over 18.7% undertake a MAR in the next 12 months. In contrast, for firms in the bottom ESV decile, only 3.6% of firms undertake a MAR in the next 12 months. As predicted, a large proportion of high-ESV firms are finding ways to "reinvent" themselves rather than surrendering controlling ownership in the listed entity.

Table 10 further confirms the results in Figure 4 using logit regressions with additional control variables. High*n* are dummy variables that equal to one if a firm's ESV at the beginning of May in year t is in the top *n* percentile. We find a monotonic decrease in the coefficient of ESV dummy from High5 to High50. These findings strongly support the idea that firms with high ESV are more likely to undertake a MAR.

8. Price Sensitivity to Earnings

Finally, we examine the sensitivity of firm prices to corporate earnings. Valuation theory predicts that high-ESV firms will be trading primarily on their expected shell value. If this is the case, the stock prices of high-ESV firms should be less sensitive to the amount of reported corporate earnings. We examine this proposition by regressing the book-to-market (BM) ratio of listed firms to their return-on-assets (ROA) for various subpopulations of firms sorted on ESV.

Table 11 reports the estimates from two Fama-MacBeth regressions. The dependent variable is the book-to-market ratio. The independent variables are: ROA, the return on assets; High33 (Med33), a dummy variable that equals to one if a firm's ESV at the beginning of May in year t is in the top (middle) 33 percentile, plus interaction terms. The dependent and independent variables are contemporaneous and from fiscal year 2010 to 2015. Variables, except dummy variables, are winsorized at 1% level for each tail every year. Of particular interest to us are the coefficients on High33×ROA and Med33×ROA.

Our results largely confirm our predictions. As expected, in most firms we find a positive relation between market-to-book and corporate earnings (i.e., a *negative* relation between BM and ROA). This is evident in both models. Specifically, in Model (2), the estimated coefficient for ROA is -1.560 and highly significant. More importantly, for high-EVSM firms, we expect this relation to be attenuated, and this is indeed what we find. For example, the estimate coefficient on RAO for top-tertile ESV firms is +0.23 (1.79 - 1.56). In other words, we find a *negative* relation between reported earnings the market-to-book ratio for high-ESV firms. This negative relation stands in sharp contrast to the *positive* relation that exists between earnings and pricing multiples for low-ESV firms. Once again, the evidence suggests that the stock returns of high-ESV firms are much more likely to be detached from firm fundamentals.

9. Conclusion

China's astonishing economic growth over the past four decades is well-documented,

but perhaps less appreciated is the central importance of financial market reform in facilitating a continuation of that growth going forward. As in most countries, debt and equity financing through public capital markets will play an important role in the growth of Chinese companies. However, with a small and nascent market for bonds, as well as a volatile and rapidly evolving market for equities, China's financial regulators must make many important reform decisions in the coming years. How and when these reforms take shape will go a long way in determining the country's economic trajectory.

In this study, we use the prices paid for shell companies in reverse merger (RM) transactions to investigate the impact of China's initial public offerings (IPOs) regulations on its publicly listed companies. We find that the shell value in China on average is between 2.9 and 4.4 Billion RMB, depending on estimation method. This amount is huge and represents about 20% to 28% of market value of an average firm. Given the high skewness of firm size distribution, it is more than 60% of the median market value of a listed firm. It reflects the huge (largely hidden) cost to unlisted firms wishing to access public equity markets. We argue this cost is attributable to China's restrictive IPO regulations, which not only limits the number of firms that may IPO, but also caps the PE ratio for the issuer (currently the cap is a PE of 23). These policies have a number of unintended consequences that we document in this study.

First, we investigate how the shell value affects stock prices and returns. We construct an ESV variable to measure the relative importance of the expected shell value in the valuation of a listed firm, and show that stocks with high ESV deliver high average returns, after controlling for all well-known characteristics. A long-short strategy based on the ESV delivers an average annual return of 30%. Furthermore, when we augment the Fama-French 5-factor model with an ESV factor, China's notoriously large size premium becomes insignificant. These results suggest that IPO policy plays a significant role in driving the size effect. They also help shed light on why small firms rarely delist in China.

We also provide new insights on the private benefits of controlling a public company in

China. Given the large shell values, it was curious to see so few RM transactions, even among firms whose market capitalization is well below the average shell value. We show that the rarity of RM deals is likely a consequence of supply side constraints. Specifically, the owners of many listed firms elect to retain control by leveraging their listing status and acquiring an unlisted business. As a result, high-EVS firms are five times more likely to engage in a future major asset restructuring (MAR) in the next 12-months than low-EVS firms.

This behavior points to another hidden cost of China's IPO policies: floundering public countries do not face a natural "sunset" mechanism. Rather, because of the high value attached to their listing status, owners and managers of poorly performing public companies can continue to acquire and operate new businesses. Therefore, the restrictive IPO regulations not only prevent successful businesses from accessing capital, they also prevent unsuccessful businesses from facing the natural consequences of their poor stewardship. Our finding that one in five high-EVS firms will engage in a MAR in the next 12 months strongly suggests that many owners of poorly-performing public companies are being given second- and third-chances at running new businesses.

To our knowledge, we are the first to study the shell value of listed firms in a government-regulated capital market like China. We show that this variable is the key to understanding many asset pricing puzzles, and even business investment decisions and M&A activities, in China. Because of her IPO regulations, many Chinese firms with negative earnings and no perspective of future growth can remain actively traded in the market. The stock prices of these firms tend not to reflect firm fundamentals and they are more sensitive to regulatory shocks. Interestingly, these firms also tend to earn a premium over larger and more mature firms, perhaps due to higher risk.

Collectively, our results demonstrate the consequences of government regulated IPOs on the capital market. Our findings help explain a number of other empirical phenomenon in China. They highlight the importance of regulatory reform to Chinese capital markets,

particularly with respect to the rules and policies governing IPOs. At the same time, we believe these findings also have implications for other capital markets in emerging countries where governments play a dominant role in the way financial markets operate.

Appendix: The Reverse Merger Process in China

Unlisted firms used RMs to go public before 2007, but the related regulatory policies were not clear until 2011.[21] Since 2011 there are two major RM related policy changes in China. On May 13th 2011, CSRC released the document, *The Revised Regulations on the Assets Restructuring and Related Financing of Listed Firms*. This policy defines the scope, conditions, and methods of the regulations on RMs for the first time. Prior to the release of this policy, the eligibility requirements for an unlisted firm in a RM were not clearly stated. According to this policy, the standards established for IPOs can be used as a reference when evaluate the eligibility of the unlisted firm in proposed RM transactions. This document does not, however, explicitly require the unlisted firm in a RM to meet IPO eligibility standards.

On November 30th 2013, CSRC released the document, *Strictly Implementing IPO Standards in the Audit of Reverse Mergers*. According this new policy, the unlisted firms that participate in RMs must meet IPO listing standards. Even with this new policy in place, the review process of Restructuring and Merger Committee differs from, and is probably less stringent than, that of IPO Committee. For example, over and above the explicit listing standards, the IPO committee will often evaluate a candidate firm's sustainability of earnings, review the legality of a firm's formation and development process, the nature and extent of its related party transactions, and investigate other risk indicators that may point to potential fraud. The RM review does not necessarily include these steps.

Figure A1 presents the sequence of events that must take place as part of a reverse merger transaction in China. The first key event (labeled "A" in graph) is a public announcement that trading has been suspended in the listed firm (i.e. the "shell"). This is typically associated with or followed shortly by news of a potential restructuring event, without any details. The second event is a resumption of trading, typically 3 or 4 months later, together with the release of a preliminary RM proposal (event B). This draft proposal

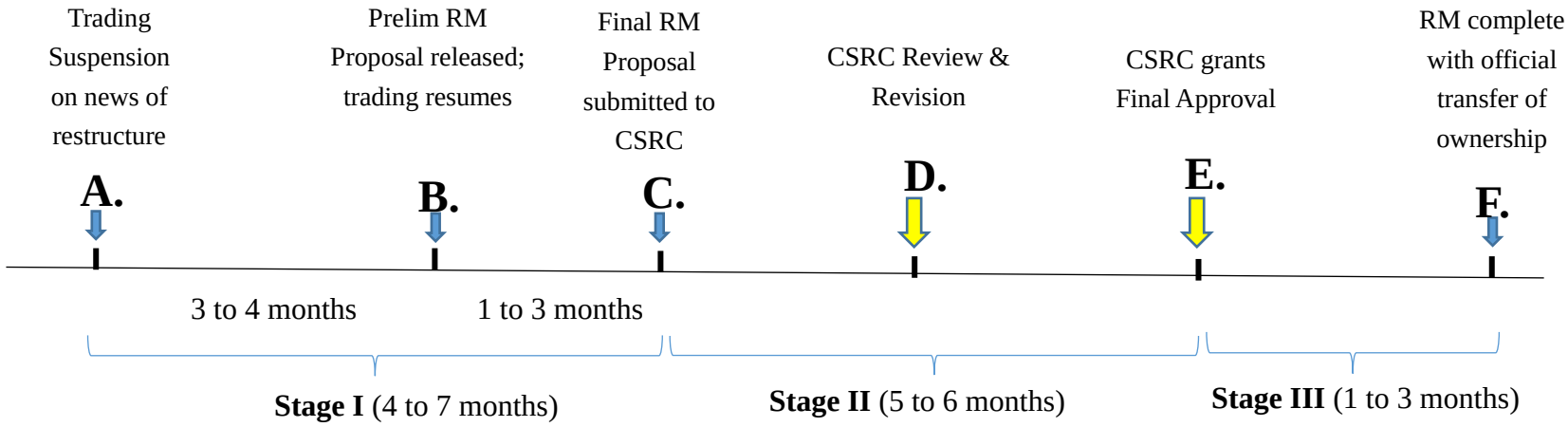
[21] Before 2011 the practitioners will classify an event as RM if the control right is changed and the firm undergoes significant asset restructuring.

contains significant details on the agreement, subject to final Board and Shareholder approval. After the preliminary proposal has been ratified by the Board and the listed firm's shareholders, it is submitted to the CSRC for approval (event C). This completes Stage 1 of the RM process, which typically takes a total of 4 to 7 months.

The next two stages of the process are mainly controlled by the CSRC. In Stage II, the Restructuring Committee of the CSRC conducts a review of the RM proposal. The CSRC typically provides feedback and often asks for certain revisions (event D). It may also request additional supplemental material be submitted. In making its decision, the CSRC is expected to apply the same disclosure and qualification standards as in a full IPO.

If all goes well, the CSRC will grant its official approval for the RM (event E). Stage II typically involves 5 to 6 months. After receiving official approval, the firm files for a formal transfer of ownership. At the completion of the official transfer of ownership procedure, the RM is complete (event F). From the initial trading suspension to the completed transfer of ownership, the entire process typically takes 10 to 16 months.

Figure A1. The Reverse Merger Process



A. Trading suspended on listed firm (typically followed shortly by news of a potential restructuring event, without details).

B. Trading resumed on listed firm (typically accompanied by release of a "Preliminary RM proposal," containing details of the agreement, subject to final Board and Shareholder approval).

C. The listed company holds general meeting of shareholders. The finalized RM proposal is approved and is submitted to the CSRC.

D. CSRC Restructuring Committee conducts review, provides feedback, asks for supplemental material as needed; if all goes well, it issues preliminary approval and a set of revision guides.

E. Listed firm completes revisions and CSRC grants official approval for RM.

F. The RM transaction is complete and the controlling shareholder of the listed firm is officially changed.

Table A1: Variable Definitions

The financial data and stock returns data of listed firms are from the China Stock Market and Accounting Research (CSMAR) Database. We exclude firms in ChiNext Board. All variables are cross-sectionally winsorized at the 1% level, either annually or monthly.

Name	Description	Definition
Firm characteristics		
Profit	Operating profit to assets	2 × (Operating Revenue - Operating Expenses - Income Tax Expenses And Additional Fees of Operations - Selling Expenses - General And Administrative Expenses) / (lagged Total Assets + Total Assets)
ROA	Return on assets	2 × (Net Profit + Finance Expenses + Income Tax Expenses) / (lagged Total Assets + Total Assets)
SaleG	Sales growth	(Operating Revenue - lagged Operating Revenue) / lagged Operating Revenue
Capex	Investment	Cash Paid to Acquire And Construct Fixed Assets, Intangible Assets And Other Long-Term Assets / lagged Total Assets
ChgAt	Change in assets	(Total Assets - lagged Total Assets) / lagged Total Assets
Acqex	Acquisition value	Net Cash Paid for Acquisition of Subsidiaries And Other Business Units / lagged Total Assets
Lev	Book leverage	Total Liabilities / Total Assets
Current	Current ratio	Total Current Assets / Total Current Liabilities
Cash	Cash holding	Cash And Cash Equivalents / Total Assets
Payout	Payout dummy	A dummy variable that equals to 1 if cash dividend>0
Fin	Financing dummy	A dummy variable that equals to 1 if equity financing>0
RE	Retained earnings ratio	(Surplus Reserves + Retained Earnings) / Total Equity Attributable to Owners of The Parent Company.
CFO	Cash flow from operating	2 × Net Cash Flow From Operating Activities / (lagged Total Assets + Total Assets)
CFI	Cash flow from investment	2 × Net Cash Flow From Investing Activities / (lagged Total Assets + Total Assets)
CFF	Cash flow from financing	2 × Net Cash Flow From Financing Activities / (lagged Total Assets + Total Assets)
ShrCon	Holding Concentration	Shares held by ten largest shareholders / Total shares

Stock Characteristics		
Rsize	Relative size	log(ME / median market equity of the market)
ME	Market equity	(Total Shares - B Shares) × A Share price + Value of B Shares
BM	Book to market	(Total Equity Attributable to Owners of The Parent Company + Deferred Tax Liabilities) / ME
ST	Special treatment	A dummy variable that equals to 1 if a firm is under special treatment
EP	Earnings price ratio	Net Profit / lagged ME
ExRet	Annual excess return	Annual stock return - annual market return
ExRetD	Annual excess return dummy	A dummy variable that equals to 1 if ExRet>=0
Ret01	Past 1 month return	Last month stock return
Ret212	Past 11 month return	Cumulative monthly return from month -2 to -12
Turnover	Turnover rate	Monthly Number of Shares Traded/ Number of tradable shares
HighN	High ESV dummy	A dummy variable that equals to 1 if a firm is among the top N percentile ESV group. N can be 5, 10, etc.
Med33	Medium ESV dummy	A dummy variable that equals to 1 if a firm is among the middle 33 percentile ESV group
CAR_1D	First-day CAR	Cumulative abnormal return from resumption of trading to the first day with closing price below the upper price limit

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Figure 1: Number of IPOs and RMs over time

This figure shows a year-by-year plot of the number of the reverse mergers (RM) and the number of IPOs from January 2007 to April 2016. The RM sample is hand-collected based on the information from THS. All clean RM deals as specified in Table 1 are included. The IPO sample is from CSMAR. The number of RMs is denoted by the line and corresponds to values in the left axis; the number of IPOs is denoted by the bar and corresponds to the values in the right axis. The shaped area represents the IPO suspension.

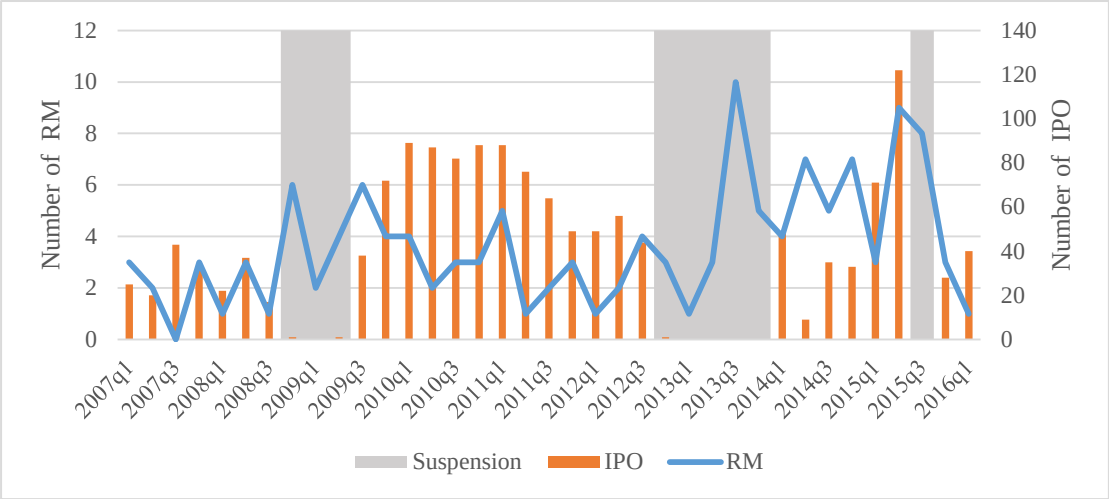

Figure 2: Shell Value over Time

These figures are time series plots of the prevailing shell value in each quarter from January 2007 to April 2016. The prevailing shell value for a given quarter is defined as the average realized shell value of all completed RM transactions in quarter t-1. If there were fewer than two RMs in quarter t-1, we use the average shell value from the past two quarters. We compute the prevailing shell value using three different estimation methods, which differ solely in terms of the market value of the combined entity (MVCE) used. For SV1, we use the price-to-earning (PE) ratio of the unlisted firm as reported in the reverse merger proposal to estimate MVCE. For SV2, we use the industry average PE ratio of the unlisted firm to estimate MVCE. For SV3, we use the closing price on first day that is below daily upper price limit after trading resumes as our MVCE estimate. Each of the three SV estimates is scaled by either the mean market value of equity of all listed firms on the announcement date of the RM (Figure 2A), or the median market value of equity of all listed firms on the announcement day of RM (Figure 2B). In both panels, we plot the value of the prevailing SV in each quarter. The dotted line is for SV1. The dash line is for SV2. The solid line is for SV3.

Figure 2A. Shell value (mil RMB)

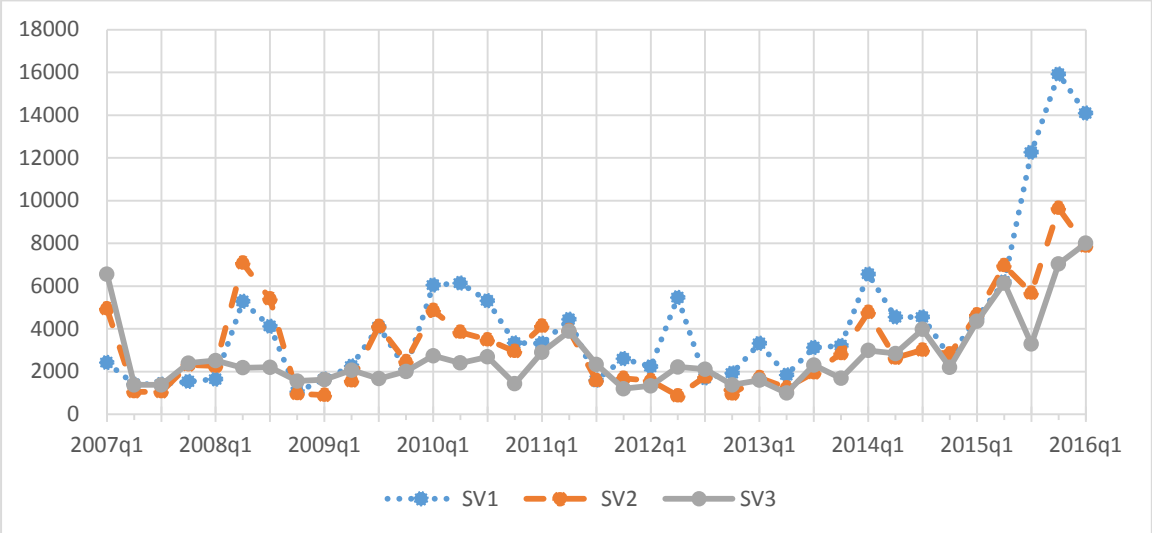

Figure 2 continued

Figure 2B. Shell value deflated by the average market value of equity

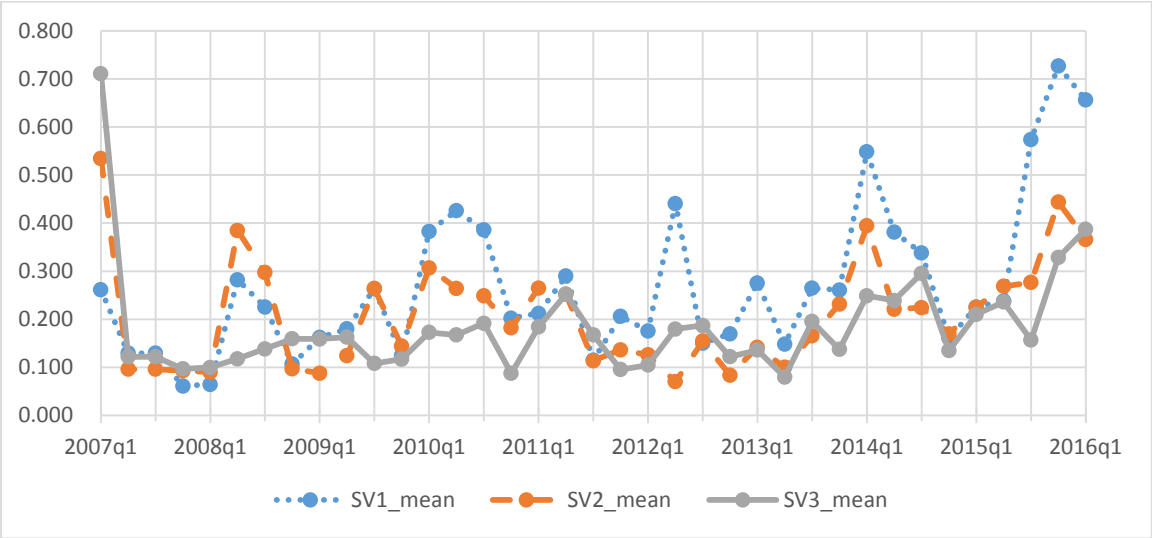

Figure 2C. Shell value deflated by the median market value of equity

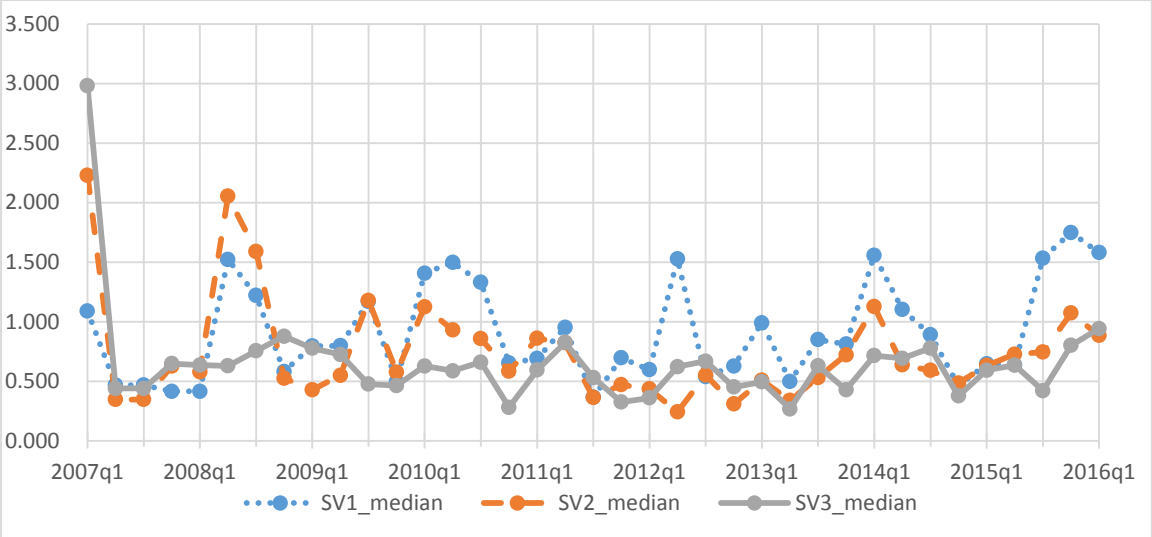

Figure 3: Policy Shocks and Hedged ESV Portfolio Return

These plots depict the difference in excess return between firms in the top decile and bottom decile by their Estimated Shell Value Metric (ESV) around regulatory shocks announced by the CSRC. To construct these graphs, firms are sorted into 10 deciles at the beginning of the May in each year based on their ESV. Top (bottom) decile firms have estimated shell values that represent the largest (smallest) proportion of their market capitalization. We identify 3 tightening reverse merger (RM) events and 3 tightening IPO events. In the Figure 3a (3b) figure, we report the average cumulative excess return to a hedged ESV portfolio over the time event window [-2, 2] for the set of IPO (RM) tightening events.

Figure 3a. Regulatory Shocks that Tighten IPO

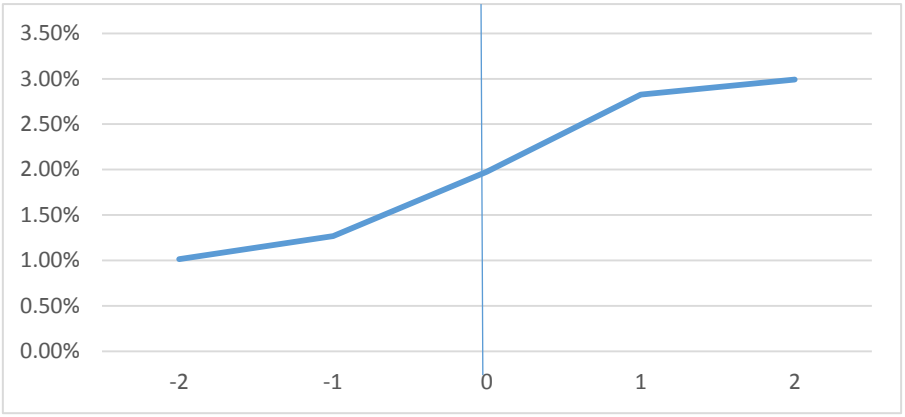

Figure 3b. Regulatory Shocks that Tighten Reverse Mergers

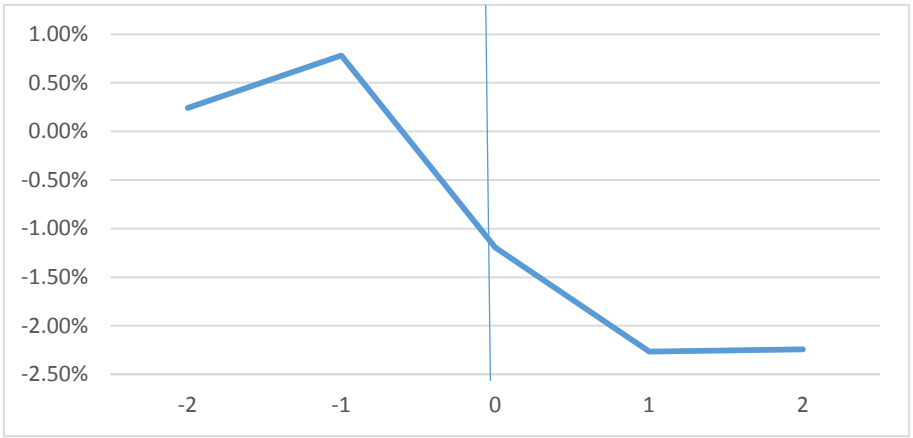

Figure 4. Future Major Assets Restructurings (MAR) by ESV Decile

This figure reports the proportion of firms in each ESV decile that undertakes a major asset restructuring (MAR) in the next 12-months. A major asset restructuring is defined, by the CSRC, as a change in the asset base of the firm that involves more than 50% of its operating assets or revenue. To construct this graph, firms are sorted by ESV at the beginning of May. We then report the percentage of firm in each decile portfolio that undertakes a major assets restructuring (MAR) in the next 12 months. The horizontal axis shows the portfolios from firms with the lowest ESV (1) to highest ESV (10).

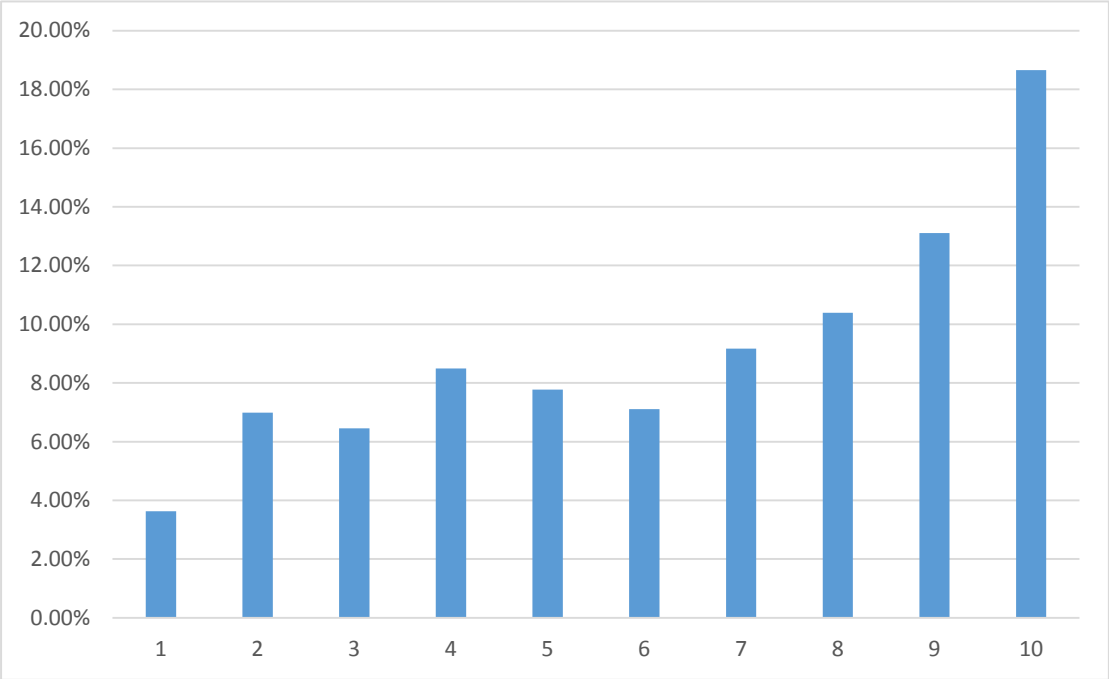

Table 1: Sample and Summary Statistics of Reverse Mergers

Panel A shows the reverse merger (RM) sample screening process. The sample period is from January 2007 to April 2016. The RM deals are excluded if they are still in process, failed, finished in multiple transactions, or miss key information. Panel B shows the summary statistics of shell value determinants. PE_pre is the forecast price earning (PE) ratio of the unlisted firm in the reverse merger proposal. PE_ind is the industry average PE ratio of the unlisted firm on the announcement day of RM. MVCE is the market value of the combined entity. MVCE1 = PE_Pre × E + W, MVCE2 = PE_Ind × E + W, and MVCE3 = P_Day1 × (S + ΔS), where E is the first-year promised net income of unlisted firm, W is net assets that remain in the combined entity and are shared by both parties, S is the original number of shares of listed firm, ΔS is the number of additional shares issued by the listed firm and given to the unlisted firm as a part of the RM, and P_Day1 is the closing price of first day that is below daily upper price limit after the trading is resumed. SFS = (S – TS) / (S + ΔS), where TS is the number of shares transferred to the unlisted firm with a pre-specified price (P'). OC is the other considerations surrendered by the owners of the shell firm OC=C + V + W - TS × P', where C is the cash payment, V is the value of net assets given to the unlisted firm in an Asset Swap, W is net assets that remain in the combined entity, and TS × P' is the value of shares transferred to the unlisted firm. CAR_1D is the cumulative abnormal return from resumption of trading to the first day with closing price below the upper price limit.

Panel A: Reverse Merger Sample	
Type	N
RM sample	249
Acquiring shares over time	-68
One-time RM sample	181
Failed	-45
In process	-2
Successful one-time RM sample	134

Panel B: Summary Statistics					
variable	N	mean	p5	p50	p95
PE pre	134	47.739	15.439	41.620	108.780
PE ind	134	38.217	14.655	34.712	68.452
MVCE1 (mil RMB)	134	18554.400	1647.345	11809.090	60715.610
MVCE2 (mil RMB)	134	15375.390	1706.812	9996.868	42454.000
MVCE3 (mil RMB)	134	13644.700	3532.770	8173.970	41345.110
SFS	134	0.326	0.108	0.324	0.549
OC (mil RMB)	134	356.519	-299.745	169.931	1620.917
C (mil RMB)	134	87.466	0.000	0.000	448.298
V (mil RMB)	134	219.036	0.000	0.000	917.538
W (mil RMB)	134	233.277	0.000	28.188	1202.669
TS×P' (mil RMB)	134	183.260	0.000	0.000	854.010
percentage of C>0	134	9.000	0.000	0.000	100.000
percentage of V>0	134	41.800	0.000	0.000	100.000
percentage of W>0	134	59.000	0.000	100.000	100.000
percentage of W is cash	134	40.299	0.000	0.000	100.000
percentage of TS>0	134	37.300	0.000	0.000	100.000
CAR_1D	134	1.034	-0.011	0.470	3.800

Table 2: Shell Value

This table shows the summary statistics of the shell value (SV). The sample period is from January 2007 to April 2016. The shell value depends on the market value of the combined entity (MVCE). For SV1, the MVCE is calculated based on the price earning (PE) ratio of the unlisted firm in the reverse merger proposal. For SV2, the MVCE is calculated based on the industry average PE ratio of the unlisted firm. For SV3, the MVCE is calculated based on the closing price of first day that is below daily upper price limit after the trading is resumed. Panel A shows the original shell value. In Panel B, SV is deflated by the average market value of equity of all listed firms on the announcement day of reverse merger (RM). In Panel C, SV is deflated by the median market value of equity of all listed firms on the announcement day of reverse merger (RM).

variable	N	mean	10%	25%	50%	75%	90%
				Panel A: RMB value			
SV1 (mil RMB)	134	4427.2	856.1	1846.3	3136.7	6137.5	8585.8
SV2 (mil RMB)	134	3389.9	827.7	1331.8	2745.3	4457.1	6942.3
SV3 (mil RMB)	134	2903.9	1137.5	1541.1	2302.8	3327.7	5572.8
				Panel B: Deflated by the mean market value			
SV1_mean	134	0.280	0.062	0.121	0.235	0.348	0.538
SV2_mean	134	0.214	0.067	0.106	0.189	0.272	0.403
SV3_mean	134	0.192	0.084	0.112	0.160	0.226	0.313
				Panel C: Deflated by the median market value			
SV1_median	134	0.916	0.272	0.492	0.766	1.074	1.911
SV2_median	134	0.730	0.256	0.377	0.590	0.876	1.370
SV3_median	134	0.656	0.306	0.411	0.560	0.740	1.069

Table 3: Firm Characteristics Shell and Non-shell Firms

This table shows the characteristics of the listed firms from May 2007 to April 2016. Panel A shows the summary statistics for firms that are bought as a shell one year before shell transaction. Panel B presents the summary statistics for firms that are not bought as a shell in the next year. Rsize is the relative size. Profit is the operating profit to assets. ST is the special treatment dummy. ShrCon is the holding concentration. Lev is the book leverage. Cash is the cash holding to assets. CFO is the cash flow from operating. Variable details are provided in Table A1.

Panel A: Shell firm-year						
Variable	N	mean	sd	5%	50%	95%
Rsize	244	-0.752	0.455	-1.255	-0.921	0.159
Profit	244	0.003	0.051	-0.070	-0.000	0.095
ST	244	0.361	0.481	0.000	0.000	1.000
ShrCon	244	0.473	0.134	0.289	0.461	0.718
Lev	244	0.571	0.261	0.136	0.571	0.937
Cash	244	0.153	0.136	0.016	0.105	0.422
CFO	244	0.027	0.075	-0.095	0.022	0.159
Panel B: Non-Shell firm-year						
Variable	N	mean	sd	5%	50%	95%
Rsize	16,272	0.184	0.910	-1.029	0.012	2.152
Profit	15,559	0.047	0.052	-0.041	0.043	0.143
ST	16,272	0.065	0.247	0.000	0.000	1.000
ShrCon	16,460	0.567	0.155	0.296	0.574	0.812
Lev	16,464	0.493	0.211	0.149	0.497	0.845
Cash	16,465	0.177	0.129	0.029	0.141	0.432
CFO	15,560	0.047	0.075	-0.087	0.046	0.173

Panel C: Comparison							
	Rsize	Profit	ST	ShrCon	Lev	Cash	CFO
Diff in mean	-0.936***	-0.044***	0.296***	-0.094***	0.078***	-0.024***	-0.020***
Diff in median	-0.933***	-0.043***	0.000***	-0.112***	0.074***	-0.036***	-0.024***

* p<0.1 ** p<0.05 *** p<0.01

Table 4: Pooled Regression to Estimate the Probability of Reverse Mergers

This table reports the results from a set of logit regressions. The dependent variable is a dummy that equals to 1 if a firm announces a RM in the period from May 2007 to April 2016. The independent variables are based on accounting information for the most recent fiscal year ended before the RM announcement. Rsize is the relative size. Profit is the operating profit to assets. ST is the special treatment dummy. ShrCon is the holding concentration. Lev is the book leverage. Cash is the cash holding to assets. CFO is the cash flow from operating. SOE is the state owned enterprise dummy. All variables, except dummy variables, are winsorized at 5% level for each tail every year. Variable details are provided in Table A1. Standard errors are clustered at the firm level.

	Exp. Sign	(1)	(2)	(3)	(4)	(5)	(6)
Rsize	-	-1.839***	-1.839***	-1.845***	-1.844***	-1.817***	-1.803***
		(-9.93)	(-9.89)	(-9.93)	(-9.96)	(-9.90)	(-9.75)
Profit	-	-7.163***	-7.318***	-7.442***	-7.662***	-7.810***	-7.598***
		(-3.91)	(-3.92)	(-3.99)	(-3.96)	(-4.03)	(-3.87)
ST	+	0.679***	0.715***	0.696***	0.696***	0.680***	0.655***
		(3.92)	(3.88)	(3.77)	(3.76)	(3.63)	(3.40)
ShrCon	-	-1.423***	-1.443***	-1.476***	-1.476***	-1.471***	-1.572***
		(-2.79)	(-2.83)	(-2.87)	(-2.88)	(-2.88)	(-3.00)
Lev	+/-		-0.183	-0.049	-0.056	-0.030	-0.043
			(-0.55)	(-0.14)	(-0.16)	(-0.09)	(-0.12)
Cash	+/-			0.714	0.682	0.677	0.580
				(1.34)	(1.26)	(1.25)	(1.06)
CFO	+/-				0.484	0.525	0.495
					(0.51)	(0.56)	(0.51)
SOE	+/-					-0.131	-0.104
						(-1.02)	(-0.79)
Constant		-4.117***	-4.015***	-4.178***	-4.180***	-4.115***	-3.732***
		(-14.67)	(-12.49)	(-12.54)	(-12.54)	(-12.06)	(-9.11)
Industry FE		No	No	No	No	No	Yes
N		15782	15781	15781	15781	15781	14759
pseudo. R^2		0.183	0.183	0.184	0.184	0.184	0.183

* p<0.1 ** p<0.05 *** p<0.01

Table 5: Fama-MacBeth regression of ESV on returns

This table shows the estimates from the Fama-MacBeth regression. The dependent variable is monthly excess return from May 2011 to November 2016. The expected shell value value, ESV, is defined as ESP × Avg_SV2 / ME, where Avg_SV2 is the average of SV2. ME is the market value of equity of the listed firm and is winsorized at 5% level for each tail every year in ESV calculation. ESP is the expected shell probability which is the predicted value from a rolling logit regression using past 4 years of data from with the specification in Column (1) of Table 4. In the rolling regression, the dependent variable is a dummy that equals to 1 if a firm announces a RM from May in year t-3 to April in year t. The timing of independent variables follows that in Table 4. After the estimation, we use the accounting and stock market information at the beginning of May in year t to predict the expected shell probability from May in year t+1 to April in year t+2. log(BM) is the logarithm of book to market ratio. Profit is the operating profit to assets. EP is the earnings price ratio. In the Fama-MacBeth regression, ESV, log(ME), log(BM), Profit, are EP are updated in May in year t+1 using the accounting and stock market information at the end of fiscal year t. Turnover is the last month stock turnover rate. Ret01 is the last month return, and Ret212 is the cumulative return from month -2 to -12. All independent and dependent variables are winsorized at 1% level for each tail every year or every month. Variable details are provided in Table A1. The t-statistics are adjusted for heteroscedasticity and autocorrelation by Newey-West method.

	(1)	(2)	(3)	(4)	(5)	(6)
ESV	0.182***	0.187***	0.189***	0.198***	0.196***	0.170**
	(3.02)	(2.94)	(2.90)	(3.11)	(2.95)	(2.59)
log(ME)	-0.005**	-0.005**	-0.005**	-0.005**	-0.006**	-0.007***
	(-2.07)	(-2.07)	(-2.07)	(-2.10)	(-2.16)	(-2.71)
log(BM)	0.001	0.002	0.002	0.002	0.001	0.001
	(0.51)	(0.81)	(0.83)	(0.95)	(0.71)	(0.65)
ret01		-0.075***	-0.075***	-0.076***	-0.076***	-0.056***
		(-5.61)	(-5.63)	(-5.75)	(-5.62)	(-3.90)
ret212		-0.006	-0.006	-0.007	-0.006	-0.003
		(-1.42)	(-1.39)	(-1.46)	(-1.38)	(-0.54)
ChgAt			0.001	0.000	-0.000	0.001
			(0.55)	(0.40)	(-0.01)	(1.32)
Profit				0.013		
				(0.72)		
EP					0.026	
					(1.45)	
Turnover						-0.018***
						(-6.05)
Constant	0.057**	0.060**	0.060**	0.060**	0.062**	0.082***
	(2.16)	(2.18)	(2.18)	(2.21)	(2.23)	(2.92)
N	67	67	67	67	67	67
Avg. R^2	0.049	0.084	0.086	0.090	0.088	0.098

* p<0.1 ** p<0.05 *** p<0.01

Table 6: Portfolio test: alpha and beta of 10 deciles sorted by ESV

This table shows the alpha and beta of 10 portfolios sorted by expected shell value (ESV). At the beginning of May in year t, firms are sorted into 10 portfolios based on their ESV. To be an implementable trading strategy, we exclude a stock in a portfolio if the stock's trading is suspended at the end of April and the top decile ESV portfolio does not include this stock in the last year. The value weighted excess monthly return, Ex ret, for each portfolio is calculated for the next 12 months. The weight is the market value of equity at the end of year t-1. Group 1 (10) is for the firms with lowest (highest) ESV. For the 10 portfolios as well as the Highest-Lowest (10-1) portfolio, we report the alpha and beta from Fama-French 5-factor model. Monthly portfolio returns are from May 2011 to November 2016. The t-statistics are adjusted for heteroscedasticity and autocorrelation by Newey-West method.

group	Ex ret	alpha	MKT	SMB	HML	RMW	CMA
1	0.351	0.240**	0.946***	-0.195**	0.161*	0.277**	0.208***
	(0.38)	(2.38)	(79.44)	(-2.49)	(1.80)	(2.24)	(3.08)
2	0.764	0.009	0.997***	0.077	-0.178**	-0.286	-0.086
	(0.71)	(0.04)	(13.98)	(0.56)	(-2.54)	(-1.19)	(-0.60)
3	0.854	-0.250*	0.986***	0.282*	-0.175*	-0.385	-0.188
	(0.78)	(-1.72)	(11.99)	(1.98)	(-1.91)	(-1.41)	(-1.62)
4	0.873	-0.482***	0.948***	0.393**	-0.097	-0.528	-0.112
	(0.78)	(-2.98)	(11.95)	(2.09)	(-0.98)	(-1.64)	(-0.88)
5	1.126	-0.331**	0.971***	0.487***	-0.277***	-0.347	0.003
	(0.98)	(-2.37)	(16.22)	(3.36)	(-4.03)	(-1.47)	(0.02)
6	1.297	-0.317**	0.938***	0.559***	-0.172**	-0.440***	0.040
	(1.18)	(-2.45)	(17.12)	(6.03)	(-2.25)	(-3.02)	(0.47)
7	1.535	-0.209	0.961***	0.620***	-0.117	-0.335**	0.291**
	(1.32)	(-1.41)	(19.16)	(6.66)	(-1.42)	(-2.20)	(2.42)
8	1.759	-0.206	0.957***	0.834***	-0.159**	-0.017	0.391***
	(1.52)	(-1.56)	(26.52)	(11.49)	(-2.22)	(-0.19)	(4.58)
9	2.097*	0.056	0.934***	0.827***	-0.077	-0.246*	0.352***
	(1.69)	(0.39)	(23.49)	(9.12)	(-0.72)	(-1.94)	(3.69)
10	2.794**	0.687***	0.856***	0.882***	-0.344***	0.038	0.958***
	(2.16)	(3.19)	(20.79)	(6.26)	(-2.99)	(0.15)	(5.58)
10-1	2.442***	0.447***	-0.090**	1.077***	-0.505***	-0.239	0.749***
	(2.91)	(2.92)	(-2.43)	(13.09)	(-9.86)	(-1.39)	(5.50)

* p<0.1 ** p<0.05 *** p<0.01

Table 7: Hedged ESV Portfolio Alpha

This table shows the estimates from different benchmark models. The dependent variable is the monthly excess return of Highest-Lowest ESV portfolio. At the beginning of May in year t, firms are sorted into 10 portfolios based on their ESV. To be an implementable trading strategy, we exclude a stock in a portfolio if the stock's trading is suspended at the end of April and the top decile ESV portfolio does not include this stock in the last year. The value weighted excess monthly return for each portfolio is calculated for the next 12 months. The weight is the market value of equity at the end of year t-1. Monthly portfolio returns are from May 2011 to November 2016. The t-statistics are adjusted for heteroscedasticity and autocorrelation by Newey-West method.

	CAPM	3-Factor	4-Factor	5-Factor
Alpha	2.322***	0.566***	0.528***	0.447***
	(2.94)	(3.69)	(3.48)	(2.92)
MKT	0.227	-0.091***	-0.098***	-0.090**
	(1.12)	(-3.37)	(-4.29)	(-2.43)
SMB		1.221***	1.236***	1.077***
		(30.27)	(33.07)	(13.09)
HML		-0.353***	-0.356***	-0.505***
		(-4.33)	(-4.51)	(-9.86)
MOM			-0.079*	
			(-1.79)	
RMW				-0.239
				(-1.39)
CMA				0.749***
				(5.50)
N	67	67	67	67

* p<0.1 ** p<0.05 *** p<0.01

Table 8: Policy Shocks and Hedged ESV Portfolio Return

This table shows the difference of excess return between highest and lowest ESV firms around the events of regulatory shocks by CSRC. At the beginning of May in year t, firms are sorted into 10 portfolios based on their ESV. There are 3 events of tightening reverse merger (RM) policy and 3 events of tightening IPO policy. For each event, the cumulative excess return in a 3-day event window [-1,1] is computed for each firm, and the differences of excess return between firms in the top decile and bottom decile of ESV are reported with the t-statistics in the parenthesis. The row Overall reports the differences of excess return between firms in the top decile and bottom decile of ESV from all 3 events.

		Ex ret	t stat
Tighten RM	Event1 (2011.05.06)	-0.457	(-1.11)
	Event2 (2013.12.02)	-5.103***	(-12.70)
	Event3 (2016.06.20)	-1.559***	(-3.25)
	Overall	-2.482***	(-9.20)
Tighten IPO	Event1 (2014.05.20)	1.334***	(5.01)
	Event2 (2016.03.16)	1.606***	(4.51)
	Event3 (2016.09.08)	2.321***	(7.59)
	Overall	1.769***	(9.35)

* p<0.1 ** p<0.05 *** p<0.01

Table 9: Testing Ten Size Portfolios using 5 and 6 Factors

This table shows the alpha and beta of 10 size portfolio from 5-factor (Panel A) and 6-factor (Panel B) models. At the beginning of May in year t, firms are sorted into 10 portfolio based on their market capitalization at the end of year t-1. To ensure an implementable trading strategy, we exclude a stock if its trading was suspended at the end of April and it was not in the sample at the beginning of the prior year. The value weighted excess return for each portfolio (Ex ret) is calculated for the next 12 months. Group 1 (10) represent firms with the smallest (biggest) market value of equity. We report the alpha and beta for each size portfolio, as well as the Smallest-Biggest (1-10) portfolio. Monthly portfolio returns are from May 2011 to November 2016. The SV factor is the monthly excess return of Highest-Lowest ESV portfolio. The t-statistics are adjusted for heteroscedasticity and autocorrelation by Newey-West method.

		Panel A: Under 5 factors						Panel B: Under 6 factors						
group	Ex ret	alpha	MKT	SMB	HML	RMW	CMA	alpha	MKT	SMB	HML	RMW	CMA	SV
1	2.929**	0.722***	0.862***	0.956***	-0.233***	-0.084	0.636***	0.361*	0.934***	0.086	0.175**	0.110	0.031	0.808***
	(2.13)	(2.68)	(22.22)	(8.65)	(-2.94)	(-0.42)	(6.66)	(1.91)	(41.95)	(0.94)	(2.49)	(1.15)	(0.24)	(12.90)
2	2.275*	0.126	0.923***	0.936***	-0.112	-0.145	0.285***	-0.013	0.951***	0.601***	0.045	-0.071	0.052	0.311***
	(1.85)	(0.94)	(24.73)	(16.00)	(-1.40)	(-1.25)	(3.20)	(-0.10)	(37.15)	(7.47)	(0.57)	(-0.69)	(0.63)	(6.68)
3	1.942*	-0.044	0.979***	0.829***	-0.126**	-0.153	0.204***	-0.126	0.996***	0.630***	-0.033	-0.108	0.066	0.185**
	(1.67)	(-0.35)	(21.79)	(12.33)	(-2.00)	(-1.52)	(2.72)	(-0.87)	(21.99)	(8.06)	(-0.41)	(-0.90)	(0.55)	(2.40)
4	1.544	-0.261**	0.961***	0.705***	-0.153*	-0.174	0.289***	-0.354***	0.979***	0.480***	-0.048	-0.124	0.133	0.208***
	(1.33)	(-2.49)	(22.25)	(9.46)	(-2.00)	(-1.33)	(3.54)	(-3.47)	(29.73)	(3.36)	(-0.50)	(-0.98)	(1.05)	(2.70)
5	1.305	-0.314**	0.960***	0.581***	-0.153*	-0.328*	0.072	-0.344**	0.966***	0.508***	-0.118	-0.312	0.021	0.068
	(1.21)	(-2.56)	(17.28)	(4.50)	(-1.98)	(-1.71)	(0.87)	(-2.45)	(18.28)	(3.19)	(-1.56)	(-1.55)	(0.21)	(0.94)
6	1.177	-0.403***	0.944***	0.565***	-0.227***	-0.332	0.057	-0.408***	0.945***	0.552***	-0.221**	-0.329	0.048	0.012
	(1.03)	(-3.20)	(15.80)	(3.48)	(-3.98)	(-1.23)	(0.51)	(-2.76)	(14.39)	(5.22)	(-2.11)	(-1.13)	(0.49)	(0.11)
7	0.954	-0.343**	0.955***	0.382**	-0.193*	-0.462	-0.147	-0.496***	0.986***	0.013	-0.019	-0.380	-0.404**	0.343***
	(0.86)	(-2.60)	(13.28)	(2.43)	(-1.94)	(-1.59)	(-1.14)	(-3.75)	(16.60)	(0.06)	(-0.15)	(-1.23)	(-2.59)	(3.18)
8	0.788	-0.426***	0.976***	0.386**	-0.180*	-0.269	-0.183	-0.482***	0.987***	0.251**	-0.117	-0.239	-0.277**	0.125
	(0.76)	(-3.11)	(13.89)	(2.60)	(-1.91)	(-0.96)	(-1.46)	(-2.92)	(13.48)	(2.12)	(-1.15)	(-0.78)	(-2.16)	(1.19)
9	0.740	0.020	0.966***	0.025	-0.245***	-0.425*	-0.075	-0.148	0.999***	-0.379	-0.055	-0.335	-0.356***	0.375***
	(0.69)	(0.10)	(12.91)	(0.17)	(-3.52)	(-1.78)	(-0.58)	(-0.95)	(16.34)	(-1.60)	(-0.62)	(-1.32)	(-2.78)	(2.97)
10	0.355	0.223*	0.957***	-0.181**	0.182**	0.297**	0.212***	0.205*	0.960***	-0.224**	0.202**	0.306**	0.182**	0.040
	(0.38)	(1.93)	(77.25)	(-2.47)	(2.16)	(2.49)	(2.98)	(1.94)	(67.25)	(-2.07)	(2.50)	(2.64)	(2.29)	(0.69)
1-10	2.574***	0.500**	-0.095***	1.138***	-0.415***	-0.381**	0.425***	0.156	-0.026	0.310***	-0.027	-0.197**	-0.151	0.768***
	(2.84)	(2.62)	(-2.71)	(13.84)	(-3.68)	(-2.59)	(3.89)	(1.43)	(-1.20)	(4.35)	(-0.23)	(-2.28)	(-0.95)	(14.80)

Table 10: ESV and Future Major Assets Restructuring

This table reports the results of a set of logit regressions that estimate the probability of a firm undertaking a major asset restructuring (MAR) in the next 12 months. A major asset restructuring is defined, by the CSRC, as a change in the asset base of the firm that involves more than 50% of its operating assets or revenue. The dependent variable is a dummy that equals 1 if a firm undertakes a MAR from May in year t to April in year t+1. High*n* are dummy variables that equal to 1 if a firm's ESV at the beginning of May in year t is in the top *n* percentile. Rsize is the relative size. Lev is the book leverage. Profit is the operating profit to assets. ST is the special treatment dummy. SOE is the state owned enterprise dummy. Dependent variables are calculated based on the accounting and stock market information at the end of fiscal year t-1. All variables, except dummy variables, are winsorized at 1% level for each tail every year. Variable details are provided in Table A1. Standard errors are clustered at the firm level.

	(1)	(2)	(3)	(4)	(5)	(6)
High5	0.330**					
	(2.45)					
High10		0.341***				
		(3.40)				
High20			0.290***			
			(3.07)			
High30				0.190*		
				(1.94)		
High40					0.063	
					(0.60)	
High50						-0.250**
						(-2.29)
Rsize	-0.312***	-0.274***	-0.241***	-0.257***	-0.310***	-0.462***
	(-6.00)	(-5.07)	(-4.02)	(-3.98)	(-4.36)	(-6.13)
Lev	0.178	0.173	0.185	0.194	0.204	0.197
	(0.99)	(0.96)	(1.02)	(1.07)	(1.13)	(1.09)
Profit	-6.230***	-6.085***	-6.053***	-6.224***	-6.461***	-6.971***
	(-7.03)	(-6.93)	(-6.86)	(-6.97)	(-7.22)	(-7.85)
ST	-0.180	-0.171	-0.113	-0.059	-0.034	-0.037
	(-1.18)	(-1.20)	(-0.81)	(-0.43)	(-0.24)	(-0.27)
SOE	-0.424***	-0.424***	-0.431***	-0.431***	-0.432***	-0.421***
	(-5.80)	(-5.79)	(-5.88)	(-5.90)	(-5.91)	(-5.77)
Constant	-1.634***	-1.678***	-1.717***	-1.711***	-1.665***	-1.452***
	(-6.51)	(-6.69)	(-6.75)	(-6.62)	(-6.28)	(-5.44)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12077	12077	12077	12077	12077	12077
Pseudo R^2	0.042	0.042	0.042	0.042	0.041	0.042

* p<0.1 ** p<0.05 *** p<0.01

Table 11: The Price-to-Earnings Relation

This table shows the estimates from Fama-MacBeth regressions. The dependent variable is the book to market ratio. ROA is return on assets. High33 (Med33) is a dummy variable that equals to 1 if a firm's ESV at the beginning of May in year t is in the top (middle) 33 percentile. The dependent and independent variables are contemporaneous and from 2010 to 2015 fiscal year. Variables, except dummy variables, are winsorized at 1% level for each tail every year. Variable details are provided in Table A1. The t-statistics are adjusted for heteroscedasticity and autocorrelation by Newey-West method.

	(1)	(2)
ROA	-1.091***	-1.555***
	(-9.48)	(-11.47)
High33	-0.140***	-0.200***
	(-7.90)	(-10.64)
High33×ROA	1.325***	1.790***
	(16.87)	(15.35)
Med33		-0.109***
		(-15.92)
Med33×ROA		1.057***
		(9.33)
Constant	0.329***	0.418***
	(6.77)	(8.37)
Industry FE	Yes	Yes
Observations	6	6
Avg. R2	0.172	0.186

* p<0.1 ** p<0.05 *** p<0.01

Online Appendix

Gate Fees: Shell Values and Regulatory Risk in Chinese Equity Markets *

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1. Under- or Over-reaction

Song et al. (2014) examine whether the high initial day returns to Chinese IPOs is due to underpricing or overvaluation and they find that, of the average initial return of 66%, around 2/3 seems to be from overvaluation and not underpricing. One concern is that perhaps some of the initial reaction to the RM announcement is also an overreaction. If that is the case, even the SV3 estimate might be too high. To resolve this issue, we examine the long-term returns of the combined entity after the initial day returns are calculated, and compare those returns with post IPO returns.

Figure B1 shows time series plots of the equal weighted average cumulative return of IPO firms and RM firms after the IPO and RMs. The sample period is from 2007 to 2016. There are 136 RMs and 1438 IPOs. Day 0 is the IPO day or the trading resumption day after the RM announcement. The return on day 0 is the cumulative return from the first trading day to the first day with closing price below the upper price limit. The figures start with day 0 return and show the cumulative return for the next 250 trading days. In Panel A, the abnormal return is the difference between the raw return and market return. In Panel B, the excess return is the difference between the raw return and risk free rate. The risk free rate is from CSMAR and is the one-year bank deposit rate. In both Panels, dash (real) line represents the return for IPO (RM) firms. Table B1 further shows the magnitude of the cumulative returns on day 0, day 125, and Day 250.

The initial day return for RMs is higher than that of IPOs.[1] After the initial day, there is a slight reversal for the RM cumulative return in the next 20 days, and there is a strong momentum for the IPO cumulative return in the same period. During the remaining period, the RM cumulative returns gradually increase over time, while the IPO cumulative returns are stable with a mild decrease. Overall, the post-shell announcement returns are not systematically negative. Actually stock performance of post-shell firm is better than the IPO firms on average. Given the upwards trend, it suggests an underreaction instead of overreaction of the RM announcements. Therefore, SV3 is a conservative estimate of the shell value. This underreaction is partially driven by the fact that there is a time gap between the RM announcement and CSRC final approval. The

[1] Our definition of initial day, or day 0, is not a single day due the price limit of Chinese stock market. The definition of day 1 to day 250 is conventional, and each day represents one trading day.

investors as well as the firm do not know whether the RM will get the final approval from CSRC.

2. Comparison of Firm Characteristics

One important question is how firms that choose RM are different from the ones that use IPO. In Table B2, we compare firm characteristics of RM firms and IPO firms. We start with the clean RM sample as specified in Table 1. We match RM firms with IPO firms by their total assets and industry using the financial information one year before they go public. Because firms go public in different years, we deflate the value of total assets by Producer Price Index. For 121 RM with complete financial information, we are able to match 90 IPO firms.

Denote the year when firms go public as T. RM firms have higher sales growth than IPO firms from year T-1 to year T+3, and the differences are generally significant. It suggests the RM firms have better growth potential and are more competitive. Consistently, RM firms tend to have higher return on assets and lower dividend payout. RM firms also conduct more equity financing after going public and have higher asset growth. Overall, RM firms do not appear to be inferior to IPO firms. Lee, Qu, and Shen (2018) conduct a similar exercise and find similar results.

3. Delisting of Chinese Listed Firms

Although the delisting of a listed firm in China is not generally common, there are three regulation eras on the delisting. The first period is from 1990 to 2000. The first Chinese stock exchange was founded in 1990, but the delisting related laws and regulations were not well established. In 1994, the Corporate Law was enacted, and it stipulated that a company will be delisted if it conducts serious illegal activities. However, it was not clear how to define “serious.” The same problem is found in the Securities Law enacted in 1999, and the delisting standards were ambiguous. Therefore, there is no delisting before 2000.

Between 2001 and 2011, the related laws and regulations became more explicit on the delisting standards and procedures. In 2001, the CSRC issued the Revised Guideline for the Suspension and Termination of the Listing Status for Firms with Losses. According to this Guideline, the trading of a firm with three years of consecutive loss will be

suspended, and it will be delisted if the firm do not have a positive profit in the fourth year. The revised Securities Law was enacted in 2006, and it was more specific on the conditions under which the firms will be delisted. The "serious illegal activities" is one of the conditions, but unfortunately the definition of "serious" in Securities Law was still not clear.

Since 2012, the delisting related laws and regulations have been further developed and become clear. Shanghai Stock Exchange and Shenzhen Stock Exchange issued the Revised Rules for Listing in 2012. According to these Rules, a firm will receive a delisting warning under certain conditions including consecutive losses, among others. If the firm with a warning cannot make improvement in the next year, it will be delisted. In 2014, CSRC issued the Several Suggestions on the Reform and Strict Implementation of Delisting Rules.

To formally investigate the delisting activities in China, we collect the firm accounting and stock price information from the China Stock Market and Accounting Research (CSMAR) Database. Following Fama and French (2004), we use the year of the firm's first appearance on the CSMAR to identify the birth of a Chinese public firm. For delisted firms, we distinguish between a voluntary and an involuntary delisting. A voluntary delisting includes mergers between two listed firms, and privatizations due to Split-Share Reform (see, e.g., Liao, Liu, and Wang, 2014).[2] An involuntary delisting includes reasons such as accounting fraud and consecutive losses. We search the media and corporate announcements and manually check the reason for each delisting.

Panel A in Table B3 reports the results from 2001 to 2017. Column (1) shows the number of firms at the beginning of the year. Columns (2) and (3) show the number of involuntary and voluntary delisting in each year. Column (4) shows the number of survived firms at the end of the year, and it excludes the newly listed firms in the year. Column (5) shows the death rate which is the number of involuntary delisting over the number of firms at the beginning of the year.

[2] For example, seven companies were delisted because they were subsidiaries of the same parent firms (e.g., China National Petroleum Corporation) and should be delisted under the Reform.

From 2001 to 2007, there are 42 involuntary delistings, and the average death rate is 0.48%. They are all related to consecutive losses. Anecdotal evidence suggests that during this period CSRC wanted to experiment the delisting to educate the market, along with Split-Share Reform, in an effort to build a modern capital market. After the Split-Share Reform was finished, there is no involuntary delisting from 2008 to 2012. From 2013 to 2017, there are 8 involuntary delistings. Four of them are related to accounting fraud, and the rest of them are due to consecutive losses. The average death rate after the Split-Share Reform in 2006, which represents the sample period in our main analysis, is 0.06%. This number seems tiny, but it is still difficult to gauge its magnitude without a benchmark.

One reasonable benchmark is the firm mortality rate in the U.S. stock market which is arguably the most mature and efficiently functioned one in the world. We use the year of the firm's first appearance on the Center for Research in Security Prices (CRSP) to identify the birth of a public firm in US. Following Bhattacharya et al. (2015), we distinguish between a voluntary and an involuntary death of a public firm based on its 3-digit CRSP delisting code. There are six types of codes: active (100–171), mergers (200–290), exchanges (300–390), liquidations (400–490), dropped (500–591), and expiration (600–610). We assign each firm during each year of its public life to one of the following three mutually exclusive categories based on its delisting code: i) active (codes 100–171), ii) voluntary death (codes 200–290 or 300–390), and iii) involuntary death (codes 400–490 or 500–591).

Panel B in Table B3 reports the results. The average death rate for U.S. public firms from 2001 to 2006 is 3.87%, and it becomes 2.47% between 2007 and 2017. In either time period, the Chinese listed firm death rate is at least one order of magnitude smaller than that of the U.S. firms. It suggests that the death rate of Chinese listed firms is indeed abnormally low.

Despite the extremely low delisting rate, one question remains: Why those firms with consecutive losses are not sold as a shell? There are two important reasons.

1. The delisted firms tend to have a lot of debt. In untabulated results, we find that the average book leverage of delisted firms (and some of them are shell targets in failed RMs)

is 300%, with a median of 135%. For example, one delisted firm has about 8 billion short term debt that is close to default. Given this large debt obligation, those firms are not attractive shell targets. On the contrary, the shells in successful RMs tend to have a leverage ratio that is close to the average level in the market.

2. Delisted firms can be re-listed in future. Although they are delisted, their shares are traded in the OTC market with some restrictions. As long as they fulfill some requirements (such as positive ROE), they can technically be re-listed. So some firms indeed tried to do RMs by acquiring a delisted shell. The related regulations on re-listing change over time, and there is a large uncertainty on relisting.[3]

4. IPO Requirement

The IPO requirements are closely to related to the general IPO policies. The IPO policies in China can be generally divided into two eras. Before 2000, there was an explicit IPO quota system. Under this system, the local government and other State agencies recommend the IPO applicants to the CSRC, while the latter makes the final decision. The second era starts in 2001. There are two major changes. First, the explicit IPO quota is removed. Second, local government and State agencies quit the job of the underwriters, and the market-based underwriters, the investment banks or securities firms, take the full responsibility. Between 2001 and 2004, there was a waiting queue system at for security firms. Each security firm had between 2 and 8 IPO waiting queues, authorized by the CSRC. IPO firms have to wait for the CSRC review in the queue in the security firm. This system was abolished in 2005.

Consistent with the IPO policy regimes, the IPO requirements can be also broadly divided into two eras. Before 2006 the requirements for the IPO were vague. For example, CSRC issued the Guideline on the IPO in 1996. Under this guideline, the amount of fund raised and the number of IPO should be both rationed. Given the pre-specified quota, the IPO priority should be given to 1156 companies that are encouraged by the State to do the IPO. In particular, the IPO priority should be given to the certain industries including agriculture, energy, transportation, telecommunication, raw materials and high

[3] In fact, there was a lawsuit against CSRC in 2003. The shareholders accused CSRC for illegally denying a relisting request.

technology. IPO for industries of manufacturing and general commerce should be strictly controlled, while the industries of finance and real estate are prohibited. The companies that apply for IPO should have good performance and perspective, and be the industry leaders.

This guideline does not provide quantitative standards for IPO application, and the firms that can apply for IPO are also pre-specified. Between 1996 and 2006, CSRC issued several IPO guidelines which further specified the requirements on the independence of the firm (e.g., the top executives of the IPO firms cannot hold positions in the holding companies.), and the governance structure (e.g., the mechanism of general meeting of shareholder, the board structure, etc.), among others. Since 1998, the IPO guidelines did not emphasize whether certain firms and industries should be given IPO priorities.

The first IPO guideline that provides clear quantitative financial requirements came in 2006 which starts the second era. The requirements, among others, include:

1. The firm has been in operation for more than 3 years.
2. There is no major change in the main business operation, directors, top executives, or controlling shareholders in the past 3 years.
3. The net income in each of the past 3 years is positive, and the cumulative net income in past 3 years is more than 30 million RMB.
4. The cumulative operating cash flows in the past 3 years are more than 50 million RMB; or the cumulative gross revenues in the past 3 years are more than 300 million RMB.
5. The total equity before IPO should be more than 30 million RMB.
6. The ratio of intangible assets to net assets should be less than 20% in the most recent years.
7. The firm does not have any unrecovered losses in the most recent year.

In 2009, the ChiNext board was established in the Shenzhen Stock Exchange, and its IPO guideline was issued in the same year. Its financial requirements include:

1. The firm has been in operation for more than 3 years.

2. The net income in each of the past 2 years is positive with consistent growth, and the cumulative net income in past 2 years is more than 10 million RMB; Or the net income in the past year is more than 5 million RMB, the gross revenue is more than 50 million RMB, and the revenue growth in the past 2 years is more than 30%.
3. The net assets in the past year are more than 20 million RMB.
4. The total equity after IPO is more than 30 million RMB.

In 2010, CSRC issued another ChiNext Board IPO guideline which further specified the industries that were encouraged and discouraged to apply for ChiNext IPO. The favored industries include, new energy, new materials, information technology, biotechnology, environment protection, aerospace, advanced manufacturing, ocean, and high technology service. The unflavored industries include, (1) textile and clothing, (2) utilities, (3) real estate and construction, (4) transportation, (5) liquor, food and soft drink, (6) finance, (7) service, and (8) other industries overcapacity identified by the State.

In 2014, 2015, and 2018, CSRC modified the general IPO guideline and ChiNext Board IPO guideline. Those modifications focus on the responsibility of controlling shareholders and underwriters, among others, while the quantitative financial requirements remain the same.

5. IPO Waiting Time

Because the IPO requirements before 2006 were vague and the process was opaque, we focus on the IPO process and its waiting time after 2006. The specifics of IPO process changes over time, but the general steps can be summarized as follows.

1. The firm submits the IPO application materials to the CSRC.
2. The CSRC discloses the materials to the public.
3. The materials are sent to the Public Offering Review Committee (PORC). Seven PORC members are selected and vote for each IPO application. An IPO is approved if at least 5 of the 7 votes are affirmative.
4. The CSRC makes the final authorization of the IPO.

After step 1, the CSRC will review the application materials and give feedback. The firm and its underwriter need to address the issues raised by the CSRC and resubmit the materials. After the CSRC is satisfied with the revision, the materials will be disclosed to public which is the step 2. Therefore, it usually takes a long time between step 1 and step 2. Because the initial submission date is not revealed to the public, it is difficult to estimate how long it takes. However, the anecdote evidence suggests that it can take about 18 months, and it is most time consuming part of the IPO process.

Not all applications can move to step 2, and a firm's IPO process can be suspended or terminated under certain conditions including, the CSRC are not satisfied with the revision, the firm cannot finish the revision in a pre-specified time period, the firm changes its underwriter, and the firm or its underwriter is involved in alleged illegal activities or scandals, among others.

The speed of the rest of process is relatively fast. It can take about 4 months from steps 2 to 3, and 3 months from steps 3 to 4. However, the exact time still varies a lot depending on the CSRC.

In December 2013, the CSRC modified the disclosure rule. The IPO application materials will be disclosed to the public when the firm makes the initial submission. In other words, steps 1 and 2 are combined. However, it does not suggest an accelerated process, and it merely takes a longer time to go from step 2 to 3 after 2013. The idea of the public disclosure is to facilitate the public tip-offs if the firm is involved in illegal activities or scandals. If there are negative reports from the public, then the CSRC will investigate and the firm needs to respond. Negative reports from the competitors are usually powerful. However, sometimes the IPO firms can be blackmailed.

Because of the change of the disclosure rule, we are able to calculate the waiting time after 2013.[4] Between 2014 to 2017, there are total 333 firms that submitted their initial IPO applications and also got a final decision from the CSRC. Among those firms, 113 are rejected and 220 are approved to go public. Among 220 approved firms, their average

[4] The CSRC website of the Underwriter Supervision provides the dates on which the firms submit their IPO applications and the date on which a final decision is made. However, there are obvious mistakes on those dates. For example, we find that the IPO application submission date is later than the final decision date for some firms. We also find that the waiting time, the time from the initial submission date to the final decision date, for many firms is about one month or even few days. So it is even faster than that in U.S.

waiting time (from the initial submission date to the listed date) is 24.5 months, with the shortest time of 7.4 month and the longest time of 35.4 month. The 333 firms do not include the firms that are still waiting.

The IPO waiting time between 2014 and 2017 is likely to be shorter than the historical average. First, we are only able to calculate the waiting time for firms that have got a final decision. Second, IPO suspensions can extend the waiting time. For example, there is a IPO suspension between July 2012 to April 2014. Under an IPO suspension, the CSRC may not accept, review, or authorize any applications. It means that IPO applicants in all steps have to wait. For a firm that submitted its IPO application at the end of June 2012, it had to wait for an average of 46.5 months, or close to 4 years.

6. Public Offering Review Committee

As shown in Section 3, there are generally 4 steps in the IPO process. Arguably the step 3 is the most uncertain part of the IPO process. The members of the Public Offering Review Committee (PORC) use their discretion to vote for each IPO application. If a firm passes the step 3, the final step of authorization is largely procedural matter.

The CSRC issued the first guideline on the PORC in 1999, defining the purpose, the responsibility, the governance structure of the PORC. Under the 1999 guideline, there are 80 PORC members, including 5 members from the CSRC, and experts from public and private sectors. Each member usually has a tenure of one year, and can be reappointed for at most 3 terms. The 80 members are divided into 8 groups, and for each IPO review meeting there has to be at least 8 group members in presence. The vote is in the form of secret ballot, and an IPO application is passed if it gets at least 2/3 of the affirmative votes. Members can abstain in a vote.

The PORC guideline was revised in 2003. The number of PORC members was changed to 25, with 5 members from the CSRC. There are 7 members in each review meeting. The vote is in the form of disclosed ballot, and the members cannot abstain in a vote.

Another major policy change on the PORC happened in 2009, when the ChiNext board was introduced. According to the 2009 guideline, there is a main board PORC with

25 members, and a ChiNext board PORC with 35 members. The IPO voting mechanism of these two committees follows the 2003 guideline. In 2017, the CSRC combined the two PORCs, and formed one committee with 66 members. The tenure of each term is one year, but a member can be reappointed for at most 2 terms.

Because the members of the PORC have almost the ultimate power in the IPO decision, they may have rent-seeking behaviors. Indeed, several former members of the PORC are arrested because of their corruption. The most prominent example is the arrest of the then vice-president of CSRC Yao Gang who was in charge of PORC for a long time on December 13, 2015.

A firm that meets the IPO requirements may not get the approval from the PORC which usually exercises its own discretion. PORC evaluates a firm using seemingly more stringent standards than the IPO requirements. According to the CSRC documents in 2001 and 2004, the PORC pays close attention to a number of issues including:

1. Whether the profitability is more than the one-year bank saving rate;
2. Whether the investment is more than 50% of the net assets;
3. Whether there are substantial changes in key accounting items without convincing explanation;
4. Whether the sales, costs, and expenses are consistent with each other;
5. Whether the reserve for fixed asset impairment is reasonable;
6. Whether the majority of the sales comes from related parties;
7. Whether the majority of the sales comes from a single client;
8. Whether the non-recurring items account for the most of the net income;
9. Whether the earnings forecasts are reasonable and conservative;
10. How the market competition affects the future sales and the firm’s position in the market;
11. How the intangible assets are acquired and used.

After a firm gets the approval from the PORC, the final authorization from the CSRC is typically a procedural matter. However, there are exceptions. For example, one firm got approved by the PORC, but later on it was sued by its competitor and failed to go to the ChiNext board eventually. In 2012, a number of firms got the approval from the

PORC, but their final authorization is suspended because of the IPO suspension. The IPO was reopened in 2014, but those firms had to resubmit their IPO applications. Several of them did not get the approval in the second application.

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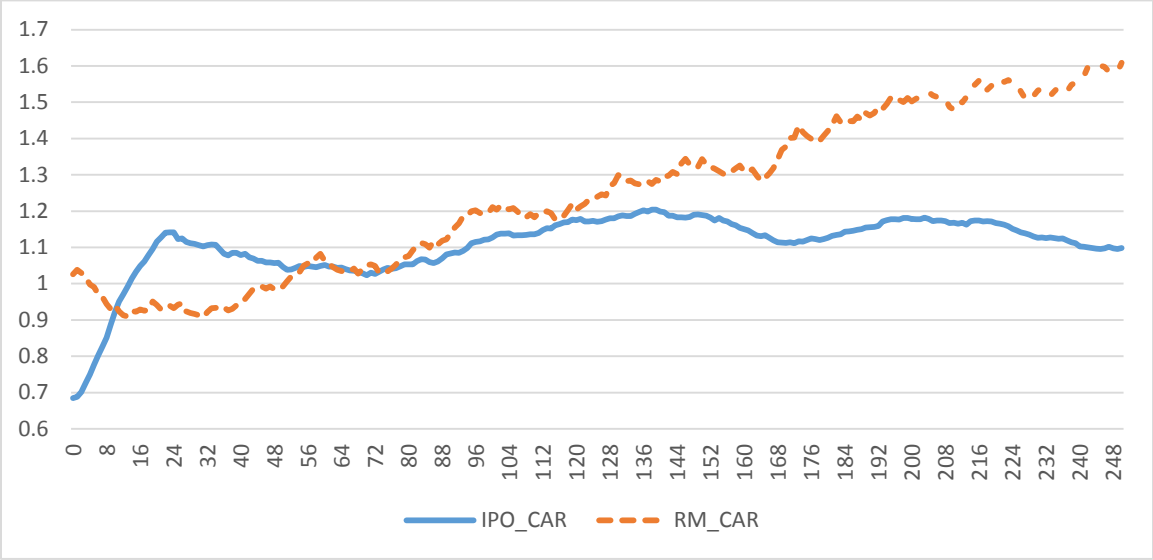
Figure B1: Cumulative Return of IPO and RM firms

These figures are time series plots of the equal weighted average cumulative return of IPO firms and RM firms after the IPO and RMs. The sample period is from 2007 to 2016. There are 136 RMs and 1438 IPOs. Day 0 is the IPO day or the trading resumption day after the RM announcement. The return on Day 0 is the cumulative return from the first trading day to the first day with closing price below the upper price limit. The figures start with Day 0 return and show the cumulative return for the next 250 trading days. In Panel A, the abnormal return is the difference between the raw return and market return. In Panel B, the excess return is the difference between the raw return and risk free rate. The risk free rate is from CSMAR and is the one-year bank deposit rate. In both Panels, dash (real) line represents the return for IPO (RM) firms.

Panel A. Cumulative Abnormal Return



Panel B. Cumulative Excess Return

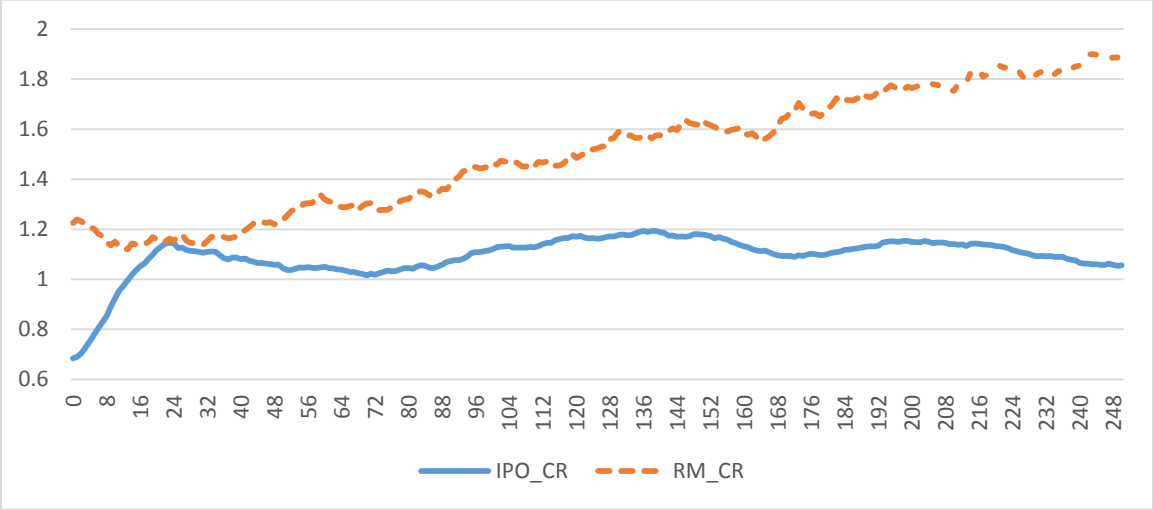


Table B1: Cumulative Return of IPO and RM firms

This table shows the equal weighted average cumulative return of IPO firms and RM firms after the IPO and RMs. The sample period is from 2007 to 2016. There are 136 RMs and 1438 IPOs. The row of Day 0 shows the cumulative return from the first trading day to the first day with closing price below the upper price limit. The row of Day 125 (250) shows the cumulative return including Day 0 return and the returns in the next 125(250) trading days. The abnormal return is the difference between the raw return and the market return. The excess return is the difference between the raw return and risk free rate. The risk free rate is from CSMAR and is the one-year bank deposit rate.

	Cumulative Abnormal Return		Cumulative Excess Return	
	IPO	RM	IPO	RM
Day 0	0.685	1.026	0.684	1.224
Day 125	1.171	1.240	1.162	1.523
Day 250	1.099	1.609	1.057	1.915

Table B2: IPO vs. RM firms

This table shows the characteristics of firms that go public through IPO and RM from one year before going public (T-1) to 3 years after IPO (T+2). We match IPO and RM firms by their value of total assets and industry in year T-1. The value of total assets is deflated by Producer Price Index. Variable details are provided in Table A1.

	T-1						T					
	RM		IPO		Diff		RM		IPO		Diff	
N	121		90				121		90			
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Log(Assets)	7.888	7.841	7.702	7.640	0.186	0.201	8.310	8.271	8.180	0.254	0.130	0.254
Log(ME)							9.169	9.196	9.046	0.134	0.123	0.134
ROA	0.168	0.125	0.139	0.110	0.028	0.015	0.149	0.124	0.095	0.041***	0.053***	0.041***
Lev	0.534	0.561	0.523	0.527	0.011	0.034	0.481	0.493	0.373	0.127***	0.108***	0.127***
Current	1.913	1.331	1.838	1.341	0.075	-0.01	2.358	1.537	4.563	-0.529***	-2.205*	-0.529***
Cash	0.175	0.142	0.216	0.154	-0.041**	-0.012	0.211	0.151	0.327	-0.142***	-0.116***	-0.142***
SaleG	0.407	0.275	0.166	0.154	0.241***	0.121***	0.772	0.274	0.140	0.178***	0.632**	0.178***
RE	0.332	0.386	0.478	0.473	-0.146**	-0.087**	0.348	0.374	0.306	0.079**	0.042	0.079**
CFO	0.100	0.086	0.112	0.116	-0.011	-0.029*	0.070	0.069	0.055	0.009	0.014	0.009
CFI	-0.077	-0.052	-0.087	-0.071	0.009	0.019*	-0.048	-0.027	-0.127	0.075***	0.079***	0.075***
CFF	0.029	0.007	0.022	-0.008	0.007	0.015	0.091	0.048	0.318	-0.229***	-0.227***	-0.229***
ChgAt	0.315	0.243	0.252	0.180	0.063	0.063	0.695	0.421	0.728	-0.072	-0.033	-0.072
Capex	0.096	0.045	0.097	0.082	-0.001	-0.038**	0.089	0.037	0.118	-0.041***	-0.029	-0.041***
Acqex	0.009	0.000	0.004	0.000	0.005	0.000	0.007	0.000	0.003	0.000	0.004	0.000
Payout							0.364	0.000	0.944	-1.000***	-0.581***	-1.000***
Fin							0.868	1.000	0.000	1.000***	0.868***	1.000***

Table B2 continued

	T+1						T+2					
	RM		IPO		Diff		RM		IPO		Diff	
N	111		90				84		65			
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Log(Assets)	8.671	8.560	8.328	8.231	0.343***	0.328***	8.943	8.907	8.575	8.597	0.368**	0.310**
Log(ME)	9.360	9.319	8.965	8.975	0.396***	0.345***	9.257	9.209	9.040	9.086	0.216*	0.123*
ROA	0.109	0.095	0.077	0.063	0.032***	0.031***	0.079	0.070	0.078	0.063	0.001	0.006
ExRet	0.032	-0.011	0.006	-0.063	0.027	0.053	-0.055	-0.123	0.045	-0.023	-0.100*	-0.100*
ExRetD	0.491	0.000	0.411	0.000	0.080	0.000	0.357	0.000	0.477	0.000	-0.120	0.000
Lev	0.509	0.546	0.395	0.404	0.114***	0.142***	0.548	0.547	0.428	0.460	0.120***	0.087***
Current	2.220	1.481	3.312	1.857	-1.092*	-0.376***	1.628	1.387	2.566	1.635	-0.938**	-0.248***
Cash	0.173	0.137	0.260	0.218	-0.088***	-0.082***	0.152	0.129	0.231	0.205	-0.079***	-0.075***
SaleG	0.800	0.196	0.193	0.161	0.606	0.036	0.358	0.197	0.169	0.129	0.189*	0.067
RE	0.408	0.431	0.337	0.320	0.071**	0.111***	0.415	0.424	0.341	0.313	0.074*	0.110***
CFO	0.047	0.052	0.045	0.050	0.002	0.002	0.042	0.045	0.076	0.068	-0.034**	-0.023
CFI	-0.133	-0.080	-0.117	-0.105	-0.016	0.025	-0.102	-0.064	-0.108	-0.100	0.006	0.035**
CFF	0.127	0.081	0.041	-0.002	0.086***	0.083***	0.086	0.050	0.017	-0.008	0.069**	0.058**
ChgAt	1.066	0.344	0.183	0.124	0.884	0.220***	0.548	0.208	0.176	0.147	0.372	0.060*
Capex	0.087	0.045	0.086	0.074	0.001	-0.029**	0.071	0.036	0.089	0.069	-0.018	-0.032***
Acqex	0.056	0.000	0.009	0.000	0.046**	0.000**	0.120	0.000	0.008	0.000	0.112	0.000***
Payout	0.468	0.000	0.822	1.000	-0.354***	-1.000***	0.571	1.000	0.908	1.000	-0.336***	0.000***
Fin	0.351	0.000	0.033	0.000	0.318***	0.000***	0.179	0.000	0.108	0.000	0.071	0.000

* p<0.1 ** p<0.05 *** p<0.0

Table B3: U.S. and Chinese Firms Death Rate

This table shows the death rate for Chinese (Panel A) and U.S. listed firms (Panel B) from 2001 to 2017. The firm accounting and stock price information for Chinese firms is from the CSMAR. We use the year of the firm's first appearance on the CSMAR to identify the birth of a Chinese public firm. We use the year of the firm's first appearance on the CRSP to identify the birth of a public firm in US.

Panel A: Chinese Firm Death Rate					
Year	No. Firm	Invol Death	Vol Death	Survived Firm	Death Rate
	(1)	(2)	(3)	(4)	(5)
2001	1140	3	0	1137	0.28%
2002	1208	7	0	1201	0.62%
2003	1267	4	0	1263	0.33%
2004	1363	8	2	1353	0.63%
2005	1367	11	0	1356	0.81%
2006	1419	4	7	1408	0.29%
2007	1530	5	5	1520	0.36%
2008	1603	0	2	1601	0.00%
2009	1700	0	5	1695	0.00%
2010	2043	0	4	2039	0.00%
2011	2321	0	3	2318	0.00%
2012	2473	0	3	2470	0.00%
2013	2472	2	4	2466	0.08%
2014	2593	1	0	2592	0.04%
2015	2813	2	5	2806	0.08%
2016	3034	1	0	3033	0.04%
2017	3466	2	2	3462	0.07%

Panel B: U.S. Firm Death Rate					
Year	No. Firm	Invol Death	Vol Death	Survived Firm	Death Rate
	(1)	(2)	(3)	(4)	(5)
2001	6628	421	428	5779	6.50%
2002	5933	315	244	5374	5.45%
2003	5536	244	241	5051	4.54%
2004	5324	113	249	4962	2.24%
2005	5240	140	230	4870	2.82%
2006	5150	81	265	4804	1.66%
2007	5106	94	340	4672	1.96%
2008	4781	172	222	4387	3.68%
2009	4497	231	127	4139	5.27%
2010	4307	125	194	3988	3.02%
2011	4118	100	194	3824	2.51%
2012	3975	90	177	3708	2.35%
2013	3930	58	171	3701	1.56%
2014	3992	43	144	3805	1.16%
2015	4011	62	174	3775	1.63%
2016	3926	87	201	3638	2.30%
2017	3853	62	183	3608	1.70%