The Unintended Consequences of Government Regulations in Emerging Financial Markets: Evidence from the Chinese IPO market[1]

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This Version: December 2016

Abstract

This paper explores the impact of regulations imposed by the Chinese government on the development of the Chinese IPO market between 2000 and 2011. Some of these regulations have affected the population of Chinese firms that went public domestically, some firms being excluding from the domestic IPO markets, others being induced to list abroad. We also provide evidence that, because of limits on prices and proceeds, the Chinese IPO market does not attract companies that need cash the most. Some IPO firms that raise large amounts of cash decide to pay large dividends shortly after going public, which investors interpret as evidence that their growth options were overestimated at the time of their IPO.

JEL Codes: G28, G30, G38

Keywords: Regulation, Emerging markets, Initial Public Offerings

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1. Introduction

Well-organized financial markets guarantee that funding goes to firms that need to finance profitable projects. The issue of how to design financial markets so as to make them as efficient as possible is therefore important for the governments of emerging economies. In this paper, we focus on one specific country, China, in which repeated government intervention has shaped financial markets. We ask whether and how government-imposed regulations in this country affected the development of the Chinese IPO market over the last fifteen years.

We focus on China because it is the largest emerging economy, which underwent a long period of very high growth of both its industrial and financial sectors. The role of the Chinese government has been critical in this growth. In general, China is an extremely centralized economy in which the government plays a key role. This has been the case in the financial industry. The government has fully designed and organized a stock market that was virtually non-existent thirty years ago. In the process, regulations have changed often and sometimes dramatically. Thus, focusing on the Chinese market allows us to observe several rule changes in a limited number of years and to explore their effect on firm decisions.

We consider one segment of the Chinese stock market, the market for Initial Public Offerings (IPOs), between 2000 and 2011. This time period is characterized both by a significant evolution of the set of regulations governing the IPO market, and by a large number of Chinese firms going public in China and abroad. We focus on some of the most important rules and rule changes that occurred during the time period and try to estimate their impact on the efficiency of the Chinese IPO market.

The main specificities of the rules imposed to Chinese firms that want to go public are described in details in the paper. We focus mostly on two important characteristics: First, the

government monitors closely the use of proceeds raised in the IPO process, from the start of the process. This limits significantly the flexibility of firms in using their IPO proceeds. Second, the government imposes constraints on IPO prices and IPO size. These constraints vary over time in an arguably unpredictable way.

Using these rules and their evolution over time, we ask a number of questions. First, do regulations prevent some firms from doing an IPO, or do they induce firms to go public abroad? Are firms that go abroad for their listing because of regulations are those with the highest growth prospects? How do regulations and changes in regulations affect the behaviour of firms that go public? With what consequences for investors? Ultimately, can we claim that regulations have a negative impact on the quality of firms that list in China?

In a nutshell, our findings suggest that the rules imposed by the Chinese government do have a negative impact on the local IPO market. We find that they induce or even force firms from high-growth industries to list overseas, while the firms that list in China are from industries with more modest growth rates. These firms have significantly lower operating performance in the years following their IPO than those that list abroad. More generally, the average firm going public in China is not from industries with the highest growth potential, and our tests indicate that this is at least partially due to pricing regulations. This suggests that one of the effects of government-imposed regulations is that the IPO market does not attract the firms that need equity financing the most. Consistent with this argument, we find that the operating performance of recent IPO firms decreases shortly after their IPO. We also find that the average Chinese IPO firm pays surprisingly high dividends, relative to IPO firms in other countries and to seasoned companies listed in China, in the year following its IPO. This seems to come from firms that raise more cash than they need to finance their growth returning this cash to their shareholders, another indication that these firms are not the ones that need equity financing the most. Investors seem to understand the inefficiencies caused by

regulations and the incentives of firms: Stock price reactions are negative when recent IPO firms announce large dividend payments.

Identification is often difficult in this kind of empirical exercises, because we typically do not observe the counterfactual of a given rule. Ideally, to estimate the impact of a rule on the IPO market, one would need to observe the same market without the rule, which is obviously not available. Instead, we exploit the fact that regulations change frequently, in ways that cannot easily be anticipated by firms that are planning their IPO. We use these rule changes in a series of empirical tests, most of which rely on comparisons between different regulatory regimes for different groups of firms, e.g., IPO firms vs. listed firms, or firms that list domestically vs. foreign listings. These comparisons allow us to estimate how changes in the rules affect firms with similar characteristics but belonging to different groups.

Our conclusions also rely on the assumption that the frequent and significant rule changes that we observe and use in our empirical tests are exogenous to the listing decision, to the decision to list locally or abroad, and to firm quality. The main endogeneity problem we are facing in making this assumption is the possibility that unobserved missing variables affect government's decisions to change rules and these left-hand side variables. Our understanding is that the objective of the government in its stock market interventions is more political than economic. The government's main goal is to satisfy the appetite of middle-class Chinese citizens to participate in the stock market, while at the same time ensuring that this stock market participation does not turn into significant losses for individual investors. One of the tools at the disposal of the government is the control of the IPO market, which becomes tighter when the stock market shows signs of overheating. Stock market overheating is likely to be correlated with macroeconomic variables that also affect some of the IPO-related firm decisions. Some of our tests, in which we analyze firm decisions after the IPO, are unlikely to be subject to this criticism. In other tests, we compare the relative industry valuations of firms

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that go public and its evolution over time. These tests are also unlikely to be contaminated by macroeconomic variables that cause the government to intervene to control the overall stock market if these variables affect all industries equally. To deal with the possibility that they do not, we include industry x year fixed effects in our empirical specifications whenever possible, so that identification is at the level of each industry industries and for each year of the sample period separately. Moreover, as we explain in Section 4.2 below, the IPO process is generally very long in China. Therefore, firms that list locally may respond to macroeconomic shocks with a lag relative to the government. In spite of all these precautions, we cannot entirely rule out the possibility that endogeneity affects some of our results, in particular those related to the decision to list abroad. We must be careful in interpreting some of the tests involving foreign-listed firms as causal.

The main contribution of this paper is to improve our knowledge of how government-imposed regulations contribute to shaping financial markets in emerging countries. As such, it is related to articles that discuss the optimal organization of financial markets, like La Porta et al. (JPE, 1998), Wurgler (2000), or the way to achieve such an optimal organization, like Henry (2000) or Glaeser, Johnson and Shleifer (2001). A few articles also focus more specifically on regulations in IPO markets. Like us, Tian (2011) focuses on the Chinese IPO market, while Thomadakis et al. (2016) consider the Greek stock market and Chang et al. (2012) the Korean IPO market. These articles generally focus on pricing regulations and their impact on pricing and short-term returns following IPOs. Our study aims at exploring the consequences of regulations on firm decisions and their impact on the population of firms listed on the local stock market.

This paper is also related to studies that explore the Chinese institutional environment and its recent evolution (Allen, Qian and Qian, 2005, Pistor and Xu, 2005). It also contributes to the Chinese IPO literature, which has mostly focused on the characteristics and performance

(both in terms of IPO underpricing and of longer-term stock performance) of Chinese IPOs (Su and Fleisher, 1999, Chan, Wang, and Wei, 2004, Cheung, Ouyang and Tan, 2009, or Du and Xu, 2009), although some studies focus on the listing decision and the choice between Chinese and foreign IPO markets (e.g., Güçbilmez, 2014) or the quality of Chinese firms listing abroad and its evolution over time (Beatty, Lu and Luo, 2016). Finally, this paper contributes to understand better how firms and investors in one large and important emerging market, China, react to frequent and important changes in regulations imposed by the central government. By and large, our conclusion is that these regulations have a significant impact on the composition of the Chinese stock market, and that both firms and investors react rationally to them.

The rest of the paper proceeds as follows. In Section 2, we develop testable hypotheses. Section 3 presents the data. In Section 4, we present and discuss tests of these hypotheses. In Section 5, we discuss these results and conclude. A complete description of regulations studied in the paper and of the data appear in the appendix.

2. Hypothesis development

The goal of the paper is to determine whether and how restrictions imposed by the Chinese government affect the Chinese IPO market. First, we need to verify that those restrictions are indeed binding. We do so in Table 2, in which we focus on two restrictions: The first one limits PE ratios of Chinese IPO firms, and was in place between November 2001 and November 2008. The second restriction was in place between 2003 and 2006 and limits issue size: It states that IPO proceeds cannot be larger than twice the firm's pre-IPO equity. We show in Table 2 that these regulations affect the price of IPOs and their size, respectively.

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Next, we ask whether these restrictions lead some firms to list abroad rather than domestically. Standard reasons for listing abroad include better brand exposure, diversifying investor base (e.g., to prevent takeover attempts), better corporate governance etc. Here we point out another potential reason: Domestic restrictions in emerging countries may force domestic firms to seek overseas listing. This is our first hypothesis:

Hypothesis 1: Government-imposed regulations in China affect the decision to list abroad vs. domestically.

To test this, one can verify that there is a positive number of firms that list overseas but could not list in China because they would violate some domestic listing regulations. The problem of this test is to identify the null hypothesis. To get around this issue, we use time-series variations in the constraints imposed by the Chinese government. The hypothesis is that the number of Chinese firms that would list abroad without the regulation should be the same number we observe when the regulation is removed, and the difference between the number of Chinese firms that list abroad with and without government-imposed restrictions can be at least partially attributed to the restrictions. In that vein, we focus on one specific constraint on the relative size of IPOs and refine Hypothesis 1 to ask whether this constraint affects the number of Chinese firms listing abroad:

Hypothesis 1-1: The ratio of firms that violate the "proceeds should be less than twice the equity before IPO" rule among the foreign listed Chinese firms is higher when this rule is in place, between 2003 and 2006, than other periods.

Government-imposed restrictions on PE ratios and issue size may also discourage firms of high-growth industries to go public in China because the valuation they can obtain domestically is significantly smaller than the valuation they can reach in foreign stock markets. This may prevent firms in high-growth industries from going public in China and push them to turn to the foreign stock market instead.

Hypothesis 1-2: Chinese firms that list domestically belong to industries with lower growth options than is those that list abroad, in particular during periods of restrictions on IPO valuation and IPO size.

Regulation can also affect listing decisions within industries. If in a given industry firm quality varies, leading to a distribution of firm value, any constraint on pricing censors the distribution of valuations by cutting out firms with the highest valuations from the distribution of IPO candidates. Firms with values above the pricing limit can decide to go public domestically at low IPO prices and to forego some IPO proceeds, or they can opt for overseas listing. Thus, in the presence of more severe pricing constraints, firms with higher values are more likely to list abroad. Similarly, IPO size restrictions can lead firms with the best growth options, which therefore need to raise the most funds to finance their growth, to list overseas. Hence the following hypothesis:

Hypothesis 1-3: Chinese firms that list domestically have lower valuations at the time of their IPO, in particular during periods of restrictions on IPO valuation and IPO size.

The next hypothesis is about the effect of regulation on the population of Chinese firms that decide to go public locally. The stock market should fund predominantly firms from industries with the best growth options. If regulation blocks these firms from the stock market, because they do not meet profitability requirements or because pricing constraints would make an IPO too costly for their current shareholders, then we might observe that the firms that go public are not necessarily those with the best growth prospects. Consider for instance the pricing restrictions that are in place during part of our sample period. When binding, these restrictions impose costly dilution to current shareholders who must sell underpriced shares to the investors who participate in the IPO. This may induce current shareholders of high-growth firms to cancel or postpone the IPO.

Hypothesis 2: Firms that go public in China are not from industries with the highest growth options, in particular during restriction periods.

The next set of hypotheses is about the response of firms to regulatory changes, and its consequence for shareholders. The third hypothesis can be summarized as follows:

Hypothesis 3: Firms respond to changes in regulations by changing the characteristics of their IPOs and their post-IPO behaviour.

In 2009, the Chinese government removed pricing restrictions and allowed firms that raised more funds than the expected proceeds announced in their IPO prospectus to use the cash in excess of the initial filing amount as they liked. Following this decision, the average PE ratios of IPOs increased dramatically. At the same time, because firms preferred to have discretion in the way they could use the cash they raised, it was in their interest to announce low expected IPO prices. By voluntarily targeting PE ratios lower than those they could obtain, firms could raise more money than they announced in their IPO prospectuses and enjoy a lot of freedom in their use of this extra cash.[3]

Hypothesis 3-1: The average target PE ratio of IPO firms is not higher in the non-PE restriction period, despite larger actual PE ratios.

Due to this behaviour of Chinese IPO firms, and the fact that IPO firms do not necessarily need cash to invest in new promising projects, some IPO firms should end up with cash in excess of their investment needs. These firms should return the cash to their shareholders. This effect should be more pronounced in firms with more concentrated ownership, in which large owners will receive a large fraction of the dividends, while the managers of firms with

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[3] The possibility to use the number of shares sold as an adjustment variable for the size of the IPO is limited by a 1999 law that imposes a minimum number of new shares, and even more by a 2007 decision that fixes the number of shares sold in the IPO (see Appendix B for a detailed presentation of this and other rules).

dispersed ownership may prefer to keep cash in the company and to obtain private benefits from this cash.

Hypothesis 3-2: IPO firms that raise more cash than they expected in the IPO are more likely to pay dividends in the years following the IPO, more so if their ownership is concentrated.

Finally, we explore market reactions to such actions by firm managers. Large dividend payments following the IPO signal that the growth opportunities of the newly listed firm are not as high as expected. Stock price reactions to such dividend announcements should be negative.

Hypothesis 3-3: The stock price reaction to dividend payments by recent IPO firms is negative.

3. Data

The sample contains all Initial Public Offerings (IPOs) of Chinese firms in China between 2000 and 2011. Because we cover firms for up to three years after their IPO, the sample period is from 2000 to 2013. We use year 2000 as our starting point because it is the first year Chinese-listed firms employed a consistent and unified set of accounting standards (Chen et al, 2012). We obtained our data from several sources, and hand-collected the remaining ones. For Chinese IPO filings, we use the WIND database. Because the WIND data only starts in 2006, we hand-collected the data from 2000 to 2005. We obtained the accounting and stock return data from CSMAR and project changes data from RESSET for these IPO firms. We eliminate 31 financial firms, 6 share swap firms,[4] two companies that were originally a single company before their IPO, 4 post-2006 IPO companies with missing filing amounts, 3 pre-

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[4] In share swaps, the firms do not go through the standard IPO process. Instead, the shareholders of another listed firm swap their shares with those of the IPO firm, like in a reverse merger.

2006 IPO companies with missing prospectuses, and 3 companies that were approved before 1990 but only listed post-2000.[5] We also require firms to have at least two years of accounting data after their listing. Our final sample includes 1,418 domestical IPOs. We also use information about 548 Chinese firms that listed overseas between 2000 and 2011. For these firms, we use SDC to obtain the filing and accounting data at the time of the IPO and we use Datastream to obtain accounting data in the following years. In some tests, we use all seasoned firms listed in Chinese stock markets. We collect their stock price data and accounting data from CSMAR.

Appendix A presents the list and the definition of variables we use in subsequent tests. We winsorize all the continuous variables at the 1% and 99% levels. For the non-IPO industry average calculation, we drop firms with negative PE ratios.

[Insert Table 1 here.]

Panel A of Table 1 reports summary statistics of the main variables used in subsequent tests for the subsample of Chinese firms that list domestically. Most of these variables are standard in the literature. A few of them are not. The *Ownership* variable measures the concentration of the firm's ownership. It is calculated as the cumulated ownership of up to the ten largest investors of the firm, provided that they are related through close family or business relationships. Close to half the ownership of IPO firms in our sample is controlled by such groups of large shareholders. This is true throughout the sample period, with very little variation in this variable between 2000 and 2011. *Excess ratio* is the scaled difference between the expected IPO proceeds announced in the IPO prospectus and the funds raised in the IPO. This variable is important in our tests because changing regulations have influenced both its magnitude and the way recent IPO firms use this cash windfall. Finally, *Excess cash*

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[5] For example, Shangdong Jintai's IPO was approved in 1989, but the company was not listed until 2001. We cannot obtain the prospectuses of these companies.

flow is an indicator variable equal to one for recent IPO firms that pay dividends greater than their operating cash flows. We use this variable, which has also changed significantly throughout our sample period, to understand how firms respond to changing regulations.

Panel B of Table 1 reports summary statistics for Chinese firms that listed abroad during our sample period, for the subset of the variables that are available for these IPOs. Comparisons between the two panels suggest that the two samples are quite different. Chinese firms that list abroad are significantly smaller than those that list domestically. They also invest less (7.4% of their total assets against 8.8% for firms that list in China). Their operating performance is about twice as high (average ROA of 12.4% vs. 5.4%), as is their valuation when they go public: The average Price-to-Earnings ratio (Market-to-Book ratio) of firms that list abroad is around 61 (20), against 39 (9) for domestic listings. Unreported industry compositions of these two subsamples are also quite different, domestic IPO firms being more capital-intensive. As an illustration, Machinery, Chemicals and Technology, hardware and equipment are the three industries with the largest numbers of domestic IPOs during our sample period, each of them representing approximately 10% of our sample of domestic IPOs. By contrast, the three leading industries for Chinese firms that list abroad are Software and services, Consumer durables and apparel, and Real-estate, representing about 11%, 10%, and 7% of the sample of foreign listings, respectively. These industry differences need to be taken into account in any comparison between domestic and foreign listings. In fact, in these comparisons, we include industry $\times$ year fixed effects, which allows us to control for time-invariant differences across industries, but also for different time patterns across industries.

[Insert Figure 1 here.]

Figure 1 shows the time-series patterns of domestic IPOs over the period. In the two graphs, the solid line shows the evolution of the annual number of IPOs in China between

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2000 and 2011. Several episodes appear clearly in these graphs. In 2000 and early 2001, there were no listing restrictions and the IPO market was active. In 2001-2008, various restrictions were put in place, reflecting the government's determination to control the stock market through regulations and limits on the number of the firms approved to go public. These restrictions led to a reduction in the number of new firms getting listed. In 2005, the number of IPOs dropped significantly, following the poor performance of the Chinese stock market. It recovered gradually in the following years, together with the stock index. In 2009, the government, trying to boost the economy while facing the Global Financial Crisis, removed most of the restrictions and simplified the IPO application process. This resulted in a significant increase in the number of IPOs. At the same time, a new stock exchange designed for high-tech firms and with less stringent listing requirements was opened, which also led to an increase in the number of IPOs. The restrictions imposed by the regulators on IPOs over our study period are presented in details in Appendix B.

Panel A of Figure 1 presents the evolution of the average PE ratio of newly listed firms between 2000 and 2011. The PE ratio changed dramatically over this period. The main variations come from the strict cap on PE ratios imposed by the regulator. As we explain in Appendix B, PE ratios of newly listed firms were capped at 20 between November 2001 and 2004 and at 30 between January 2005 and November 2008. Then the cap was dropped.

Panel B reports average annual cash surprises (excess ratio)[6] of IPO firms. The excess ratio is defined as the difference between the final IPO amount and the initial filing amount. In China, when firms apply for IPO listing, they have to justify their financing needs by committing to a specific and detailed investment project that they will invest in after going public using the proceeds of the IPO. Post-IPO investment in the proposed projects is mandatory and controlled by the government. The project announced before the IPO is

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[6] We use the terms cash surprises and excess ratio interchangeably in the text.

binding, unless the firm explicitly asks for a change in projects, which is costly and slows down the IPO process. A significant change in this rule occurred at the end of 2008. Before the change, firms could not raise more funds than they needed to invest in their projects. After it, they can use more funds than announced in the IPO prospectus and use this cash windfall as they like. This rule change, together with the simultaneous removal of the PE cap, changed dramatically the incentives of IPO firms. Post-2008, firms have an incentive to announce low expected IPO prices, corresponding to limited IPO proceeds (and to small projects) in their IPO prospectus and to raise significantly larger amounts (at significantly higher prices) that they can use with complete discretion. Firms respond to this change in incentives: As Panel B of Figure 1 shows, the average cash excess ratio is close to zero during the heavily restricted period (from 2002 to 2008). This ratio becomes very large after 2009.

4. Results

4.1. Government-imposed constraints and the decision to go public in China or abroad

In this section, we test Hypothesis 1, which states that government-imposed constraints may prevent some firms from going public and induce others to list abroad.

[Insert Table 2 here.]

We start by observing that the restrictions imposed by Chinese regulators are actually binding for most of the IPO firms. Table 2 reports the number of firms that are within 1 percentage point of the government-imposed limitation on Price-to-Earnings ratios, as well as the proportion of capped firms among the total IPO firms in the same year. With the exception of 2005 and 2006, two years of decline of Chinese stock markets in which pricing limits were not binding for most IPOs, a large proportion of IPO firms are priced at the cap.

In fact, the very rare firms that manage to obtain PE ratios in excess of the cap are mainly state-owned enterprises (SOEs), which presumably have larger bargaining power in negotiating IPO prices.

One effect of government restrictions is that some firms may be forced to seek foreign listing. Panel B of Table 2 provides statistics on the number of overseas-listing Chinese firms that are otherwise in violation of domestic listing restrictions. The restriction that we study in the table is the regulation that states that "total proceeds cannot exceed more than twice of the common equity". This restriction was in place between 2003 and 2006, but given the time it takes between the start of the IPO process and the time firms actually go public, we assume it affected IPOs that were completed between 2004 and 2007. We focus on Chinese firms that list abroad and ask what fraction of these firms had total proceeds greater than twice their equity, when prices were constrained vs. when they were not. Consistent with Hypothesis 1-1, the fraction of firms violating the rule is 41% in the restricted period and only 28% in the non-restricted period. The difference is statistically significant at the 1% level. Although we cannot rule out the possibility that rule-violating firms would have listed abroad even in the absence of the restriction, this result shows that regulations blocked access to equity financing to firms that had to go public in other financial markets in which the size of the equity issue was not perceived as an issue.

Another way to explore the incentives of Chinese firms to list abroad is by comparing industry valuations. We hypothesize that firms in industries with high valuations are more likely to seek overseas listing when valuations at the time of the IPO are limited by pricing constraints. Considering industries instead of individual firms allows us to abstract from individual firm characteristics that can explain listing decisions, and to focus on industry-level growth options, with the idea that the average firm in industries in which growth options are larger is in greater need of external financing.

Table 3 reports the tests of this hypothesis (Hypothesis 1-2). In Panel A of the table, we compare adjusted industry-level Market-to-Book ratios, equal to the average MB ratio of listed firms in the industry of the IPO minus the average MB ratios in all other industries, between firms listing overseas and domestically. Panel A of the table also reports comparisons of industry valuation ranks, obtained by ordering the 31 industries in our sample based on the average MB ratio of the listed firms they contain. First we provide these statistics during the period in which PE ratios are capped (between November 2001 and November 2008).[7] In this period, the industry of the average firm listing abroad has a MB ratio 0.14 above other industries, while the average domestic IPO belongs to an industry that is valued slightly below the average industry (by -0.03, to be precise). The ranks of the industries for the two groups of IPO give a similar picture: foreign listings belong to industries with higher valuations than locally-listed firms. For the two measures, these differences between local and foreign IPOs are statistically significant at the 5% level or better. During the periods in which there is no such cap on valuations (before November 2001 and after November 2008), there is not much difference between the level and the rank of the industries of firms that list domestically and those of foreign listed firms in terms of valuation. This suggests that the pricing restrictions imposed by the Chinese government affect the population of firms that list abroad and locally. When these restrictions are more severe, firms from industries with higher valuations, which are presumably also the industries with the most promising growth prospects, avoid the local IPO market and are more likely to list abroad.

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[7] In this table, we consider PE restrictions only and ignore IPO size restrictions because the IPO size restriction period (2003 to 2006) is included in the pricing-restriction period (Nov. 2001 to Nov. 2008). In Panel B of the table, in which the analysis is at the firm level, the tests have more power, which allows us to study the two periods separately.

Panel B of Table 3 confirms that there is a significant valuation difference between the two groups of firms, mostly when pricing or proceeds are constrained. In this table, which presents linear regressions, the analysis is at the IPO level and the dependent variables are valuation proxies: the offering Price-to-Earnings ratio in columns 1 and 2, the offering Market-to-Book ratio in columns 3 and 4. Industry fixed effects capture time-invariant industry differences in valuation. We do not include time fixed effects because the time dimension is captured by two dummy variables: *Pricing restriction period* in columns 1 and 3, *Proceeds restriction period* in columns 2 and 4. *Pricing restriction period* is equal to one when PE ratios are constrained, between November 2001 and November 2008. *Proceeds restriction period* is equal to one when IPO proceeds are constrained, between 2003 and 2006. Since the proceeds constraint period is included in the pricing constraint period, the effect we identify in columns 2 and 4 is the effect of the combination of the two constraints. The main coefficients of interest in these regressions are those on *Foreign List,* an indicator variable equal to 1 for foreign IPOs, and on its interaction with *Pricing restriction period* (in columns 1 and 3) and *Pricing restriction period* (in columns 2 and 4). The coefficient on *Foreign List* represents the valuation premium (or discount) of foreign IPOs outside the restriction period, while the sum of this coefficient and the coefficient on *Foreign List* interacted with the restriction period dummy represents the valuation difference between domestic and foreign IPOs during restriction periods.

In the four columns of Table 3, Panel B, the coefficient on *Foreign List* is positive but not statistically significant. The coefficient in the interaction variable (*Foreign List × Pricing restriction period* in columns 1 and 3, *Foreign List × Proceeds restriction period* in columns 2 and 4), however, is positive and significant in columns 1, 2 and 4. More importantly, the Wald tests reported at the bottom of the table show that the sum of coefficients on *Foreign List* alone and interacted with the restriction period dummy is always significantly positive at

the 1% level. In other words, firms that list abroad obtain higher valuations, but mostly during restriction periods. The economic magnitudes of those valuation differences are also very large, consistent with the summary statistics of Table 1: during pricing restriction periods, the PE ratios of foreign IPOs are 34.8 (6.058+28.767) higher than that of domestic IPOs, while their MB ratios are 9.5 (3.871+5.579) higher. In the same vein, during the proceeds restriction period between 2003 and 2006, the PE ratios of foreign IPOs are 38.7 (8.74+29.973) higher than that of domestic IPOs and their MB ratios are 11.6 (3.403+8.183) higher.

These results suggest that constraints on pricing and proceeds imposed by the regulator affect the valuation of firms listing locally and abroad: when these constraints are lifted, valuation differences disappear or become more modest. Another related issue is about the type of firms that list abroad vs. domestically. One possibility is that random firms from the population of Chinese IPO candidates list abroad, in countries where they can obtain higher valuations. This is the benign view, in which the effect documented above simply reflects valuation differences between the Chinese and foreign markets, not intrinsic differences between domestic and foreign IPO firms. Another possibility, however, is that firms self-select into foreign listing, and that firms of higher intrinsic quality list abroad. This alternative possibility is more pernicious because it implies that regulations have a negative impact on the quality of firms that are listed in Chinese stock markets.

[Insert Table 4 here.]

To distinguish between these two alternative possibilities, we compare the operating performance (Return on Assets) of foreign and domestic listings in the three years following the IPO in the first two columns of Table 4. Summary statistics in Table 1 suggest that firms that list locally differ from firms that choose foreign markets in several important dimensions. Adding industry effects and controlling for firm characteristics allows us to neutralize some

of these dimensions. Consistent with the univariate results of Table 1, Chinese-listed firms have lower operating performance (of about 3%) but this difference is not statistically significant at usual levels. It goes up, however, during restriction periods: the coefficients on *Foreign List × Pricing restriction period* and *Foreign List × Proceeds restriction period* are both positive, in columns 1 and 2, respectively. More importantly, the sum of coefficients on *Foreign List* alone and interacted with the restriction period dummies is significantly positive (at the 1% level in column 1, at the 5% level in column 2). This suggests that the performance difference between domestic and foreign IPO firms is more pronounced when the regulator imposes restrictions on prices or proceeds. In other words, firms that list abroad obtain higher valuations, but mostly during restriction periods.

Another possibility is that the two types of firms differ in other dimensions than their performance. For example, listing abroad may allow firms to raise more funds, which leads firms with greater investment opportunities (and therefore greater value) to choose foreign markets. To examine this possibility, we repeat the previous test using capital expenditures as the dependent variable, in columns 3 and 4 of Table 4. In fact, firms listed locally invest slightly more than their foreign-listed counterparts in the three years following their IPO, in particular when they went public during restriction periods: the sum of coefficients on *Foreign List* alone and interacted with the restriction period dummies is significantly negative (at the 5% level in column 3, at the 1% level in column 4). In light of previous results on valuation and operating performance differences, this suggests that domestic IPO firms invest in less profitable projects. Taken together, the results in tables 3 and 4 suggest that there is a quality difference between the two groups of firms, and finer subperiod analysis suggests that this is driven at least partially by regulations on the pricing of IPOs.

4.2. Government-imposed constraints and the decision to go public

In this section, we focus on Hypothesis 2, which predicts that, in the population of private Chinese firms, those that go public are not necessarily those that need financing the most. Unlike in our previous tests, the evidence on this hypothesis can only be indirect because data limitations prevent us from observing the valuation, performance, and need for funding of private firms other than those that eventually go public. Instead, we first focus on industry valuations. Our premise is that capital should be allocated to firms in industries with the largest growth options. Thus, we should observe more IPOs in industries with higher relative valuations.

[Insert Table 5 here.]

In Table 5, we compare relative industry valuations of firms going public in four subperiods with different pricing constraints (none before November 2001, a PE limit of 20 until December 2004, of 30 until November 2008, and no limit thereafter) in Panel A. Panel B groups these subperiods into two periods, with or without a pricing constraint. During the periods with no pricing restrictions (pre-Oct. 2001 and post-Nov. 2008), the average market-to-book ratios in industries of firms that go public are higher than during the period with pricing restrictions (November 2001 to November 2008). Moreover, in times of pricing restriction, the average valuation (MB) of firms in the same industries as those that go public is slightly below the overall average valuation in other industries. By contrast, the valuation of industries IPO firms are coming from is above the average valuation (+0.38) after November 2008, when PE limits are lifted. The same picture emerges when one considers industry ranks instead of valuation.[8] Panel B of Table 5 formally tests the differences

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[8] The first period we study in Panel A (2000 to October 2001) does not seem to differ from periods with pricing restrictions even though it has no such restrictions. This is driven by IPOs of state-owned enterprises (SOEs), which represent a large fraction of IPOs in this period. Without those, the number of IPOs in the first period goes down to 80, the adjusted industry MB goes up to 0.21, and the relative industry MB rank goes down to 16.06. More generally, our results in this table are stronger when we ignore IPOs by SOEs. This is not

between relative industry valuations in pricing restriction periods vs. periods with no price limits. These differences are highly significant statistically. This suggests that pricing limits affect the population of firms going public and discourage firms from industries with the highest growth options to go public, at least domestically. One might argue that post-2009 is associated with the start of a new exchange board for high-tech growth firms with less strict listing rules. When we exclude firms from this exchange, the level and rank of average MB in industries of firms going public decrease slightly, but they are still much higher than during the restriction period.

Another way to gauge whether firms that go public in China are firms with good growth prospects is to examine the evolution of their performance around their IPO.

[Insert Table 6 here.]

We do so in Table 6, in which we use a difference-in-differences approach to explore changes in operating performances in terms of sales and Return on Assets (ROA) between three years before and three years after the IPO. Treated firms are the domestic IPO firms in the sample. Control firms are firms that have been listed for at least two years as at date 0, that are in the same industry, year, terciles of total assets and sales growth, quartile of ROA, and that are the closest to the treatment firm in terms of ROA (for this sequential matching, we proceed like in Derrien and Kecskes (2013)). Panel A of the table reports the distribution of sales growth and ROA one year before the IPO. IPO firms perform slightly better than their peers before they go public, but differences are not statistically significant. We further compare the ROA and sales over the period around the IPO (from the IPO minus 3 years to the IPO plus 3 years) in Panel B of Table 6. Again it seems that on average IPO firms perform slightly better than similar seasoned firms in most years. Importantly, however, when we calculate the difference-in-differences between IPO and seasoned firms and

surprising considering that IPO decisions in such firms may be driven by concerns other than valuation and funding needs.

between IPO-3 years and IPO+3 years, in Panel C, we find that the change in ROA is significantly worse for IPO firms than for their peers over that period, while sales keep increasing. The performance of IPO firms seems to decline around the time when they go public. This may be because firms that have access to the IPO market in China are not those that need financing the most. This result is also consistent with reversion to the mean of performance, which was observed in past studies using data from other countries (e.g., Chemmanur, He and Nandy (2014)).

4.3. The unintended negative consequences of the constraints

This section examines the third hypothesis, which predicts that government regulations and changes in regulations affect the behaviour of IPO firms. We focus on a significant change in the incentives of IPO firms that occurred at the end of 2008. Firms willing to do an IPO in China must do so to finance a pre-specified investment project, and IPO candidates have to disclose the detailed usage of IPO funds in their application process. This changed at the end of 2008. First, the pricing constraint was lifted, which implies that firms could go public at much higher valuations than they could previously obtain. Second, while the proceeds announced in the IPO prospectus still have to be used to fund a pre-determined investment project, the firm can use any proceeds raised above the cost of the project with complete discretion. In this new regime, firms have incentives to announce small-scale projects and small target PE ratios, hoping that the IPO price they will eventually obtain will allow them to raise significantly more funds, which they will be able to use as they see fit. Hence our Hypothesis 3-1 regarding the evolution of target PE ratios of IPOs around this regulatory change.

[Insert Table 7 here.]

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Table 7 reports the difference in the target and actual PE ratios of Chinese IPOs until November 2008 vs. after 2010 (2009 is the first year in which the restriction was removed, but most of the firms listed in 2009 applied for listing before 2009, under the previous regime, so we drop these firms from the analysis). The average target PE ratio of 23.89 post-2010 is significantly lower statistically than it was before November 2008 (25.88 on average), though overall valuations are significantly higher in the last two years of our sample period relative to earlier years. The second line of Table 7 presents actual PE ratios obtained by IPOs in the two subperiods: it shows a significant increase, which is the direct consequence of the removal of price limits. This difference between target and actual valuations represent significant cash windfalls for IPO firms in the years following the removal of price limits.

Next we ask what firms do with these cash windfalls. We have seen in Table 6 that recent IPOs tend to grow more than listed firms in the three years following their listing. In the presence of large "cash surprises" (significant amounts of cash raised in excess of the amount filed in the IPO prospectus), firms could also decide to return cash to their shareholders. Whether they do so should depend on shareholder incentives. When ownership is concentrated, shareholders have both strong incentives and the possibility to influence the decision to pay dividends. This is probably less the case in firms with dispersed ownership or in SOEs, in which managers have more incentives to use slack to extract private benefits.

[Insert Table 8 here.]

We test this hypothesis (Hypothesis 3-2) in Table 8, in which we use the following specification:

$$D_{i,j,t} = \beta_0 + \beta_1 Excess\ ratio_i + \beta_2 Ownership_i + \beta_3 Excess ratio_i \times Ownership_i + \beta_4 Controls_{i,t-1} + \delta_{j,t} + \varepsilon$$

The dependent variable is the payout ratio of firm i that belongs to industry j in the three years following the IPO. Columns 1 and 2 report the results for the first year after the IPO

and columns 3 and 4 report the results for the three years after the IPO. The specification include industry × year fixed effects that capture the evolution of dividend payments at the level of the industry the firm belongs to. The main independent variables of interest are *excess ratio* (the amount raised above the targeted amount scaled by total assets of the IPO year), *ownership*, which measures the ownership concentration of the firm at the time of the IPO, and the interaction of these two variables. We also include controls lagged by one year relative to the dividend-payment year. Table 1 suggests that recent Chinese IPOs pay significant dividends (2.1% of their total assets on average in the three years following the IPO). The first column of Table 8 shows that higher excess cash and more concentrated ownership are associated with larger payouts in the year following the IPO. This effect is mostly driven by the interaction of those two variables (Column 2): IPO firms with highly concentrated ownership and large cash surprises pay high dividends. The effect is economically sizeable: A one-standard deviation increase in both *Ownership* and *Excess ratio* leads to an increase of about 6% of the standard deviation of the payout ratio $(0.157 \times 0.202 \times 0.036 / 0.019 = 6\%)$.

Taking a longer perspective, one notices that firms with high excess ratios and concentrated ownerships continue to pay larger dividends in the three years following their IPO, but the coefficient on the interaction variable in column 4 goes down by about a third compared to that in column 2. Also consistent with an attenuation of this effect over time, the effect of *Excess ratio* on dividend payout is no more significant in column 3, and the coefficient on *List Year*, which counts the number of years since the IPO, is negative and significant. In unreported robustness checks, we use different dependent variables such as payout ratio using dividends relative to earnings (instead of total assets) and a dummy variable indicating whether the dividend payout is larger than the net income or the annual cash flows. We also run logit regressions. The results hold qualitatively in all cases. Thus, the

time when Chinese IPO firms are more likely to pay dividends is right after their IPO, provided that they raised more cash than they needed and that their ownership is concentrated.

Next we ask whether investors understand the implications of such large dividend distributions by some recent IPO firms. If our interpretation that these dividends indicate that the firm has no profitable project available is correct, investors should revise downward their expectations of the growth options of the firm when dividends are announced. This should lead to a significant decrease in the firm's stock price following the dividend announcement.

[Insert Table 9 here.]

This is Hypothesis 3-3, which we test in Table 9. This table reports Cumulative Abnormal Returns in the 7-day period around the announcement of the dividend by newly-listed firms in the three years following their IPO. Industry × year fixed effects control for the evolution of the average industry-level stock reaction to dividend announcement. The results suggest that a higher payout ratio is associated with a more positive response from the market. However, the interaction of this variable with the cash surprise at the time of the IPO (the *Excess ratio* variable in the regression) has a large negative coefficient, which is not affected much in column 2 of the table, in which we add more controls to the specification. In this regression, a one-standard deviation increase in both *Excess ratio* and *Payout ratio* leads to an average stock price decrease of 0.44% in the period around the dividend announcement $(0.202 \times 0.019 \times 1.153 = 0.44\%)$.

In other words, recent IPO firms that pay dividends are not penalized by investors, but those that pay a large dividend instead of investing the cash windfall they have obtained in their IPO are. This suggests that, at the time these firms announce their dividends, investors realize that they over-estimated the growth options of these firms. The downward revisions of these growth options leads to a decrease in the value of the firms.

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[Insert Table 10 here.]

In the next table, we explore the propensity of recent IPO firms to pay dividends and market reactions to dividend announcements relative to listed firms. It might be the case that large dividend payments are frequent in China, and that our previous results are simply capturing this phenomenon. In the first column of the table, we regress payout ratios on firm characteristics, the most important of which is *Seasoned*, a variable equal to 1 for seasoned firms and 0 for recent IPO firms. Again, industry × year fixed effects capture industry-level evolutions of the dependent variables. Consistent with previous results, we find that recent IPO firms pay on average 0.5% of their total assets more than the average comparable listed firm. This is in sharp contrast with the evidence from more developed financial markets and with the intuition, which suggests that IPO firms are at a stage of their life cycle in which they need cash to invest. Consistent with the view that dividend announcements by firms that went public recently reveal that their growth options are more limited than initially expected, dividend announcements by recent IPO firms are associated with a return 0.8% lower than that of seasoned companies making similar announcements.

5. Discussion and conclusion

Our results suggest that regulations imposed by the Chinese government have a significant impact on the Chinese IPO market. In particular, pricing constraints seem to affect the decision to list in China or abroad. The most promising firms seem to prefer listing abroad. Although this is perhaps due to factors unrelated to regulations per se, our results suggest foreign listing by high-value firms is more widespread at times when pricing restrictions are more severe. Another important result is that firms change their behaviour in response to regulation changes, and investors understand the incentives of firms and react

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accordingly. For example, when firms that went public recently and had successful IPOs that allowed to raise more funds than they asked for announce large dividend payments, investors understand that these firms have less growth opportunities than they initially thought, and their stock price decreases.

Overall, these results show that the Chinese IPO market is not organized optimally, in the sense that it does not attract to the stock market the firms that need new financing the most. IPO-specific regulations seem to play a role in this phenomenon, although other frictions may also be at play. One of them, the impact of which we cannot directly test, is the fact that the Chinese government is constantly experimenting with new rules. This creates a very uncertain environment for IPO candidates, which might decide to list abroad or to obtain alternative forms of financing.

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Appendix A. Variable definitions

Name	Definitions
Excess ratio	IPO proceeds minus filing amount scaled by total assets of the IPO year
Payout ratio	Dividends scaled by total assets
Ownership	Ownership of the largest shareholder in the company, plus the cumulative ownership of other shareholders (in the ten largest) that have family or business relations with the largest shareholder
Excess ROA	Dummy variable equal to 1 if dividends exceed net income, 0 otherwise
Excess cash flow	Dummy variable equal to 1 if dividends exceed operational cash flows, 0 otherwise
Size	Natural log of total assets
Leverage	Book debt divided by total assets
Sales growth	Sales in the current year minus sales in the previous year, divided by sales in the previous year
Cash Flow	Ratio of operational cash flows to total assets
Capex	Capital expenditures scaled by total assets
ROA	Net income divided by total assets
List Year	Number of years since the IPO
Offering PE Ratio	Price-to-Earnings ratio at the time of the IPO, equal to the offer price divided by the latest Earnings Per Share before the offering
Offering MB Ratio	Market-to-Book ratio at the time of the IPO, equal to the market value of equity after the IPO divided by total common shareholders' equity before the offering
Pricing restriction period	Periods when PE ratios are not constrained for Chinese IPOs, from Nov. 1st 2001 to 2008
Proceeds restriction period	Periods when IPO proceeds should not exceed twice the common equity for Chinese IPOs, from 2004 to 2007
Chinesedum	Dummy variable equal to 1 for Chinese firms that list domestically, 0 for Chinese firms that list abroad
Seasoned	Firms that have been listed for over 3 years

Appendix B: Financial hurdles for getting listed in Chinese stock market

All companies applying for an IPO must meet the following historical financial performance criteria to be eligible for an initial public offering on one of China's two stock exchanges.

(1) Cumulative net income in the three years prior to the IPO must exceed 30 million renminbi (RMB), and the company cannot report a net loss in any of the three years;

(2) Cumulative revenue in the three years prior to the IPO must equal at least RMB 300 million or cumulative cash flow from operation in three years prior to the IPO must be at least RMB 50 million;

(3) Intangible assets cannot account for more than 20% of total assets; and

(4) Net assets in the year before the IPO must total at least RMB 30 million.

From 2003 to 2006, IPO proceeds should not larger than twice the equity.

Window guidance

The only explicit regulation is the smallest number of shares issued. A 1999 law specified that firms with fewer than 400 million shares outstanding must have at least 25% of new shares following the IPO. Other regulations are not written but there is a consensus on them among market participants.

Over time, there is different guidance on the IPO process.

- Number of shares: from 2007 on, firms with fewer than 400 million shares must have exactly 25% of newly issued shares after the IPO.
- IPO price:
  - Before 1999.06: Ranged between 13-17
  - 1999.06- 2001.10: No cap.
  - 2001.11-2004.12: PE capped at 20.
  - 2005.01-2008.11: PE capped at 30.
  - 2008.12-2013: No cap.
  - 2012-2013: All IPOs suspended.
  - 2014-: IPOs restarted and PE is capped at industrial PE.

The timeline of an IPO application

Firms that want to go public first need to approach an underwriter, which advises them and organizes the whole process, usually involving legal and accounting firms for relevant material. The application preparation takes at least one year on average.

The project that justifies the fund raising is determined at this stage. Any change to this project or to the amount required to invest in it requires another round of approval from relevant agencies, which is time consuming and costly. Thus, firms try to keep revisions from initial filing to a minimum from this point on.

Finally, the application is filed with the Chinese Securities Regulatory Commission (CSRC). The contents of the application are very similar to those in the prospectus. They include information on the funds needed and the expected amount raised, as well as extra funding sources in case the funds raised in the IPO do not cover the funding needs of the project.

The waiting period, defined as the difference between the date of application filing and the date of listing, includes at least two components. First is the period from application to final approval, and the second is the period from formal approval and listing. Both can potentially take a long time and are quite uncertain.

Overall, the waiting time is very uncertain. From our interview with the practitioners, the waiting period is from one to two years normally, unless the IPO market is suspended by the government.

The final prospectus, after approval by CSRC, includes information on the total amount needed to fund the project and the expected amount raised, equal to the number of new shares times the expected IPO price.

Figure 1. Time-series patterns of Chinese IPOs

This figure shows the time-series patterns of Chinese IPO firms during 2000-2011. The red line in panels A and B represents the number of firms that do an IPO in China between 2000 and 2011 (with the numbers appearing on the right vertical axis). Panel A also show the evolution of the average PE ratio over the same period. Panel B shows the evolution of the average excess ratio, defined as the IPO proceeds minus the filing proceeds, scaled by total assets after the IPO.
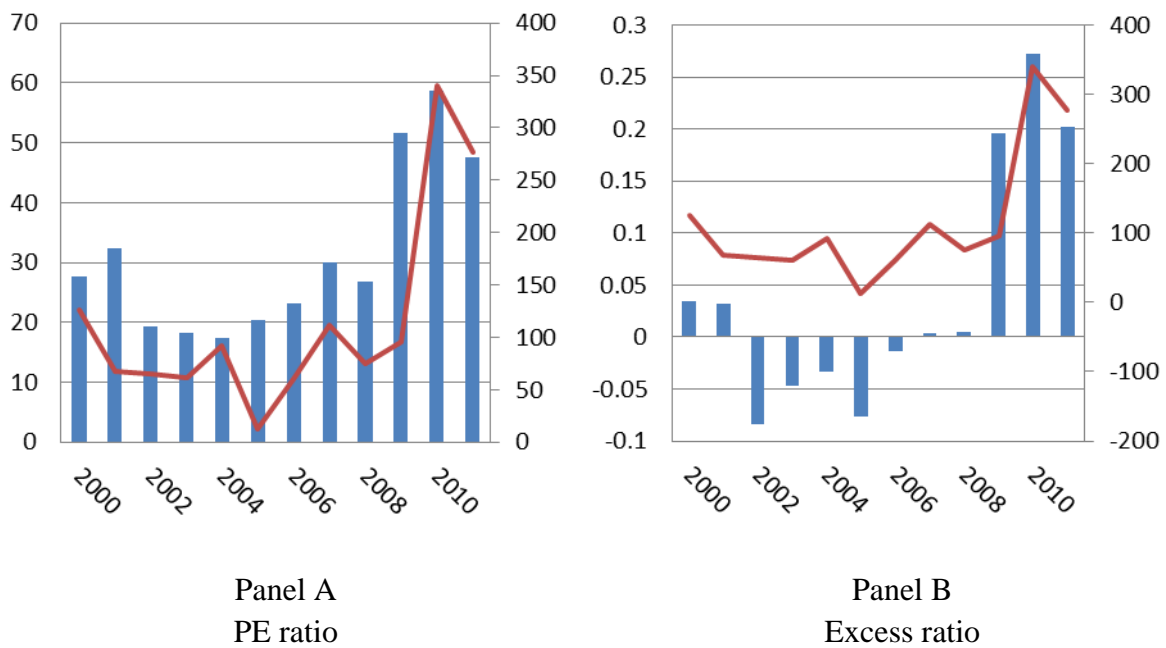

Panel A
PE ratio

Panel B
Excess ratio

Table 1: Summary statistics of Chinese IPO firms

This table provides descriptive statistics for the variables in our sample of Chinese IPOs. Panel A presents statistics for Chinese firms that list in China, Panel B for Chinese firms that list abroad. *Payout ratio* is defined as dividends divided by total assets. *Excess ratio* is calculated as the IPO proceeds minus the filing proceeds, scaled by total assets after the IPO. *Size* is defined as the log of assets. *Sales growth* is defined as sales in the current year minus sales in the previous year divided by sales in the previous year. *Leverage* is the ratio of book debt to total assets. *Ownership* is the ownership of the largest shareholder in the company, plus the cumulative ownership of other shareholders (in the ten largest) that have family or business relations with the largest shareholder. *ROA* is the ratio of net income to total assets. *Cash flow* is the ratio of operating cash flows to total assets. *Capex* is capital expenditures scaled by total assets. *List year* is the number of years since the firm went public. Statistics on these variables are reported for the first three years post-IPO. *Offering PE* (respectively, *Offering M/B*) is the price-to-earnings ratio (respectively, the market-to-book ratio) of firms, calculated at the time of their IPO. All continuous variables are winsorized at the 1% and 99% levels.

Panel A: Domestic listings

Variable	N	Mean	Median	SD	Min	Max
Payout ratio	4,254	0.021	0.016	0.019	0	0.092
Excess ratio	4,254	0.137	0.088	0.202	-0.350	0.582
Size	4,254	21.11	20.92	0.968	19.60	25.02
Sales growth	4,254	0.217	0.189	0.372	-0.915	1.819
Leverage	4,254	0.156	0.114	0.137	0.008	0.637
Ownership	4,254	0.487	0.502	0.157	0.167	0.785
Cash flow	4,254	0.035	0.037	0.074	-0.196	0.219
ROA	4,254	0.054	0.053	0.036	-0.077	0.163
List year	4,254	2	2	0.817	1	3
Capex	4,254	0.088	0.071	0.069	0.001	0.328
Offering PE	1,418	39.32	32.56	21.18	6.67	150.82
Offering M/B	1,418	9.27	7.68	6.21	1.31	56.21

Panel B: Chinese firms that list abroad

Variable	N	Mean	Median	SD	Min	Max
Size	1,347	14.534	14.481	1.756	10.007	19.996
Leverage	1,387	0.363	0.338	0.207	0.038	0.836
ROA	1,279	0.124	0.058	0.370	-0.573	2.587
Capex	1,381	0.074	0.050	0.075	0.000	0.362
Offering PE	391	61.21	19.36	111.65	2.27	462.26
Offering M/B	398	19.83	5.68	37.66	1.31	157.31

Table 2: Pricing constraints and the listing decision
Panel A presents the number and percentage of domestic IPOs with an offering Price-to-Earnings ratio within one percentage point of the PE limit chosen by the regulator. From November 2001 to 2004, the PE limit is 20. From 2005 to November 2008, the PE limit is 30. Panel B presents statistics on the fraction of foreign-listed IPOs that would violate the rule stating that "proceeds should not exceed twice the common equity" in different periods. It compares this fraction for firms affected by the restriction (those that went public between 2004 and 2007) vs. firms that went public in the rest of the 2000-2011 period. *** denotes significance at the 1% level.

Panel A: Domestic IPO firms with capped PE ratios

Year	Number of IPOs	Number of capped IPOs	% capped
Nov. 2001-2002	76	63	82
2003	65	36	55
2004	100	36	36
2005	14	0	0
2006	61	5	8
2007	112	67	60
Jan.-Nov. 2008	76	32	42

Panel B: Foreign-listed IPOs violating the "proceeds should not exceed twice the common equity" rule

	Restriction period (2004-2007)	Non-restriction period	p-value of difference
Fraction of firms violating the rule	0.41	0.28	<0.01***
Number of observations	229	282	

Table 3: Valuation of Chinese firms that go public abroad vs. domestically
Panel A presents differences in average adjusted industry Market-to-Book (MB) and industry MB rank between firms that go public abroad and domestically in the year of their IPO. *Adjusted industry MB* is the average MB of listed firms in an industry minus the average MB of all listed firms. Firms have to be listed for at least 2 years to enter the sample. *Industry MB Rank* is the rank of the average MB of an industry (relative to all other industries). Panel A is exploring the PE restriction period (Nov.2001-Nov.2008). Panel B explores the non-restriction periods (2000 to Oct.2001 and post-Nov.2008). p-values of difference tests between the two groups of firms appear in the last column.

Panel B presents OLS regressions of valuation ratios at the time of the IPO for domestic vs. foreign-listed Chinese firms (Price-to-Earnings ratio in column 1, Market-to-book ratio in column 2). *Foreign List* is a dummy variable equal to 1 for foreign listings, 0 otherwise. *Pricing restricted Period* is a dummy variable equal to 1 when PE ratios are constrained for Chinese IPOs, from Nov. 2001 to Nov. 2008, 0 otherwise. *Proceeds restriction period* is a dummy variable equal to 1 when IPO proceeds should not exceed twice the common equity for Chinese IPOs, from 2004 to 2007. *Size* is the log of total assets. *Leverage* is the ratio of book debt to total assets. *ROA* is the ratio of net income to total assets. Industry fixed effects are included. Heteroskedasticity-robust t-statistics are in parentheses. The last two lines show *F*-stats of Wald tests of the hypothesis that the sum of the coefficients on *Foreign List* and *Foreign List x Pricing restriction period* (resp., *Foreign List x Pricing restriction period*) is equal to 0. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Relative industry valuations of domestic vs. foreign IPOs

	Foreign listing	Domestic listing	*p*-value of difference
Pricing restriction period (Nov.2001 to Nov.2008)			
Adj. industry MB	0.14	-0.03	0.01**
Industry MB Rank	14.56	16.78	<0.01***
Number of observations	283	503	
Non pricing-restriction period (pre-Nov.2001 and Post Nov.2008)			
Adj. industry MB	0.34	0.28	0.51
Industry MB Rank	15.62	14.43	0.06*
Number of observations	200	914	

Panel B: Valuation of domestic vs. foreign IPOs

	(1) Offering PE	(2) Offering PE	(3) Offering MB	(4) Offering MB
Foreign List	6.058 (0.84)	8.740 (1.36)	3.871 (1.36)	3.403 (1.44)
Pricing restriction period	-26.115*** (-18.98)		-6.029*** (-11.74)	
Proceeds restriction period		-19.437*** (-13.05)		-4.974*** (-9.96)
Foreign List x Pricing restriction period	28.767*** (2.62)		5.579 (1.44)	
Foreign List x Proceeds restriction period		29.973** (2.52)		8.183** (2.07)
Size	0.203 (0.10)	1.133 (0.54)	-1.525** (-2.43)	-1.315** (-2.11)
ROA	-0.457 (-0.01)	5.512 (0.15)	40.864*** (4.15)	41.474*** (4.16)
Leverage	20.100 (1.29)	12.043 (0.78)	29.520*** (6.20)	27.372*** (5.87)
Observations	1,771	1,771	1,716	1,716
Adjusted R^2	0.110	0.086	0.187	0.177
Wald test of *Foreign List + Foreign List x Pricing restriction period* = 0 (*F*-stat)	17.19***		12.88***	
Wald test of *Foreign List + Foreign List x Proceeds restriction period* = 0 (*F*-stat)		14.22***		13.12***

Table 4: Operating performance and investment of Chinese firms that go public abroad vs. domestically

This table presents OLS regressions of the operating performance (Return On Assets) and investment (capital expenditures) of domestic and foreign-listed Chinese companies in the three years that follow their IPO. *ROA* is the ratio of net income to total assets. *Capex* is defined as capital expenditures scaled by total assets. *Foreign List* is a dummy variable equal to 1 for foreign listings, 0 otherwise. *Pricing restricted Period* is a dummy variable equal to 1 when PE ratios are constrained for Chinese IPOs, from Nov. 2001 to Nov. 2008, 0 otherwise. *Proceeds restriction period* is a dummy variable equal to 1 when IPO proceeds should not exceed twice the common equity for Chinese IPOs, from 2004 to 2007. *Size* is defined as the log of total assets. *Leverage* is the ratio of book debt to total assets. *Payout Ratio* is defined as dividends divided by total assets. *List year* is the number of years since the firm went public. Industry fixed effects are included. t-statistics allowing standard errors to cluster at the firm level appear in parentheses. The last two lines show *F*-stats of Wald tests of the hypothesis that the sum of the coefficients on *Foreign List* and *Foreign List x Pricing restriction period* (resp., *Foreign List x Pricing restriction period*) is equal to 0. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	(1) ROA	(2) ROA	(3) Capex	(4) Capex
Foreign List	0.027 (1.12)	0.033 (1.57)	-0.012 (-1.35)	-0.014* (-1.67)
Pricing restriction period	0.017*** (4.32)		0.010*** (3.27)	
Proceeds restriction period		0.012*** (3.02)		0.007** (2.02)
Foreign List x Pricing restriction period	0.047* (1.69)		-0.007 (-1.13)	
Foreign List x Proceeds restriction period		0.029 (0.90)		-0.012* (-1.87)
Size	-0.003 (-0.88)	-0.005 (-1.34)	-0.000 (-0.30)	-0.001 (-0.80)
Leverage	-0.134*** (-5.10)	-0.125*** (-5.03)	0.028*** (3.51)	0.033*** (4.22)
List Year	-0.015*** (-5.64)	-0.015*** (-5.45)	0.001 (1.30)	0.001 (1.26)
Observations	5,432	5,432	5,532	5,532
Adjusted R^2	0.066	0.062	0.107	0.105
Wald test of *Foreign List + Foreign List x Pricing restriction period* = 0 (*F*-stat)	11.77***		5.65**	
Wald test of *Foreign List + Foreign List x Proceeds restriction period* = 0 (*F*-stat)		5.82**		9.83***

Table 5: Industry Market-to-Book of IPO firms

This table presents the mean value of adjusted industry MB and industry MB rank of Non-SOE IPO firms in different periods. The adjusted industry MB is the average MB of firms in an industry minus the average MB of all listed firms (listed for at least two years). Industry Rank is the rank of the average MB of an industry (relative to all other industries). The PE constraint period is from November 2001 to November 2008. The Non PE constraint period includes 2000 to October 2001 and December 2008 to 2011.

Panel A presents the mean value of the adjusted industry MB and the industry MB rank of all domestic IPO firms in different periods.

Panel B presents the difference in mean values of adjusted industry MB and industry MB ranks of domestic IPO firms between PE constraint period and Non-PE constraint period. The p-value of a difference test between the two periods appears in the last column.

*, **, and *** denote significance at the 10%, 5%, and 1% levels respectively.

Panel A

	2000 to 2001.10	2001.11 to 2004	2005 to 11. 2008	12.2008 to 2011
Adjusted industry MB	-0.09	-0.03	-0.02	0.38
Industry MB rank	17.71	17.67	15.96	13.52
Observations	198	240	263	716

Panel B

	PE constraint period	Non PE constraint period	P-value of the difference
Adjusted industry MB	-0.03	0.28	<0.01***
Industry MB rank	16.78	14.43	<0.01***
Observations	503	914	

Table 6: Operating performance changes around Chinese IPOs
This table reports changes in operating performance around the IPO, for domestic IPO firms in the sample vs. seasoned firms, which are used as controls. Controls are selected as follows: For all firms listed for at least 2 years, we sort ROA into quartiles and sales growth and total assets into terciles every year and match each treatment firm with a seasoned firm in the same industry, year, total assets, sales growth and ROA groups. The seasoned firm with the smallest difference in ROA with the treatment firm is chosen as the control firm.

Panel A reports descriptive statistics for treated and control firms one year before the IPO, as well as p-values of differences between the mean values of the variables for treated vs. control firms. Size is defined as the log of assets. Sales growth is defined as sales in the current year minus sales in the previous year, divided by sales in the previous year. ROA is net income divided by book total asset.

Panel B reports mean values of ROA and sales of treated and control firms from 3 years before to 3 years after the IPO. Sales are in 10^9 RMB.

Panel C reports difference-in-differences estimates for ROA and sales from 3 years before to 3 years after the IPO. The first difference is the difference between the average ROA (respectively, sales) 3 years after the IPO and the average ROA (respectively, sales) 3 years before the IPO for both treated and control firms. The second difference is the difference between the differences of treated and control firms. DiD results are winsorized at the 1% and 99% levels. *, **, and *** denote significance at the 10%, 5%, and 1% levels respectively.

Panel A: Summary statistics – Chinese IPOs vs. matched seasoned firms

variable	25th percentile		median		75th percentile		P-value
	treated	control	treated	control	treated	control	
Size	19.51	20.10	20.35	20.46	21.11	21.29	0.04**
Sales growth	0.069	0.060	0.201	0.197	0.391	0.434	0.79
ROA	0.075	0.069	0.123	0.120	0.198	0.188	0.53

Panel B: Evolution of operating performance

Year		N	IPO-3	IPO-2	IPO-1	IPO+1	IPO+2	IPO+3
ROA	Treated	4,370	0.110	0.117	0.118	0.053	0.045	0.042
	Control	4,392	0.043	0.066	0.081	0.035	0.036	0.046
Sales	Treated	4,394	2.42	3.16	3.91	6.02	7.04	8.62
	Control	4,392	2.07	2.58	2.78	4.75	5.27	5.77

Panel C: Difference-in-differences

	N	ROA	Sales
Diff-in-diff	733	-0.052***	1.11**

Table 7: Pre-Nov.2008 vs. post-2009 target and actual PE ratios of IPO firms
This table presents target PE ratios announced by domestic IPO firms before November 2008 vs. after December 2009. The target PE ratio is announced in the pre-IPO prospectuses. It is calculated as the offering PE multiplied by the filing amount and divided by IPO proceeds. The p-value of a difference test between the two periods appears in the last column.*, **, and *** denote significance at the 10%, 5%, and 1% levels respectively.

	Pre-Nov. 2008	Post-Dec. 2009	P-value
Target PE	25.88	23.89	<0.001***
PE	24.49	52.96	<0.001***
Number of observations	675	647	

Table 8: Cash surprises and payout ratios

This table presents the relation between payout ratio and cash surprises up to 3 years after the IPO for domestic IPOs. *Payout ratio* is defined as dividends divided by total assets. *Excess ratio* is IPO proceeds minus filing proceeds, divided by total assets. *Size* is the log of total assets. *Sales growth* is sales in the current year minus sales in the previous year, divided by sales in the previous year. *Leverage* is the ratio of book debt to total assets. *Ownership* is the ownership of the largest shareholder in the company, plus the cumulative ownership of other shareholders (in the ten largest) that have family or business relations with the largest shareholder. *ROA* is the ratio of net income to total assets. *Cash flow* is operating cash flows divided by total assets. *Capex* is capital expenditures divided by total assets. *List year* is the number of years since the firm went public. Industry × year fixed effects are included. Heteroskedasticity-robust t-statistics are in parentheses in the first two columns, t-statistics allowing for clustering of standard errors at the firm level in the last two columns. *, **, and *** denote significance at the 10%, 5%, and 1% levels respectively.

	First Year Payout Ratio	First Year Payout Ratio	First 3 Years Payout Ratio	First 3 Years Payout Ratio
Excess Ratio	0.009*	-0.008	0.002	-0.010*
	(1.95)	(-0.90)	(0.69)	(-1.78)
Ownership	0.007**	0.001	0.006***	0.002
	(1.97)	(0.22)	(2.91)	(0.94)
Excess Ratio × Ownership		0.036**		0.025**
		(2.14)		(2.34)
State Owned	-0.000	-0.000	-0.000	0.000
	(-0.18)	(-0.00)	(-0.06)	(0.13)
Size	-0.000	-0.000	0.001**	0.001**
	(-0.68)	(-0.61)	(2.24)	(2.33)
Sales Growth	-0.002	-0.002	-0.003***	-0.003***
	(-1.08)	(-1.11)	(-3.51)	(-3.37)
Leverage	-0.013**	-0.013**	-0.020***	-0.020***
	(-2.43)	(-2.48)	(-7.32)	(-7.35)
Cash Flow	0.034***	0.034***	0.036***	0.036***
	(3.96)	(3.93)	(8.78)	(8.77)
ROA	0.289***	0.289***	0.247***	0.247***
	(9.24)	(9.23)	(20.37)	(20.35)
Capex	-0.019**	-0.019**	-0.023***	-0.023***
	(-2.22)	(-2.18)	(-5.60)	(-5.53)
List Year			-0.001***	-0.001***
			(-3.47)	(-3.46)
Year × Industry fixed effects	Yes	Yes	Yes	Yes
Observations	1,418	1,418	4,201	4,201
R^2	0.393	0.396	0.437	0.438

Table 9: Market reaction to dividend announcements

This table presents determinants of the market reaction to dividend payout announcements up to three years after domestic IPOs. *CAR* is the seven-day cumulative abnormal return around the announcement of the dividend. *Payout ratio* is defined as dividends divided by total assets. *Excess ratio* is calculated as the IPO proceeds minus the filing proceeds, scaled by total assets. *Size* is the log of assets. *Sales growth* is defined as sales in the current year minus sales in the previous year, divided by sales in the previous year. *Leverage* is the ratio of book debt to total assets. *Ownership* is the ownership of the largest shareholder in the company, plus the cumulative ownership of other shareholders (in the ten largest) that have family or business relations with the largest shareholder. *ROA* is the ratio of net income to total assets. *Cash flow* is ratio of the operating cash flows to total assets. *Capex* is capital expenditures divided by total assets. *List year* is the number of years since the firm went public. Industry × Year fixed effects are included. t-statistics allowing standard errors to cluster at the firm level appear in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels respectively.

	(1) CAR	(2) CAR
Payout Ratio	0.395***	0.353***
	(4.10)	(3.00)
Excess Ratio	0.0169	0.0111
	(1.36)	(0.77)
Excess Ratio × Payout Ratio	-1.182***	-1.153***
	(-3.30)	(-3.11)
List Year	0.0116***	0.0121***
	(5.95)	(6.01)
State Owned		-0.000646
		(-0.16)
Ownership		0.0140
		(1.54)
Size		0.00178
		(1.01)
Sales Growth		-0.00274
		(-0.60)
ROA		-0.00612
		(-0.10)
Leverage		-0.0169
		(-1.41)
Cash Flow		-0.00866
		(-0.43)
Industry × Year fixed effects	Yes	Yes
Observations	3,295	3,295
Adjusted R^2	0.081	0.080

Table 10: Payout ratios and dividend-announcement CAR for IPOs vs. seasoned firms

This table presents regressions of the payout ratio, defined as dividends divided by total assets, and the CAR in the seven days around dividend announcements, on the following explanatory variables: *Seasoned* is a dummy variable equal to 1 for seasoned companies, 0 for domestic IPO firms up to three years after their IPO. *State Owned* is a dummy variable equal to 1 if the firm is state-owned, 0 otherwise. *Size* is the log of total assets. *Sales growth* is defined as sales in the current year minus sales in the previous year, divided by sales in the previous year. *Leverage* is the ratio of book debt to total assets. *Ownership* is the ownership of the largest shareholder in the company, plus the cumulative ownership of other shareholders (in the ten largest) that have family or business relations with the largest shareholder. *ROA* is the ratio of net income to total assets. *Cash flow* is ratio of operating cash flows to total assets. *Capex* is capital expenditures scaled by total assets. *List year* is the number of years since the firm went public. Year × Industry fixed effects are included. t-statistics allowing standard errors to cluster at the firm level appear in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels respectively.

	(1) Payout Ratio	(2) CAR
Seasoned	-0.005^{***}	0.008^{***}
	(-12.75)	(3.89)
State Owned	0.001^{*}	-0.002
	(1.65)	(-1.07)
Size	0.001^{***}	0.001^{*}
	(3.32)	(1.67)
Sales Growth	-0.000^{***}	-0.001
	(-6.44)	(-0.86)
Leverage	-0.000	-0.001
	(-0.69)	(-0.19)
Cash Flow	0.039^{***}	-0.002
	(17.20)	(-0.17)
ROA	0.104^{***}	0.052^{**}
	(22.44)	(2.44)
List Year	-0.000^{***}	-0.000
	(-9.19)	(-0.79)
Capex	-0.009^{***}	
	(-3.26)	
Industry × Year fixed effects	Yes	Yes
Observations	19,929	11,294
Adjusted R^2	0.334	0.022