

Initial Public Offerings Chinese Style

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Abstract

This paper provides a survey of China's IPO market. We examine the following key aspects of IPOs—the policy history, IPO pricing, bids and allocation, and aftermarket trading. We show that heavy-handed regulations result in suppressed IPO offer prices and high initial returns, resulting in a high cost of going public. As a consequence, investors treat IPOs as lotteries with extreme short-term returns, with little attention to the long-term. The auction selling method, however, works in the way it is supposed to. Mutual funds bid more smartly than other investors, and their advantages are unlikely to be due to underwriters' preferential treatment. We also discuss the latest registration-system reform and examine IPOs under the new regime. Our study lends useful insights to countries beyond China as they weigh different approaches to IPOs.

JEL codes: G24, G32, G38

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1. Introduction

This paper provides a comprehensive study of the initial public offering (IPO) market in mainland China since 1990. We discuss existing papers in this field but mainly conduct our own analysis. We examine various aspects of IPOs—the policy history, IPO pricing, bids and allocation, and aftermarket trading (using proprietary data), and discuss the direction of future regulatory reforms. We examine these issues from a combination of two perspectives: IPO theories (the economic forces) and the regulatory environment in China (the political considerations). The tradeoff between economic forces and political considerations is certainly not unique to China, and many countries other than the US and China want to explore different approaches for IPOs, hence our study lends useful lessons to markets beyond China.

Since 2000, there has been a drastic shift in the initial public offering (IPO) market across the world. While IPO volume has dropped considerably in the U.S. and other developed markets, China has experienced a tremendous growth in listings. China had no stock exchanges between 1949 and 1990; yet as of December 2018, it has the third largest stock market in the world, after the US and Japan: 3,657 stocks are listed on its two exchanges with a total market cap of RMB 43.50 trillion (\$6.32 trillion).¹ In October 2020, China's market cap hit \$10 trillion, exceeding that of Japan. During 2011-2018, 1,546 companies went public in China. In comparison, 971 operating companies went public in the US, and 2,218 went public in Europe (across 25 countries) during the same period.

In addition to serving the second largest economy in the world, China's IPO market attracts the world's attention with several peculiar phenomena: the eye-popping first-day return (with an average of 170% during 1990-2018, and a whopping aggregate money left on the table of 1.6 trillion RMB (\$233 billion) in the recent 2014-2018 period), the lukewarm subsequent stock market performance in spite of huge economic growth, and the fact that many high profile growth firms such as Alibaba and Baidu chose to list in other markets rather than domestic exchanges.

In this study, we first lay out the history of IPO regulations from the early 1990s to the present. To our knowledge, this is the first paper to do that, relying on multiple sources including the prospectus of each individual IPO. Historically, China's financing system has largely relied on banks rather than securities markets. Regulators recognize the importance of IPOs in developing the stock market and have gradually moved to make these transactions more efficient and more

¹ The exchange rate as of December 2018 is \$1 = RMB 6.88.

market-based as financial markets developed. Nonetheless, the regulators at the China Securities Regulatory Commission (CSRC) have multiple and often conflicting objectives. In particular, the political consideration of avoiding investor losses for the sake of “social stability” makes regulators unwilling to leave the market to price these securities on their own. On multiple occasions, some of the progress that has been made in moving towards a more market-oriented environment has been quickly reversed after encountering a market downturn.

In explaining the IPO regulations, we focus on three issues: the changes in the IPO selling method; the quota, approval, and registration systems used in China; and the IPO process. We discuss additional regulatory details in the Internet Appendix. The IPO selling method determines the way IPOs are priced and allocated.² China has used either a fixed price offering (FPO), or an auction, or a combination of the two methods (with an auction tranche catering to institutional investors to set an offer price, and an FPO tranche catering to individual investors), to sell IPO shares.³ The auction method is supposed to price IPO shares based on market demand. Yet, we clearly observe a pattern of “one step forward, two steps back” toward loosening up regulations on IPO pricing. For many of the last 30 years including the present period, the CSRC has placed limits on the offer price based on price-earnings (P/E) ratios, with the maximum far below what investors were willing to pay for most IPOs.

Although the IPO literature suggests that the auction method tends to be associated with lower underpricing than other selling methods, China has experienced strikingly high underpricing using the auction method. Most of the earlier studies on China’s IPO market focus on underpricing. We survey these papers and conduct a comprehensive and updated examination of underpricing determinants. Consistent with Cheung, Ouyang, and Tan (2009) and Gao (2010), we find that a large part of the high underpricing is due to regulatory restrictions on the offer price. Dividing the sample into restricted and unrestricted periods, underpricing has averaged 222.6% and 59.8% respectively. Regression analyses that control for firm characteristics confirm this conclusion. Using information not included in earlier studies of underpricing, we document several new results. We find that retail demand has a larger influence on underpricing than institutional demand.

² There are three major IPO methods around the world. With bookbuilding, underwriters collect information about the demand for shares and then price and allocate share to investors at their own discretion. With a fixed price offering, the offer price is set before information about the state of demand has been collected. With an auction, the price is set after information about demand is collected, and then shares are allocated based on pre-specified rules.

³ The auction method is often referred as bookbuilding in Chinese media and official documents. But because the underwriters do not have allocation discretion, it is in act an auction mechanism.

Moreover, after controlling for demand, price revision has no positive relationship with underpricing, which is in contrast to the well-known partial adjustment effect documented in the US (Hanley, 1993).

Given the high levels of underpricing, IPO shares are highly coveted commodities. We ask whether those who are fortunate enough to receive an IPO allocation will hold the stock for the long run, and whether those who fail to receive an allocation still want to buy the shares on the open market. These questions have not been examined before. We obtain proprietary data on the trading activities of institutional investors and match them to the IPO demand and allocation data. We document strikingly high flipping ratios of institutional investors once they are allowed to sell: 55% of the allocated shares are sold in the first week. Those who submitted orders but failed to receive IPO allocations rarely buy on the open market once the shares are publicly traded. The evidence thus suggests that institutional investors' interest in IPO stocks is only transient, mainly to take advantage of IPO underpricing, i.e., the phenomenon of a low offer price relative to the immediate aftermarket price. The lack of interest in long-term investment discourages due diligence on the part of investors.

One advantage of studying IPOs in China is that the information on the demand for and allocation of shares is publicly available for the auction tranche. In contrast, similar data for bookbuilt IPOs in other parts of the world (e.g., in the US) is rarely available. Several recent papers use Chinese data to study information production and potential preferential treatments in IPO auctions; both are very interesting questions and cannot be answered using the well-researched US data. We survey these papers, and conduct our own analysis of various investor types' bids and allocations. Consistent with existing studies, we find evidence that mutual funds as a group bid more smartly than other investors. Some authors have suggested that the smart bidding is attributable to underwriters' preferential treatment. Our analysis, however, suggests that preferential treatment is unlikely in these auctions. Hence IPO auctions work as intended: they gather information and prevent preferential treatment.

Finally, we discuss some of the consequences of the IPO approval system. The approval system gives preferences to large state-owned enterprises. The difficulty and high cost of going public in China has led many companies, especially high growth firms with no positive earnings yet, to list in other markets rather than on domestic exchanges. Many more companies have not been able to get public financing. A stock market overweighting SOEs and with poor corporate governance has

witnessed lackluster performance despite huge economic growth. The new Science and Technology Innovation Board (STAR Market) of the Shanghai Stock Exchange and the 2020 reform of the Shenzhen Growth Enterprise Market (GEM) aim to address these problems. Specifically, listing firms are not required to be profitable, and the offer price is not limited to a set P/E ratio. We conduct a brief examination of the IPOs on the new boards. The latest reform is one step in the right direction, but its long-term performance and the sustainability of the reforms remain to be seen.

In summary, after 30 years of trial and error, Chinese regulators have been slow to relax heavy-handed regulations and are still reluctant to trust the market to price IPOs on its own. As a result, the IPO offer price is not efficient: we observe excessive initial returns, making it extremely costly for firms to go public. Furthermore, investors buying IPO stocks in the market once trading starts have earned lukewarm long-run returns. Ironically, investors are rational in treating IPOs as lotteries with extreme short-term returns, with little incentive for due diligence or investing for the long-term. Many high growth companies choose to list in other markets and other firms cannot be publicly financed. All these issues have a negative impact on the efficiency of capital allocation: they leave fewer good investment opportunities for Chinese investors, and result in a higher cost of capital for good companies.

We are of the opinion that the key for a more efficient IPO market is a reduction in the number of ad hoc restrictions and interventions from regulators. In particular, the pricing restrictions should be abolished and the profitability requirement for IPO eligibility should be relaxed. Instead, regulators should let the market price the securities and let investors take the risk. If they bear the financial consequences, investors, especially institutional investors, will rationally price the securities. As in most countries, investor protection can be provided by corporate governance and disclosure requirements, along with penalties for executives who engage in financial fraud.

We also would like to point out that among all the problems with China's IPO market, the selling method—a hybrid of auction and fixed price offering—is not one of them. In fact, the IPO literature suggests that despite the theoretical advantages of the bookbuilding method assuming no agency problems between issuers and underwriters, it is vulnerable to the abuse of underwriter power. The auction method largely mitigates the agency problems, and in other countries is associated with lower underpricing and less rent-seeking activity. Our analysis shows that the auction method works in the way it should in China and we find little evidence of manipulated

allocation due to underwriters' quid pro quo activities. We caution against the tendency to copy developed market practices indiscriminately, including the popular bookbuilding method, for the reforms of IPO regulations.

2. China's IPO Regulations

China's economy has traditionally relied more on the banking system rather than securities markets to finance firms, as is true in most countries. This is still the case to date.⁴ Both systems give priorities to large state-owned enterprises (SOEs) over small and medium sized SOEs or private-sector firms.⁵

The securities regulator, the CSRC, has multiple and often conflicting goals. Like the Securities and Exchange Commission (SEC), its counterpart in the U.S., the CSRC has goals of investor protection and facilitating capital formation. In addition to these goals, the CSRC has used IPO approvals to favor certain industries or provinces in an attempt to guide the allocation of capital in a centrally planned manner. Investor protection has been implemented through not only disclosure requirements, but also screens on company qualifications such as the requirement of positive profitability, and pricing restrictions such as capping the price-earnings ratio at which IPOs can be offered. In particular, the CSRC is nervous about exposing investors to investment risk, fearing that frustrated investors would blame the government and cause "social instability". Hence the motive for imposing a cap on the offer price of IPO shares. Furthermore, periodic moratoriums on IPOs appear to be motivated by government attempts to peg stock prices, limiting increases in the supply of shares following market declines. The CSRC is one of the few financial market regulators in the world that actively attempts to balance supply and demand. As a result of these conflicting objectives, Chinese authorities have imposed heavy-handed regulations and frequently changed policies back and forth.

IPO regulations involve many aspects, and the details are overwhelming. In this section, we focus on the IPO selling method; the quota, approval, and registration systems that the country has used; and the IPO process under the approval system, which is still the main system today. More (detailed) information about IPO regulations can be found in the Internet Appendix.

⁴ According to the web site of the People's Bank of China, for the year of 2017 total equity financing was RMB 873 billion, whereas total new bank loans were RMB 13,840 billion.

⁵ In fact, one of the stated purposes of creating the stock market in the 1990s was to channel private savings to SOEs (see Song and Xiong, 2018; Allen, Qian, Shan, and Zhu, 2020).

2.1 The history of how IPOs are sold

China's stock market was established in the early 1990s: the Shanghai Stock Exchange (SSE) in December 1990 and the Shenzhen Stock Exchange (SZSE) in April 1991. In those earlier years, IPOs were issued in various ways and were not centrally regulated.⁶ In October 1992, the Chinese Securities Regulatory Commission (CSRC) was formed and took over IPO regulations.

Table 1 summarizes the history of the methods for selling IPOs since the formation of the CSRC. We rely on four types of sources to put together the history: regulatory documents, early studies on Chinese IPOs, information for individual IPOs (including prospectus and price and accounting data), and interviews with practitioners and government officials. Existing studies often differ from each other in their descriptions and division of the history, and typically price restrictions are not explicitly stated in government documents but implemented via “window guidance,” the term used for unwritten policies that are implemented in practice. We cross-check between these sources to make sure of the accuracy of the information.

We divide the history since the formation of the CSRC (October 1992) into several subperiods (see Table 1). As in many markets, the FPO method was first used (during the first period of October 1992 – June 1999), probably due to its simplicity. In all but the first period, either FPO or auctions (or a hybrid of the two) are used. In almost all periods, 50% or more of shares are allocated to retail investors in a tranche that is now usually called the online tranche because investors apply on-line. The institutional tranche is referred to as the offline tranche. The form of the selling method thus appears similar across different periods. The main difference lies with whether there are regulatory restrictions on the pricing of the IPO shares. On this important dimension, we clearly see the back-and-forth of the regulatory attitude toward the IPO market: there were multiple attempts to relax restrictions on IPO pricing, but every attempt was reversed shortly thereafter.

For brevity, we focus on recent periods in this subsection. We provide more detailed information for each subperiod in the Internet Appendix. In June 2009 (the beginning of the sixth period), the CSRC issued a document titled “Guidance on the Further Reform and Refinement of the Initial Public Offering Method”, which emphasized the relaxation of regulatory restrictions and moved to allow the market to determine the IPO price. This started the longest unrestricted period for China's IPOs (July 2009 – November 2012). Most recent studies of the Chinese IPO

⁶ The main regulators were the provincial branches of the central bank. IPO shares were sold in various ways including private placements and public fixed price offerings.

market choose to focus on this period for two reasons. First, the offer price in this period can be viewed as freely determined by underwriters and the issuer after observing the investor bids. Second, detailed bid and allocation data of the offline auction tranche catering to institutional investors became available in this period. Since November 2010, IPO firms have been required to publicly disclose such information. We have also obtained similar information for the early part of this period from the stock exchanges.

Regulators imposed an IPO moratorium in late 2012 due to poor stock market performance. In January 2014 (the beginning of the seventh period), IPO activities were resumed and another round of policy reforms were implemented intending to give more freedom to the market. The most important change was that underwriters were allowed some allocation discretion for the auction tranche (for more details, see the Internet Appendix). Such discretion immediately led to some egregious incidents and therefore market outcries of unfair dealings. In response to the complaints, regulators abruptly ended the reform.

In the eighth, and last period, in our study (from June 2014 to present), regulators took control again: they imposed a rigid P/E cap of 23 on all IPOs, although there is no written regulation. This uniform price control prevents efficient pricing and once again led to skyrocketing initial returns. The auction method became not very useful for setting offer prices due to the price control, so small issuers (those with less than 20 millions shares offered) are allowed to use the pure FPO method.

Starting in July 2019, the establishment of the STAR market and the reform of the Shenzhen GEM Board have resulted in additional innovations in Chinese IPO practice. We discuss this new market in Section 7.

2.2 The quota system, the approval system, and the registration system

Before July 1999, the authorities used a quota system for IPOs. That is, the CSRC, together with the State Planning Commission (SPC)⁷, determined the total amount of IPOs each year and then allocated quotas to each province and each industry ministry, which in turn allocated quotas to lower level governments or firms directly controlled by ministries.⁸ The quotas could not be

⁷ It is now known as National Development and Reform Commission (NDRC).

⁸ In the early 1990s, the quota was in terms of the nominal value of IPO shares. Since the nominal value of each share is RMB 1, the quota was effectively in terms of the number of shares. It turned out local governments had incentives to divide the quota across many firms, with each firm receiving a small quota. To address this issue, local governments and ministries were no longer given *share* quotas directly in the late 1990s. Instead, they were given quotas of IPO firms, and the CSRC then determined how many shares each firm could issue.

traded. Under this system, which firms get to go public and how many shares each firm could sell were both determined by the government. The system favored large SOEs over small and medium-sized SOEs and private firms, and the quotas were allocated depending on the government's strategic focus at the time.

In July 1999, with the introduction of the Securities Law, the quota system was officially abolished and the approval system started. In principle, any company that satisfies listing conditions can apply to have an IPO. However, IPOs still have to be approved by the CSRC, hence “soft” quotas can still be applied.⁹ Consistent with this, the CSRC seems to have used different standards over different time periods in screening the IPO applicants. The system thus continues to favor large SOEs.

Under both the quota and approval systems, access to the public equity market is a privilege and a limited resource, hence “guanxi” or connections (in particular, political connections) get to play a role. Francis, Hasan and Sun (2009) show that firms with political connections receive preferential treatment in the IPO process. Chen, Guan, Zhang, and Zhao (2017) document evidence that politically connected underwriters increase the likelihood of clients' IPO applications being approved. Fan, Wong and Zhang (2014) show that politically connected IPO firms underperform other IPO firms subsequent to the offering.¹⁰

The regulators have thought about changing to a US-style registration system, in which any company is permitted to go public providing that it meets disclosure requirements, for a long time (the idea was discussed in official documents as early as 2014). In 2019, a pilot registration system was introduced for the new STAR market (which starting in August 2020 also applies to Shenzhen's ChiNext market). We discuss this new board in Section 7.

2.3 The application and offering process

In this subsection, we describe the application and offering processes under the approval system, which is still the main system today, with the notable exception of the new STAR market. For this purpose, we use information from Qian, Shao and Liao (2019), who focus on the longest free-market period, 2009-2012, but most of the information applies today as well.

⁹ The number of shares and the amount of proceeds raised also need to be approved by the CSRC.

¹⁰ Piotroski and Zhang (2014) argue that IPOs can be politically motivated. Specifically, they demonstrate that local IPO volume goes up before an impending provincial-level political promotion event, especially if the politicians are likely to be rewarded for market development activity. These promotion period IPOs underperform other IPOs.

To apply for an IPO, a firm must satisfy some minimum requirements on size and profitability. For one thing, it must have positive net income prior to the filing.¹¹ Satisfying these conditions does not guarantee the approval of an IPO. The CSRC has the discretion of deciding on individual cases or imposing stricter conditions across the board. Table 2 (based on Appendix A of Qian, Shao and Liao, 2019) shows the key steps for IPO application and approval. In short, this is a long process and it is difficult to get approved. For the 951 IPOs between 2014 and 2017 (the IPO file date was disclosed starting in 2014), the time hiatus between the file date and the approval date has been roughly triple that of the U.S., an average (median) of 489 (481) days, with only 33 firms taking less than 90 days.

Once an IPO approval is officially granted, the offering process starts. IPO shares are sold via a hybrid auction method consisting of an offline auction tranche, which caters to institutional investors, and an online fixed-price offering tranche, which caters to retail (individual) investors. Typically the auction tranche sells 20% of the shares offered and the FPO tranche sells 80%.¹² Table 2 also illustrates the timeline of the IPO process on the Shenzhen Stock Exchange. IPOs on the Shanghai Stock Exchange also use a hybrid auction method, but with differences on specific mechanisms and processes. Perhaps the biggest difference is that for the auction tranche, SSE used a two-stage auction method before 2014, with the first auction producing a price range and the second auction producing the final offer price. But since 2014, the SSE has used the same auction method as the SZSE.

The day on which investors submit order deposits is customarily called Day T. The offering starts on Day T-6, when the issuer publishes “IPO announcement” and “IPO Bookbuilding [Auction] and Road Show Announcement”. The offline auction tranche and the road show start on Day T-5 and last for three business days. Investors submit bids, i.e., combinations of price and quantity. Each investor can bid no more than the total number of shares sold in the tranche.

Recall that China uses an auction method that sets the offer price lower than the clearing price. Bids above the offer price are known as valid bids. Among valid bids, allocation is made proportionally except for the period of November 2010-November 2012 on the Shenzhen Stock

¹¹ The SSE has generally stricter listing requirements than the SZSE SME board, which in turn has stricter requirements than the GEM (ChiNext) board. For example, the SZSE SME board requires firms to have positive income in each of the last three years prior to IPO application, whereas GEM only requires positive income for the year before the IPO if the firm’s income and revenues meet certain levels.

¹² Although selling more shares, the FPO tranche does not contribute to the price discovery. It is the auction tranche that determines the offer price after observing institutional investor bids.

Exchange, during which the allocation was determined based on a lottery. A key difference resulting from the two allocation rules is that when the pro rata method is used, everyone with valid bids receives a small allocation. When the lottery method is used, fewer investors receive allocation, but each successful bidder receives a larger allocation.

Once the offer price for the IPO is determined based on the auction, investors can submit orders to the online tranche. Both individual and institutional investors can participate in the tranche (but an investor cannot participate in both tranches). Each investor can bid for no more than 0.1% of the shares sold in the online tranche, whereas institutional investors can, and do, bid for up to 100% of the offline tranche. Allocation is determined using a lottery. The IPO stock starts public trading typically 5 to 10 business days after the IPO allocation.

Before 2016, investors (both online and offline) needed to pay the full amount of their bids on day T, before allocation is announced, creating an opportunity cost to bidding. This requirement was abolished in 2016 and subscription rates for IPOs have become even higher.

3. Sample and Data

We use a comprehensive dataset of Chinese IPOs that are available in the CSMAR or WIND databases. To date, all the companies that have gone public are domestic firms incorporated in China. Our sample excludes IPOs via reverse mergers, in which a private firm is acquired by a publicly traded firm, with the formerly private firm dominating the merged entity. Our sample includes 3,600 IPOs during 1990-2018 (3,559 since the formation of the CSRC in October 1992). Separately, we also analyze 215 STAR market IPOs starting in July 2019, and 237 Shenzhen GEM IPOs from August 2020 following an important regulatory change. Specifically, these IPOs are subject to neither PE restrictions for setting the offer price, nor profitability requirements for determining eligibility to go public.

We obtain IPO information from the WIND database including fees, firm age, offer price, underwriter name, financials, shares sold, and online subscription ratio. We retrieve post-IPO stock prices and returns from the CSMAR database. In addition, we obtain detailed bid and allocation data of the auction tranche for 850 IPOs during 2009-2012, the longest period without price restrictions. Public disclosure of such information starts from November 2010, and we obtain information for earlier IPOs on the Shenzhen Stock Exchange from the exchange.¹³ Finally, we

¹³ Bid and allocation data are not available for IPOs on the Shanghai Stock Exchange during 2009-October 2010.

obtain proprietary data on account-level trading for all institutional investors for the six-month period following each IPO on the Shenzhen Stock Exchange during 2009-2012. We are able to match the identity of the institutional investors in the trading data and those who participate in an IPO.

Table 3 presents summary statistics of these offerings by year. It shows the relative weight of the two stock exchanges in the IPO market over time. In the 1990s, the number of IPOs was divided between the two exchanges pretty equally. Between 2000-2004, the majority of IPOs listed on the SSE. The dominance shifted to the SZSE during 2005-2012. Since 2014, the division has become more even again. (More details are in the Internet Appendix.) Table 3 also shows that the percentage of SOE IPOs has been declining since 2002: the majority of IPOs were SOEs before 2005, and the percentage has plateaued at about 10% since 2010. The proceeds raised in the IPOs is also reported. Chinese IPOs do not include overallotment options with a few exceptions. In Internet Appendix B, we present the descriptive statistics of IPOs of the whole sample.

4. IPO Underpricing

IPO underpricing—the phenomenon that the offer price is lower than the immediate aftermarket price—is a robust and persistent phenomenon across countries and over time. Major explanations include information asymmetry, agency, and investor sentiment theories. In China, however, we believe that the first and foremost driving force for IPO underpricing is regulatory restrictions on the offer price.

The underpricing magnitude is particularly large in China. During 1990-2018, the average underpricing, measured as the percentage difference between the IPO offer price and the first trading day closing price (initial returns), is an eye-popping 170% (Table 3).¹⁴ In comparison, the corresponding number is 16.8% for the US, 44.5% for Hong Kong, and 25.8% for Singapore, respectively.¹⁵ Among the 54 countries listed on Jay Ritter's website, only Saudi Arabia and the

¹⁴ Starting from 2014, IPO stocks are subject to a daily return limit of +/- 44% on the first trading day. After that, the usual 10% daily limit applies (this applies to all stocks). Very often, the upper limit is reached in one trade for the first few days. Similar to Chiang, Qian and Sherman (2010) and Chiang, Hirshleifer, Qian and Sherman (2011), which study the Taiwanese IPO market with similar restrictions, we define the initial return in this period as the percentage difference between the offer price and the closing price on the first non-hit day (i.e., the first trading day on which the regulatory return limit is not reached).

¹⁵ For some markets, such as Hong Kong and Japan, there is a big difference between equally weighted (EW) and proceeds-weighted (PW) initial returns, and the difference is driven by microcap issuers. In China, there are few microcap issuers, and therefore this is not an issue.

United Arab Emirates have higher average underpricing. The extreme underpricing of Chinese IPOs imposes a large opportunity cost on issuing firms. Suppose a firm raises 1 billion RMB in the IPO, an underpricing of 170% means that it leaves 1.7 billion RMB on the table: without the underpricing, the firm could have received that much more money by selling the same number of shares.

A firm can reduce the high opportunity cost of leaving money on the table by conducting a small IPO followed by a follow-on offering (an SEO) at a higher offer price. The Securities Law, however, has a minimum float requirement (25% for most issuers and 10% for very large issuers, see the Internet Appendix for more detail). Because of this limitation, a firm issuing 1 billion RMB of stock that leaves 1.7 billion RMB on the table, and has a post-issue market cap of 4×2.7 billion = 10.8 billion RMB has given away $1.7/10.8 = 15.7\%$ of its post-issue value to new investors.

As shown in Table 1, most of the time the IPO market in China has been subject to caps on the offer price that were binding for most issuers. Such restrictions have been motivated by the regulators' desire to prevent investor losses, which might frustrate "social stability". These caps applied uniformly to all types of firms. The average offer price P/E ratio during restricted periods is 20.3. In contrast, the average is 43.8 during unrestricted periods.

Table 4 reports the number of IPOs and the mean and median underpricing for each regulatory period. It shows that about two thirds of the IPOs were issued during periods with price caps (restricted periods). For every restricted period but one, the mean and median underpricing exceeded 100%. In contrast, for each unrestricted period except for 7/1999-9/2001, the mean and median underpricing were below 75%. Overall, the mean (median) underpricing for restricted periods is 222% (155%), and that for unrestricted periods is 60% (37%), with the difference statistically significant at the 1% level. In particular, the mean (median) underpricing was 36% (27%) during the longest free period of 2009-2012, which is comparable to the magnitudes in many developed markets. In contrast, the 2014-2018 period (restricted) sees the highest initial return with an average of 315%. That corresponds to a whopping sum of 1.6 trillion RMB (\$233 billion) as money left on the table.¹⁶

¹⁶ This number is of similar magnitude to the value of money left on the table reported by Deng, Sinclair, and Yu (2020). They report that from 2014-July 2020, excluding STAR market IPOs, 88.2% of the money left on the table in Chinese IPOs accrued to investors in the on-line tranche.

Table 4 also reports the mean 1-year and 3-year buy-and-hold abnormal returns, computed as the difference between the stock's return and the return on a matching portfolio. The mean BHAR1Y is similar for restricted and unrestricted periods: -5.5% and -6.6% respectively. But the mean BHAR3Y differs substantially: the restricted period has a mean of -9.5% and the unrestricted period has a mean of 8.3%.

Early studies provide evidence that price caps are associated with higher underpricing. Using a sample of 1992-2006 IPOs, Cheung et al. (2009) show that the underpricing is negatively related to the IPO P/E ratio benchmarked against an industry average P/E. Using a sample of 2006-2008 IPOs, Gao (2010) documents that if the P/E ratio reaches the regulatory cap, the underpricing is higher. Existing papers also explore other determinants of IPO underpricing in China. Consistent with the information risk theories, underpricing is documented to be negatively related to firm size, firm age, or issue size (Chan, Wang, and Wei, 2004; Yu and Tse, 2006; Cheung et al., 2009; Tian, 2011). Consistent with the sentiment theory, underpricing is positively related to stock market returns prior to the IPO (Yu and Tse, 2006; Cheung et al., 2009; Gao, 2010) and investor demand of the IPO shares (Gao, 2010; Tian 2011). Several papers try to capture agency problems within the firm using the fraction of government holding or nontradable shares (before the split-share reform), with a higher percentage representing more agency problems. The evidence is mixed there: Chen, Firth and Kim (2004) find a positive relationship between the percent of nontradable shares and underpricing, whereas Chan et al. (2004) and Yu and Tse (2006) document a negative relationship between the two. In addition, Chen, Wang, Li, Sun and Tong (2015) report that SOE firms tend to have higher underpricing. Su and Brookfield (2013) show that underwriter reputation is associated with decreases in underpricing after 2001.

Building upon these studies, we provide a comprehensive investigation of the role of price restrictions, the information risk hypothesis, and the investor sentiment theory simultaneously, and do so for the complete history of China's IPO market.¹⁷ Notably, most of the existing studies on underpricing do not include the longest free period of 2009-2012 (hence the most interesting and important period), which we examine separately and closely, equipped with additional information

¹⁷ Another major theory of IPO underpricing focuses on the agency problems between underwriters and the issuing firm. It argues that underwriters have incentives to deliberately underprice the IPO shares and give these shares to their favored clients in exchange for side payments such as brokerage commissions or future investment banking business (for evidence in the U.S., see Loughran and Ritter 2002; Reuter, 2006; Goldstein, Irvine and Pucket, 2011; Liu and Ritter, 2010; and Chang, Chiang, Qian and Ritter, 2017, provides evidence in Taiwan). However, the auction method, by taking away the underwriters' allocation power, should largely erase this problem.

of interest to the IPO literature such as institutional demand and price revision which are not available for other periods.

Table 5 reports regressions with initial returns as the dependent variable using all IPOs from October 1992 through 2018. The first three columns in Table 5 use the full sample. In Column 1, we include *restricted*, a dummy variable equal to one if the IPO is issued in a restricted period and zero otherwise, as well as year and industry fixed effects. Standard errors are clustered by industry and year. The regression coefficient on *restricted* is a significantly positive 68.3, suggesting that the average underpricing in restricted periods is higher than that in unrestricted periods by 68%, after controlling for industry and year differences. This coefficient is smaller than the 163% mean difference reported in Table 4 because industry and year fixed effects (mainly year fixed effects) explain much of the difference. In Column 2, we add a variable to measure investor demand for the IPO shares, i.e., $\log(\textit{subscription})$, which is the natural logarithm of the subscription ratio for the FPO tranche. (The subscription ratio for the auction tranche is not available until 2005, and we discuss its effect below for periods for which data are available.) In this regression, the coefficient on *restricted* remains significantly positive but the magnitude is reduced to 41.9. The coefficient on $\log(\textit{subscription})$ is also significantly positive.

In Table 5, Column 3, we include all of the explanatory variables that we consider, i.e., *mktret_pr3mon* (the market return in the three months prior to the IPO), $\log(\textit{assets})$, $\log(\textit{firm age})$, *ROA*, *SOE* (a dummy equal to one if the firm is an SOE), *SSE* (a dummy equal to one if the IPO is listed on the Shanghai Stock Exchange), and *tech* (a dummy equal to one if the firm is in a high-tech industry), in addition to *restricted* and $\log(\textit{subscription})$. The detailed definition for each variable is in the appendix. The effect of *restricted* remains virtually unchanged from Column 2: the coefficient is now 44.8, suggesting that after controlling for everything else, the initial return is 44.8% higher in restricted periods. The coefficient on $\log(\textit{subscription})$ remains highly significant but the magnitude is roughly halved: a one-standard-deviation increase in $\log(\textit{subscription})$ (1.64) is associated with a 26.5% higher underpricing.

Comparing the R-squared in the three columns shows that regulatory restrictions and investor demand are the two most important factors in explaining IPO underpricing in China after

controlling for year and industry fixed effects. The R^2 in Column 2 is 0.46 and that in Column 3 is 0.48. In other words, adding the rest of the variables increases the R^2 by only 0.02.¹⁸

Columns 4-5 of Panel A of Table 5 report underpricing regression results for IPOs in the restricted periods, and Columns 6-7 report results for the unrestricted periods. Consistent with the sentiment theory, underpricing is positively related to recent market returns for both periods.

Explanations for underpricing based on information risk can have different predictions for the restricted and unrestricted period regressions. When the offer price is unrestricted, the theory predicts that underpricing is positively related to firm risk. When the offer price is restricted and the restriction is binding for a large proportion of IPOs, as is true for the restricted periods, the prediction can be different. All else equal, a low-risk firm should have a higher market P/E ratio than a high-risk firm, resulting in more underpricing for the low risk firm, the opposite prediction from the unrestricted regime.

Using asset value, firm age, and ROA as inverse measures for firm risk, we find that underpricing is negatively related to two out of three of these variables (hence positively related to firm risk) in unrestricted periods, which is consistent with the information risk theory. Interestingly, the coefficients on these variables are also negative, and much larger in magnitude, in restricted periods. This finding suggests that the riskier firms may have better growth opportunities, commanding a higher market PE ratio.

Investor demand (measured by the subscription ratio) is an endogenous variable. If high initial returns are predictable due to restricted offer prices, then rent-seeking activity by investors will result in higher subscription ratios. Furthermore, the more restricted the IPO firm's P/E relative to the market P/E, the higher are both the predicted initial return and the predicted subscription ratio. Thus, in Panel B of Table 5, we replace $\log(\text{subscription})$ with the ratio of $PE_{\text{market}}/PE_{\text{IPO}}$, where PE_{market} is the median price/earnings ratio of all publicly traded stocks at the time of the current IPO, and PE_{IPO} is the P/E of the current IPO using the offer price. The results show that *restricted* continues to have a substantial impact on the initial return. $PE_{\text{market}}/PE_{\text{IPO}}$ has a significantly positive effect in unrestricted periods, but not in restricted periods. This difference is likely because the expected underpricing (measured by $PE_{\text{market}}/PE_{\text{IPO}}$) has a positive relation with investor demand (measured by $\log(\text{subscription})$) in unrestricted periods but not in restricted periods. That

¹⁸ The R^2 for the univariate regression on *restricted* (or $\log(\text{subscription})$) alone, without the fixed effects, is 0.14 (0.17).

is, investor demand in restricted periods is always high (in restricted periods *subscription* has a mean (median) of 1,801 (927) vs 191 (141) in unrestricted periods), and it does not depend on the incremental underpricing any more.

We next zero in on the longest free period of 2009-2012. For this period, we have additional information on price revision, institutional subscription, and underwriter reputation, variables that are of interest in the underpricing literature but have not been examined by early studies of the China market. Table 6 reports the initial return regressions for this period. In Columns 1 and 2, we include only $\log(\textit{subscription})$ or $\log(\textit{institutional subscription})$, in addition to year and industry fixed effects. Given that the two variables have a correlation of 0.6, it is not surprising that both are positively related to initial returns. The retail demand variable, however, has a higher explanatory power than the institutional demand variable (the R-squared is 0.23 in Column 1 and 0.19 in Column 2).

Price revision—the percentage change of the final offer price relative to the midpoint of the suggested price range—is shown to be an important determinant of underpricing for IPOs in the US (Hanley, 1993). The positive relationship between price revision and the initial return is evidence of partial adjustment, i.e., the offer price is only partially adjusted to positive information as reflected in demand, hence higher demand leads to higher initial returns. Price revision is naturally a proxy for investor demand when the direct demand information is usually not publicly available for bookbuilding IPOs. There is evidence that price revision becomes insignificant when demand information is directly controlled for (Cornelli and Goldreich (2003) for a sample of international bookbuilding IPOs underwritten by European banks; Qian, Ritter and Yan (2014) for a sample of US bookbuilding IPOs). Chiang, Qian and Sherman (2010) also document partial adjustment for discriminatory price auctions in Taiwan.

As expected, price revision is positively correlated with investor demand, especially with institutional demand since the offer price is determined out of the institutional auction tranche: the unreported correlation with $\log(\textit{institutional subscription})$ is 0.58 and that with $\log(\textit{subscription})$ is 0.38. Nonetheless, Column 3 of Table 6 shows that in China, there is no significant relationship between price revision and initial return, after controlling for year and industry fixed effects.¹⁹

¹⁹ Including *price revision* results in a smaller sample size. During the period of 10/2010-2012, the suggested price range is published together with the detailed bid and allocation data. We are able to obtain both types of information (suggested price range and detailed bid and allocation data) for IPOs during 2009-October 2010 from Shenzhen Stock

This is consistent with the finding of Qian, Shao and Liao (2019) for Chinese IPOs, but in contrast to the vast literature for U.S. IPOs.

In Column 4, we include both subscription variables and price revision. The retail demand variable remains highly significant and institutional demand becomes significant only at the 10% level. In Column 5, we further add *High UW repu* (a dummy equal to one if the Securities Association of China assigns a high rating to the underwriter; for a more detailed definition, see the appendix), as well as the explanatory variables used in Column 7 of Panel A of Table 5. The institutional demand variable becomes insignificant. The fact that retail demand is a more important explanatory variable for initial returns than institutional demand suggests that sentiment is a more important driver of initial returns than information revelation by institutional investors. After controlling for demand, the coefficient on price revision actually becomes negative. This negative relation is consistent with the finding of Jia, Ritter, Xie, and Zhang (2019). They argue that the lack of a positive relationship between the price revision and initial return suggests that the offer price is completely (rather than partially) adjusted to the information contained in (institutional) investor demand. If that is the case, then the positive relationship between demand and initial return is likely driven by investor sentiment rather than the need to compensate institutional investors for information revelation as suggested by bookbuilding theory. Underwriter reputation is insignificant in both the multivariate regression (Column 5) and the univariate regression (not tabulated).

In summary, we find that in China, the two most important determinants for IPO underpricing are the presence of a regulatory offer price P/E ratio limit and investor demand. The fact that retail demand has more explanatory power than institutional demand, and the finding that the prior market return is positively related to the initial return, indicate the effect of market sentiment. We struggle to find evidence consistent with the information risk theory for underpricing.

5. Bids and the Allocation of IPO shares

IPOs in mainland China use an auction where all investors pay the same offer price, but the offer price can be set at or below the market clearing price, also known as a “dirty Dutch auction”. The mechanism is similar to the auction method used in the US market, but different from the

Exchange, but not for IPOs on the Shanghai Stock Exchange during that period. After 2013, the suggested price range is no longer published.

method used in Taiwan where winning investors pay what they bid, in what is known as a discriminatory auction, in contrast to a uniform price auction. Chiang, Qian, and Sherman (2010) and Chiang, Hirshleifer, Qian, and Sherman (2011) examine the bidding behavior of both individual and institutional investors in IPO auctions in Taiwan. They conclude that institutional investors' bids are based on information because their unexpected entry and bid aggressiveness are associated with higher returns. On the other hand, retail investors chase returns and as a group do not bid based on information. Furthermore, experience with these auctions does not improve their bidding. Using a small sample of US IPO auctions (because the method is not commonly used in the US), Degeorge, Derrien, and Womack (2010) also conclude that institutional bids reveal information since their demand is highly elastic, whereas there is evidence of free-riding of retail investors.

Seven types of investors can participate in the institutional (off-line) tranche: mutual funds, securities firms, insurance companies, financial firms (conglomerates' financing subsidiaries), trust firms, recommended investors by underwriters (which can be institutions or individuals), and qualified foreign institutional investors (QFIIs).

This institutional feature allows us to examine whether different types of institutional investors bid differently and/or receive different treatment from underwriters. Using detailed bid and allocation data for the auction tranche of 850 IPOs during 2009-2012, we first describe the characteristics of each investor type's bids and allocations, and then examine whether some investor types bid more smartly than others, and if yes, the source of their advantages.

Table 7 presents the mean values of various demand and allocation measures by investor type. The first portion of the table reports the demand of each investor type. Mutual funds, securities firms, financial firms, and trust firms participate in all or almost all IPOs, but insurance companies, recommended investors and QFIIs do not always participate. Mutual funds are the largest group of investors in terms of both the number of bidders and the demand quantity; securities firms come second. In an average IPO auction, there are 157 bidders, out of which 43% are mutual funds and 29% are securities firms. The average subscription ratio (demand over supply) during 2009-2012 is 101.4 times for the offline tranche, out of which 41.1 is due to demand from mutual funds and 28.0 to demand from securities firms. QFII and recommended investors are the least important in terms of the bidding quantities. By 2019, the number of recommended investors (mainly

individuals) increased, contributing to a dramatic increase in the average subscription ratio, as we will document later.

The second portion of Table 7 reports the allocation received by each investor type. Not surprisingly, mutual funds and securities firms receive the most allocations since they bid the most: they on average receive 42% and 29% of the shares in the auction tranche, respectively. The average allocation ratio of each investor type is roughly in proportion to its average subscription ratio. The average number of investors who receive allocations is 59 (compared to 157 total bidders on average).²⁰ Among investors receiving allocations, the fraction in each investor type roughly corresponds to the fraction of all investors in that type. For example, 43.0% of all investors are mutual funds; and 43.4% of investors receiving allocations are mutual funds. The fact that allocation is roughly in proportion to demand suggests that the auction method is fair: it works as it is supposed to.

The third portion of Table 7 describes the typical bid size of an investor in each type. For each IPO, we first compute the median value of the bid size across investors within a type. We then report the mean value of that median bid size across auctions where this investor type participates. For example, insurance companies participate in 583 out of 850 auctions. Among those auctions, an insurer's typical demand is RMB 147 million, corresponding to 84% of the total number of shares offered in the offline tranche. The typical demand sizes of other investor types are of similar magnitudes, except that recommended investors (mainly wealthy individuals) tend to bid smaller amounts. These numbers show that each investor typically submits a large order to increase its chance of receiving a significant allocation, expecting severe rationing.²¹

The last portion of Table 7 reports the allocation received among those who bid (in comparison, in the second portion of the table, the allocation is set at zero if an investor type does not bid). Investors receive a small number of shares relative to their demand: the average allocation ratio for all investors is 2.3%. Consistent with the results in the second portion of the table, the allocation

²⁰ A higher fraction of winning investors occurs when proportional allocation is used rather than lottery allocation. In our sample, 440 auctions use proportional allocation (373 IPOs on the Shenzhen Stock Exchange before November 2010 and 67 IPOs on the Shanghai Stock Exchange) and 410 auctions use the lottery method (IPOs on the Shenzhen Stock Exchange from November 2010) for valid bids, i.e., bids at or above the offer price.

²¹ Rock (1986) argues that uninformed investors will receive more allocations when the stock is of low quality and informed investors do not participate. A strategy of submitting a large order for all IPOs can result in an allocation-weighted return being far below the unconditional average return. In China, because almost all IPOs are heavily oversubscribed, and price drops are rare, such adverse selection problems are not as problematic as they could be.

ratio is similar across investor types. The typical allocation for each investor is even smaller: 0.48% relative to their own demands among all investors.

Next we examine whether some institutional investors are more informed bidders than others. The literature shows that institutional investors are more informed than retail investors, both in bookbuilding and auctioned IPOs (Aggarwal, Prabhala, and Puri, 2002; Boehmer, Boehmer, and Fische, 2006; Chiang, Qian and Sherman, 2010). Most studies, however, do not address whether there are differences among institutional investors because detailed demand data are lacking for bookbuilt IPOs and investors do not have to submit informative bids when allocations are at the discretion of the underwriters instead of based on their bids.

Using Chinese IPO data, Chemmanur, Ma, Wu, and Yu (2017) report that bids of mutual funds are more informative than bids of other investors. Their bids have more influence on the offer price and can predict initial returns and long-run post-IPO returns. Jiang, Shao and Xue (2018a) define relational investors as those that have participated (more) in previous IPOs underwritten by the same underwriter of the current IPO. They show that relational investors are more likely to participate in an IPO and their bids are more informative in that they are closer to the first trading day closing price. Liu, Ma, and Zou (2019) identify informed bidders as those who bid close to the offer price in previous IPOs, and show that they continue to bid more closely to the offer price in the current IPO.

Reuter (2006) finds that mutual funds paying more brokerage fees to the underwriting bank receive more allocations in U.S. bookbuilt IPOs, and Jenkinson, Jones, and Suntheim (2018) find the same for European IPOs. Two papers suggest some mutual funds receive preferential treatments even in auctioned IPOs in China due to their brokerage relationship with the underwriter. Chemmanur, Liu, and Tian (2017) argue that underwriters give preferential treatment by setting the offer price in such a way that more orders from these favored mutual funds are eligible for share allocation. Alternatively, Jiang, Shao, and Xue (2018b) suggest that favored mutual funds receive information leakage from low reputation underwriters: they bid more closely to the offer price and they bid later than other investors.

To investigate whether mutual funds bid more smartly than other investors, we compare their bid distributions with others'. For each IPO auction, we divide mutual funds' bids (relative to the offer price) into a set of price bins: the lowest is less than 0.75 and the highest is equal to or greater than 1.15, with each bin in the middle increasing by an interval of 0.05. We calculate the proportion

of bids in each price bin. We then average the proportion across IPOs and that gives us the average probability of bids in each price bin. We do the same for investors other than mutual funds and get another bid distribution.

Figure 1 displays the two distributions of bids for mutual funds and other investors, respectively. Two differences between the distributions stand out. First, mutual funds have a lower probability to be in the lowest price bin (<0.75) (9.4% vs. 11.8%), suggesting they are more serious bidders. Second, they have a higher probability to be at or narrowly above the offer price, i.e., in the bin between 1 and 1.05 (18.2% vs. 16.9%). Both differences are statistically significant. A smaller but still statistically significant difference exists for the price bin between 1.1 and 1.15: mutual funds' probability in this bin is slightly higher (6.6% vs. 6.1%). Together these differences give mutual funds a higher probability to bid at or higher than the offer price (43.8% vs. 41.6%). The probabilities in other bins are not significantly different between the two types of investors.

In short, we see some evidence that mutual funds' bids are smarter: they are more likely to bid high enough to be eligible for allocation, but no more likely to bid too high (in the price bin ≥ 1.15). In particular, they are more likely to bid at or narrowly above the offer price. This could be either due to their own information advantage or to preferential treatments from underwriters, the latter of which in turn can be via whisper information (Jiang et al. 2018b) or target pricing (Chemmanur, Liu, and Tian, 2017). Nonetheless, the economic magnitude of this advantage is not big: compared to other investors, the extra bids at or narrowly above the offer price constitute only 1% of all mutual funds' bids. After the random allocation among valid bids, this corresponds to only a slightly higher allocation to demand ratio for mutual funds (2.45% vs. 2.25% for other investors). Thus the resulting advantage for mutual funds is quite limited, which casts doubt on the effectiveness and therefore motives of preferential treatments.

We then divide the sample into hot and cold IPOs based on the initial return and post-IPO one-year style-adjusted buy-and-hold abnormal return, respectively (i.e., hot IPOs are those with above-median initial return or one-year BHAR), and investigate whether mutual funds' advantages differ across these two types of IPOs. (The detailed definition of style-adjusted BHARs is in the appendix.) The results are reported in Table 8. We find that mutual funds are always less likely to bid too low (i.e., in the price bin <0.75), in both hot and cold IPOs. Their advantage in narrowly beating the offer price (i.e., in the price bin of $[1, 1.05)$) is also similar between the two subsamples with above- or below-median initial returns. Interestingly, when dividing the sample based on the

one-year return performance, this advantage only holds among the good subsample (i.e., with above-median performance). It is reasonable to think that underwriter's preferential treatment, if any, is more likely to deliver good returns in the short run rather than in the long run. In that case, our evidence suggests that mutual funds' smart bidding is more likely due to their own information advantage about the stock's intrinsic value rather than to the underwriter's preferential treatment.

Finally, we find evidence that the greater the allocation to mutual funds, the better the aftermarket long-run return performance. Table 9 reports the result. In the table, we regress various aftermarket return measures on mutual funds' allocation ratio (measured as the fraction of shares allocated to mutual funds relative to the shares offered in the auction tranche), controlling for other firm and offering characteristics. Aftermarket returns refer to the initial return and the style-adjusted buy-and-hold abnormal returns (BHARs) during the 3 months, 6 months, 1 year, 2 years and 3 years subsequent to the IPO, respectively. We find that the coefficient on the allocation ratio is significantly positive for regressions of 3-month, 6-month, 1-year and 2-year BHARs, but while positive it is not significant for initial returns and 3-year BHARs. In terms of economic significance, a one-standard-deviation increase in mutual funds' allocation ratio is associated with higher 3-month, 6-month and 1-year BHARs by 3%, and a higher 2-year BHAR by 5%. The result is robust if we control for other investor types' allocation ratios. That mutual fund allocation is positively related to long-run stock returns but not initial returns again suggests that mutual funds' smart bidding is their own doing, assuming underwriters' information advantage is more likely about short-term returns rather than long-run returns.

It is also noteworthy that Table 9 shows that long-run returns are negatively related to retail demand at the IPO, $\log(\textit{subscription})$, but positively related to institutional demand, $\log(\textit{insti subscription})$. This pattern suggests that strong retail demand pushes the initial market price above fundamental value, resulting in a subsequent reversal.

In summary, we find some evidence that mutual funds bid more smartly than other investors, and that the advantage is unlikely to be due to preferential treatments from underwriters. Overall, the auction method works as expected, i.e., to gather demand information and reward the higher bidders. The allocation does not appear to be manipulated for underwriter's quid pro quo purposes in an economically significant manner.

6. Aftermarket Trading

We obtain proprietary data on account-level trading for all institutional investors for a six-month period following each IPO on the Shenzhen Stock Exchange during 2009-2012, and match the identity of the institutional investors in the trading data and those who participate in an IPO. We examine post-IPO trading activities in general, and those by IPO investors in particular. For IPO investors, we ask whether those who are fortunate enough to receive an allocation will hold the stock for the long run, and whether those who fail to receive an allocation buy shares on the open market.

Panel A of Table 10 reports the average daily trading volume and turnover ratio in four periods after IPOs: the first trading day, the first week excluding the first day, the first 3 months excluding the first week, and months 4-6. The table shows that the first day sees the most active trading: the average trading volume is RMB 583 million (\$85 million) and the turnover ratio (relative to float) is 70.8%. The float is the number of shares that can be traded, i.e., shares offered in the IPO minus IPO shares that are subject to lockup. During the analysis period (2009-2012), shares issued in the offline tranche are subject to a three-month lockup period for IPOs prior to June 2012 and no lockup after that. Shares obtained from the online FPO tranche are never subject to lockup, and thus comprise the float. In the rest of the first week, the average daily trading volume is RMB 221 million and the average daily turnover is 28%, much lower than the first day trading. Similarly, the trading intensity continues to decrease in the months to come, but it continues to be much higher than for U.S. IPOs, other than on the first day, for which turnover is similar.

Panel A also reports the buy, sale and netbuy (buy minus sale) activities by institutional and retail investors, respectively. It is clear that trading is dominated by retail investors. On the first day, institutional buy relative to float is only 2.8%, sale is 5.5% and netbuy is -2.7%. The low level of sale is partly due to the fact that in most of the analysis period, institutional investors receiving an allocation from the auction tranche are subject to a lockup period. But it also reflects low trading activity in general (either buy or sale) on the part of all institutional investors. In contrast, retail buy is 68.0%, sale is 65.3% and the netbuy is 2.7% of the float. Similarly, for each of the next three periods, most of the trading is done by retail investors.

In untabulated results, we find that institutional investors who bid in IPO auctions, whether or not they receive allocations, rarely buy in the open market. On average only 3.9% of successful bidders (those who receive allocations) and 2.3% of unsuccessful bidders buy in the six months after an IPO. In other words, IPO investors only want to buy the stock at the discounted offer price

and are not interested in acquiring the stock in the open market. There are no similar statistics in the U.S.; but interviews with practitioners suggest that institutional IPO investors, if they receive small allocations, either sell to hold none or buy more on the open market to reach a certain level of holding.

The next two panels of Table 10 present the average flipping rate of successful bidders. The flipping rate is calculated as the number of shares sold by successful bidders relative to the number of shares offered in the auction tranche. We examine the flipping rate for three periods after the lockup period ends: the first day, the first week excluding the first day, and the first three months excluding the first week.

We divide the analysis period (2009-2012) into three stages. In Stage 1 (2009-October 2010), proportional allocation is used among valid bids, hence many investors receive shares but each receives a small allocation. IPO shares from the auction tranche are subject to a three-month lockup period. In Stage 2 (November 2010-May 2012): the change is that allocation among valid bids is determined by lottery, hence a small number of investors receive allocations but each receives a large allocation. In Stage 3 (June 2012-December 2012): the change is that IPO shares from the auction tranche are no longer subject to lockups.

Panel B of Table 10 reports the flipping rate of successful bidders for the whole analysis period, and for the three stages separately. For the whole analysis period, 35.4% of shares allocated in IPO auctions are flipped as soon as the lockup period expires. Another 19.7% were sold in the rest of the week. A total of 55.1% of allocated shares are sold in the first week. Another 33.1% of shares received in the IPO are sold in the rest of the three months.

When comparing across the three stages, we see the lowest flip rates for Stage 2 when lottery allocations were used and there was a lockup period: the first day (after the end of the lockup) flip rate is only 19.9% (vs. 45.8% for Stage 1 and 57.9% for Stage 3), and the first-week flipping rate is 40.6% (vs. 65.6% for Stage 1 and 71.2% for Stage 3). Thus, larger allocations and a lockup period requirement seem to be associated with lower flipping rates, especially on the first trading day that selling is allowed. With larger allocations under the lottery method, investors are more likely to do due diligence and bid more seriously (Cao et al. (2016)). If they are informed about the stocks' intrinsic values, they may choose to hold some of the stocks for which they receive allocations rather than selling indiscriminately. In addition, they are more likely to hold after a three-month lockup period if the aftermarket price tends to be initially overvalued but approaches

the fair value in three months. This is consistent with the observation that the average 3-month BHAR is -7.1% and the 6-month BHAR is -7.2%. In other words, most of the poor performance occurs in the first three months. But the underperformance is more than compensated by the IPO underpricing: the average initial return is 36.8% for these 783 IPOs on SZSE during 2009-2012.

In comparison, Aggarwal (2002) examines 193 U.S. IPOs during the period of May 1997-June 1998 and documents an average flipping rate of 15% during the first two trading days (there is no lockup period for shares offered in IPOs in the US; instead lockups apply only to pre-IPO shareholders).²² Thus the flipping rate is much higher in China: in the first two trading days the average is 41.5%.

Aggarwal (2002) also documents that higher initial returns are associated with higher flipping rates. Along that line, we classify sample firms into terciles based on the initial return. Panel C of Table 10 reports the flipping rate in each return tercile. Indeed, the average flipping rate for the first trading day increases with the initial return: it is 23.9%, 34.4% and 45.3% for return tercile 1, 2 and 3, respectively. The flipping rate for the rest of the first week, however, is very close among IPOs in the three terciles.

In summary, we find two striking patterns in post-IPO trading. First, institutional investors who bid in the auction tranche rarely buy on the open market, regardless of their allocation. Second, IPO investors who receive allocations sell the majority of their allocation in the first week that they can. Together the evidence suggests that investors participate in IPOs aiming for a handsome short-term return, with little interest in holding for the long run. Such an incentive discourages due diligence and hinders price discovery both at the time of the IPO and in the aftermarket.

7. Criticisms of IPO regulations, and the latest reforms

7.1 Criticisms of IPO regulations

Our empirical analysis has focused on the pricing and trading of IPOs. We demonstrate that regulatory pricing restrictions lead to great underpricing, which imposes a high cost of issuance on companies. It also distorts investor incentives. In many regards, Chinese regulators have created a system that has been dysfunctional in achieving the goals of facilitating capital formation and

²² The average first-day turnover (trading volume/shares issued, not including the overallocation options) on IPOs in the U.S. increased from 35.3% in 1990-1998 to 65.0% in 2001-2019, according to Table 3a of the IPO Statistics file on Jay Ritter's IPO Data website, but it is not clear how much of the increase in turnover is due to the growth of high frequency trading rather than an increase in flipping.

protecting investors, although there has been some success at allocating capital to certain sectors and smoothing market returns. The severe underpricing in many periods, and periodic moratoriums on going public, have not facilitated capital formation. The high returns for investors that have received a modest number of shares at the offer price have encouraged flipping. The many investors who have purchased in the market have frequently incurred losses, defeating the goal of protecting investors. Furthermore, resources have been wasted by investors seeking to purchase what is essentially a lottery ticket with a small chance of winning.

Several papers raise concerns about the selection of firms for the public market and the oversight of public firms in China. Derrien, Wu, Zeng and Zhang (2017) and Cong, Lee, Qu and Shen (2020) argue that China's IPO regulations—in particular, the listing requirement of positive profits and regulatory price caps—bias against high-growth technology firms and induce an exodus of these firms to foreign equity markets. Notably, the three best known public Chinese companies “BAT”—i.e., Baidu, Alibaba and Tencent, all technology firms, are all listed in Hong Kong or the U.S. Cong et al. (2020) report that during 2007-2017, 85 Chinese firms went public in the U.S. and 497 in Hong Kong, compared to 2,087 in mainland China. The total amount raised from Hong Kong and U.S. IPOs for Chinese firms exceeded that from mainland IPOs (\$66 billion vs. \$50 billion) (see their Table 3.5). Compared to their mainland counterparts, IPO firms outside mainland China are less profitable, lower in assets, but have much higher market-to-book ratios (see their Table 3.6).

The approval system results in many firms having no access to the public equity market. Some companies have gone public via the back door by conducting a “reverse merger” with a listed company. The demand for these reverse mergers has been so strong that it has propped up the price of failing listed companies, resulting in few distress delistings and a strong small firm effect (Liu, Stambaugh, and Yuan, 2019).

Allen, Qian, Shan and Zhu (2020) examine the reasons behind the underperformance of China's stock market despite the fast economic growth. They propose two reasons. One, the listing regulations favor large SOEs, which lead to a misrepresentation of the economy. Second, listed firms have low investment efficiency, which is associated with poor corporate governance.

The disclosure of IPO firms is also problematic. Allen et al. (2020) report that firms use earnings management before the IPO, and that the extent of earnings-boosting is significantly greater than the counterparts in the U.S. and Chinese firms listed externally. We believe that this

pattern may be associated with the listing requirement of positive profits. We are also concerned that this requirement may give firms incentives to engage in real earnings management by cutting R&D investments or employment growth before the IPO, which will hurt the firms' growth and prospects in the long run. Earnings management, including real earnings management, after the IPO is also a problem. Firms will be labeled as "special treatment" if they have negative earnings for two consecutive years and can be suspended from trading if they report losses for three consecutive years. Yet delistings are rare, as are mergers between publicly traded firms.

Moreover, underwriters exacerbate rather than mitigate the disclosure problem. Qian, Shao, and Liao (2018) provide evidence that underwriter-affiliated analysts hype IPO stocks by overestimating the firms' future performance in their pre-IPO research reports, which leads to higher offer prices and higher immediate aftermarket prices but poorer long-run returns. Jia, Ritter, Xie, and Zhang (2019) examine pre-IPO coverage by unaffiliated analysts and conclude that their research is valuable.²³

7.2 The new registration system for the STAR market and the GEM Board

The new STAR market in Shanghai and the reform of the Shenzhen GEM Board are meant to address some of the problems that we have discussed. In November 2018, President Xi Jinping announced that China would establish a new Science and Technology Board (STAR Market) on the Shanghai Stock Exchange and experiment with a registration system for IPOs on this board. On July 22, 2019, the first batch of 25 firms went public on the STAR Market. On August 24, 2020, the GEM Board of the Shenzhen Stock Exchange started to list IPOs using the same requirements as the STAR market.

IPO policies for these two markets have several key new features. First, using a U.S.-style registration system, firms do not need to get approval from the CSRC for their IPOs. Instead, the stock exchanges are responsible for making sure that firm disclosures are adequate and truthful. Second, although there are still listing requirements centered around the size of the business, firms do not have to show positive profits to be listed. Third, to attract high-tech firms, STAR allows dual-class shares and/or weighted voting rights. Fourth, the IPO offer price is determined by the underwriter and the issuer via the auction method; the price cap of 23 is not imposed. Fifth, to

²³ Unlike in the US where neither affiliated nor unaffiliated analysts provide pre-IPO research coverage, both types of analysts do so in China.

encourage underwriters to do careful due diligence, underwriters are required to purchase 2-5% of the shares offered and hold these shares for two years.

Table 11 presents the descriptive statistics for these IPOs under the new registration system (STAR market and GEM board since August 24, 2020), and compare them to the IPOs on the SSE main board and the old GEM board during 2019-2020, respectively. The table shows that firms listed on the old GEM Board are much smaller than those on the SSE main board, in terms of assets, market cap, and proceeds. Nonetheless, under the new regime, the size of GEM IPOs becomes larger and more comparable to those on SSE and STAR. Interestingly, although positive profits are not required, the average ROAs of STAR and new GEM IPOs are both positive and not significantly different from their respective benchmarks.

The subscription ratios from both the online and offline tranches are astronomically high, for all four groups of IPOs. Nonetheless, the institutional subscription ratios are much lower for STAR and new GEM IPOs. Note that the institutional subscription ratios for IPOs are even higher in recent years than the ratios reported in Table 7 for 2009-2012 for two reasons. First, since 2016 investors are not required to deposit the RMB amount of their orders in advance anymore; instead only those who receive allocations pay afterwards, dramatically reducing the opportunity cost of requesting shares. Second, the re-installation of the price cap in 2014 makes the market certain that these IPOs will generate huge initial returns, and IPO allocations literally are lotteries with small winning probabilities but huge prizes if won. The removal of the price cap for IPOs on STAR and new GEM Board reduces institutional demand, but not blind demand from retail investors.

When looking at the P/E ratio, it is clear that SSE and old GEM IPOs are subject to the cap of 23, whereas IPOs under the new regime are not, with a mean of 67 for those on STAR and 35 for those on new GEM. Despite much higher offer prices (in terms of P/E ratio), IPOs under the new regime still experience extremely high initial returns—on average 160% for STAR and 237% for new GEM IPOs, which are not statistically different from the average initial returns from their respective benchmarks (171% for SSE and 228% for old GEM). The high initial returns despite the removal of a price cap might be related to two factors. First, although the requirement that underwriters must buy and hold part of any issue that they take public incentivizes them to conduct careful due diligence investigations, it also incentivizes them to underprice the shares. Second, it might be related to the ever-high investor sentiment about IPOs. The extremely high subscription

ratios, especially those due to retail investors, suggest that investors continue to believe these IPOs give guaranteed high returns.

The STAR market is not China's first attempt to establish a Nasdaq rival for hosting high-tech firms. Previous attempts include the GEM market on SZSE in 2009 and the over-the-counter New Third Board in 2013. Both lack quality listings and the latter has very low liquidity. With the blessing from the top leaders and its market-oriented policies, the new reform is promising. But its success depends on consistent policies that do not change quickly with the market conditions. In addition, corporate governance matters in order to attract capital in the long run. Bernstein, Dev, and Lerner (2020) document that many countries have created new stock exchanges geared toward entrepreneurial companies, and that shareholder protection strongly predicts exchange success.

8. Conclusions

We investigate several important aspects of the IPO market in China—the policy evolution, IPO pricing, bidding and allocation practices, and aftermarket trading. We describe the regulatory environment for IPOs in China and the policy changes from the early 1990s to the present. The unique regulatory background is essential in understanding China's IPO market.

One striking feature of Chinese IPOs is the extremely high underpricing: the average first-day return is 170% during 1990-2018. For the recent period of 2014-2018, the average has been even higher at 315%. Consistent with major theories of IPO underpricing, we find that the first-day returns are positively related to a firm's information risk and investor sentiment. Nonetheless, a large part of the underpricing is due to regulatory restrictions on the offer price.

We examine detailed bids of, and allocation to, seven types of institutional investors in IPO auctions during 2009-2012. We find that allocation is roughly in proportion to each investor type's demand. There is evidence that mutual funds bid more smartly than other investors: they are serious bidders (unlikely to bid too low) and are more likely to bid at or above the offer price. We also find that the allocation that mutual funds receive is positively related to long-term stock returns but not reliably related to the initial return, again suggesting that mutual funds' smart bidding is due to their own information advantage about the firm's intrinsic value. Thus the auction method works as it is supposed to: the allocation is not subject to underwriter manipulation in an economically significant way.

Our analysis of aftermarket trading reveals two striking patterns. First, IPO institutional bidders, whether or not they received an allocation, rarely buy the stock on the open market. Second, those who receive allocations sell the majority of their shares in the first week after they are allowed to do so. The evidence thus suggests that investors have little incentive for long-run investment in these stocks, which does not encourage them to analyze firm fundamentals.

China's IPO regulations—restrictions on eligibility, long delays before approval is given, and severe underpricing—have made it extremely costly for companies to go public in China. Many companies have responded by going public in Hong Kong, the U.S., or elsewhere. The new STAR market is one step in the right direction for facilitating capital formation. The early evidence is that, if given a choice, firms will choose to be listed on the STAR market rather than the other boards due to the speedy process and the higher offer price valuation. The other boards, to remain relevant, will have to undergo the same reforms. Indeed, in August 2020 ChiNext followed the STAR market and dropped its profitability and P/E ratio requirements. Market forces are leading to an IPO process relying upon disclosure instead of accounting-based criteria, prices determined by the market instead of ad hoc caps, and responsible investors who do their due diligence instead of gamblers earning high returns. The massive oversubscription of underpriced IPOs by rent-seeking investors will end when the rents fall, with issuers benefiting from the reduced cost of raising capital. Although these reforms will make going public in China more attractive for Chinese companies, one other reason for going public in Hong Kong or elsewhere still exists: raising money abroad allows firms to get around restrictions on currency convertibility.

The fast-growing IPO market in China and its unique regulatory environment (and the evolution of these regulations) provide an abundance of opportunities for finance researchers to study interesting and important questions. Will the new registration system succeed in attracting high growth firms and preventing frauds effectively? Will IPO firms under the registration vs. approval systems be of different kinds and do investors understand these difference? Will Chinese companies stop listing abroad? When buying an IPO at the offer price becomes risky, how will institutional and retail investors change their behavior? The answers will not only lend insights to China's further reforms of its capital market, but also provide valuable lessons to other markets in the world.

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Table 1: History of IPO method

This table summarizes the history of how IPOs are priced and allocated. Hiatuses between consecutive periods are due to IPO moratoriums.

Time period	IPO method	Pricing restrictions	Allocation	Investor clientele
1. 10/1992–6/1999	Fixed price offering (FPO)	P/E cap at 20 most of the time	Mainly by lottery	Mostly retail investors
2. 7/1999–9/2001	Either of two methods: (1) FPO; (2) Hybrid of auction and FPO	No price cap	Online FPO: by lottery. Offline Auction: pro rata among bids \geq offer price	FPO: mainly retail investors; Auction: institutional investors, mainly mutual funds
3. 11/2001–9/2004	Either (1) Auction or (2) FPO	P/E cap at 20	Lottery	Both retail and institutional investors
4. 2/2005–6/2005	Hybrid of auction and FPO	No price cap	Online FPO: by lottery. Offline Auction: pro rata among bids \geq offer price	FPO: mainly retail investors; Auction: institutional investors
5. 6/2006–9/2008	Hybrid of auction and FPO	Window guidance of P/E cap, around 30.	Online FPO: by lottery. Offline Auction: pro rata among bids \geq offer price	FPO: mainly retail investors; Auction: institutional investors.
6. 7/2009–11/2012	Hybrid of auction and FPO	No price cap	Online FPO: by lottery. Offline Auction: pro rata among bids \geq offer price ²⁴	FPO: mainly retail investors; Auction: mainly institutional investors
7. 1/2014–2/2014 (48 IPOs)	Hybrid of auction and FPO	No price cap	Online FPO: by lottery. Offline Auction: underwriters have some allocation discretion	FPO: mainly retail investors; Auction: mainly institutional investors
8. 6/2014–present	Either (1) Hybrid of auction and FPO or (2) FPO	Window guidance P/E cap of 23, with the exception of STAR and Shenzhen GEM after August, 2020.	Online FPO: by lottery. Offline Auction: pro rata among bids \geq offer price	FPO: mainly retail investors; Auction: mainly institutional investors

²⁴ For the period of November 2010 – November 2012, IPO auctions on the Shenzhen Stock Exchange allocated shares by lottery among bids at or above the offer price.

Table 2: IPO process since 2009

This table illustrates the key steps and days for an IPO on the Shenzhen Stock Exchange (SZSE). IPOs on the Shanghai Stock Exchange (SSE) go through the same application and approval process. The key difference in the offering process is that before 2014 an IPO auction on SSE consists of two steps: the first auction determines a price range and the second determines the final offer price.

Date	Key Activities
File Day	The issuer files the first preliminary prospectus with China Securities Regulatory Commission (CSRC). This prospectus is disclosed for IPOs after 2013. There can be multiple revisions of the prospectus after this.
Date of First Disclosed Prospectus	The prospectus (the latest version) is disclosed to the public shortly before (typically 1-2 weeks before) the last step of IPO review—when CSRC Public Offering Review Committee holds a review meeting about the issuance.
Date of PORC Meeting	CSRC Public Offering Review Committee holds a review meeting about the issuance, and votes on whether the IPO should be approved. The result is known on the same day.
Date of Approval Grant	Approval is officially granted, normally weeks after the PORC meeting, but the waiting time is at CSRC’s discretion and can vary a lot.
T-6 ²⁵	Offering process starts. The issuer publishes “IPO announcement” and “IPO Bookbuilding [Auction] and Road Show Announcement”. ²⁶ The underwriter submits its analyst’s “Research Report on Investment Value” to the EIPO system on the stock exchange.
T-5 to T-3	IPO auction (offline) bidding and road show
T-2	IPO offer price is determined.
T-1	The issuer publishes “Offering announcement”, in which the auction results are summarized and the offer price is announced.
T	<ul style="list-style-type: none"> • Online fixed-price offering • Online investors transfer full deposits (order quantity times offer price) to China Securities Depository and Clearing Corporation Limited (CSDC). • Offline investors with valid bids transfers full deposits (valid bidding quantities times the offer price) to CSDC.²⁷
T+1	The allocation of the offline tranche is determined.
T+2	The allocation of the offline tranche is announced. Offline investors receive refunds of their deposits for unfilled orders. For IPOs since November 2010, the detailed auction bids are disclosed in the document “the Announcement of Offline Allocation Results”.
T+3	The allocation of online tranche is announced. Online investors receive refunds of deposits for unfilled orders.
About 5-10 business days later	IPO stock starts trading

²⁵ The numbers (of days) in this table (such as T-6, T+1, etc.) all refer to the numbers of business days.

²⁶ Although called bookbuilding in these documents and in the media, Chinese IPOs use a (hybrid) auction method, because underwriters have no allocation discretion.

²⁷ Since 2016, investors (both online and offline) do not need to pay deposits in advance. Instead, those who receive allocations are to pay the full amount on Day T+2.

Table 3: IPOs by year

This table lists by year the number of IPOs and average IPO characteristics. *Aggregate proceeds* are in billions of constant 2018 RMB. All other variables are defined in the appendix. Long-run returns are missing for earlier years because there are not enough matching firms (we require a minimum of 3 nonIPO matching firms), and they are missing for recent years because the required time frame (1 year or 3 years post IPO) has not been reached by the time of the analysis. We use *t*-test for means of long-run returns. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Year	N	SSE	SOE	Aggregate Proceeds (RMB Billion)	Initial Return (%)	BHAR1Y (%)	BHAR3Y (%)
1990	6	1.000	0.333	0.211	273.7	.	.
1991	4	0.000	0.750	0.019	718.3	.	.
1992	43	0.465	0.721	2.542	351.3	.	.
1993	117	0.538	0.769	15.988	351.2	.	.
1994	107	0.589	0.879	15.299	129.7	.	.
1995	19	0.421	0.632	3.416	122.5	-28.4	-133.3
1996	175	0.480	0.857	23.789	111.9	7.7	-45.9***
1997	202	0.401	0.906	64.637	152.4	0.7	-9.3
1998	99	0.505	0.909	41.058	126.8	1.8	5.6
1999	97	0.464	0.938	49.420	112.8	-2.4	-0.0
2000	141	0.617	0.929	83.703	147.3	7.7***	1.2
2001	77	0.987	1.000	61.403	137.9	0.5	-5.3*
2002	70	0.986	0.957	49.875	131.4	-1.8	9.6**
2003	67	1.000	0.687	47.242	72.0	4.0	20.6**
2004	100	0.610	0.530	36.105	70.1	2.4	24.3
2005	15	0.200	0.467	5.763	45.1	0.8	-54.2
2006	66	0.224	0.463	134.170	82.4	-85.0***	-69.9***
2007	125	0.192	0.328	477.083	191.2	-23.0***	-2.1***
2008	77	0.078	0.247	103.438	114.9	-5.1	0.9
2009	99	0.091	0.182	187.898	74.1	-12.2**	-22.4***
2010	347	0.075	0.130	491.064	41.4	-19.6***	-13.8***
2011	282	0.138	0.064	282.443	21.1	-0.7***	25.2***
2012	155	0.168	0.103	103.432	26.5	1.1	59.8***
2013	0			0.000			
2014	125	0.344	0.104	66.889	162.2	-5.3	-8.8
2015	219	0.406	0.096	157.639	385.7	13.8***	9.7**
2016	227	0.454	0.106	149.608	423.5	-20.7***	.
2017	436	0.491	0.069	230.109	266.1	-0.3	.
2018	102	0.544	0.000	202.302	200.9	.	.
Total	3,600	0.398	0.390	3,086.545	169.8	-6.0***	-0.9

Table 4: Initial return and long-run returns by regulatory period

This table reports the mean and median (in brackets) of initial returns and post-IPO long-run abnormal returns, measured from the first unrestricted closing price, for each period listed in Table 1. The superscript “R” refers to restricted periods. *Money left on the table* for each IPO is calculated as IPO proceeds times the initial return. We report the aggregate money left on the time for each period. All other variables are defined in the appendix. For the period of 6/2014–12/2018, *BHAR3Y* is computed for 241 IPOs that have had three years of return data, and *BHAR1Y* is computed for 926 IPOs that have had one year of data, as of the day of analysis. For long-run returns, we use *t*-test for means. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively, assuming independence.

Time period	N	Initial return	Money left on the table (MM)	BHAR1Y	BHAR3Y
10/1992–6/1999 ^R	778	169.4% [118.8%]	206,508.2	2.1%	-16.9%***
7/1999–9/2001	260	138.4% [131.0%]	170,425.1	4.5%**	-0.4%
11/2001–9/2004 ^R	245	90.4% [81.7%]	87,031.5	1.6%	18.3%
2/2005–6/2005	15	45.1% [46.4%]	3,179.7	3.83%	-54.2%
6/2006–9/2008 ^R	269	142.2% [106.3%]	554,066.3	-33.3%***	-26.9%***
7/2009–11/2012	883	36.0% [26.4%]	275,966.7	-11.2%***	10.5%***
1/2014–2/2014	48	72.7% [58.4%]	11,866.9	17.5%	13.4%
6/2014–12/2018 ^R	1,061	314.7% [241.0%]	1,580,369.0	-3.6%***	-0.4%
Restricted Periods	2,367	222.5% [155.1%]	2,431,154.0	-5.5%***	-9.5%**
Unrestricted Periods	1,192	59.8% [36.7%]	458,258.8	-6.6%***	8.3%***
Full sample	3,559	168.0% [110.9%]	2,889,413.0	-6.0%***	-0.9%

Table 5: Determinants of initial returns: Full sample (10/1992-2018)

The dependent variable in each column is the percentage *initial return*. Columns (1)-(3) use the full sample of IPOs during 10/1990 (when CSRC was formed) –12/2018, Columns (4)-(5) include IPOs in the restricted periods where regulatory caps on the offer price are in place, and Columns (4)-(5) include IPOs in the unrestricted periods. All variables are defined in the appendix. In Panel B, we replace $\log(\text{subscription})$ in Panel A regressions with $PE_{\text{market}}/PE_{\text{IPO}}$, which is the ratio of the market median P/E relative to the IPO firm's P/E. The IPO firm's P/E ratio is based on its offer price and last annual earnings. The market median P/E is the median value of all publicly traded firms' P/E ratios which are based on their closing prices on the current IPO's first trading day and their last annual earnings prior to the current IPO. *t*-statistics based on standard errors clustered by industry and year are in parentheses. ***, **, and * denote significance at the 1% 5%, and 10% level, respectively.

Panel A

VARIABLES	Full Sample			Restricted periods		Unrestricted periods	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Restricted	68.31*** (3.36)	41.88** (2.27)	44.79*** (2.66)				
Log(subscription)		31.30*** (10.46)	16.14*** (4.87)	33.20*** (7.40)	13.33*** (2.74)	26.87*** (8.73)	23.39*** (6.90)
Mktret_pr3mon			1.39*** (7.10)		1.52*** (5.59)		0.36** (2.48)
Log(assets)			-25.47*** (-7.77)		-39.28*** (-8.60)		-6.35*** (-2.88)
Log(firm age)			-2.36 (-1.49)		-4.04** (-1.99)		1.86 (0.82)
ROA			-3.68*** (-6.62)		-5.21*** (-6.10)		-0.62*** (-3.02)
SOE dummy			25.65** (2.35)		27.77* (1.80)		15.15*** (3.14)
SSE dummy			-19.57*** (-2.88)		-28.45*** (-3.45)		15.53*** (3.00)
Tech dummy			2.82 (0.19)		5.23 (0.22)		4.35 (0.78)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	3559	3260	3245	2076	2067	1184	1178
Adjusted R-squared	0.380	0.457	0.484	0.347	0.391	0.524	0.534

Panel B: replacing $\log(\text{subscription})$ with $\text{PE}_{\text{market}}/\text{PE}_{\text{IPO}}$

VARIABLES	Full Sample			Restricted periods		Unrestricted periods	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Restricted	68.31*** (3.36)	53.65*** (2.84)	45.72*** (2.68)				
$\text{PE}_{\text{market}}/\text{PE}_{\text{IPO}}$		3.52** (2.22)	3.29** (2.08)	2.63 (1.49)	2.21 (1.26)	5.80*** (3.15)	7.81*** (4.12)
Mktret_pr3mon			1.25*** (6.44)		1.38*** (5.22)		0.56*** (3.68)
Log(assets)			-30.65*** (-9.97)		-42.12*** (-9.95)		-17.23*** (-8.13)
Log(firm age)			-1.71 (-1.08)		-3.06 (-1.51)		3.53 (1.51)
ROA			-4.06*** (-7.69)		-5.25*** (-6.32)		-1.65*** (-6.50)
SOE dummy			27.13** (2.25)		25.98 (1.50)		23.42*** (4.48)
SSE dummy			-20.52*** (-2.99)		-27.95*** (-3.38)		11.83** (2.09)
Tech dummy			-2.70 (-0.18)		-5.47 (-0.23)		4.30 (0.73)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	3559	3290	3220	2133	2067	1157	1153
Adjusted R-squared	0.380	0.442	0.480	0.334	0.384	0.464	0.512

Table 6: Determinants of initial returns: Unrestricted period of 2009-2012

The dependent variable in each column is the percentage *initial return*. All variables are defined in the appendix. *t*-statistics based on standard errors clustered by industry and year are in parentheses. ***, **, and * denote significance at the 1% 5%, and 10% level, respectively.

VARIABLES	(1)	(2)	(3)	(4)	(5)
Log(subscription)	18.84*** (5.95)			15.85*** (8.27)	14.23*** (6.59)
Log(insti subscription)		13.56*** (2.77)		10.57* (1.77)	10.24 (1.59)
Price revision			-0.10 (-0.69)	-0.41** (-2.01)	-0.47** (-2.25)
High UW repu					-4.01 (-1.64)
Mktret_pr3mon					0.32*** (2.67)
Log(assets)					-2.95 (-1.12)
Log(firm age)					5.05** (2.27)
ROA					-0.42** (-2.30)
SOE dummy					16.40*** (3.24)
SSE dummy					13.05* (1.92)
Tech dummy					7.72 (1.36)
Year FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Obs	881	881	850	850	850
Adjusted R-squared	0.234	0.193	0.140	0.269	0.291

Table 7: Bid and Allocation by Investor Type

This table uses a subsample of 850 IPOs during 2009-2012. It reports the means of various demand and allocation variables for all investors and each of the seven investor types respectively. *Bid dummy* is equal to one if at least one member of a type bids in an IPO auction. *Bid quant* is the total RMB demand (based on their bid price) of a type in an IPO auction. *Subscription ratio* is the aggregate demand of a type of investors relative to the supply of an IPO auction. *#investors* is the number of investors of a certain type in an IPO auction. *%all investors* is the percentage of all investors in an IPO auction that belong to a certain type. *Allocation dummy* is equal to one if at least one member of a type receives allocations in an IPO auction. *Allocation quant* is the total RMB allocation (shares allocated times offer price) of a type in an IPO auction. *Allocation/supply* is the aggregate allocation received by a type of relative to the supply of an IPO auction. *#investors w allocation* is the number of investors of a certain type that receive an allocation. *%investors w allocation* is the number of investors of a certain type who receive an allocation, divided by the total number of investors who receive an allocation. *Allocation/demand* is the total allocation received by an investor type, relative to its total demand. A variable starting with “typical” refers to the median value of the variable across an investor type in an IPO auction, and the table reports the mean values of the median across IPOs. For each IPO auction, *Typical bid quant* is the median RMB demand among investors of a certain type. *Typical subscription ratio* is the median subscription ratio among investors of a certain type. *Typical allocation quant* is the median RMB allocation among investors of a certain type. *Typical allocation/supply* is the median ratio of allocation relative to supply of the auction tranche among investors of a certain type. *Typical allocation/demand* is the median ratio of allocation relative to demand among investors of a certain type. *Recommend* is mainly wealthy individuals recommended by underwriters. *QFII* is Qualified Foreign Institutional Investors.

	Mutual fund	Securities firm	Insurer	Trust	Finance co.	Recommend	QFII	All investors
<u>All IPO auctions (variable=0 if no bids)</u>								
N	850	850	850	850	850	850	850	850
<u>Bid size</u>								
Bid dummy	1.00	1.00	0.69	0.97	0.98	0.54	0.33	1.00
Bid quant (RMB MM)	6,780.00	4,498.00	2,977.00	1,421.00	876.70	164.90	53.43	16,771.03
Subscription ratio	41.12	28.01	17.06	8.69	5.13	1.06	0.33	101.40
#investors	67.13	42.48	23.93	13.13	7.07	2.89	0.47	157.10
%all investors	43.03%	28.73%	11.82%	8.27%	4.65%	3.26%	0.23%	100%
<u>Allocation size</u>								
Allocation dummy	0.95	0.94	0.50	0.69	0.62	0.20	0.18	1.00
Allocation quant (RMB MM)	83.80	54.43	23.65	17.41	11.12	5.02	0.42	195.85
Allocation/supply	42.36%	28.99%	9.67%	10.12%	5.79%	2.71%	0.23%	100%
#investors w allocation	26.06	15.18	8.56	5.77	2.83	0.34	0.23	58.97
%investors w allocation	43.41%	28.68%	9.42%	10.09%	5.34%	2.77%	0.24%	n.a.

When a type of investors participate (variable =missing if no bids)

N	850	850	583	827	832	460	280	850
<u>Bid size</u>								
typical bid quant (RMB MM)	93.93	105.00	146.90	116.50	116.80	55.38	116.90	100.88
typical subscription ratio	66.80%	74.72%	84.09%	75.34%	76.74%	42.84%	70.31%	72.81%
<u>Allocation size</u>								
Allocation/demand	2.45%	2.33%	1.65%	2.51%	2.83%	3.59%	1.11%	2.31%
typical allocation quant (RMB MM)	0.37	0.40	1.60	1.66	1.52	1.13	1.08	0.28
typical allocation/supply	0.16%	0.21%	0.64%	0.90%	0.94%	0.60%	0.56%	0.15%
Typical allocation/demand	0.56%	0.53%	1.02%	1.55%	2.04%	1.65%	1.11%	0.48%

Table 8: Bid distributions: Mutual Funds vs. Other Investors

This table uses a subsample of 850 IPOs during 2009-2012. It reports the probabilities of bids in different price ranges for mutual funds and other investors. Price bins are based on bid price relative to the offer price. We report the average proportion of bids in each price bin across IPOs. Columns (1) and (2) use the overall analysis sample. In Columns (3)-(6) we divide the sample into above- and below-median initial returns. In Columns (7)-(10) we divide the sample into above- and below-median BHAR1Y (i.e., one-year buy-and-hold abnormal return). ***, **, and * denote that the difference between mutual funds and other investors are significant at the 1% 5%, and 10% level, respectively.

Price bins	Overall		Above-median IR		Below-median IR		Above-median BHAR1Y		Below-median BHAR1Y	
	Mutual funds (1)	Others (2)	Mutual funds (3)	Others (4)	Mutual funds (5)	Others (6)	Mutual funds (7)	Others (8)	Mutual funds (9)	Others (10)
<0.75	0.0939	0.1177***	0.0769	0.0988***	0.1108	0.1366***	0.0928	0.1152***	0.0949	0.1202***
[0.75, 0.8)	0.0617	0.0632	0.0552	0.0538	0.0683	0.0727	0.0608	0.0639	0.0627	0.0625
[0.8, 0.85)	0.0877	0.0860	0.0782	0.0807	0.0973	0.0913	0.0904	0.0860	0.0850	0.0860
[0.85, 0.9)	0.0982	0.1005	0.0909	0.0901	0.1055	0.1109	0.0936	0.1000	0.1028	0.1009
[0.9, 0.95)	0.1273	0.1206	0.1229	0.1169	0.1317	0.1244	0.1278	0.1254	0.1268	0.1159*
[0.95, 1)	0.0930	0.0960	0.0911	0.0953	0.0954	0.0975	0.0908	0.0997*	0.0957	0.0932
[1, 1.05)	0.1820	0.1690***	0.1909	0.1769**	0.1739	0.1604*	0.1916	0.1716**	0.1732	0.1657
[1.05, 1.1)	0.0926	0.0885	0.0985	0.0986	0.0867	0.0783*	0.0921	0.0897	0.0931	0.0872
[1.1, 1.15)	0.0664	0.0609*	0.0766	0.0697	0.0563	0.0521	0.0635	0.0571	0.0693	0.0648
≥1.15	0.0965	0.0975	0.1188	0.1192	0.0742	0.0757	0.0966	0.0914	0.0965	0.1035
≥1	0.2555	0.2469***	0.4847	0.4644***	0.3911	0.3665**	0.4438	0.4098***	0.4321	0.4212

Table 9: Mutual fund allocation and aftermarket performance

This table uses a subsample of 850 IPOs during 2009-2012. The dependent variables in each column are percentage *initial return* and various measures of long-run returns. *Allocation/supply* is the aggregate allocation to mutual funds relative to the supply of an IPO auction tranche (in decimal). All other variables are defined in the appendix. *t*-statistics based on standard errors clustered by industry and year are in parentheses. ***, **, and * denote significance at the 1% 5%, and 10% level, respectively.

VARIABLES	Initial Return (1)	BHAR3m (2)	BHAR6m (3)	BHAR1Y (4)	BHAR2Y (5)	BHAR3Y (6)
Allocation/supply	8.16 (1.07)	14.84*** (4.71)	14.20*** (3.58)	15.18** (2.55)	24.81* (1.86)	24.64 (1.44)
Log(subscription)	14.47*** (6.78)	-6.82*** (-7.39)	-8.29*** (-7.26)	-7.61*** (-4.36)	-11.37** (-2.53)	-12.13** (-2.21)
Log(insti subscription)	10.14 (1.55)	4.93*** (4.75)	5.22*** (3.85)	6.19*** (3.40)	7.11** (2.19)	3.54 (0.75)
Price revision	-0.49** (-2.45)	-0.03 (-0.54)	-0.10 (-1.54)	-0.03 (-0.33)	-0.20* (-1.76)	-0.38 (-1.50)
High UW repu	-3.79 (-1.59)	-1.17 (-0.73)	1.30 (0.70)	3.25 (1.25)	4.65 (1.18)	-1.97 (-0.26)
Mktret_pr3mon	0.31** (2.57)	0.18** (2.12)	-0.19** (-2.21)	0.30** (2.48)	0.05 (0.29)	0.06 (0.19)
Log(assets)	-2.86 (-1.11)	0.17 (0.14)	0.19 (0.13)	-0.31 (-0.16)	-2.35 (-0.71)	-10.73*** (-2.79)
Log(firm age)	4.97** (2.21)	-1.26 (-1.16)	-1.36 (-1.02)	-0.06 (-0.03)	1.48 (0.62)	3.30 (0.86)
ROA	-0.44** (-2.38)	-0.11 (-0.96)	-0.23 (-1.37)	0.06 (0.24)	-0.47 (-0.97)	-0.59 (-0.80)
SOE dummy	16.17*** (3.21)	0.79 (0.33)	-2.11 (-0.80)	2.11 (0.48)	4.13 (0.53)	7.98 (0.53)
SSE dummy	12.53* (1.89)	-9.82*** (-3.17)	-13.19*** (-3.62)	-12.52** (-2.50)	-14.91 (-1.56)	-24.87 (-1.57)
Tech dummy	8.30 (1.48)	-4.02 (-0.86)	-0.78 (-0.13)	3.56 (0.40)	0.28 (0.02)	-2.82 (-0.13)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs	850	850	850	850	850	850
Adjusted R-squared	0.292	0.113	0.119	0.0902	0.101	0.112

Table 10: Aftermarket trading and IPO investors' flipping rate

The sample includes 783 IPOs on the Shenzhen Stock Exchange during 2009-2012. Panel A reports the *daily average* of trading variables in four periods post IPO: D1 is the first trading day, W1mD1 is the first week minus the first trading day, M3mW1 is the first three months minus the first week, M4-6 is months 4-6 post IPO. *Trade vol* is the trading volume in millions of RMB. *Turnover* is the number of shares traded relative to the float, where float is the number of shares that are free to trade. *Insti buy (sale)* is the number of shares bought (sold) by institutional investors relative to the float. *Retail buy (sale)* is the number of shares bought (sold) by retail investors relative to the float. *Insti (retail) netbuy* is the institutional (retail) netbuy (buy minus sale) relative to the float.

Panels B and C report the average flipping rate of IPO investors in the auction tranche. *Flip rate* is the total number of shares sold by investors from the auction tranche divided by the number of shares offered in the auction. We look at the flipping rate in three periods *after the lockup period*: D1 (the first trading day), W1mD1 (the first week minus the first trading day), and M3mW1 (the first three months minus the first week). Panel B reports the flipping rate by policy state. During 2009-10/2010, allocation is determined on a pro rata basis among valid bids (i.e., bids at or above the offer price) in the auction tranche, and the shares received from the auction tranche are subject to a 3-month lockup period. During 11/2010-5/2012, allocation is determined by a lottery among valid bids, and the shares received from the auction tranche are also subject to a 3-month lockup period. During 6/2012-12/2012, allocation is determined by a lottery among valid bids, and the shares received from the auction tranche are not subject to lockup period. *Initial return* is the first trading day closing price relative to the offer price, minus one. Panel C reports the flipping rate by the IPO's initial return tercile. For 1/2009 to 5/2012, the float is the retail tranche shares until 3 months, and then it is the retail plus institutional tranche shares in months 4-6. For 6/2012 to 12/2012, the float is the IPO shares in both tranches for all of the first six months.

Panel A: daily average trading of the IPO stock

Variables	D1	W1mD1	M3mW1	M4-6
trade vol (RMB mil)	582.61	221.06	75.73	63.4
turnover (%float)	70.75%	28.00%	10.07%	7.30%
insti buy (%float)	2.77%	1.06%	0.43%	0.36%
insti sale (%float)	5.46%	0.64%	0.29%	0.54%
retail buy (%float)	67.98%	26.82%	8.35%	5.08%
retail sale (%float)	65.29%	27.25%	8.49%	4.91%
insti netbuy (%float)	-2.69%	0.43%	0.14%	-0.18%
retail netbuy (%float)	2.69%	-0.43%	-0.14%	0.18%

Panel B: Flipping rate by policy stage

	2009-2012	Pro rata allocation (2009-10/2010)	Lottery allocation (11/2010-5/2012)	Lottery, No lockup (6/2012- 12/2012)
# of IPOs	783	373	345	65
initial return	36.84%	50.24%	24.49%	25.51%
Flip rate on D1 after lockup	35.38%	45.77%	19.90%	57.89%
Flip rate in W1mD1 after lockup	19.70%	19.86%	20.73%	13.36%
Flip rate in M3mW1 after lockup	33.11%	27.16%	42.34%	18.32%

Panel C: Flipping rate by initial returns

	Initial return		
	Tercile 1 (low)	Tercile 2	Tercile 3 (high)
# of IPOs	261	261	261
initial return	1.18%	27.16%	82.18%
Aggregate flip rate on D1 after lockup	23.92%	34.36%	45.28%
Aggregate flip rate in W1mD1 after lockup	17.09%	17.71%	17.55%
Aggregate flip rate in M3mW1 after lockup	38.31%	34.45%	25.17%

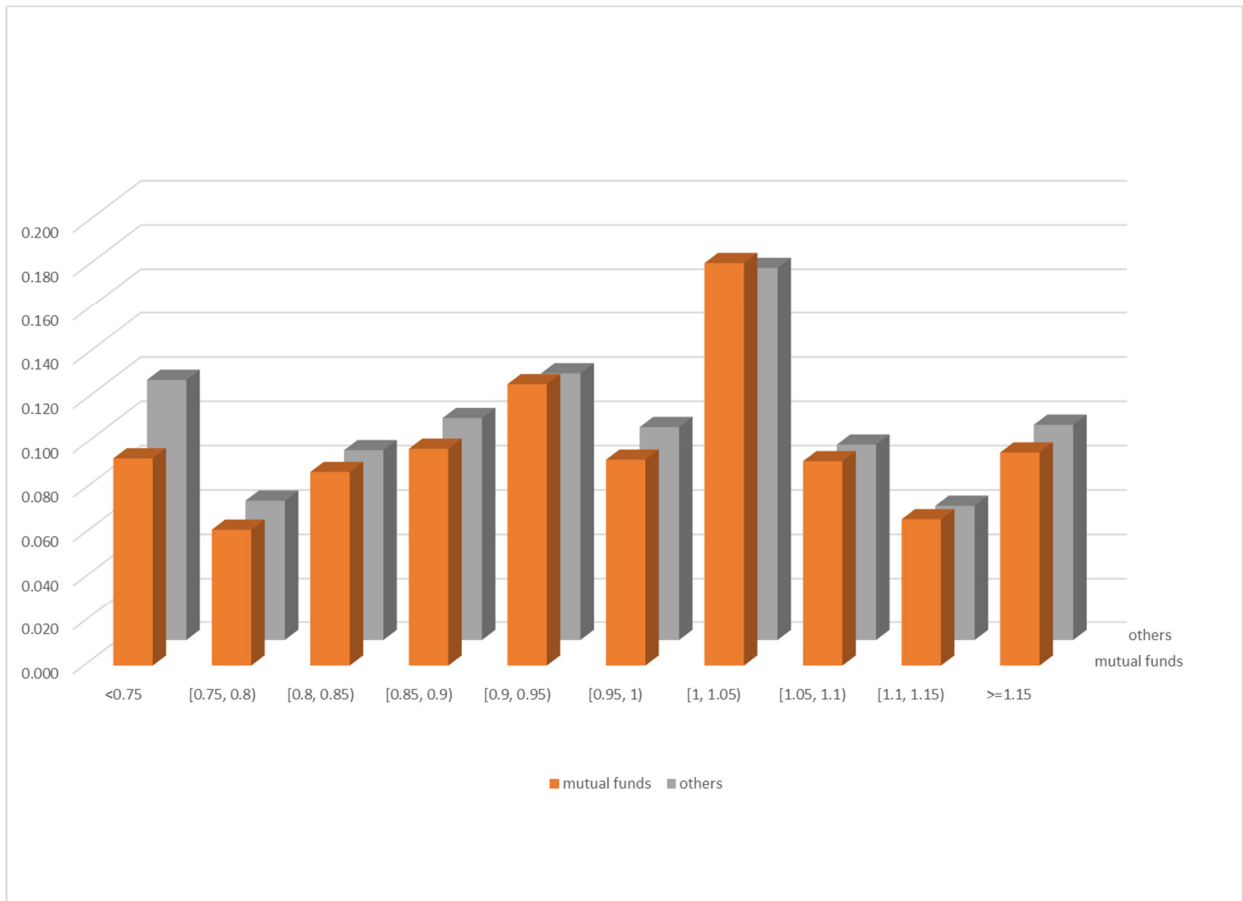
Table 11: STAR Market vs. Other IPOs

This table reports descriptive statistics for four groups of IPOs during 2019-2020: IPOs on the STAR Market, those on the Shanghai Stock Exchange (SSE) main board, those on the GEM board of the Shenzhen Stock Exchange before August 24, 2020 (GEM-old), and those listed on GEM since (GEM-new). STAR and GEM-new IPOs are under the new registration system and not subject to the pricing restriction. Mean values of variables are reported. *Market Cap_{OP}* is the shares outstanding post issuance times offer price. *Market Cap_{1st day}* is the shares outstanding post issuance times the first trading day closing price for STAR IPOs (and first non-hit day closing price for nonSTAR IPOs). *Proceeds* is the proceeds raised in the IPO, i.e., shares offered in the IPO times offer price. *Leverage* is total liabilities relative to assets. All other variables are defined in the appendix. ***, **, and * denote significance of *t*-tests at the 1% 5%, and 10% level, respectively, assuming independence.

	STAR	SSE	GEM-new	GEM-old	Diff	Diff
	(1)	(2)	(3)	(4)	(1)-(2)	(3)-(4)
N	215	143	63	96	143	63
Assets (MM)	2,360	97,500	3,708	1,083	-95,140*	2,625
Market Cap _{OP} (MM)	7,485	13,800	6,433	2,687	-6,315*	3,746**
Market Cap _{1st Day} (MM)	18,600	24,300	16,500	8,538	-5,700	7,962*
Proceeds (MM)	1,419	1,610	1,048	556	-191	492***
Firm age	14.26	17.17	16.75	14.99	-2.91***	1.75**
Tech dummy	0.67	0.21	0.41	0.47	0.46***	-0.06
Leverage	0.33	0.42	0.36	0.35	-0.09***	0.01
ROA, %	10	12	14	14	-2	0
SOE dummy	0.10	0.18	0.05	0.09	-0.08**	-0.05
Subscription	2,545	2,691	6,025	4,229	-146	1,796***
Insti Subscription	2,115	8,002	3,308	9,139	-5,887***	-5,831***
P/E	67.38	21.89	35.34	21.74	45.50***	13.60***
Initial return, %	160	171	237	228	-11	9

Figure 1: Bid distributions: Mutual funds vs. other investors in the auction tranche

This table uses a subsample of 850 IPOs during 2009-2012. The X-axis represents ranges of bid price relative to the offer price. The price bin of, for example, [0.95, 1) includes bids of 95% to 99.999% of the offer price. The Y-axis is the average proportion of bids in each price bin across IPOs. The numbers shown in this figure are reported in Table 8.



Appendix: Variable Definitions

Assets: Asset value prior to the IPO (in millions), deflated to constant 2018 RMB. The RMB/U.S. Dollar exchange rate as of December 2018 is \$1=RMB 6.88. $\text{Log}(\text{Assets})$ is the natural logarithm of *Assets*.

Firm age: The number of days between the beginning of the IPO auction and the firm's founding date, divided by 365. $\text{Log}(\text{firm age})$ is the natural logarithm of *firm age*.

Industry: Industry classification based on the WIND 4-digit industry codes (an industry code has 8 digits in total), which classifies firms into 24 industries.

Proceeds: Number of shares issued multiplied by the offer price. There are generally no overallotment option shares.

Initial return (Underpricing)(%): The first trading day closing price relative to the offer price, minus one, measured as a percentage. For the post-2013 sample period, IPO stocks (with the exception of STAR Market IPOs) are subject to a return limit of $\pm 44\%$ on the first trading day, and the general 10% daily limit after that (this applies to all stocks). Hence, we define the initial return for these IPOs as the percentage difference between the offer price and the closing price on the first day on which the regulatory return limit is not reached. STAR Market IPOs are not subject to any return limit in the first 5 trading days.

Insti subscription: Demand divided by supply of shares in the offline auction tranche. $\text{Log}(\text{insti subscription})$ is the natural logarithm of *insti subscription*.

ROA (%): The annual net income divided by assets in the year prior to the IPO, measured as a percentage. Two ROAs in the CSMAR database have been corrected after inspection of the prospectuses: 3468.7% has been changed to 3.4687% for firm code 600874 from 1995 and 113.234% has been changed to 11.3234% for firm code 000426 from 1996.

SOE dummy: A dummy equal to one if the firm is a state-owned enterprise (SOE) and zero otherwise. A firm is a state-owned enterprise if its ultimate controlling shareholder (disclosed in the prospectus) is a SOE.

SSE dummy: A dummy equal to one if the firm is listed on the Shanghai Stock Exchange.

Tech dummy: A dummy equal to one if the firm is in a high-tech industry, similarly defined as Loughran and Ritter (2004). That is, the dummy is equal to one if the firm is in one of the following industries: computer hardware (WIND industry codes 452020), electronics (industry codes 453010), navigation equipment (452030), measuring and controlling devices (201040), medical instruments (351010), telephone equipment (452010), communications services (501010 and 501020) and software (451010, 451020, 451030).

BHAR3M, BHAR1Y, BHAR2Y, BHAR3Y (%): The style-adjusted buy-and-hold abnormal return of the stock during the 60, 240, 480, and 720 trading days after IPO, relative to the first trading day closing price, using the average buy-and-hold return during the same period of a portfolio of matching firms as the benchmark. For each IPO stock, we select as matching firms those that have been publicly traded for at least three years and are in the same size and market-to-book (M/B) quintiles as the sample firm. Size is measured as the post-issue market cap on the IPO day based on the closing price. M/B for the IPO firm is its post-issue market value of equity on the IPO day relative to book value of equity post-issuance (i.e., book value of equity before issuance plus the IPO proceeds). M/B for a matching firm is its market value of equity on the IPO day relative to the book value of equity at the end of the last fiscal year prior to the IPO day. We require a minimum of 3 matching firms for each IPO. If an IPO is delisted before 3 years, the buy-and-hold return is ended on the delisting date.

High UW repu: A dummy equal to one if Securities Association of China (SAC) assigns a rating of 10 or 11 to the underwriter in the IPO year, and zero otherwise. SAC evaluates investment banks each year for their risk management quality, competitiveness in the industry, and regulatory compliance. Ratings range from 1 (worst) to 11 (best).

Mktret_pr3mon (%): The percentage return on the Shenzhen Stock Exchange Index during the 60 trading days before the IPO.

P/E: We obtain the so-called diluted P/E from WIND. It is offer price relative to earnings per share, which in turn is the last annual earnings divided by post-issue shares outstanding. This is the P/E ratio that the regulatory cap is based on.

Price revision (%): Offer price divided by the midpoint of the price range suggested by the underwriter, minus one, measured as a percentage.

Restricted: a dummy equal to one if the IPO is issued in a restricted period (i.e., there is a regulatory price cap on the offer price) and zero otherwise.

Subscription: Demand divided by supply of shares in the online FPO tranche. $\text{Log}(\text{subscription})$ is the natural logarithm of *subscription*.

Underpricing(%): Measured as *Initial return*.

Internet Appendix A: More Information on China IPO Regulations

A.1. More details on the history of the IPO method

In the last three decades, China has used two IPO selling methods—fixed-price offerings (FPO) and auctions, and a hybrid of the two (an auction tranche for institutional investors plus an FPO tranche for retail investors). Even though the media and the official documents often refer to the auction method as bookbuilding (or price inquiry), it is a misnomer because underwriters have no allocation discretion.²⁸ Under both selling methods, Chinese regulators often impose offer price limits, either explicit or implicit, and thus the price discovery benefit of an auction has been limited.

China is not the only country that uses bookbuilding in name, but deviates in practice. In India, since 2005 underwriters also do not have allocation discretion, and thus in practice auctions (without price constraints) are used (Jagannathan, Jirnyi, and Sherman, 2015). In Japan, the offer price is never set above the maximum of the file price range, and 90% of IPOs are priced at the maximum, so effectively a fixed price system is used (Kaneko, 2019).

In a fixed-price offering, the offer price is announced before investors submit orders. The underwriters and the issuing company decide on the offer price and make sure it complies with regulations, either explicit or implicit. Shares can be allocated either on a pro rata basis or by lottery (mostly by lottery in China) if there is excess demand. In this case, the underwriter theoretically has pricing power, but no allocation discretion. In practice, CSRC limits on the offer price, when imposed, have eliminated the underwriter's pricing power most of the time.

In an IPO auction, the offer price is set after observing the bids. Before an auction, a reservation price is set or a price range is suggested. Investors submit orders as combinations of price and

²⁸ The only exception is that during the short period of January–February 2014, underwriters were given limited allocation discretion.

quantity. The rule of the auction can be flexibly designed. In a uniform price auction, all winning investors pay the same offer price, which can be set either at or below the market clearing price (the highest price that sells all the shares). A uniform price auction in which the offer price is set below the market clearing price is also known as a dirty Dutch auction—that is the method China has used. Under this method, allocation among bids above the offer price is determined either on a pro rata basis or by lottery. In a discriminatory price auction, an investor receives her demanded shares if she bids at or above the clearing price, but every investor pays what she bids. In general, underwriters have little power when auctions are used. With the auction method China uses, the underwriter has some flexibility with the offer price, but no discretion with the allocation of the shares.

In contrast, underwriters have the most power—both pricing and allocating power—in the bookbuilding method that is widely used in the U.S., Europe, and elsewhere. Under this method, underwriters solicit indications of interest (i.e., nonbinding orders) from investors. They determine the final offer price (in negotiation with the issuer) after observing the order information, and they decide to whom to allocate the shares and how much. Jagannathan, Jirnyi and Sherman (2015) document that there is a global convergence toward the bookbuilding method: when there is no regulatory restriction, the bookbuilding method is often chosen. A debate exists, however, about what causes this convergence, whether it is because of its efficiency or due to underwriters' self interest.²⁹

We divide the history since the formation of the CSRC (October 1992) into several subperiods (see Table 1). As in many markets, the FPO method was first used (during the first period of

²⁹ Liu and Ritter (2011) provide an explanation for why underwriters want to excessively underprice when there is bookbuilding, and why reputation effects do not eliminate excessive underpricing. Chang, Chiang, Qian and Ritter (2017) and Chiang, Lowry and Qian (2019) provide evidence that cast doubt on the benefits of bookbuilding.

October 1992 – June 1999), probably due to its simplicity. In all but the first period, either FPO or auctions (or a hybrid of the two) are used. As is true in other markets, an FPO is usually open to all investors and therefore is dominated by retail investors. An IPO auction, on the other hand, is mainly open to institutional investors, because it requires certain investor sophistication to submit orders with price. When a hybrid of the two is used, there are two tranches: an offline auction tranche catering to institutional investors and an online FPO tranche catering to retail investors. Towards the end of our sample period, wealthy individual investors were permitted to participate in the offline tranche. An offer price is determined after the auction, and investors from both tranches pay the same offer price.

The form of the selling method thus appears pretty similar across different periods. The main difference lies with whether there are regulatory restrictions on the pricing of the IPO shares. On this important dimension, we clearly see the back-and-forth of the regulatory attitude toward the IPO market: there were multiple attempts to relax restrictions on IPO pricing, but every attempt was reversed shortly thereafter (the longest “free” period was July 2009 – November 2012),

During the first period (October 1992 – June 1999), regulators adopted the FPO method. The offer price was controlled so that the P/E ratio was capped around 15–20. The details of the FPO method varied over time. For example, the definition of P/E varied in terms of what earnings per share (EPS) to use (the benchmark period for earnings, the scope of earnings, and the shares to include, can all be different in different times). In addition, the subscription eligibility/rights can depend on different things. In earlier years, investors need to purchase or obtain by lottery subscription warrants to be able to participate in an IPO. In later years of the first period, the number of shares an investor can demand depends on factors such as the amount of bank deposits one has or the value of her security holdings. Ma and Faff (2007) discuss in more detail the various

types of FPOs during this period. In 1994, the Company Law was issued. This law clarifies information disclosure standards for listing firms.

In July 1999 (the beginning of the second period), the first Securities Law became effective, in which it is clearly stated that the IPO offer price is negotiated between the issuing company and the underwriters. It is generally believed that the law lifted regulatory restrictions on IPO pricing. Our data, however, show that most IPOs between July 1999 and April 2000 still have P/E ratios no higher than 20, indicating that the CSRC was not approving IPOs with a higher offer price P/E ratio. And many firms stated in their prospectuses that the offer price was determined by multiplying a P/E ratio close to 20 with their earnings but offered little explanation on how the P/E ratio was determined. Starting from mid 2000, the ratio seemed to break free from that cap.

The Securities Law also stipulates that firms should offer no less than 25% shares in the IPO (relative to post-issue shares outstanding) unless they will have at least 400 million shares after issuance, in which case they should offer no less than 10% shares. This regulation results in most companies issuing exactly 25% shares in their IPOs.

In November 2001 (the beginning of the third period), an upper limit was explicitly reinstated on the offer price, with a new concern about an overheated IPO market. The auction method was used until June 2002. Due to the strict P/E cap, however, bid prices are not very informative. Most investors simply bid at a price that sets the P/E at or higher than 20 in order to be eligible for allocation, rather than bid at their true valuations. For that reason, the auction method was replaced by FPO in the second part of the period.

In February 2005 (the beginning of the fourth period), the CSRC issued “Notice on Several Issues on the Trial Implementation of the Price Inquiry System for Initial Public Offering of

Stocks”.³⁰ This document clarified and unified many issues about the IPO method to use, and thus laid out the playbook for IPOs in the next 10-15 years. It specified that all IPOs would use a combination of an offline auction tranche and an online FPO tranche. It also specified that six types of qualified institutions could participate in the auction tranche: mutual funds, securities firms, insurance companies, trust companies, financial companies, and Qualified Foreign Institutional Investors (QFIIs). Another group of investors were added starting from October 2010: investors recommended by the underwriter.³¹

The 2005 Notice is the first time a major official document used the term “price inquiry” (before the auction method was often referred as the method for “institutional allocations”) which led to the common misconception that this is similar to the US bookbuilding method. But it is not the bookbuilding method because underwriters have no allocation discretion. The price restriction was removed in this period.

This fourth period lasted for less than six months, and the authorities suspended IPOs to focus on the split-share structure reform. The majority of publicly listed firms at that time were SOEs and had a split share structure, consisting of nontradable shares held by the state and tradable shares held by institutional and retail investors. In the period of 2005-2007, the reform converted all nontradable shares to tradable shares. The conversion required the two types of shareholders to negotiate and implement a compensation plan whereby holders of nontradable shares pay the other

³⁰ There were several months of IPO suspension between the third and the fourth periods. The Chinese market has suspended IPO activities nine times (see Cong, Howell, and Zhang, 2017 for a list of these moratoriums). Most of the time it is due to poor market conditions, and sometimes it is related to market reforms or regulation changes. In this case, the CSRC suspended all IPOs in preparing for the new IPO method.

³¹ To qualify, the six types of investors must meet certain criteria set by the CSRC, including varying criteria on size, investment type, and activeness for different types of investors. From October 2010, underwriters can recommend and include some otherwise unqualified institutional investors such as corporations. From May 2012, underwriters can also recommend and include some individual investors.

group for obtaining the trading rights (for more detail, see Li, Wang, Cheung, and Jiang, 2011, and Liao, Liu and Wang, 2014).

When reopening the IPO market in June 2006 (the beginning of the fifth period), the regulators were concerned that a high IPO offer price would lead to poor aftermarket returns, which would frustrate investors and eclipse “the fruits of the reform”. With this mindset, a window guidance cap was imposed again on the IPO P/E ratio, of approximately 30.

In June 2009 (the beginning of the sixth period), the CSRC issued a document titled “Guidance on the Further Reform and Refinement of the Initial Public Offering Method”, which emphasized the relaxation of regulatory restrictions and moved to allow the market to determine the IPO price. This started the longest “free market” period for China’s IPOs (July 2009 – November 2012). Most recent studies of the Chinese IPO market choose to focus on this period for two reasons. First, the offer price in this period can be viewed as freely determined by underwriters and the issuer after observing the investor bids. Second, detailed bid and allocation data of the offline auction tranche (catering to institutional investors) became available in this period. Since November 2010, IPO firms have been required to publicly disclose such information. We have also obtained similar information for the early part of this period from the stock exchanges.

Regulators suspended IPOs again in late 2012 due to poor stock market performance. In January 2014 (the beginning of the seventh period), IPO activities were resumed and another round of policy reforms were installed intending to give more freedom to the market. The most important change was that underwriters were allowed certain allocation discretion for the auction tranche. As a new rule, the highest bids were to be excluded from allocation to mitigate the free-rider problem, and only a small number (typically 10-20) of valid bidders (those with bids at or above the offer price but are not excluded for being too high) will be eligible for allocations. How many

bids to exclude and whom to exclude among those with the same bidding price are at the discretion of the underwriter. Such discretion immediately led to some egregious incidents and therefore market outcries of unfair dealings. In the IPO of Zhongxing Travels, for example, 96% of bids were excluded from valid bids. That is, only the very lowest bidders are eligible for allocation. In another case (Tianci Materials), 524 institutional investors participated in the IPO auction, 155 bid at the offer price (RMB 13.66), but only 20 were chosen as valid bidders.

Another new policy also raised investor concerns and suspicion. For the first time, secondary shares (i.e., shares held by existing shareholders) could be sold in an IPO. In fact, secondary shares had to be used to prevent the firm from raising more new capital than the projected proceeds stated in the prospectus, which happens when the offer price turns out to be higher than expected. Concerns arose that this gave firms and underwriters incentives to set the offer price too high so that existing shareholders could cash out right away (otherwise they were subject to the lock-up period). In response to these complaints, regulators abruptly ended the reform.

In the eighth, and last period, in our study (from June 2014 to present), regulators took control again: they imposed a rigid P/E cap of 23 on all IPOs, although there is no written regulation. This uniform price control prevents efficient pricing and once again has led to skyrocketing initial returns. We will discuss the initial returns in more detail below. The auction method became not very useful due to the price control, so small issuers (those with less than 20 million shares offered) are allowed to use the pure FPO method.

A.2 Other IPO regulations

A.2.1. Stock exchanges

The two stock exchanges—the Shanghai Stock Exchange (SSE) and the Shenzhen Stock Exchange (SZSE)—were established in 1990 and 1991, respectively. They were initially controlled by local governments (including their personnel and financial decisions), but in 1997 control was shifted to the CSRC. In 2000, the CSRC decided that SSE should mainly host large blue-chip stocks and SZSE should cater to small and medium size firms. In the next few years, there were few IPOs on SZSE since most IPOs were large SOEs. To find its own clientele, SZSE added two new sections of listing in addition to the Main Board: the Small and Medium Enterprise (SME) Board in 2004 and ChiNext Board (also known as Growth Enterprise Market, or GEM) in 2009, with the last board featuring high-growth high-tech but likely smaller and younger companies. These two new boards hosted most of the IPOs during 2009-2012 and gave more opportunities for small and medium size SOEs as well as private firms to be listed. Worried about SSE not getting enough business, the CSRC made an announcement in March 2014 that there would be no size distinction between the two stock exchanges any more: companies can choose to be listed on either exchange.

A.2.2 Lock-up period

For IPO investors, the CSRC “Notice on Several Issues on the Trial Implementation of the Price Inquiry System for Initial Public Offering of Stocks” in February 2005 stipulates that offline auction tranche (institutional) investors are subject to a three-month lock-up period. This rule was effective until May 2012 when it was removed. Investors who obtain shares from the online FPO tranche are not subject to any lock-up period. In the U.S., there are no mandated lockup periods, and the lockups that are commonly agreed to by the pre-issue shareholders do not apply to investors purchasing shares in the IPO.

The lock-up period rules for pre-IPO investors are complicated. Various regulatory bodies have their own rules (or window guidance) and different types of shareholders are subject to different restrictions. First, the Company Law issued in 1993 requires that all pre-IPO shares be subject to a minimum one-year lock-up period. In addition, the Company Law, CSRC, and stock exchanges have stricter rules for certain types of pre-IPO investors, including the controlling shareholder, investors who became shareholders shortly before the IPO, executives and board of directors and supervisors (and the rules of the CSRC and stock exchanges vary over time). For example, the controlling shareholders and the immediate pre-IPO investors are typically subject to a three-year lock-up period. Executives, directors and supervisors are also subject to additional rules. The Company Law stipulates that they cannot sell more than 25% of their holdings each year at their posts and that they cannot sell shares in the six months after they leave their positions. The other regulatory bodies can impose even stricter rules depending on the stock exchange and the time period. These restrictions are in general much more severe than if the company were to go public in Hong Kong, Singapore, or the U.S., the three most common venues for overseas listings by Chinese companies.

Internet Appendix B: Summary Statistics

This table reports the summary statistics of variables for IPOs during 10/1992 (when CSRC was formed) –12/2018. Information on *insti subscription* is available from 2005, *high UW repu* is from 2009, and data on *price revision* is for IPOs during 2009-2012 (the information on suggested price range is not publicly available before and after this period). The high mean and standard deviation for assets is attributable to the IPOs of the “big four” commercial banks. Variables are defined in the appendix.

variable	N	mean	p25	p50	p75	sd
Assets (RMB MM)	3,403	17,596.690	391.134	651.433	1,269.749	300,722.300
Firm age	3,510	7.996	2.581	6.960	12.389	6.343
ROA (%)	3,394	11.753	7.080	10.421	14.895	6.850
SOE dummy	3,559	0.387	0	0	1	0.487
SSE dummy	3,559	0.397	0	0	1	0.489
Tech dummy	3,559	0.243	0	0	0	0.429
P/E	3,402	28.404	18.000	22.980	31.030	19.639
Mktret_pr3mon (%)	3,559	5.418	-6.461	2.121	11.364	20.460
Initial return (%)	3,559	168.043	43.495	110.868	208.954	208.912
BHAR3m (%)	3,155	-4.204	-19.989	-7.596	6.518	26.255
BHAR6m (%)	3,155	-3.154	-22.402	-7.458	11.050	34.444
BHAR1Y (%)	3,133	-5.959	-27.849	-11.099	10.384	46.638
BHAR2Y (%)	2,656	-4.567	-34.088	-13.985	13.006	63.979
BHAR3Y (%)	2,447	-0.868	-45.683	-16.270	19.177	132.014
Restricted	3,559	0.665	0	1	1	0.472
Subscription	3,260	1,217.109	122.482	281.467	1,877.017	1,784.451
Insti subscription	2,093	3,166.018	35.260	165.100	3,752.577	6,066.846
Price revision (%)	850	-2.344	-15.176	-2.423	10.594	19.998
High UW repu	1,935	0.504	0.000	1.000	1.000	0.500