Initial Public Offerings Chinese Style

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Abstract: This paper provides a survey of China's IPO market, focusing on IPO pricing, bids and allocation, and aftermarket trading. We show that strict regulations result in suppressed IPO offer prices and high initial returns, causing a high cost of going public. Investors treat IPOs as lotteries with extremely high 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 in a more informative way than other investors, and their advantages are unlikely to be due to underwriters' preferential treatment. We also discuss the latest registration-system reform.

JEL codes: G24, G32, G38

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There is an Internet Appendix available at https://site.warrington.ufl.edu/ritter/files/IPO-Chinese-style-IA.pdf

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I. Introduction

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 high IPO volume and a tremendous growth in listings. China had no stock exchanges between 1949 and 1990; yet as of 2020, it has the second largest stock market in the world, after the U.S.: 4,154 stocks are listed on its two exchanges with a total market cap of RMB 80 trillion ($12 trillion).[1] During 2011-2018, 1,546 companies went public in China. In comparison, 971 operating companies went public in the U.S., and 2,218 went public in Europe (across 25 countries) during the same period.

This paper provides a survey of the IPO market in mainland China since 1990. We focus on the three most important topics of IPO research—IPO pricing, bids and allocation, and aftermarket trading. First, the topic of IPO pricing commands a large share of the IPO literature in general, and IPOs in China stand out for the extremely high first-day returns (also known as IPO underpricing): the average first-day return is 172% during 1990-2021. We conduct a comprehensive study of the various theories and possible determinants of underpricing using the complete history of the Chinese IPO market. Second, bidding and allocation is one of the most interesting issues in IPO research and is intricately connected with IPO pricing. Unlike in the U.S., IPOs in China and many other Asian markets use a hybrid auction method. In theory, auctions should eliminate underwriter favoritism, but they require a high degree of investor sophistication for the method to work. The availability of detailed bid and allocation data enables us to examine investor sophistication across different types of investors and whether some investors' advantages are due to underwriter favoritism. Third, we use proprietary trade-level

[1] The exchange rate as of December 2020 is $1 = RMB 6.53. As of the end of 2020, 3,818 domestic companies were listed on Nasdaq and the New York Stock Exchange with a market cap of $40 trillion.

data to study how institutional investors trade the IPO stock in the aftermarket, adding to an understudied area. Our survey discusses existing studies in the appropriate sections of this paper but also provides our own analysis.

We examine these topics through a combination of two lenses: IPO theories (the economic forces) and the regulatory environment in China (the political considerations). The tradeoff between economic forces and political considerations is not unique to China, and many countries want to explore different approaches for IPOs. Hence our study lends useful lessons to markets beyond China.

To understand the regulatory environment in China, we first lay out the history of IPO regulations from the early 1990s to the present. We focus on three regulatory issues: the changes in the IPO selling method; the quota, approval, and registration systems; and the IPO process. 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. 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 fact an auction mechanism. The auction method is supposed to price IPO shares based on market demand. For most of the last 30 years, however, Chinese regulators have 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.

[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.

Although the IPO literature suggests that the auction method tends to be associated with lower underpricing than other selling methods, China has experienced unusually high underpricing using the auction method. We show that regulatory pricing restrictions and investor sentiment are the two most important drivers for underpricing in China. After controlling for various firm characteristics including industry and year fixed effects, IPOs subject to pricing restrictions have average first-day returns that are 45 percentage points higher. We also examine underpricing without pricing restrictions by focusing on the longest unrestricted period of 2009-2012. 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, consistent with the sentiment theory. 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 U.S. (Hanley, 1993).

Several recent papers use detailed demand and allocation data for Chinese IPOs to study information production and potential preferential treatments in IPO auctions; both are interesting issues that cannot be addressed using U.S. 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 in a more informative way than other investors. In contrast to existing studies, however, our analysis suggests that preferential allocation treatment is unlikely to be important in these auctions. Hence IPO auctions work as intended: they gather information and prevent preferential treatment. There is also evidence that institutional investors tend to bid more seriously when they have a chance to receive larger allocations under the lottery allocation method than under the pro-rata allocation method.

Using proprietary data on the trading activities of institutional investors, we investigate 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. Answers to both questions are negative. 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 that they are permitted to sell. 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. Cross-sectionally, we find that flipping ratios increase with initial returns and are higher after the removal of the lockup period that institutional buyers that received allocations previously faced. Flipping ratios are also lower when the lottery allocation method is used as opposed to the pro-rata method.

Finally, we discuss some of the consequences of the approval system for IPOs, and the latest reforms attempting to address these issues. The approval system, where government regulators decide which companies will be allowed to go public, in general gives preference 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. The Science and Technology Innovation Board (STAR Market) of the Shanghai Stock Exchange launched in 2019 and the 2020 reform of the Shenzhen Growth Enterprise Market (GEM) aim to address these problems. Specifically, on these two boards, a U.S.-style registration system has replaced the approval system; listing firms are not

required to be profitable; and the offer price is not limited to a set P/E ratio. We empirically compare IPOs under the registration system and those still under the approval system. The latest reform has achieved some but not all of its intended goals; its long-term success and sustainability remain to be seen.

In summary, after 30 years of trial and error, Chinese regulators have been slow to relax strict 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 in that much of the value created by private firms is transferred to new shareholders when they go public: initial returns are excessive, making it extremely costly for firms to go public. Specifically, in addition to the stress caused by the uncertainties of how long the IPO process will take, an average IPO in China has incurred direct and indirect costs that exceed the amount of money raised. Ironically, investors are rational in treating IPOs as lotteries that offer extreme short-term returns without much downside risk, since only 1.2% of IPOs decline on the first day of trading during restricted periods; they thus have 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, as it has been for the STAR Market and the Shenzhen GEM. Instead, regulators should let the market price the securities and let investors take the risk. Reforms since 2019 have begun to implement these changes. If investors, especially institutional investors, bear the financial

consequences, they 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.

II. China's IPO Regulations

China's economy has traditionally relied more on the banking system rather than securities markets to finance firms. This is still the case to date.[3] Both systems give priorities to large state-owned enterprises (SOEs) over small and medium sized SOEs or private-sector firms.[4]

The securities regulator, the China Securities Regulatory Commission (CSRC), has multiple and often conflicting objectives. Like the Securities and Exchange Commission (SEC),

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

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". This fear is 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 strict regulations and frequently changed policies back and forth.

IPO regulations involve many aspects. 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 in use today. More (detailed) information about IPO regulations can be found in Internet Appendix A.

A. 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, a limited number of IPOs were issued in various ways and were not centrally regulated.[5] In October 1992, the CSRC was formed and took over IPO regulations.

[Insert Table 1 about here]

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 price restrictions are frequently 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.

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 general, 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. Most of the time, an auction is used for the offline tranche, and the resulting offer price is then used for the FPO online tranche. The main difference between periods lies with whether there are regulatory restrictions on the pricing of the IPO shares. Table B2 in Internet Appendix B shows, for each restricted period, the percentage of IPOs with binding P/E ratios (defined as with P/E ratios that are within 0.5 below the cap, e.g., between 22.5 and 23 if the cap is 23) and the percentage of IPOs with P/E ratios exceeding the cap. In the restricted periods, over 50% of the time the P/E cap is binding.

[5] 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.

On the important dimension of pricing restrictions, 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 until the 2019-2020 reform. With "social stability" in mind, the regulators tend to reverse loosening regulations and revert to imposing price caps when they see signs of an "overheated IPO market" and are worried that IPO investors might lose money. This incentive can be heightened when combined with other reasons to ensure a rosy picture of the stock market. For example, when reopening the IPO market in June 2006 after a one-year moratorium to focus on the split-share structure reform, in which SOEs with multiple share classes were converted into single class structures, the regulators reversed previous policies and imposed a price cap to ensure the accomplishments of the reform are not eclipsed by IPO stocks' poor returns (measured from the offer price).

For brevity, we focus on recent periods in this subsection. We provide more detailed information for each subperiod in Internet Appendix A. 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 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.

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 Internet Appendix A). Such discretion immediately led to some egregious incidents of underpriced IPOs being allocated to a small subset of eligible bidders, resulting in 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 the 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 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 million shares offered) were 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, while at the same time restrictions have still been binding for main board IPOs in Shanghai and Shenzhen. We discuss these new unrestricted markets in Section 7.

B. 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),[6] determined the total IPO volume 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.[7] The quotas could

[6] It is now known as National Development and Reform Commission (NDRC).

[7] 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.

not be 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. Although any company that satisfies listing conditions can apply to have an IPO. IPOs still have to be approved by the CSRC, hence "soft" quotas can still be applied.[8] 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) 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.[9]

The regulators have long thought about changing to a US-style registration system, in which any company is permitted to go public providing that it meets disclosure requirements, with the idea 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 GEM Board.

C. The Application and Offering Process

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

In this subsection, we describe the application and offering processes under the approval system, which is still in use today, with the notable exception of the new STAR market and Shenzhen GEM.

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.[10] 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 in some time periods, partly to protect investors and partly to guide the allocation of capital. Table 2 (based on Appendix A of Qian, Shao and Liao, 2020) 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 between the file date and the approval date has been roughly four times that of the U.S., an average (median) of 489 (481) days, with only 33 firms taking less than 90 days.

[Insert Table 2 about here]

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 investors. 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

[10] The SSE has stricter listing requirements than the SZSE SME (small and medium enterprise) board, which in turn has stricter requirements than the GEM (growth enterprise market) board. For example, the SME board requires firms to have positive income in each of the last three years prior to IPO application, whereas GEM, also known as ChiNext, only requires positive income for the year before the IPO if the firm's income and revenues meet certain levels.

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 Price Inquiry [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.

China uses an auction method that sets the offer price below the clearing price. Bids at or 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 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 proportional allocation. When the lottery method is used, fewer investors receive allocations, 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 for 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 for the online tranche is determined using a lottery, with public trading typically starting 5 to 10 business days after the IPO allocation.

Before 2016, investors (both online and offline) needed to deposit 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.

III. 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 P/E 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 the online subscription ratio. We retrieve post-IPO stock prices and returns from the CSMAR database. In addition, we obtain detailed bid and allocation data for 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.[11] Finally, we obtain proprietary data on account-level trading for all institutional investors for the six-month period following each IPO on the SZSE 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.

[Insert Table 3 about here]

Table 3 presents summary statistics of these offerings by year for 1990-2021. 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

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

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 Internet Appendix A.2.) 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, which generally do not contain overallotment options, is also reported. In Table B1 in Internet Appendix B, we present the descriptive statistics of IPOs for the 1992-2018 sample that we use in most of our analysis.

IV. IPO Underpricing

IPO underpricing, the phenomenon that the offer price is lower than the immediate aftermarket price, is prevalent across countries. In China, however, the underpricing level is particularly high. During 1990-2021, the average underpricing, measured as the percentage difference between the IPO offer price and the first trading day closing price (i.e., the initial return), is 172% (Table 3).[12] In comparison, the equally weighted average underpricing is 17.5% for the US, 40.5% for Hong Kong, and 24.7% for Singapore, respectively.[13] Among the 55 countries listed on Jay Ritter's website, only a few countries have higher average underpricing. In addition, these high returns come with little downside risk for IPO investors: the initial return is negative in less than 5% of cases, and only 1.2% in the restricted periods. In comparison, 15% of IPOs in the U.S. have negative initial returns.

[12] 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).

[13] See https://site.warrington.ufl.edu/ritter/files/IPOs-International.pdf. 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 the weighting is not an important issue.

The extreme underpricing of Chinese IPOs imposes a large opportunity cost on issuing firms. For a firm that raises 1 billion RMB (about $140 million) in the IPO, a mean 172% initial return means that it leaves over 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, also known as a seasoned equity offering (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 Internet Appendix A 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.

Major explanations for underpricing in the IPO literature include information asymmetry, agency, and investor sentiment theories. In China, however, an important driving force is regulatory restrictions on the offer price. As shown in Table 1, most of the time the IPO market in China has been subject to caps on the offer price that applied uniformly to all types of firms. Such restrictions have been motivated by the regulators' desire to prevent investor losses, which might frustrate "social stability". The average offer price P/E ratio during restricted periods is 20.3. In contrast, the average is 43.8 during unrestricted periods.

[Insert Table 4 about here]

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 restricted period sees the highest initial return, with an average of 315%. That corresponds to the sum of 1.6 trillion RMB ($233 billion) as money left on the table.[14] For the 1990-2018 period as a whole, 3.447 trillion RMB (approximately $450 billion) was left on the table, an amount 150% greater than the corresponding number for U.S. IPOs during that time period. The total amount of money left on the table in China greatly exceeds the aggregate gross proceeds.

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 from the first unconstrained closing market price after the IPO and the return on a portfolio of seasoned stocks matched by market cap and M/B ratios. The mean BHAR1Y is similar for restricted and unrestricted periods: -6.5% and -6.6%, respectively. But the mean BHAR3Y is -16.2% for restricted periods and 8.3% for unrestricted periods, a substantial difference.

Early studies provide evidence that offer price caps are associated with higher underpricing. Using a sample of 1992-2006 IPOs, Cheung, Ouyang, and Tan (2009) show that the underpricing is negatively related to the IPO P/E ratio. Using a sample of 2006-2008 IPOs, Gao (2010) documents that if the P/E ratio reaches the regulatory cap, the underpricing is higher. Chen, Ke, Wu, and Yang (2018) examine a sample of 1997-2004 IPOs and document that IPO firms' P/E ratios are higher when unrestricted and that the higher pricing is not followed by

[14] This number is of similar magnitude to the value of money left on the table reported by Deng, Sinclair, and Yu (2021).

poorer long-run stock returns. 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 holdings 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.

In this survey study, we provide a comprehensive investigation of underpricing determinants for China's IPO market. We do so for two reasons. First, most existing studies cover only periods prior to 2009. The recent decade is not well studied. In particular, the longest unrestricted period of 2009-2012 deserves attention and presents an opportunity to study variables of interest that are not available for other periods. Second, existing studies each focus on a subset of determinants. By presenting a comprehensive examination, we can compare the relative importance of different theories and determinants.

We investigate the role of price restrictions, the information risk hypothesis, and the investor sentiment theory in determining IPO underpricing in China. For price restriction, we use

a dummy variable, RESTRICTED, which is equal to one if the IPO is issued in a restricted period and zero otherwise. For investor sentiment, we look at the effect of retail investor demand (measured as the subscription ratio from the online tranche, i.e., log(SUBSCRIPTION)) and market condition (measured by the market return in the three months prior to the IPO, i.e., MKTRET_PR3MON).[15] For information risk, we use asset value (log(ASSETS)), firm age (log(FIRM_AGE)), and profitability (ROA) as inverse measures for the risk. We also control for SOE_DUMMY (equal to one if the firm is an SOE), SSE_DUMMY (equal to one if the IPO is listed on the Shanghai Stock Exchange), and TECH_DUMMY (equal to one if the firm is in a technology industry). The detailed definition for each variable is in the appendix.

[Insert Table 5 about here]

Table 5 reports regressions with the percentage INITIAL_RETURN 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 the dummy RESTRICTED, as well as year and industry fixed effects with 24 industries. 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 log(SUBSCRIPTION). The coefficient on RESTRICTED remains significantly positive but the magnitude is reduced to 41.9. The coefficient on log(SUBSCRIPTION) is also significantly positive, consistent with the investor sentiment theory.

[15] The subscription ratio for the offline auction tranche is not available until 2005. We discuss its effect below for periods where data is available.

In Column 3, we include all the explanatory variables that we consider. 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(SUBSCRIPTION) remains highly significant; a one-standard-deviation increase in log(SUBSCRIPTION) (1.64) is associated with a 26.5% higher underpricing. Also consistent with the sentiment theory, underpricing is positively related to recent market returns. 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.[16]

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. Retail demand and recent market returns have positive coefficients in 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

[16] The R^2 for the univariate regression on RESTRICTED (or log(SUBSCRIPTION)) alone, without the fixed effects, is 0.14 (0.17).

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(SUBSCRIPTION) with the ratio of $PE_{MARKET}\_PE_{IPO}$, where PE_{MARKET} is the aggregate price-to-earnings ratio of the market and PE_{IPO} is the price-earnings ratio of the current IPO using the offer price. The results show that restricted continues to have a substantial impact on the initial return. $PE_{MARKET}\_PE_{IPO}$ has a significantly positive effect and the effect is strongest in restricted periods. This pattern is consistent with the conjecture that the more restricted the IPO firm's P/E is, the higher the initial return should be.

We next zero in on the longest free period, 2009-2012 to examine how IPO prices are determined when pricing restrictions are not present. For this period, we also have information on several variables that are of interest in the underpricing literature but have not been examined by early studies of the China market—price revision, institutional subscription ratio, and underwriter reputation. Table 6 reports the initial return regressions for the period of 2009-2012. In Columns 1 and 2, we include only log(SUBSCRIPTION) or log(INSTI_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).

[Insert Table 6 about here]

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 U.S. (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 not publicly available for bookbuilding IPOs. There is evidence that price revision becomes insignificant when demand information is directly controlled for (see Cornelli and Goldreich (2003) for a sample of international bookbuilding IPOs underwritten by European banks; Qian, Ritter and Yan (2014) for a sample of U.S. 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 correlation with log(INSTI_SUBSCRIPTION) is 0.58 and that with log(SUBSCRIPTION) is 0.38. Nonetheless, Column 3 of Table 6 shows that in China, there is no significant relationship between the price revision and initial return, after controlling for year and industry fixed effects.[17] This lack of a relation is consistent with the findings of Qian, Shao and Liao (2019) for Chinese IPOs, but in contrast to the vast literature for U.S. IPOs.

[17] 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

In Column 4 of Table 6, we include both subscription variables and price revision. The retail demand variable remains highly significant but institutional demand becomes significant only at the 10% level. In Column 5, we further add HIGH_UW_REPUTE_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, consistent with the findings 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. Alternatively, 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 Reuter, 2006; Goldstein, Irvine and Puckett, 2011; and Liu and Ritter, 2010; and for evidence in Taiwan see

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

Chang, Chiang, Qian and Ritter, 2017). However, the auction method, by taking away the underwriters' allocation power, should largely erase this problem.

When bookbuilding is used, underwriters collect revenue both from the direct fees (the gross spread) and payments from profitable clients of the underwriter who in return receive underpriced shares. Because of the inability to allocate underpriced shares, in China underwriters receive essentially all of their revenue from the gross spread alone. Pan, Wang, and Zhou (2021) and Yan, Ling, Cheng, and Hu (2021) document that the average gross spread on Chinese IPOs has increased over time, and now is at or above levels charged in the U.S., at an average of about 7% of proceeds.

Returning to the determinants of underpricing during 2009-2012, in Table 6, 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 of IPO underpricing are regulatory price restrictions 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 find some evidence consistent with the information risk theory, but it is less important in driving the high levels of underpricing in China than limits on P/E ratios during restricted periods.

V. Bids and Allocations 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, sometimes known as a "dirty Dutch auction". The mechanism is similar to the auction method used in the U.S. market, but

different from the 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.[18] Seven types of investors can participate in the auction 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).

Using detailed bid and allocation data of the auction tranche for 850 IPOs during 2009-2012, the longest period without price restrictions, we first describe different investor types' bids and allocations because such information is lacking in the literature. We also discuss the difference between the pro-rata and the lottery allocation method. We devote most of this section, however, to the debate regarding whether some investor types bid more intelligently than others, and if yes, the source of their advantages. This question has been the focus of existing studies of bids and allocations. We review these studies and weigh in with our own analysis.

Consistent with the literature, this section analyzes bids and allocations in an unrestricted period in which the auction is truly useful in determining the price. We ought to point out that the bidding behaviors can be very different during periods when the offer price is restricted. Although there is no detailed bidding data available for other periods, conversations with practitioners suggest that bids in the post-2013 period (with a strict P/E cap of 23) are mostly uninformative: most bids are at or slightly above 23 times earnings-per-share to make sure they are among valid bids. In other words, pricing restrictions render IPO auctions less useful and strict restrictions can make them meaningless.

[Insert Table 7 about here]

[18] Chiang, Qian, and Sherman (2010) and Chiang, Hirshleifer, Qian, and Sherman (2011) examine the bidding behavior of institutional vs. retail investors in IPO auctions in Taiwan. Degeorge, Derrien, and Womack (2010) provide a study of IPO auctions in the U.S., where the method is not commonly used.

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 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.

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 fact that allocation is roughly in proportion to demand suggests that the auction method is fair and it works as it is supposed to.

The third portion of Table 7 describes the typical bid size, using several different measures, 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 583 auctions, an insurer's typical order size is RMB 147 million, for 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.

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 institutional investors is 2.3%. Consistent with the results in the second portion of the table, the allocation ratio is similar across investor types.

Throughout the history, allocation is made proportionally among valid bids except for November 2010-November 2012 on the Shenzhen Stock Exchange, during which the allocation was determined based on a lottery. A key difference between 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 an allocation, but each successful bidder receives a larger allocation. With more money at stake, investors may have higher incentives to gather information and bid more seriously with a lottery (Cao et al. 2016). We compare bid characteristics under the two regimes (see Table B3 of Internet Appendix B). Consistent with this conjecture, we find that under the lottery regime, institutional investors tend to bid less (a lower average subscription ratio of 51 vs. 148), bid lower (as reflected in the ratio of the average bidding price relative to the midpoint of the price range), and the bid dispersion is also lower.

If lower institutional bids lead to lower offer prices and retail investor sentiment remains the same on the open market, one would predict higher initial returns. The results, however, are mixed. Table B3 in the Internet Appendix shows that the IPO offer price is lower under the lottery regime (lower P/E) but the initial return and $PE_{MARKET}\_PE_{IPO}$ are also lower, the latter suggesting lower sentiment or overall stock market valuation during the subperiod. Indeed, under

the lottery regime, market conditions as measured by the market return in the three months prior to the IPO (MKTRET_PR3MON) and retail subscription are both significantly lower. Further, the effect of lottery allocation on initial returns disappears in multivariate regressions once we control for year fixed effects. Thus, we can't reject the possibility that the univariate correlation between pricing and lottery is due to other time-related factors.

Next, we turn to the question of 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 Fishe, 2006; Chiang, Qian and Sherman, 2010). Most studies, however, do not address whether there are differences among institutional investors.

Using Chinese IPO data, Chemmanur, Ma, Wu, and Yu (2020) 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 (2022) 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 (2018) suggest that favored mutual funds receive information leakage from low reputation underwriters: they bid closer to the offer price and they bid later than other investors.

To investigate whether mutual funds bid more intelligently 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 (<75% of the offer price) and the highest is equal to or greater than 1.15 (≥15% above the offer price), 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.

[Insert Figure 1 about here]

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.

Thus, we see some evidence that mutual funds' bids are more informative: 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.,2018) 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 pervasiveness of preferential treatments.

[Insert Table 8 about here]

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.

[Insert Table 9 about here]

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 is not significant for initial returns and 3-year BHARs. 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' advantages do not come from underwriters, because 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(SUBSCRIPTION), but positively related to institutional demand, log(INSTI_SUBSCRIPTION). This is consistent with the notion that strong retail demand due to sentiment pushes the initial market price too high, resulting in a subsequent reversal.

In summary, we find some evidence that mutual funds bid in a more informative way than other investors, which is consistent with the findings of Chemmanur, Ma, Wu, and Yu (2017). Nonetheless, there is little evidence that their advantages are due to preferential treatments from underwriters, as suggested by existing studies (Chemmanur, Liu, and Tian, 2017; Jiang et al., 2018). 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.

VI. Aftermarket Trading

There has been little evidence on how investors trade the IPO stocks on the open market. In particular, how will those who participated in the IPO process trade? Will those who fail to receive an allocation buy shares on the open market? Will those who are fortunate enough to receive an allocation hold the stock for the long run? And what will influence their buying/selling decisions? We add to the literature by examining these questions in this section. 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.

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 were subject to a three-month lockup period for IPOs prior to June 2012, but there have been no lockups since then. 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.[19]

[Insert Table 10 about here]

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, institutional 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

[19] The average first-day turnover (trading volume/shares issued, not including the overallotment options) on IPOs in the U.S. is 63.3% in 2004-2021, according to Table 3a of the IPO Statistics file on Jay Ritter's IPO Data website.

investors, if they receive small allocations, either sell to hold none or buy more on the open market to reach a certain level of holdings.

Panel B of Table 10 presents 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), 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), allocation is determined by lottery; 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 on the first day after the lockup expiration. 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 auction are sold in the rest of the three months. Adding these last two numbers together, institutional investors sell 88.2% of shares received in the offline tranche within three months after the lockup.

In comparison, Aggarwal (2003) 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

(in the U.S., lockups apply only to pre-IPO shareholders). Thus the flipping rate is much higher in China: in the first two trading days the average is 41.5%.

Thus, 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 shares 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. This behavior discourages information acquisition and hinders price discovery both at the time of the IPO and in the aftermarket.[20]

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 lockup) flip rate is 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). This is consistent with the notion that with larger allocations under the lottery method, investors bid more seriously and tend to hold the stock longer (Cao et al. 2016). A lockup period also seems to dampen flipping.

Next, we examine the determinants of institutional investors' flipping behavior more systematically. First, Aggarwal (2002) documents that higher initial returns are associated with higher flipping rates for U.S. IPOs. We expect a similar relationship for Chinese IPOs. Second, we look at the effect of the allocation method by including a LOTTERY_DUMMY that equals one if a lottery is used for allocation. Third, we include a NO_LOCKUP_DUMMY that equals one if the there is no lockup period for institutional investors. Based on the univariate results in

[20] Note that our bid and trading data are for the longest free period of 2009-2012. Although we do not have detailed data for other periods, it is likely that bids are less informative, and flipping is even more prevalent during restricted periods. For example, most bids in the post-2013 period are at or slightly above 23 (the P/E cap) times the firm's earnings per share, just to ensure they are among valid bids.

Panel B of Table 10, we expect that LOTTERY_DUMMY has a negative effect and NO_LOCKUP_DUMMY has a positive effect on flipping. Fourth, we examine whether retail flipping (which is not subject to a lockup) can predict institutional flipping. We are able to measure retail flipping on the first trading day due to the T+1 trading system in China, i.e., investors can only sell a stock at least one day after they purchase it. RETAIL_FLIP is the total sale amount on the first trading day minus the aggregate sale by institutional investors, relative to the IPO shares allocated to retail investors. By construction, the retail flipping rate is very close to the first day turnover ratio. Because it is well documented that first-day trading activity and initial returns are highly correlated, we use the orthogonalized version of the variable, RETAIL_FLIP_RESIDUAL, which is the regression residual of retail flip on initial return. Fifth, we test whether investors are more likely to sell when the market price immediately after lockup is above their bid prices (so investors may believe that the stock is fully or overpriced). We look at PRICE_TO_BID, the closing price on the first day after the lockup, relative to an investors' bid price. Finally, we consider the stock's P/E ratio in relation to the market, $PE_{MARKET}\_PE_{IPO}$.

We conduct regressions of an investor's flipping behavior on these variables, controlling for other firm and offering characteristics. Table 11 reports OLS regression results using IPO-investor observations. Investor fixed effects are controlled for, among other things. The dependent variable is FLIP_D1, a dummy equal to one if the investor sells on the first day after the lockup. The results are robust if we examine investors' flipping behavior during the first week after the lockup, or use IPO-level observations (in this case, the dependent variable is the fraction of shares flipped at the IPO level on the first day or in the first week after the lockup).

[Insert Table 11 about here]

Table 11 shows that flipping is positively related to initial return in all columns, with an additional 8% of institutional recipients flipping if the first day return is 110% rather than 10%. The use of the lottery allocation method is associated with less flipping, consistent with the notion that investors bid more seriously and are more likely to hold the stock. Investors flip more when there is no lockup period, and when the IPO's P/E is relatively low compared to the market PE. The variable PRICE_TO_BID (the market price after lockup÷bid price) has a positive regression coefficient when initial return is not controlled for (not tabulated) but the regression coefficient becomes insignificant when initial return is included. Thus, PRICE_TO_BID does not have additional explanatory power for institutional investors' flipping behavior.

Table 11 shows that RETAIL_FLIP_RESIDUAL has a positive and significant coefficient. We note that when institutional investors are not subject to a lockup period, retail and institutional flipping are measured on the same day. In unreported results, when including only IPOs with a lockup period, RETAIL_FLIP_RESIDUAL has a positive coefficient that is significant only at the 10% level. In short, retail flipping on the first trading day has some weak predictive power for institutional flipping after their lockup has expired.

VII. Criticisms of IPO regulations and the latest reforms

Our analysis has focused on the pricing of IPOs and investor behavior. We demonstrate that regulatory pricing restrictions lead to great underpricing, which imposes a high cost of issuance on companies. It also distorts investor incentives.

There are also concerns about the selection of firms for the public market and the oversight of public firms in China. Derrien, Wu, Zeng, and Zhang (2016) and Cong, Lee, Qu, and Shen (2020) argue that China's IPO regulation, in particular the listing requirement of

positive profits and regulatory price caps, creates a bias against high-growth technology firms and induces 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. When Alibaba went public in the U.S. in 2014 at a P/E ratio of 31.8, it was able to raise $9 billion more than if it had sold the same number of shares in China at a P/E of 23. There were 321 Chinese IPOs listed on the U.S. major exchanges during 1992-2021, excluding four IPOs for which we do not have pre-IPO earnings. Among these, 144 (44.9%) were unprofitable at the time of the IPO, a percentage that is similar to the 50.7% of the 6,095 domestic U.S. firms going public through traditional IPOs during these same years.

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. Yet, 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).

Allen, Qian, Shan and Zhu (2022) examine the reasons behind the underperformance of China's stock market despite the fast economic growth. During 1992-2018, the country's GDP grew by a factor of eight whereas the Shanghai Composite Index grew by a factor of two (both in real terms). They propose two reasons for the slower growth of stock prices.[21] 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. One

[21] Hsu, Ritter, Wool, and Zhao (2022) also document that real stock returns in China have been lower than per capita economic growth. They posit that economic growth is also boosted by increased labor force participation, high savings rates, and technological change, all of which contribute to higher standards of living but do not necessarily result in higher EPS growth.

governance issue is related to disclosure. Allen et al. report that firms use earnings management before the IPO, and that the extent of earnings-boosting is significantly greater than for their counterparts in the U.S. or Chinese firms listed externally. Moreover, underwriters exacerbate rather than mitigate the disclosure problem. Qian, Shao, and Liao (2020) 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 et al. (2019) examine pre-IPO coverage by unaffiliated analysts and conclude that their research is valuable.[22]

The new STAR market in Shanghai and the reform of the Shenzhen GEM Board are meant to address some of the problems under the approval system. In July 2019, a new Science and Technology Board (STAR Market) on the Shanghai Stock Exchange was launched to experiment with a U.S.-style registration system. In August 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, 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, dual-class shares and/or weighted voting rights are allowed. 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.

[Insert Table 12 about here]

[22] Unlike in the U.S. where neither affiliated nor unaffiliated analysts provide pre-IPO research coverage, both types of analysts do so in China.

Table 12 presents the descriptive statistics for these IPOs under the new registration system (STAR market starting in July 2019 and GEM board since August 24, 2020), and compares them to the IPOs on the SSE main board and the old GEM board during 2019-2020, respectively. 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. In fact, only 7% of the 215 STAR IPOs and none of the 63 new GEM IPOs have nonpositive ROAs.

The subscription ratios for both the online and offline tranches are very high for all four groups of IPOs, on average in the thousands! 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 no longer required to deposit the RMB amount of their orders in advance anymore; instead those who receive allocations pay afterwards, greatly reducing the opportunity cost of requesting shares. Second, the re-installation of the price cap in 2014 makes the market virtually certain that IPOs on the SSE and old SZSE GEM 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 the STAR market and new GEM Board has reduced institutional demand, but not retail demand.

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 the P/E ratio, IPOs under the new regime still experience extremely high initial returns, on average 160% for STAR IPOs 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, which are not subject to price limits on the first day of trading, despite the removal of a price cap, might be related to two factors. First, the new registration-based markets have a requirement that underwriters must buy and hold part of any issue that they take public, which is intended to incentivize them to conduct careful due diligence investigations. The requirement, however, may also incentivize them to underprice the shares. Second, the high returns 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 poor long-run returns (average 1-year BHARs of around -30% to -40%, as shown in Table 12) are consistent with investor sentiment causing overvaluation in the immediate aftermarket.

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 (NEEQ) in 2013. Both lack quality listings and the latter has very low liquidity. The new reforms achieved some of their goals (e.g., higher offer prices) but other things have not changed yet (e.g., most IPO firms still have positive earnings; and the initial returns are still high). Its long-term 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.

VIII. Conclusions

We investigate several important aspects of the IPO market in China—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 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 172% during 1990-2021. It imposes high costs for firms to go public. We find that the two most important drivers for underpricing in China are regulatory price restrictions and investor sentiment, as proxied by retail subscription ratios. In restricted periods, the average underpricing is 222%; in restricted periods the average underpricing is 60%.

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 the demand from each investor type. There is evidence that mutual funds bid in a more informative way than other investors. However, mutual funds' smart bidding is likely due to their own information advantage rather than preferential treatments from underwriters. The auction method thus works as it is supposed to: the allocation is not subject to underwriter manipulation in an economically significant way.

Investors' aftermarket trading has two interesting features. 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 have made it extremely costly for companies to go public in China. Many companies, especially high-growth tech firms, 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 right direction is an IPO system relying on 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 long-term success of the reforms depends on consistent policies that do not change quickly with market conditions. At some point, with unrestricted offer prices, a switch of investor sentiment or other changes in market conditions will lead to (some) negative initial returns. Without regulatory interventions trying to save investors from such risk, investors will come to realize that IPO stocks are not providing guaranteed returns but are risky investments. They will have to conduct careful due diligence and price IPO shares more efficiently. The massive oversubscription of IPOs will end when the rents fall. And issuers will benefit from the reduced cost of raising capital.

The fast-growing IPO market in China and the evolution of its 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 differences? Will Chinese companies stop listing abroad? When buying an IPO at the offer price becomes risky, how will institutional and retail investors change their behaviors? 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.

At the time of our writing, there are political factors that are also affecting the IPOs of Chinese companies. For Chinese companies listed in the U.S., the U.S. government is insisting that the U.S. Public Company Accounting Oversight Board (PCAOB) be permitted to inspect their auditors in China, with delisting from U.S. exchanges occurring if this requirement is not satisfied. At the same time, there are financial press reports that companies with data that may be subject to national security concerns will not be able to list outside of China, with Hong Kong listings permitted. In addition, the Chinese government has pressured major tech companies to focus on stakeholders other than shareholders, at the expense of profits. These political factors are affecting the IPO decisions and valuations of many companies.

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Table 1: History of IPO Methods

Table 1 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 Clienteles
1. 10/1992–6/1999	Fixed price offering (FPO)	P/E cap varied around 15-20	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 ≥ 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 ≥ 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 ≥ 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 or lottery among bids ≥ offer price[23]	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 after July 2019 and Shenzhen GEM after August 2020.	Online FPO: by lottery. Offline Auction: pro rata among bids ≥ offer price	FPO: mainly retail investors; Auction: mainly institutional investors

[23] 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

Table 2 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 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[24]	Offering process starts. The issuer publishes "IPO announcement" and "IPO Bookbuilding [Auction] and Road Show Announcement".[25] 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	• 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.[26]
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

[24] The numbers (of days) in this table (such as T-6, T+1, etc.) all refer to the numbers of business days.
[25] Although called bookbuilding in these documents and in the media, Chinese IPOs use a (hybrid) auction method, because underwriters have no allocation discretion.
[26] 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, 1990-2021

Table 3 lists 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-tests for means of long-run returns, assuming independence. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Year	N	SSE_ DUMMY	SOE_ DUMMY	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	-20.8***	-36.8***
2017	436	0.491	0.069	230.109	266.1	-0.1	-18.0***
2018	102	0.544	0.000	202.302	200.9	-27.3***	-44.8***
2019	207	0.614	0.164	246.111	159.4	-32.1***	.
2020	396	0.593	0.088	445.579	190.1	-33.7***	.
2021	522	0.477	0.132	509.898	176.7	.	.
Total	4,724	0.433	0.326	4288.133	171.8	-10.7***	-7.1%***

Table 4: Initial Return and Long-run Returns by Regulatory Period, 10/1992 to 12/2018

Table 4 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, in millions of constant 2018 RMB. We report the aggregate money left on the time for each period. All other variables are defined in the appendix. For long-run buy-and-hold abnormal returns, measured from the closing market price on the first day of trading without binding price limits, we use *t*-tests for means, assuming independence. The first subperiod starts with he 1995 cohort for the BHARs. ***, **, 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%]	346,780	2.1%	-16.9%***
7/1999–9/2001	260	138.4% [131.0%]	255,405	4.5%**	-0.4%
11/2001–9/2004[R]	245	90.4% [81.7%]	128,588	1.6%	18.3%
2/2005–6/2005	15	45.1% [46.4%]	4,461	3.83%	-54.2%
6/2006–9/2008[R]	269	142.2% [106.3%]	728,970	-33.3%***	-26.9%***
7/2009–11/2012	883	36.0% [26.4%]	334,423	-11.2%***	10.5%***
1/2014–2/2014	48	72.7% [58.4%]	12,732	17.5%	13.4%
6/2014–12/2018[R]	1,061	314.7% [241.0%]	1,636,265	-5.7%***	-20.7%***
Restricted Periods	2,367	222.5% [155.1%]	2,845,064	-6.5%***	-16.2%**
Unrestricted Periods	1,192	59.8% [36.7%]	602,561	-6.6%***	8.3%***
Full sample	3,559	168.0% [110.9%]	3,447,624	-6.5%***	-7.1%***

Table 5: Determinants of Initial Returns: Full Sample (10/1992-2018)

Table 5 uses the percentage INITIAL_RETURN as the dependent variable in each column. Columns 1-3 use the full sample of IPOs during 10/1992 (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(SUBSCRIPTION) in the Panel A regressions with $PE_{market}\_PE_{IPO}$, which is the ratio of the market's aggregate P/E relative to the IPO firm's P/E. 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: Log(SUBSCRIPTION) as an explanatory variable

	Full Sample			Restricted Periods		Unrestricted Periods	
VARIABLES	1	2	3	4	5	6	7
RESTRICTED_DUMMY	68.31***	41.88**	44.79***				
	(3.36)	(2.27)	(2.66)				
log(SUBSCRIPTION)		31.30***	16.14***	33.20***	13.33***	26.87***	23.39***
		(10.46)	(4.87)	(7.40)	(2.74)	(8.73)	(6.90)
MKTRET_PR3MON			1.39***		1.52***		0.36**
			(7.10)		(5.59)		(2.48)
log(ASSETS)			-25.47***		-39.28***		-6.35***
			(-7.77)		(-8.60)		(-2.88)
log(FIRM AGE)			-2.36		-4.04**		1.86
			(-1.49)		(-1.99)		(0.82)
ROA			-3.68***		-5.21***		-0.62***
			(-6.62)		(-6.10)		(-3.02)
SOE_DUMMY			25.65**		27.77*		15.15***
			(2.35)		(1.80)		(3.14)
SSE_DUMMY			-19.57***		-28.45***		15.53***
			(-2.88)		(-3.45)		(3.00)
TECH_ DUMMY			2.82		5.23		4.35
			(0.19)		(0.22)		(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(SUBSCRIPTION) with $PE_{market}\_PE_{IPO}$

	Full Sample			Restricted Periods		Unrestricted Periods	
VARIABLES	1	2	3	4	5	6	7
RESTRICTED_DUMMY	68.31***	68.71***	60.95***				
	(3.36)	(3.45)	(3.50)				
$PE_{market}\_PE_{IPO}$		6.37	31.13***	12.35	30.63**	-5.59	17.62*
		(1.08)	(2.94)	(1.61)	(2.26)	(-1.52)	(1.86)
MKTRET_PR3MON			1.10***		1.13***		0.49***
			(6.05)		(4.43)		(3.26)
log(ASSETS)			-22.80***		-32.69***		-15.78***
			(-8.27)		(-8.71)		(-7.49)
log(FIRM_AGE)			1.25		0.32		3.94*
			(0.85)		(0.17)		(1.71)
ROA			-0.08**		-0.09***		-1.56***
			(-2.09)		(-2.66)		(-6.37)
SOE_DUMMY			30.36***		28.76**		20.84***
			(2.95)		(1.99)		(4.13)
SSE_DUMMY			-20.41***		-28.33***		13.16**
			(-2.99)		(-3.47)		(2.47)
TECH_DUMMY			-5.45		-5.88		2.48
			(-0.37)		(-0.25)		(0.41)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	3559	3402	3288	2223	2118	1179	1170
Adjusted R-squared	0.380	0.438	0.468	0.342	0.373	0.445	0.494

Table 6: Determinants of Initial Returns: Unrestricted Period of 2009-2012

Table 6 uses the percentage INITIAL_RETURN as the dependent variable in each column. 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***			15.85***	14.23***
	(5.95)			(8.27)	(6.59)
log(INSTI_SUBSCRIPTION)		13.56***		10.57*	10.24
		(2.77)		(1.77)	(1.59)
PRICE_REVISION			-0.10	-0.41**	-0.47**
			(-0.69)	(-2.01)	(-2.25)
HIGH_ UW_REPUTE_DUMMY					-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

Table 7 uses a subsample of 850 IPOs during 2009-2012 and 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 investor relative to the supply in 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
All IPO Auctions (Variable=0 if No Bids)								
N	850	850	850	850	850	850	850	850
Bid Size								
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%
Allocation Size								
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 Investor Participates (Variable =Missing if No Bids)								
N	850	850	583	827	832	460	280	850
Bid Size								
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%
Allocation Size								
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

Table 8 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.

	Overall		Above-median IR		Below-median IR		Above-median BHAR1Y		Below-median BHAR1Y	
Price Bins	Mutual Funds	Others	Mutual Funds	Others	Mutual Funds	Others	Mutual Funds	Others	Mutual Funds	Others
	1	2	3	4	5	6	7	8	9	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 Stock Performance

Table 9 uses a subsample of 850 IPOs during 2009-2012 in OLS regressions. The dependent variables in each column are percentage INITIAL_RETURN and percentage long-run abnormal returns over various horizons. 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	14.84***	14.20***	15.18**	24.81*	24.64
	(1.07)	(4.71)	(3.58)	(2.55)	(1.86)	(1.44)
log(SUBSCRIPTION)	14.47***	-6.82***	-8.29***	-7.61***	-11.37**	-12.13**
	(6.78)	(-7.39)	(-7.26)	(-4.36)	(-2.53)	(-2.21)
log(INSTI SUBSCRIPTION)	10.14	4.93***	5.22***	6.19***	7.11**	3.54
	(1.55)	(4.75)	(3.85)	(3.40)	(2.19)	(0.75)
PRICE_REVISION	-0.49**	-0.03	-0.10	-0.03	-0.20*	-0.38
	(-2.45)	(-0.54)	(-1.54)	(-0.33)	(-1.76)	(-1.50)
HIGH_UW_REPUTE_DUMMY	-3.79	-1.17	1.30	3.25	4.65	-1.97
	(-1.59)	(-0.73)	(0.70)	(1.25)	(1.18)	(-0.26)
MKTRET_PR3MON	0.31**	0.18**	-0.19**	0.30**	0.05	0.06
	(2.57)	(2.12)	(-2.21)	(2.48)	(0.29)	(0.19)
log(ASSETS)	-2.86	0.17	0.19	-0.31	-2.35	-10.73***
	(-1.11)	(0.14)	(0.13)	(-0.16)	(-0.71)	(-2.79)
log(FIRM_AGE)	4.97**	-1.26	-1.36	-0.06	1.48	3.30
	(2.21)	(-1.16)	(-1.02)	(-0.03)	(0.62)	(0.86)
ROA	-0.44**	-0.11	-0.23	0.06	-0.47	-0.59
	(-2.38)	(-0.96)	(-1.37)	(0.24)	(-0.97)	(-0.80)
SOE_DUMMY	16.17***	0.79	-2.11	2.11	4.13	7.98
	(3.21)	(0.33)	(-0.80)	(0.48)	(0.53)	(0.53)
SSE_DUMMY	12.53*	-9.82***	-13.19***	-12.52**	-14.91	-24.87
	(1.89)	(-3.17)	(-3.62)	(-2.50)	(-1.56)	(-1.57)
TECH_DUMMY	8.30	-4.02	-0.78	3.56	0.28	-2.82
	(1.48)	(-0.86)	(-0.13)	(0.40)	(0.02)	(-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

Table 10 uses a sample of 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_VOLUME 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. INSTITUTIONAL_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. INSTITUTIONAL_NETBUY and RETAIL_NETBUY are the institutional (retail) netbuy (buy minus sale) relative to the float.

Panel B 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). There are three policy stages during the analysis period. During 2009-10/2010, allocation is determined on a pro rata basis among valid bids (i.e., bids at or above the offer price), 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.

Panel A: Daily Average Trading of the IPO Stock

Variables	D1	W1mD1	M3mW1	M4-6
TRADE_VOLUME (RMB mil)	582.61	221.06	75.73	63.4
TURNOVER (%float)	70.75%	28.00%	10.07%	7.30%
INSTITUTIONAL_BUY (%float)	2.77%	1.06%	0.43%	0.36%
INSTITUTIONAL_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%
INSTITUTIONAL_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 of Institutional investors

	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	36.8%	50.2%	24.5%	25.5%
FLIP_RATE on D1 After Lockup	35.4%	45.8%	19.9%	57.9%
FLIP_RATE in W1mD1 After Lockup	19.7%	19.9%	20.7%	13.4%
FLIP_RATE in M3mW1 After Lockup	33.1%	27.2%	42.3%	18.3%

Table 11: OLS Regression Determinants of Flipping

Table 11 uses a sample of 783 IPOs on the Shenzhen Stock Exchange during 2009-2012. The dependent variable in each column is FLIP_D1, which is a dummy variable equal to one if an investor sells IPO shares in the first day after the lockup period, and zero otherwise. Unlike other tables, INITIAL_RETURN is measured as a decimal. LOTTERY_DUMMY is a dummy variable equal to one if allocation is by lottery among valid bids, and zero if the allocation is made on pro-rata basis. NO_LOCKUP_DUMMY is a dummy variable equal to one if institutional investors are not subject to a lockup period. PRICE_TO_BID is the closing price on the first day after the lockup period relative to an investor's bidding price in the IPO. RETAIL_FLIP_RESIDUAL is the residual value of regressing retail flipping on INITIAL_RETURN using IPO-level observations, where retail flipping on the first trading day after IPO is measured as the aggregate sale minus aggregate institutional sale, relative to the IPO allocation to retail investors. All other variables are defined in the appendix. *t*-statistics based on standard errors clustered by IPOs are in parentheses. ***, **, and * denote significance at the 1% 5%, and 10% level, respectively.

	Dependent Variable = FLIP_D1						
VARIABLES	1	2	3	4	5	6	7
INITIAL_RETURN	0.080***	0.079***	0.080***	0.078***	0.077***	0.077***	0.075***
	(6.19)	(6.14)	(6.23)	(6.04)	(5.76)	(6.17)	(5.57)
LOTTERY_DUMMY		-0.278***					-0.262***
		(-9.55)					(-8.91)
NO_LOCKUP_DUMMY			0.299***				0.276***
			(6.67)				(6.12)
$PE_{MARKET}\_PE_{IPO}$				0.192***			0.172***
				(5.25)			(4.74)
PRICE_TO_BID					0.007		0.004
					(0.49)		(0.27)
RETAIL_FLIP_RESIDUAL						0.117***	0.100**
						(2.92)	(2.52)
log(SUBSCRIPTION)	0.003	0.005	0.007	-0.021**	0.002	0.002	-0.013
	(0.29)	(0.52)	(0.82)	(-2.26)	(0.27)	(0.23)	(-1.38)
log(INSTI_SUBSCRIPTION)	-0.001	-0.007	-0.009	-0.002	-0.002	-0.000	-0.015
	(-0.09)	(-0.77)	(-0.92)	(-0.23)	(-0.18)	(-0.03)	(-1.63)
HIGH_UW_ REPUTE_DUMMY	-0.021**	-0.019*	-0.020**	-0.019**	-0.021**	-0.019*	-0.016
	(-2.06)	(-1.87)	(-2.04)	(-1.99)	(-2.06)	(-1.90)	(-1.64)
PRICE_REVISION	-0.044	-0.038	-0.042	0.020	-0.044	-0.035	0.029
	(-1.28)	(-1.12)	(-1.22)	(0.56)	(-1.27)	(-1.00)	(0.82)
MKTRET_PR3MON	-0.236***	-0.225***	-0.230***	-0.229***	-0.235***	-0.237***	-0.213***
	(-5.15)	(-4.95)	(-5.03)	(-5.25)	(-5.16)	(-5.23)	(-4.97)
log(ASSETS)	-0.014*	-0.014*	-0.013*	-0.027***	-0.013*	-0.012	-0.024***
	(-1.72)	(-1.77)	(-1.69)	(-3.73)	(-1.67)	(-1.52)	(-3.31)
log(FIRM_AGE)	0.00	0.002	-0.000	-0.002	0.001	0.000	-0.001
	(0.04)	(0.29)	(-0.06)	(-0.27)	(0.08)	(0.04)	(-0.09)
ROA	-0.173**	-0.180***	-0.156**	-0.232***	-0.168**	-0.162**	-0.204***
	(-2.53)	(-2.65)	(-2.29)	(-3.72)	(-2.42)	(-2.31)	(-3.24)
SOE_DUMMY	-0.008	-0.008	-0.007	-0.004	-0.008	-0.012	-0.008
	(-0.45)	(-0.49)	(-0.41)	(-0.24)	(-0.49)	(-0.71)	(-0.52)
TECH_DUMMY	0.034	0.032	0.034	0.055**	0.035	0.035	0.052**
	(1.35)	(1.27)	(1.33)	(2.37)	(1.39)	(1.40)	(2.22)
Year FF	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Investor FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	46,953	46,953	46,953	46,953	46,953	46,953	46,953
Adjusted R-squared	0.325	0.327	0.327	0.327	0.325	0.326	0.330

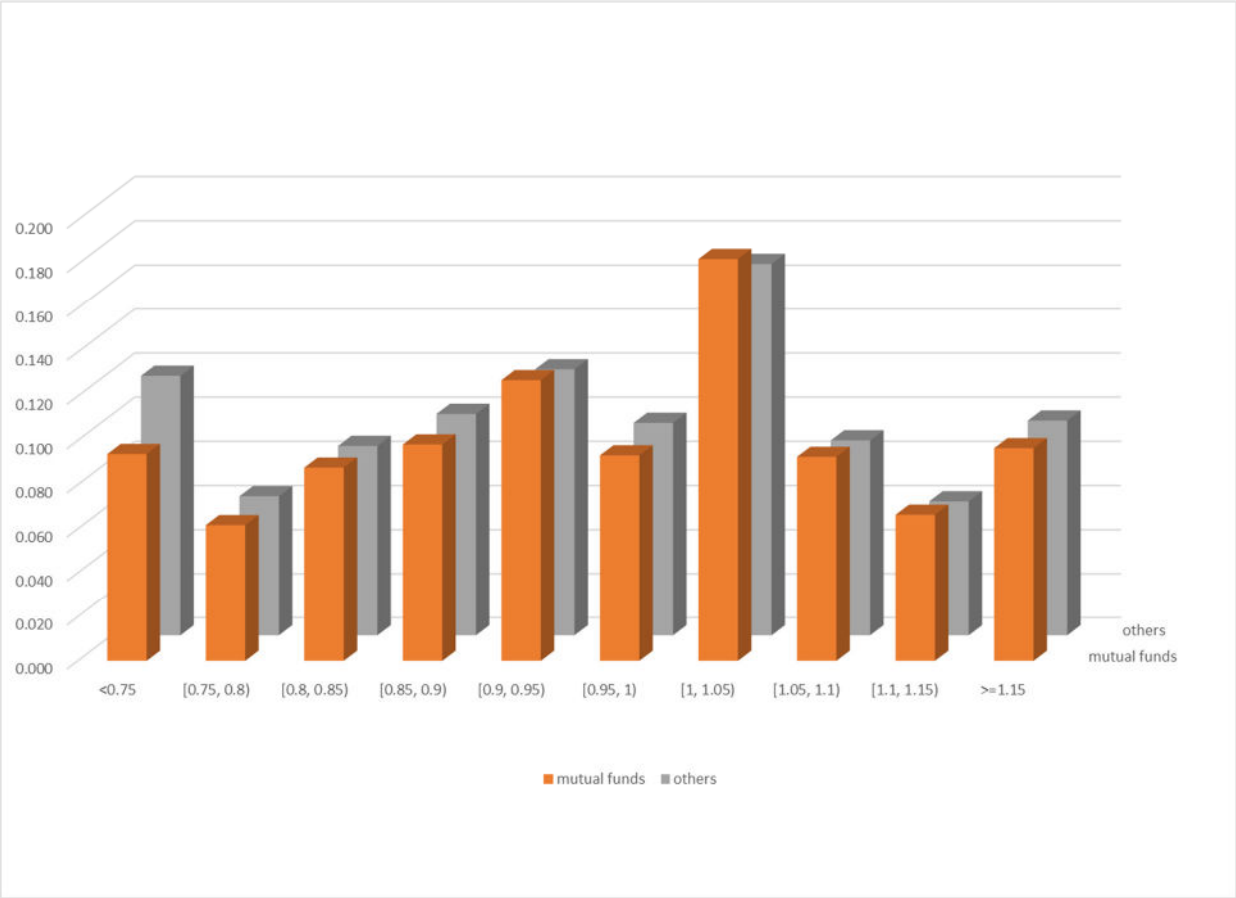
Table 12: STAR Market vs. Other IPOs

Table 12 reports mean values 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 in millions of RMB. LEVERAGE is total liabilities relative to assets. For the average P/E ratios on the STAR and GEM-new markets, we exclude companies with negative EPS before computing the means. All other variables are defined in the appendix. All the BHAR variables are significantly differently from zero at the 5% level. ***, **, 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		
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***
PE	67.38	21.89	35.34	21.74	45.50***	13.60***
INITIAL_RETURN (%)	160	171	237	228	-11	9
MONEY_LEFT_ON_TABLE (MM)	2115	1384	1756	1136	731	620**
BHAR3M (%)	-15.5	-19.7	-25.6	-14.4	4.2	-11.2**
BHAR6M (%)	-21.2	-26.5	-37.0	-22.9	5.3	-14.1**
BHAR1Y (%)	-28.0	-33.5	-39.8	-37.3	5.5	-2.5

Figure 1: Bid Distributions: Mutual Funds vs. Other Investors in the Auction Tranche

Figure 1 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. Log(Assets) is the natural logarithm of Assets.

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 that is not subject to binding price limits, 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 based on the first unconstrained closing market price. M/B for the IPO firm is its post-issue market value of equity relative to the 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.

FIRM_AGE: The number of days between the beginning of the IPO auction and the firm's founding date, divided by 365. Log(firm age) is the natural logarithm of firm age.

HIGH_UW_REPUTE_DUMMY: 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).

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.

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 and Shenzhen GEM (starting in August 2020) IPOs) are subject to a return limit of ±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 and Shenzhen GEM IPOs are not subject to any return limit in the first 5 trading days.

INSTITUTIONAL_SUBSCRIPTION: Demand divided by supply of shares in the offline auction tranche. Log(insti subscription) is the natural logarithm of institutional subscription.

LOTTERY_DUMMY: A dummy variable equal to one if allocation is by lottery among valid bids, and zero if the allocation is made on pro-rata basis.

MKTRET_PR3MON (%): The percentage return on the Shenzhen Stock Exchange Index during the 60 trading days before the IPO.

PE: 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 PE ratio that the regulatory cap is based on.

PEMARKET_PEIPO: The ratio of the aggregate P/E of the market relative to the IPO firm's P/E. The aggregate P/E of the market is the sum of all listed firms' market cap divided by the sum of their earnings.

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

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

RESTRICTED_DUMMY: A dummy variable 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.

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 variable 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 variable equal to one if the firm is listed on the Shanghai Stock Exchange.

SUBSCRIPTION: Demand divided by supply of shares in the online (retail) FPO tranche. log(SUBSCRIPTION) is the natural logarithm of SUBSCRIPTION.

TECH_DUMMY: A dummy equal to one if the firm is in a high-tech industry, similarly defined as in 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).

UNDERPRICING (%): Measured as INITIAL_RETURN.