NBER WORKING PAPER SERIES

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Working Paper 26815
http://www.nber.org/papers/w26815

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
March 2020

We thank workshop participants at the Chinese University of Hong Kong, Shenzhen, the Five Star Conference in Beijing, and PBC School of Finance for helpful comments and suggestions. The views expressed herein are those of the authors and do not necessarily reflect the views of the National Bureau of Economic Research.

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March 2020
JEL No. G15,G23

ABSTRACT

Using a comprehensive dataset of Chinese corporate bond issuances, we uncover substantial evidence of issuance overpricing: the yield spread of newly issued bonds at their first secondary-market trading day is on average 5.35 bps higher than the issuance spread. This overpricing is robust across subsamples of bond issuances with different credit ratings, maturities, issuance types, and issuer status. We further provide extensive evidence to support a hypothesis that competition among underwriters drives this overpricing through two specific channels—either through rebates to participants in issuance auctions or through direct auction bidding by the underwriters for themselves or their clients.

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Pricing in the primary markets of securities such as stocks and bonds reflects the efficiency of these markets and directly concerns issuers, investors, and regulators. The extensive literature on this important topic has found substantial evidence of underpricing in equity IPOs, e.g., Ritter (1987), Loughran and Ritter (2002), Ritter and Welch (2002), and Ljungqvist (2007). The literature often attributes this underpricing to premiums offered by issuers to compensate investors for the risks related to asymmetric information and adverse selection they face in purchasing IPOs. While the literature on the issuance pricing of corporate bonds, which we review later, is not as developed and is less conclusive, it mostly finds evidence of underpricing in corporate bond markets of developed economies and also attributes the underpricing to asymmetric information faced by bond investors. Is underpricing a universal phenomenon in security issuance, especially in security markets of emerging economies, which tend to have different institutional environments and underwriting mechanisms from the United States? This paper addresses this issue in China's corporate bond market.

As part of the government's effort to liberalize interest rates in China, China's corporate bond market has experienced rapid growth in recent years. By the end of 2018, outstanding corporate bonds in China reached 3.8 trillion USD, making it the second-largest corporate bond market in the world, just behind the United States, with 9.2 trillion USD in outstanding bonds and ahead of Japan's 0.7 trillion USD in outstanding bonds.[1] China's corporate bond market is different from the more developed U.S. market in several ways, as reviewed by Amstad and He (2019). First, it directly grew out of China's banking sector, with commercial banks as its major investors and underwriters. This means that bond issuance directly competes with bank loans for firms' financing needs. Second, debt securities issued in this market are mostly commercial paper and medium-term notes with an average maturity of 1.7 years, which is substantially shorter than that in the U.S. corporate bond market. Third, the bond default rate has been artificially low due to explicit or implicit government guarantees to bond issuers, as discussed by Zhu (2016). These differences make examining pricing in China's corporate bond market particularly interesting.

In China, firms can issue debt securities in two separate markets, one in the interbank market and the other in the exchange market, with the interbank market accounting for about 90% of bond

[1] According to SIFMA: https://www.sifma.org/resources/research/us-bond-market-issuance-and-outstanding/ and the Asian Development Bank: https://asianbondsonline.adb.org/economy/?economy=CN#data.

issuances in recent years. We collect a comprehensive dataset of 14,310 debt securities issued by 2,288 non-financial firms in 2015–2018 in the interbank market, including both bond IPOs and reissuances. In sharp contrast to pricing in the U.S. corporate bond market, we uncover strong evidence of overpricing in China's corporate bond market. The yield spread of a bond at its first secondary-market trade is, on average, 5.35 bps higher than its yield spread at the bond issuance, relative to the yield of a Treasury bond with similar maturity. Given the total issuance size in our sample of about 17 trillion RMB and an average bond maturity of 1.7 years, this overpricing implies substantial savings of around 4 billion RMB for bond issuers each year. Furthermore, this overpricing is robust across bonds with different characteristics, such as an IPO or non-IPO, maturity, underwriter type, and across issuers with different attributes, such as credit rating, size, and state ownership.

Why is pricing so different in China's corporate market? It is ultimately driven by the institutional setting of this market. Asymmetric information between issuers and investors is less of a concern, with banks serving as the major investors and underwriters in the market. Their underwriting activities make them well-informed of market conditions and the risks of individual bond issuers. The aforementioned low default rate in this market further alleviates the adverse selection problem, which is the key mechanism driving underpricing of security issuances in developed economies.

What has caused the pervasive overpricing in China's corporate bond market? Our main hypothesis is that competition among underwriters for underwriting business has led them to drive up the issuance price. The yield of a firm's bond issuance serves as a key indicator of the firm's debt financing cost, which not only measures the firm manager's performance but more importantly provides a publicly observed benchmark rate for its future bank loan financing (by far the most important financing channel for firms in China). For these reasons, bond issuers may care about a lower bond yield for new issuances more than a lower issuance fee, which in turn may lead underwriters to compete for issuance business based on lower issuance yields rather than lower underwriting fees. Consistent with this hypothesis, we find that a higher yield spread in the issuance of a bond (i.e., lower pricing) predicts a higher probability of the underwriter's being fired by the issuer from underwriting its future bond issuance. This finding directly links

overpricing with underwriters' incentives.[2]

To formally test the hypothesis, we identify two specific channels through which underwriters can influence the issuance price. In China's interbank market, there are typically one or two licensed underwriters, which are mostly commercial banks, who underwrite a bond issuance through a single-price auction. Only qualified institutions can bid in the auction, and bonds are allocated to the highest bidders. The underwriters are not only responsible for attracting qualified institutions to participate in the auction, but can also bid for themselves and their clients who are not qualified to directly bid.

The first channel that underwriters can use to influence the issuance price is a rebate they provide to winning auction participants. While the public cannot access data on the use of such underwriter rebates, it is so widely used that the regulator of the interbank market, the National Association of Financial Market Institutional Investors (NAFMII), issued a new regulation that took effect on October 1, 2017, to prohibit underwriters from using rebates, with the objective of promoting fair competition and transparency in bond issuances. In 2018, after this ban on underwriter rebates, the average overpricing in bond issuance dropped from 5.55 bps in 2017 to 1.72 bps.

This policy shock provides an opportunity to test the causal relationship between the rebate and overpricing, as implied by our main hypothesis, by using a difference-in-difference analysis to examine how the drop in issuance overpricing varied across different issuers and underwriters. As central state-owned enterprises (SOEs) are giant firms with the central government's implicit guarantees, they are more valuable than other firms, causing more intense competition among underwriters for their bond underwriting business. Consistent with this notion, we find that after the underwriter rebate ban, the drop in overpricing is significantly greater for bonds issued by central SOEs than those issued by other firms. Furthermore, we also find that the drop in overpricing is significantly smaller for bond issuances underwritten by the top four banks, which are the largest underwriters in the interbank market. This finding is consistent with the notion that these top underwriters face less competition and thus have less incentive to use rebates in bond

[2] It is common to measure a firm's cost of debt financing by the yield of its bond issuance rather than the yield from secondary market trading, due to the potential lack of liquidity in the secondary market. As a result, bond issuers desire a lower bond yield at issuance.

issuance. These significant difference-in-difference results support that underwriter rebates served as an important channel for underwriters to drive up bond issuance prices.

Interestingly, issuance overpricing remained significant even after the ban on underwriter rebates caused the overpricing to drop substantially. This observation motivates our analysis of the second channel—underwriters' direct bidding in an auction. By bidding more aggressively, underwriters can directly drive up the bond issuance price. Interestingly, underwriters on average acquired 42% of the bond issuances in our sample. We find a surprising pattern that underwriters tend to acquire more bonds in bond issuances with higher overpricing. This pattern is in sharp contrast to an alternative hypothesis that underwriters buy more at low prices to take advantage of their superior information about the issued bonds. Furthermore, we find that after an institution obtains the underwriting license, it tends to buy more in bond issuances underwritten by itself, at greater overpricing. These findings all support our main hypothesis that underwriters buy more to drive up issuance prices at the expense of themselves or their clients.

Our study contributes to three streams of the finance literature. First, our paper expands the literature on issuance pricing of corporate bonds. Cai, Helwege and Warga (2007), Goldstein and Hotchkiss (2009), Helwege and Kleiman (1998), and Hale and Santos (2007) document significant underpricing for IPOs and reissuances of both investment- and speculative-grade corporate bonds in the United States. However, Datta et al. (1997) find moderate overpricing in a sample of 18 IPOs of investment-grade bonds in the United States. There is also evidence of underpricing in the European Union bond markets, e.g., Zaremba (2014) and Wasserfallen and Wydler (1988). Different from other major corporate bond markets around the world, McKenzie and Takaoka (2008) and Matsui (2006) provide preliminary evidence of issuance overpricing in the Japanese bond market. It is perhaps not surprising that overpricing appears both in Japan and China, as the bond markets in both countries share important similarities including having banks as major investors and underwriters. Our analysis not only shows robust evidence of overpricing in China's corporate market but also provides extensive analysis of the mechanisms that lead to the overpricing, which is missing from the studies of overpricing in the Japanese market.

Second, our paper adds to the economic understanding of issuance pricing. The existing literature has mostly focused on two key mechanisms for security underpricing. One is information

asymmetry, e.g., Rock (1986), Allen and Faulhaber (1989), Grinblatt and Hwang (1989), Benveniste and Spindt (1989), Benveniste, Busaba and Wilhelm (2002), and Sherman and Titman (2002), while the other is liquidity, e.g., Ellul and Pagano (2006), and Booth and Chua (1996). Complementing these studies, our analysis provides extensive evidence for a different mechanism that generates issuance overpricing—underwriter competition. Datta, et al (1997) speculate that the overpricing found in their study of bond IPOs in the U.S. market could be driven by excessive competition among underwriters, but they do not provide evidence on either underwriter incentives or the channels.

Third, our paper also adds to the quickly growing literature on China's financial system. See the handbook edited by Amstad, Sun and Xiong (2019) for chapters on different segments of China's financial system and, in particular, the chapter of Amstad and He (2019) for an overview of China's corporate bond market. Ang et al. (2017) examine the pricing of municipal bonds in China and link the pricing to real estate and political risks. Chen, He and Liu (2018) argue that the rapid growth of China's corporate bond market is driven by the need of local government's financing platforms to roll over bank loans initially given during China's 4 trillion RMB post-crisis stimulus package. By exploring the different rules used by the interbank market and the exchange market for repo transactions, Chen et al. (2018) find that an increase in haircut requirement can have a substantial effect on firms' bond financing cost in China. Our paper shares the common theme of these papers in exploring important characteristics of China's corporate bond market, albeit with a distinct focus on issuance pricing.

The remainder of the article is organized as follows. Section I introduces the institutional background of China's interbank bond market. Section II summarizes our data, the methodology of defining overpricing, and the explanatory variables. Section III documents bond overpricing, and Section IV examines the underlying mechanisms. We conclude the paper in Section V.

I. Institutional Background

In this section, we provide a brief overview of key features of China's bond market and bond issuance institutions, which are directly related to our study.

A. Overview of China's corporate bond markets

China's bond market is comprised of both exchange and interbank bond markets. The interbank bond market is an over-the-counter wholesale market. In contrast, the exchange market is a retail market, in which individuals and small- and medium-sized institutions trade bonds through centralized trading platforms.

The interbank bond market was established in 1997 to provide an alternative to bank loans for firms to finance their investment. Bank loans had been Chinese firms' primary source of external financing. As a legacy of China's credit plan, banks had closely followed the benchmark lending rates announced by the People's Bank of China to determine the rates for bank loans, rather than based on market conditions and credit quality of the borrowers. To reform this key sector of China's financial system, the Chinese government adopted its usual strategy of dual-track reform by introducing a market track—i.e., the interbank bond market, which allows firms to issue corporate bonds to banks—to compete with the existing state track, i.e., the bank loan market.[3] That is, a firm can now choose to either get a bank loan directly from a bank or issue a bond in the interbank market, depending on which market offers a more attractive rate. This competition is aimed to make the bank loan market, which continues to be the primary channel of firm financing, more market driven. Different from a typical corporate bond market outside China, investors of corporate bonds in China's interbank market are primarily banks, because banks, as the initial financial institutions before other types of financial institutions were eventually introduced during China's economic reforms, hold most of the national savings, including those of households, firms and local governments. Due to this reason, the interbank market is the dominant market for bond issuance and trading in China.

As Figure 1 shows, the interbank market accounted for nearly 100% of new bond issuances in 2010. While the market share of the interbank market dropped in more recent years due to the

[3] See Song and Xiong (2018) for a discussion of China's dual-track reforms and Ma and He (2019) for a review of China's interest rate liberalization.

development of the exchange market, it remained above 88% even at its lowest point in 2016 and bounced back to 90% in 2018. Due to the dominance of the interbank market, this paper focuses on corporate bond issuance in the interbank market.[4] As a wholesale market, only qualified institutional investors including commercial banks, mutual funds, insurance companies, and security firms can participate in the interbank market. The total number of interbank market members reached 6,543 in December 2018. The People's Bank of China (PBC), the central bank in China, oversees the interbank market. Under the guidance of the PBC, the NAFMII is responsible for formulating rules to govern institutional participants in the interbank market.

There are three major categories of fixed-income securities in China's interbank market based on issuing entities: government bonds, financial bonds, and non-financial corporate bonds. In this paper, we focus on non-financial corporate bonds issued by non-financial firms.[5] Figure 2 shows the issuance size of different types of non-financial corporate bonds for each year in 2009–2018. The total annual issuance size has grown substantially, from around 1 trillion RMB in 2009 to 5.5 trillion RMB in 2018; commercial paper and mid-term notes account for about 90% of all issuances. Our sample is comprised of commercial paper and mid-term notes.

B. Corporate bond issuance

To issue a debt instrument in the interbank market, an issuer must register the instrument with NAFMII following its *Rules on the Registration for Issuance of Non-Financial Enterprises Debt Financing Instruments in the Interbank Bond Market*. The issuance takes the form of book building, which is a standard single-price auction. The issuer usually hires one, and sometimes, two underwriters. NAFMII has issued licenses to 55 underwriters, which are listed in Appendix I. The

[4] In the exchange market, there is a long waiting period between the bond issuance and the secondary market trading. This period varies from one week to three months and is, on average, about 45 days in our sample period. Due to the potential bond price fluctuation during this long waiting period, it is difficult to precisely measure the issuance overpricing. This difficulty also motivates us to exclude bonds issued in the exchange market from our analysis.

[5] Financial bonds are mainly issued by large commercial banks that have implicit government guarantees. Since major investors and underwriters in the primary market are also the same group of commercial banks, financial bonds have very different characteristics compared to non-financial bonds.

initial 24 underwriters that obtained their licenses before 2010 included all of the large banks in China—the five state banks (Industrial and Commercial Bank of China, Agricultural Bank of China, Bank of China, China Construction Bank, and Bank of Communications), the two development banks (China Development Bank and the Import-Export Bank of China), and all of the so-called joint stock commercial banks (such as China Merchant Bank and Ping An Bank). There were only two non-bank institutions on the initial list of underwriters, CITIC Securities and China International Capital Corporation. This list of underwriters was gradually expanded to include more smaller banks and more securities firms, including subsidiaries of three non-Chinese banks, HSBC Bank (China), Standard Chartered Bank (China), and BNP PARIBAS (China). NAFMII also authorized 77 other financial institutions to participate in issuance auctions. In a bond issuance, the underwriter is responsible for not only attracting investors based on the book building needs of the issuance but also participating in the auction to bid the issued instruments for their own accounts or for their clients who are not qualified to directly participate in the auction. The other qualified participants may also bid for unqualified investors.

Figure 3 provides a timeline to illustrate key steps of the book building process. Prior to book building, the issuer and the underwriter sign a letter to confirm the price range for book building. After that, the underwriter contacts potential investors to participate in the auction. One day before the book building day, the underwriter sends a formal subscription statement to participating institutions and publishes the statement to the public. The subscription statement includes major terms of the bond being issued, the interest rate range of the bond, the subscription timeline and procedure, placement and payment terms, and the designated payment account.

On the book building day, a single-price auction is held, in which all participating institutions submit sealed bids of rate-quantity pairs that specify the amount to be purchased at a specified minimum yield to the underwriter. The clearing price is identified by equating the aggregate demand submitted by all bidders to the total issuance amount. All winning bidders pay the same price. The bond is settled on the following day. Secondary market trading starts on the first

business day after the settlement is complete. The auction yield is disclosed to the market before the first day of the secondary market trading.

II. Data and Overpricing Measures

A. Data sample

Our data sample includes all commercial papers (CP) and mid-term notes (MTN) issued by non-financial firms in China's interbank market from 2015 to 2018.[6] Note from Figure 1 that the volume of bond issuance was relatively low before 2015. For simplicity, we will use the term "corporate bonds" to refer to these two types of debt securities throughout the paper. Bond characteristics and issuer information, including issuance size, issuance date, maturity date, bond rating, the issuer's credit rating, and the issuer's location, are from WIND, a data vendor, and the China Foreign Exchange Trade System (CFETS). Price data for bond trading in the secondary market are obtained from WIND and Choice.[7] Information from various datasets are cross-checked and verified. Taken together, our sample covers 14,310 bonds issued by 2,288 firms, with a total issuance size of over 17 trillion RMB.

To complement the above data, we also collect detailed book building data of 8,514 bonds issued between January 2015 and February 2018 from NAFMII.[8] This dataset contains the complete allocation of bond issuances to each winning bidder. In total, the sample includes 44,080 successful bids from 100 authorized institutional investors (the joint set of licensed underwriters and qualified institutions). Specifically, this dataset covers the quantity of bonds acquired by the

[6] As shown in figure 2, CP and MTN account for about 90% of all non-financial corporate bonds issued in the interbank market. The rest include either private placement notes (PPN) and asset-backed notes (ABS). We exclude PPN and ABS from our analysis because PPN is not issued through auction process and ABS is fundamentally different from CP and MTN.

[7] Choice is a data platform operated by the East Money Information Co., Ltd, a leading financial and stock information website provider in China.

[8] The data from NAFMII contain book building information for all CP and MTN issued during January 2016–February 2018, and about 60% of the CP and MTN issued in 2015.

underwriter in each bond issuance.

B. Overpricing measure

Following the bond literature, e.g. Lou, Yan and Zhang (2013), we use two measures of issuance overpricing in this paper. The first is the spread change from issuance to the first trading day, i.e., the first day that a trade occurs in the secondary market.[9] The bond spread is defined as the difference in yield between a given corporate bond and the risk-free rate of similar maturity.[10] A bond's issuance spread change is then calculated as the spread difference between the first trading day and the issuance as follows:

$$\Delta\text{Spread} = \text{Spread}_{\textit{first trade}} - \text{Spread}_{\textit{issuance}} \qquad (1)$$

As bond yield is negatively related to bond price, a positive spread change implies that the bond is overpriced at issuance relative to the trading price in the secondary market.

Similar to the U.S. corporate bond market, a bond's first secondary-market transaction may not occur on its first trading day due to illiquidity of the secondary market. To alleviate the concern about noise being induced by the potentially long delay in the first secondary-market trade, we follow Cai, Helwege and Warga (2007) to require that the sample only includes bonds that have at least one trade within seven calendar days from the first trading day, i.e., five trading days if there is no holiday during the week. This requirement only modestly reduces our sample from 14,310 bonds to 13,787 bonds issued by 2,248 firms, among which 13,618 bonds are traded on their first trading day.

We also use a second measure of issuance overpricing by a bond's excess return from its issuance to the first trading day. We first calculate the bond's raw return as

[9] As the first trade may take place a few days later, the first trading day is not necessarily the first day after the issuance that the market is open.

[10] The Chinese Treasury bond yield indices are used as the risk-free rate. We use spread change instead of yield change to measure overpricing to alleviate the concern that overpricing could be driven by the risk-free rate change. In fact, the magnitude of the risk-free rate drift is marginal. All our results hold if we use yield change.

$$\text{Ret}_i = (P_{i,T} - P_{i,t}) / P_{i,t} \qquad (2)$$

where Ret_i is the cumulative raw return of bond *i* that is issued on day t and then first traded on day *T*. The price $P_{i,T}$ is the sum of the flat price and accrued interest and $P_{i,t}$ is the issuance price. We then adjust the raw return by benchmarking it to the corresponding benchmark return of the CSI Corporate Index with the same credit rating.

These two measures are closely related to each other because bond price appreciation is equal, by first-order approximation, to the negative yield change multiplied by bond duration. Nevertheless, the values of the two measures offer different economic interpretations. As bond yield often serves as an indicator of the issuer's cost of debt financing, the yield spread change from issuance to the first secondary-market trade measures issuance overpricing through the reduction in the issuer's cost of debt financing per year. The negative value of the excess bond return from issuance to the first trade reflects the net loss to investors who acquire the bond at issuance.[11] The two measures provide similar results in our analysis.

C. Summary statistics

Table 1 provides summary statistics of bond issuance in our sample. Panel A shows that the bond issuance totals 16.4 trillion RMB (about 2.4 trillion USD) from 2015 to 2018. More than 36% of the bonds are underwritten by the "big-four" state-owned commercial banks, while less than 9% of bonds are underwritten by the security firms.[12] Panel B reports characteristics of the bonds in

[11] Due to the limited availability of bond market indices in China, neither of these measures is perfect. Ideally, we would like to benchmark each bond to a corporate bond market index with the same maturity and the same credit rating so that the index controls for both the bond's term and credit premia. However, we are not able to match each bond in our sample with such a precisely-matched index. Instead, we use a Treasury yield index with a similar maturity to compute the yield spread change, and a corporate bond index with the same credit rating (albeit not necessarily the same maturity) to calculate the excess return.

[12] In 1995, the Chinese government introduced the Commercial Bank Law to commercialize the operations of the four state-owned banks: the Bank of China, the China Construction Bank, the Agricultural Bank of China, and the Industrial and Commercial Bank of China. These four banks are commonly referred as the "big-four," and their assets account for 40% of China's banking sector. When a bond has more than one underwriters, we define the bond is underwritten by the big-four banks (security firms) if at least one of the underwriters is a big-four bank (security firm).

our sample. These bonds have an average maturity of 1.69 years with an average issuance size of 1.2 billion RMB. Different from the U.S. bond market, debt securities issued in China's bond market tend to have shorter maturities. Moreover, 84% of bonds are issued by firms that have issued bonds in the previous year. All the bonds are rated as one of the following five categories: AAA, AA+, AA, AA-, and A+. The median rating is AA+.[13] Panel C reports characteristics of bond issuers in our sample. Generally, the issuers are large firms with a mean (median) total asset of 147 (23) billion RMB. They have an average leverage ratio of 0.65 and an average ROA of 3%.

Panel D summarizes the share of newly issued bonds directly acquired by underwriters. Each bond issuance usually has one to two underwriters. We construct a variable *Underwriter Share*$_j$ by aggregating the share purchased by all underwriters in the issuance of bond j. An underwriter may purchase the bond either for its own account or on behalf of its clients. This variable serves as a proxy for the strength of underwriter support, as a larger share purchased by the underwriters reflects a greater effort by underwriters to boost the issuance price. Interestingly, in our sample, underwriters on average purchased 42% of the newly issued bonds. This large share makes underwriters' direct bidding a potentially important channel for issuance overpricing, which we will examine in section IV.B.

III. Issuance Overpricing

We use the spread change, ΔSpread, as the primary measure of bond issuance overpricing. In Table 2, Panel A, we present summary statistics of ΔSpread, which has an average of 5.35 bps and is statistically significant. This positive spread change indicates that corporate bonds tend to be overpriced at issuance relative to their secondary-market trading prices.

We also examine the spread change in a longer period after the issuance to determine whether there is any price reversal after the first secondary-market trade. We calculate the $\Delta\text{Spread}_{15\ days}$,

[13] See Amstad and He (2019) for a detailed discussion of heavy concentration of Chinese corporate bonds in these highly-rated categories.

which is the difference between the yield spread of a new bond on the fifteenth calendar day after its issuance and its issuance spread. If the bond is not traded on the fifteenth calendar day, we use the spread of the closest trading day within a five-day window centered on the fifteenth calendar day. The mean of $\Delta\text{Spread}_{15\ days}$ is 7.65 bps and is statistically significant. We further calculate the difference between $\Delta\text{Spread}_{15\ days}$ and ΔSpread for each bond, which requires the existence of both $\Delta\text{Spread}_{15\ days}$ and ΔSpread. The mean difference between $\Delta\text{Spread}_{15\ days}$ and ΔSpread is 1.73 bps, which is statistically significant and indicates a further downward drift in the bond price after the first trade. The lack of any reversal of the downward price drift after the first trade shows that issuance overpricing measured by the spread change of the first trading day is robust.

In Panel B, we further use the excess return as a measure of issuance overpricing. The average first trading day excess return reaches −8.0 bps and is statistically significant. Meanwhile, the fifteenth calendar day excess return is −11.26 bps. These negative excess returns are consistent with the positive spread changes shown in Panel A and confirm overpricing of the bonds at issuance.

Next, we examine how the bond issuance overpricing varies across bonds and across issuers with different characteristics. We report summary statistics of spread change in Table 3. In Panel A, we group the bonds in our sample based on their credit ratings. Issuance overpricing is present in all rating groups, with the AAA group having the highest overpricing of 6.38 bps and the AA+ group having the lowest overpricing of 4.26 bps, which is nevertheless highly significant.

In Panel B, we group bonds according to their maturities within each rating group. The summary statistics show that all maturity groups exhibit overpricing. For instance, among AAA bonds, those with maturities less than one year have an average overpricing of 8.41 bps, while those with maturities longer than two years have an average overpricing of 1.82 bps. Both are statistically significant. In Panel C, we split each rating group into two equal subgroups based on the bond issuer's total assets. Issuance overpricing is present in each subgroup with roughly the same magnitude.

In Panel D, we explore how overpricing varies across the issuer's issuing history. If a firm has not previously issued any bond in the interbank market, we denote the firm's bond issuance as an IPO issuance. There is significant overpricing in both issuance groups. The non-IPO issuance group has an average overpricing of 5.50 bps, while the IPO-issuance group has an average overpricing of 3.41 bps.

In Panel E, we partition bonds into two subgroups by whether the bond issuer is a state-owned enterprise directly controlled by the central government (hereafter, central SOE).[14] There are over 100 central SOEs, such as PetroChina, China Telecom, China National Cereals, Oils and Foodstuffs Corporation. Central SOEs are often the largest and most strategically important firms in China, which have implicit guarantees from the central government. In 2017, central SOEs had a combined asset of 168.6 trillion RMB (24.4 trillion USD), and revenue of more than 23.4 trillion RMB (3.6 trillion USD).[15] Given the strength of these firms and their low credit risk, they are often regarded as the most valued clients for underwriters. Interestingly, bonds issued by central SOEs are associated with higher issuance overpricing. For instance, those issued by central SOEs have an average overpricing of 9.94 bps, substantially higher than the overpricing of 4.88 bps in bonds issued by other firms. This large difference is consistent with an argument that bond underwriters compete hard for bond issuance of central SOEs, which we will further explore in our subsequent analysis.

In Panel F, we partition bonds into subgroups by whether the bond is underwritten by the big-four banks, and whether the bond is underwritten by security firms. The big-four state banks are the largest underwriters in the interbank market and have underwritten more than 36% of the bonds in our sample. This panel does not show any significant difference between the overpricing of bonds underwritten by the big-four state banks and other underwriters. However, our later analysis will show that after controlling for bond rating, the overpricing of bonds underwritten by the big-

[14] The state-owned Assets Supervision and Administration Commission, a special commission of the State Council, oversees central SOEs.

[15] Sources: Xinhuanet "China's central SOEs deliver strong performance," March 9, 2017.

four banks is lower than those underwritten by other institutions. This is because the majority of bonds underwritten by the big-four state banks are AAA bonds and AAA bonds tend to be more overpriced than other bonds. This panel also shows that bonds underwritten by security firms are associated with lower issuance overpricing, which is consistent with the fact that security firms tend to have less capital than banks to offer rebates and purchase bonds in bond issuance.

Panel G presents the magnitude of overpricing in each year of our sample. The overpricing is positive and significant in 2015, 2016, 2017, and 2018, with an average value of 7.03 bps, 7.82 bps, 5.55 bps, and 1.72 bps, respectively. The sharp drop in issuance overpricing in 2018 is related to a government regulation change regarding the use of underwriter rebates which occurred on October 1, 2017, which we will discuss in detail in Section IV.

Taken together, Table 3 shows there is significant overpricing in corporate bond issuance in China and that this overpricing is robust across time, bonds, and issuers with different characteristics. Table 4 reports summary statistics of issuance overpricing by using excess returns of the first secondary-market trading day as the overpricing measure. The cross-sectional patterns are fully consistent with those in Table 3.

IV. Economic Mechanisms

What has caused overpricing in bond issuances? We focus on competition among underwriters to form our main hypothesis.

> **Main hypothesis:** To compete for underwriting business, underwriters may engage in a game of driving up bond prices (i.e., driving down bond yields) at issuance relative to the secondary market prices.

Overpricing at issuance is beneficial to the issuer for at least two reasons. First, it directly reduces the issuer's issuance cost. As shown by Table 2, the magnitude of issuance overpricing is in the range of 5–10 bps. This issuance overpricing effectively reduces the underwriting fee, which is

around 30 bps in China's bond market.[16] Second, and perhaps more importantly, as bond yield at issuance is often regarded by regulators and the public as a salient measure of the issuer's financing cost, it serves as a performance measure of the issuer. Our interviews with the practitioners indicate that the issuer can use the yield from its bond issuance to bargain with banks about the interest rates of its future bank loans, the initial motivation for the Chinese government to develop the interbank bond market. This latter reason makes a lower yield at issuance more desirable to the issuer than simply a lower underwriting fee.

A bond issuer usually taps into the bond market repeatedly. There are 55 licensed underwriters competing for underwriting business. If a bond issuance does not meet the issuer's expectations, the issuer could replace its current underwriter with another one for its future bond issuances. Therefore, competitive pressure may drive underwriters to strive for lower issuance yields. We first test this competition effect by exploring the connection between an underwriter's current underwriting performance, measured by issuance overpricing, and its probability of being replaced by the issuer in its next bond issuance.

Specifically, we measure the performance of an underwriter in a bond issuance by comparing the issuance spread to a benchmark spread—the average issuance spread of all comparable bonds in the interbank market.[17] Intuitively, issuers prefer a lower issuance spread relative to the benchmark spread. Thus, we construct an indicator variable $Underperformed_{i,n}$, which equals 1 if issuer i's n^{th} bond issuance spread is larger than its benchmark spread, and 0 otherwise. We also define an indicator variable $Switch_{i,n+1}$ to measure a change of underwriter. $Switch_{i,n+1}$ is equal to 1 if issuer i replaces all the underwriters for its $n+1^{th}$ issuance after the n^{th} issuance, and 0 otherwise. We run a logit regression with the underwriter switch dummy $Switch_{i,n+1}$ as the dependent variable and the indicator variable, $Underperformed_{i,n}$, as the main explanatory variable. We use various bond and issuer characteristics as controls. The bond-level controls include issuance amount,

[16] As the underwriting fee is not reported to the public, our data do not cover the underwriting fee for each issuance. Our interview with the practitioners and regulators suggest that underwriters sometimes also compete by reducing their underwriting fee, even though it is not encouraged by the regulators. The regulators tend to discourage excessive competition in driving down underwriting fees.

[17] Comparable bonds must meet three conditions: (1) it must have the same rating as the referenced bond; (2) the maturity difference between a comparable bond and the referenced bond must be less than one month; and (3) a comparable bond must be issued within a one-month window before the issuance of the referenced bond.

subscription ratio, maturity, and secondary market liquidity, which is measured by the logarithm of the total trading volume of the bond in the first month after issuance, an IPO dummy, whether the issuer was issuing bond for the first time in the interbank market, and credit rating. The issuer-level controls include leverage, ROA, and the logarithm of firm book asset, sales, and cash holdings.

In columns (1) and (2) of Table 5, the coefficient of $Underperformed_{i,n}$ is positive and statistically significant, without and with the firm and bond characteristics being included as controls. This coefficient is also economically significant. Taking column (1) for example, the estimate for the coefficient of $Underperformed_{i,n}$ implies that if the current issuance underperforms the comparable issuances, the probability of the underwriter being replaced will increase by about 7.8% in the next bond issuance. Column (3) adds the independent variable $Underwriter\ Share_{i,n}$, the share of bonds acquired by the underwriter in issuer i's n^{th} issuance, to the right-hand side of the regression. The coefficient of $Underperformed_{i,n}$ remains positive and significant, while the coefficient of $Underwriter\ Share_{i,n}$ is negative, indicating that the underwriter's bond acquisition reduces its chance of being replaced in the next issuance.

Taken together, Table 5 shows that bidding up bond prices and acquiring larger bond positions in issuance are associated with lower probability of the underwriter being replaced in the subsequence bond issuance. This association is consistent with the competition effect posited by our main hypothesis. However, one might argue that this association may be driven by omitted variables unrelated to competition between underwriters. To address such a concern, we will examine the cross-section of issuance overpricing and the channels through which underwriters may drive issuance overpricing.

Our main hypothesis implies that overpricing may vary across issuers and underwriters. As underwriters have greater incentives to compete for more-valuable bond issuers, such as central SOEs, our hypothesis predicts that issuance overpricing is greater for bonds issued by central SOEs, as already shown by summary statistics reported in Panel E of Table 3. Furthermore, as more

secured underwriters, such as the big-four state banks, are less exposed to competition from other underwriters, our hypothesis predicts that issuance overpricing is smaller for bonds with more-secured underwriters. We shall further explore these cross-sectional predictions of our hypothesis.

There are two potential channels for an underwriter to drive up the issuance price: one is to provide a rebate to other participants of the auction as compensation for their overbidding, and the other is to directly overbid through its own account beyond its investment demand. We shall further examine the relevance of these channels below.

Since the goal of an underwriter is to drive down the issuance cost for the issuer, which is directly measured by the spread change, we report regression results from using the spread change as the primary measure of issuance overpricing in the subsequent analysis. We also report parallel results from using the excess return as the secondary measure in the Internet Appendix.

A. The underwriter rebate channel

Anecdotal evidence suggests that it is a common practice in the interbank market for underwriters to provide rebates to successful bidders to attract more-qualified institutions to participate in issuance auctions and bid more aggressively. Although underwriter rebate can directly lead to overpricing in bond issuances, we face a data-availability challenge in that underwriters do not have to report the rebates to either market participants or regulators. In addition, we also face the usual identification concern that rebates might be correlated with unobserved determinants of bond issuance pricing.

On September 1, 2017, China's interbank market regulator, NAFMII, issued a new regulation that requires underwriters to stop using any form of rebate in the book building process (NAFMII 2017). This regulation took effect on October 1, 2017. According to NAFMII, the purpose of this regulation is to promote fair competition and transparency in the bond issuance process. This ban on underwriter rebates provides a natural experiment, which is exogenous to any bond issuance, yet has cross-sectional implications for issuance outcomes.

Figure 4 depicts quarterly bond issuance overpricing from 2015 to 2018. It shows that overpricing dropped significantly after the ban on underwriter rebates, from roughly 6 bps in the third quarter to 0 in the fourth quarter of 2017, before it bounced back to around 1–2 bps. The sharp drop in issuance overpricing after the policy shock confirms the relevance of underwriter rebates in driving issuance overpricing.

Nevertheless, one may still argue that the drop in issuance overpricing might be caused by unobservable factors other than underwriter rebates. To fully examine this issue, we adopt a difference-in-difference method to examine how this policy shock affected issuance overpricing across different bond issuers and across different underwriters. As implied by our main hypothesis, we expect bonds issued by central SOEs, which are more valuable issuers to underwriters, to have greater issuance overpricing before the policy shock and thus greater reductions in overpricing after underwriter rebates were prohibited. Similarly, we also expect bonds with more-secured underwriters, such as the big-four state banks, to have less issuance overpricing before the policy shock and thus to have smaller reductions in overpricing after the underwriter rebate ban. We specifically test each of these two predictions around the policy shock below.

Reduction in overpricing across issuers

As discussed earlier, central SOEs are strategically important firms with implicit guarantees from the central government and are thus underwriters' most valued clients. Consequently, underwriters may compete harder for the underwriting businesses of central SOEs by offering higher rebates to attract participants in auctions of bonds issued by central SOEs before the underwriter rebate ban. We use central SOEs as the treatment group and other firms as the control group. We expect the ban on underwriter rebates to generate a greater reduction in the overpricing of bonds issued by central SOEs. To test this prediction, we conduct a difference-in-difference analysis in a twelve-month window around the policy shock, controlling for a host of bond and issuer-level characteristics, as specified below:

$$\Delta \text{Spread}_{i,t} = \theta_0 + \theta_1 \text{Treat}_i + \theta_2 \text{Post}_t + \theta_3 \text{Treat}_i \times \text{Post}_t + \sum \theta_m \text{Control}_{m,i,t} + \varepsilon_{i,t} \qquad (3)$$

where Treat_i is an indicator that equals 1 for bonds issued by central SOEs and 0 otherwise, while Post_t is an indicator that equals 1 in the months following the policy shock and 0 otherwise. Like the regression analysis reported in Table 5, we use the same set of bond and issuer characteristics as controls.

Table 6 reports the results in columns (1) and (2), without and with the control variables, respectively. The coefficient of Treat_i is positive, indicating that bond issuance by central SOEs is associated with greater overpricing before the underwriter rebate ban. More important, the difference-in-difference estimate, i.e. the coefficient of $\text{Treat}_i \times \text{Post}_t$, is significantly negative, confirming that issuance overpricing of bonds issued by central SOEs dropped more after the ban on underwriter rebates than bonds issued by the control group, by 7.2 bps without including the controls and by 6.2 bps after including the controls. Also note that some of the control variables are highly significant. For example, more subscription is associated with lower overpricing, while issuers with larger size tend to have larger overpricing.

One caveat of the analysis reported above is that bond issuance is endogenous and the composition of issuers might have changed after the policy shock. As the control variables may not be sufficient to measure the composition change, one might be concerned that the difference-in-difference measure might be biased. To address this concern, we further take advantage of another interesting feature of China's interbank market: bond issuers can register bond issuances with NAFMII in multiple installments. These bonds usually have the same terms and ratings, along with many other characteristics as stated in the registration documents. The change in the overpricing of pre-registered sequential bond issuances by the same issuer allows us to control for the potential change in the composition of bond issuers.

Specifically, we construct a subsample of pre-registered sequential issuances that spanned the ban on underwriter rebate. This subsample of sequential issuances is slightly less than half of the

full sample, containing 1,481 or 1,445 bond issuances for the regressions without or with controls. Columns (3) and (4) report the regression results from using this subsample. The difference-in-difference estimate remains significantly negative with magnitudes very similar to when we use the full sample. The control variables also have similar estimates as those of the full sample.

Reduction in overpricing across underwriters

Next, we examine the different impacts of the ban on issuance overpricing across underwriters. We use the big-four state banks as the treatment group. As discussed earlier, the big-four banks are the largest underwriters in the interbank market and have underwritten more than 36% of the bonds in our sample. Since these four banks have extensive connections with institutional investors, they are less likely to resort to excessive rebates to compete for underwriting business. Therefore, we expect the ban on underwriter rebate to have a smaller impact on the overpricing of bonds underwritten by the big-four banks.

We continue to use the regression specification in model (3) with the treatment group dummy Treat being equal to 1 if the bond is underwritten by a big-four bank and 0 otherwise. Like before, we conduct a difference-in-difference analysis in the twelve-month window around the policy shock, using both the full sample and the subsample of sequential issuers. Table 7 reports the results. The difference-in-difference estimate is significantly positive in all specifications, confirming that the ban on underwriter rebates has a smaller impact on issuance overpricing of bonds underwritten by the big-four banks. Taking the coefficient in column (4) for example, we see the impact of the ban on issuance overpricing of bonds underwritten by the big-four state banks is 2.3 bps smaller than that of bonds underwritten by other underwriters.

Taken together, Tables 4 and 5 provide cross-sectional evidence from the ban on underwriter rebate to support underwriter rebate as an important channel for underwriters to drive bond issuance overpricing in China. Interestingly, Figure 4 and Table 3 show that even after the ban on underwriter rebates, issuance overpricing, while largely reduced, remained significant in 2018, suggesting that additional channels are at work. Thus, we examine another channel—underwriters'

direct bidding—in the next subsection.

B. The underwriter bidding channel

In addition to using rebates, underwriters can directly bid in the auction either for their own accounts or for their clients who are not qualified to bid. As most of the underwriters are large commercial banks, they have large amounts of capital to invest in corporate bonds. Thus, by bidding aggressively, they may drive down the bond yield at issuance. This feature makes bond issuance in China different from that in the United States, where underwriters are not allowed to directly engage in buying securities in the book building process. Interestingly, in our sample, underwriters on average purchased 42% of the newly issued bonds. This large share makes underwriters' direct bidding a potentially important channel driving issuance overpricing.

Underwriter purchase

We first summarize how overpricing varies across bonds acquired in issuance auctions by qualified investors without an underwriting license and bonds acquired by licensed underwriters for bonds. As underwriters may have an information advantage over other participants in the auctions, the usual profit maximization motives would imply lower overpricing in their bond acquisitions, especially in bonds they underwrite. In contrast, our main hypothesis implies that in order to bid up issuance prices in bonds they underwrite, overpricing might be higher in bonds acquired by licensed underwriters, especially in bonds they underwrite.

Table 8 reports the average overpricing in three portfolios of newly issued bonds: 1) new bonds acquired by qualified investors, 2) new bonds acquired by licensed underwriters but underwritten by others, and 3) new bonds acquired by licensed underwriters that they underwrite. We first calculate the average overpricing for each institution (qualified investor or licensed underwriter) and then take the average across the institutions in each category. The first row uses an equal-weighted average, while the second row uses a value-weighted average.

Interestingly, overpricing in Portfolio 3 is significantly higher than that in Portfolio 1 by 2.42 bps in the equal-weighted average and by 3.09 bps in the value-weighted average. This difference contradicts the hypothesis that underwriters use their information advantage to acquire new bonds. Instead, it supports our main hypothesis that underwriters bid in issuance auctions to drive up prices. The overpricing in Portfolio 3 is also significantly higher than that in Portfolio 2 by 1.32 bps in the equal-weighted average and by 2.1 bps in the value-weighted average. This difference further shows that underwriters do not profit from bidding in bonds they underwrite.

We further explore the relationship between issuance overpricing in each bond issuance and the share acquired by its underwriter in the auction. *Underwriter Share* serves as a proxy for the strength of underwriter support, as a larger share purchased by underwriters reflects greater underwriter effort to drive down the yield. Thus, our main hypothesis predicts a positive correlation between *underwriter share* and issuance overpricing, while the alternative hypothesis that underwriters bid to take advantage of their superior information predicts a negative correlation.

We examine this relationship by using the following regression:

$$\Delta\text{Spread}_j = \theta_0 + \theta_1 \textit{ Underwriter Share}_j \text{ or } \textit{Underwriter Dummy}_j + \sum\theta_m \text{Control}_{m,i} + \varepsilon_j \qquad (4)$$

Table 9 reports the results. Columns (1) and (2) show that the coefficient of *Underwriter Share* is positive and statistically significant, without and with controlling for the same list of bond and issuer characteristics used in the earlier analysis. This positive relationship is inconsistent with the information advantage hypothesis and instead supports our main hypothesis that underwriters may bid up the issuance price by purchasing more in the auction. Given that *Underwriter Share* has an average value of 42% and ΔSpread has an average of 5.35 bps, the coefficient of 3.076 estimated in column (2) implies that about 25% of issuance overpricing may be related to the underwriters' purchases.

One might argue that the magnitude of *Underwriter Share* is contaminated by underwriters bidding for their clients. For robustness, we also construct an alternative indicator variable, *Underwriter Dummy*$_j$, which equals 1 if the underwriters engage in purchasing a positive amount

in the auction (i.e., *Underwriter Share*$_j$ is greater than 0) and 0 otherwise. Columns (3) and (4) report regression results from using this alternative measure, *Underwriter Dummy*$_j$, to replace *Underwriter Share*$_j$. The coefficient of the alternative measure *Underwriter Dummy*$_j$ remains positive and significant, again confirming a positive relationship between underwriter purchases and issuance overpricing.

Difference-in-difference analysis

Ten institutions obtained their underwriting licenses during our sample period,[18] as shown in Appendix I. We refer to these institutions as switchers. As the process of applying for an underwriting license in China is long and uncertain, it is reasonable to treat the approval of a license application as independent of a particular bond that the institution bids for its own account or its clients. The changes in the bidding behavior of these ten institutions after obtaining their underwriting licenses thus make a nice setting to further test our main hypothesis.

We pool together a sample of bond issuances that are purchased by all institutional investors, including the ten switchers during our sample period. This sample allows us to focus on the changes in the bidding behavior of the switchers. As extensively discussed by Bertrand and Mullainathan (2003), Bertrand, Duflo and Mullainathan (2004), and Roberts and Whited (2012), the following regression model with institution fixed effects and time indicators in staggered license status is equivalent to the standard difference-in-difference research design:

$$\Delta\text{Spread}_j \text{ or } \textit{Share Purchase}_{k,j} \qquad (5)$$
$$= \theta_1 \textit{Status}_{k,j} + \theta_2 \textit{Self-underwritten}_{k,j} + \sum \theta_k \text{Control}_{k,i,j} + \text{Institution FE} + \text{Year-month FE} + \varepsilon_{k,j}$$

where *Share Purchase*$_{k,j}$ is defined as the share of bond *j* being acquired by institution *k.* We use an indicator variable, *Status*$_{k,j}$, to denote the status of institution *k* during the issuance of bond *j*: it

[18] Shanghai Rural Commercial Bank, Bank of Dalian, Guangdong Shunde Rural Commercial Bank Company, Bank of Ningbo, and Bank of Hangzhou obtained licenses at the very beginning of our sample period and therefore are viewed as qualified underwriters throughout this study.

equals 1 if institution *k* has an underwriting license at the time of the bond issuance, and 0 otherwise. The coefficient of this variable measures the change in the dependent variable after an institution obtains its underwriting license (regardless of whether it underwrites the bond). We further construct a dummy variable, $Self\text{-}underwritten_{k,j}$, which is equal to 1 only if bond *j* is underwritten by switcher *k*, and 0 otherwise. The coefficient of this variable is key as it measures the change in the dependent variable after an institution obtains an underwriting license and actually underwrites the bond. The regression includes institution fixed effects, year-month fixed effects, and bond- and issuer-level controls.

Table 10 presents the regression results. As shown by the coefficient of *Self-underwritten* in columns (2) and (4), after an institution obtains its underwriting license, the share of its purchase in a bond it underwrites is 23.6% more than in a bond another institution underwrites, and the overpricing in a bond it underwrites is 1.47 bps higher than in a bond purchased by it but underwritten by another institution. These changes are both statistically and economically significant. Interestingly, the coefficient of *Status* in columns (2) and (4) also shows that after an institution obtains its underwriting license, the share of its purchases and overpricing in bonds unwritten by other institutions does not change significantly. These no-change results alleviate the endogeniety concern that the changes in switchers' bidding for bonds they underwrite might be driven by omitted variables, which prompt the switchers to become underwriters.

Taken together, Table 10 shows that after an institution obtains its underwriting license, it bids more aggressively in issuance auctions—it purchases more bonds than before, particularly bonds underwritten by itself, despite that issuance overpricing is more pronounced for bonds that are both underwritten and purchased by it than those bonds purchased but not underwritten by it. This evidence lends additional support to our main hypothesis that underwriters purchase bonds at issuance to drive up overpricing.

V. Conclusion

This paper documents robust evidence for overpricing in China's corporate bond issuances. The spread in the first secondary-market trading day is on average higher than the issuance spread by 5.35 bps. This issuance overpricing is present in different subsamples of bonds divided by bond credit rating, maturity, firm size, issuing history, issuer and underwriter types, and issuance year. Our analysis attributes issuance overpricing to competition among underwriters, through two specific channels—either rebates to issuance auction participants or directly bidding by underwriters.

References:

Allen, F., Faulhaber, G., 1989. Signaling by underpricing in the IPO market. Journal of Financial Economics 23, 303–323.

Amstad, M., Sun, G., Xiong, W., 2019. The Handbook of China's Financial System. Princeton University Press, forthcoming.

Amstad, M., He, Z., 2019. Chinese Bond Market and Interbank Market. In: Amstad, M., Sun, G., Xiong, W. (Eds.), The Handbook of China's Financial System. Princeton University Press, forthcoming.

Ang, A., Bai, J., Zhou, H., 2017. The great wall of debt: real estate, corruption, and Chinese local government credit spreads. Unpublished working paper.

Benveniste, L., Spindt, P., 1989. How investment bankers determine the offer price and allocation of new issues. Journal of Financial Economics 24, 343–361.

Benveniste, L., Busaba, W., Wilhelm, J., 2002. Information externalities and the role of underwriters in primary equity markets. Journal of Financial Intermediation 11, 61–86.

Booth, J., Chua, L., 1996. Ownership dispersion, costly information and IPO underpricing, Journal of Financial Economics 41, 291–310.

Bertrand, M., Duflo, E., Mullainathan, S., 2004. How much should we trust differences-in-differences estimates? The Quarterly Journal of Economics 119 (1), 249–275.

Bertrand, M., Mullainathan, S., 2003. Enjoying the quiet life? Corporate governance and managerial preferences. Journal of Political Economy 111 (5), 1043–1075.

Cai, N., Helwege, J., Warga, A., 2007. Underpricing in the corporate bond market. The Review of Financial Studies 20, 2021–2046.

Chen, H., Chen, Z., He, Z., Liu, J., Xie, R., 2019. Pledgeability and asset prices: Evidence from the Chinese corporate bond markets. Unpublished working paper.

Chen, Z., He, Z., Liu, C., 2018. The financing of local government in China: stimulus loan wanes and shadow banking waxes. Journal of Financial Economics, forthcoming.

Datta, S., Iskandar-Datta, M., Patel, A., 1997. The pricing of initial public offers of corporate straight debt. Journal of Finance 52, 379–396.

Ellul, A., Pagano, M., 2006. IPO underpricing and after-market liquidity. Review of Financial Studies 19, 381–421.

Grinblatt, M., Hwang, C., 1989. Signaling and the Pricing of Unseasoned New Issues. Journal of Finance 44, 393–420.

Goldstein, M., Hotchkiss, E., 2007. Dealer behavior and the trading of newly issued corporate bonds, AFA 2009 San Francisco meetings paper.

Hale, G., Santos, J. 2007. Evidence on the costs and benefits of bond IPOs. New York Federal Reserve mimeo.

Helwege, J., Kleiman, P., 1998. The pricing of high-yield debt IPOs, Journal of Fixed Income 8, 61–68.

Matsui, K., 2006. Overpricing of new issues in the Japanese straight bond market. Applied Financial Economics Letters 2, 323–327.

Ljungqvist, A., 2007. IPO underpricing. In: Eckbo, E., (Ed.), Handbook of Empirical Corporate Finance. Elsevier, pp. 375–422.

Lou, D., Yan, H., Zhang, J., 2013. Anticipated and repeated shocks in liquid markets. Review of Financial Studies 26, 1891–1912.

Loughran, T., Ritter, J., 2002. Why don't issuers get upset about leaving money on the table in IPOs? Review of Financial Studies 15, 413–443.

Ma, J., He, X., 2019. China's interest rate liberalization. In: Amstad, M., Sun, G., Xiong, W. (Eds.), The Handbook of China's Financial System. Princeton University Press, forthcoming.

McKenzie, C., Takaoka, S., 2008. Mispricing in the Japanese corporate bond market. Unpublished working paper.

NAFMII, Announcement of National Association of Financial Market Institutional Investors, Sep.1, 2017, No. 23.

Ritter, J., 1987. The costs of going public. Journal of Financial Economics 19, 269–282.

Ritter, J., Welch, I., 2002. A review of IPO activity, pricing, and allocations. Journal of Finance 57, 1795–1828.

Roberts, M., Whited, T., 2012. Endogeneity in empirical corporate finance. Unpublished working paper.

Rock, K., 1986. Why new issues are underpriced. Journal of Financial Economics 15, 187–212.

Sherman, A., Titman, S., 2002. Building the IPO order book: Underpricing and participation limits with costly information. Journal of Financial Economics 65, 3–29.

Wasserfallen, W., Wydler, D., 1988. Underpricing of newly issued bonds: evidence from the Swiss capital market. Journal of Finance 43, 1177–1191.

Zaremba, A., 2014. Underpricing of newly issued corporate bonds in the CEE markets. European Journal of Economics and Management 1(1), 6–16.

Song, Z., Xiong, W., 2018. Risks in China's financial system. Annual Review of Financial Economics 10, 261–286.

Zhu, N., 2016. China's Guaranteed Bubble: How implicit government support has propelled China's economy while creating systemic risk. McGraw-Hill Education.

Appendix 1. List of Licensed Underwriters in the Interbank Market (2018)

Institution name	License granted date	Institution name	License granted date
Industrial and Commercial Bank of China	Prior to 2010	GF Securities Company	November 28, 2012
Agricultural Bank of China	Prior to 2010	Huatai Securities Company	November 28, 2012
Bank of China	Prior to 2010	China Galaxy Securities Company	November 28, 2012
China Construction Bank	Prior to 2010	Guosen Securities Company	November 28, 2012
Bank of Communications	Prior to 2010	Orient Securities Company	November 28, 2012
China Development Bank	Prior to 2010	Haitong Securities Company	November 28, 2012
The Import-Export Bank of China	Prior to 2010	Bank of Jiangsu	March 3, 2014
China Merchants Bank	Prior to 2010	Huishang Bank	March 3, 2014
China CITIC Bank	Prior to 2010	Bank of Tianjin	March 3, 2014
Industrial Bank	Prior to 2010	Beijing Rural Commercial Bank	March 3, 2014
China Everbright Bank	Prior to 2010	Shanghai Rural Commercial Bank	January 15, 2015
China Minsheng Bank	Prior to 2010	Bank of Dalian	January 15, 2015
Hua Xia Bank	Prior to 2010	Guangdong Shunde Rural Commercial Bank Company	January 15, 2015
Shanghai Pudong Development Bank	Prior to 2010	Bank of Ningbo	January 15, 2015
China Guangfa Bank	Prior to 2010	Bank of Hangzhou	January 15, 2015
Ping An Bank	Prior to 2010	Postal Saving Bank of China	December 31, 2015
Hengfeng Bank	Prior to 2010	Bank of Chengdu	May 18, 2016
China Bohai Bank	Prior to 2010	Bank of Zhengzhou	May 18, 2016
Bank of Beijing	Prior to 2010	Chongqing Rural Commercial Bank	May 18, 2016
Bank of Shanghai	Prior to 2010	Bank of Qingdao	May 18, 2016
Bank of Nanjing	Prior to 2010	Hankou Bank	May 18, 2016
China Zheshang Bank	Prior to 2010	Xiamen Bank	May 18, 2016
CITIC Securities Company	Prior to 2010	Bank of Changsha	May 18, 2016
China International Capital Corporation	Prior to 2010	Agricultural Development Bank of China	August 7, 2017
Guotai Junan Securities Company	November 28, 2012	HSBC Bank (China) Company	October 27, 2017
China Merchants Securities Company	November 28, 2012	Standard Chartered Bank (China) Company	January 31, 2018
Everbright Securities Company	November 28, 2012	BNP PARIBAS (China) Company	December 7, 2018
China Securities Company	November 28, 2012		

Figure 1. China's Bond Issuance

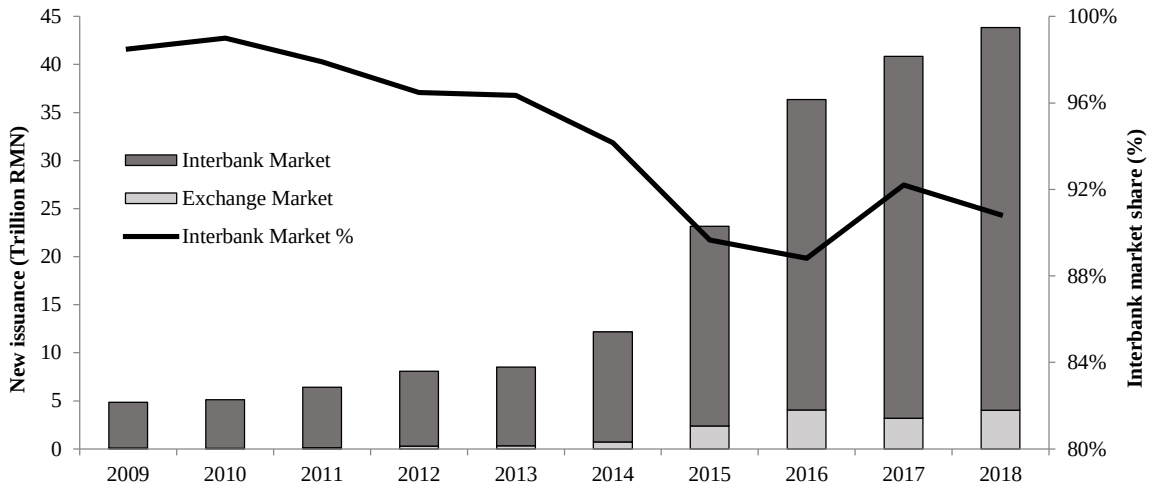

Figure 2. Debt-financing instruments issuance by category

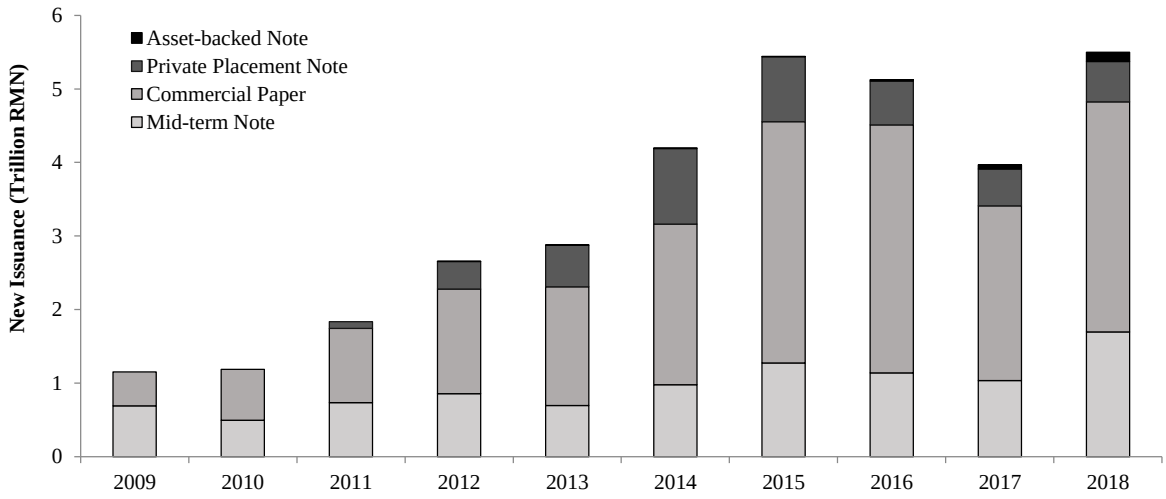

Figure 3. Issuance Timeline

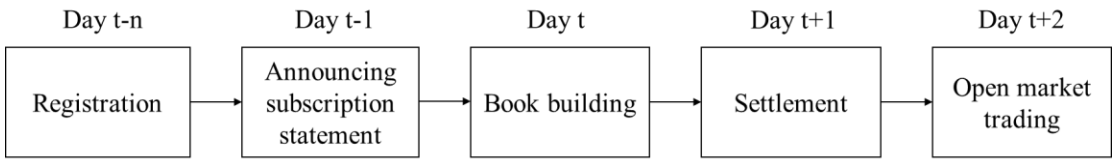

Figure 4. Overpricing Over Time

Table 1. Summary Statistics: Bond- and Issuer-Level Information

This table provides summary statistics of the bond issuance on the interbank market from 2015 to 2018. Panel A reports the number of bond issuances, issuing companies, and the total issuance amount for each year. Panels B and C report the summary statistics of bond and issuer characteristics, respectively. The subscription ratio is calculated by dividing the total subscription by the issue amount. We convert letter ratings into numerical values, i.e. AAA to 5, AA+ to 4, AA to 3, AA- to 2, and A+ to 1. Panel D summarizes the share of newly issued bonds directly acquired by underwriters. Number of observations, the mean, the standard deviation, the 25th percentile, the median, and the 75th percentile are presented.

Panel A: New Issues across Years: 2015–2018					
Year	2015	2016	2017	2018	Total
No. of Issues	3,379	3,441	2,880	4,087	13,787
issued by the big-four banks	1,258	1,400	957	1,353	4,968
issued by security firms	186	218	295	522	1,221
No. of Companies	1,304	1,238	1,016	1,198	2,248
Issue Amount (¥mil)	4,457,040	4,301,615	3,197,455	4,487,525	16,443,635
Panel B: Bond-Level Information					
	N	Mean	SD	P25	P50	P75
Coupon rate (%)	13,787	4.67	1.22	3.72	4.65	5.45
Maturity	13,787	1.69	1.69	0.74	0.75	3.00
Issue Amount (¥mil)	13,787	1,193	1,246	500	1,000	1,500
Subscription Ratio	13,280	1.69	0.81	1.10	1.44	2.00
IPO	13,787	0.08	0.26	0	0	0
Recent Issuance	13,787	0.84	0.37	1	1	1
Rating	13,787	4.13	0.85	3.00	4.00	5.00
Panel C: Issuer-Level Information					
	N	Mean	SD	P25	P50	P75
Leverage	13,780	0.65	0.13	0.58	0.66	0.74
ROA	13,695	0.03	0.03	0.01	0.02	0.04
Asset (¥mil)	13,780	146,812	378,466	23,215	52,052	144,973
Sale (¥mil)	13,778	57,480	155,963	4,620	14,935	52,173
Cash (¥mil)	13,730	12,549	35,988	2,166	5,242	13,222
Trading Volume (¥mil)	13,787	1,433	1,811	460	890	1,710
Panel D: Bond Allocation					
	N	Mean	SD	P25	P50	P75
Underwriter Share	8,198	0.42	0.30	0.17	0.40	0.66

Table 2. The Overpricing of Bond Issuances

This table reports the summary statistics of the spread change after issuance. Panel A reports the summary statistics of the spread difference between the first trading day since issuance and the auction, ΔSpread, the spread difference between the fifteenth calendar day since issuance and the auction, $\Delta Spread_{15\ days}$, and the difference between the $\Delta Spread_{15}$ and ΔSpread. The spread is calculated as the corporate bond yield minus the corresponding Chinese Treasury Bond Yield Index of similar maturity. Panel B reports the summary statistics of the first-trade excess return, the fifteenth calendar day excess return, and the difference between the Excess return $_{15\ days}$ and the Excess return. The excess return is calculated as described in Section II.

Panel A: Spread change							
	N	Mean	SD	*t*-Statistic	P25	P50	P75
ΔSpread	13,787	5.35***	10.71	58.62	-0.16	4.13	9.13
$\Delta Spread_{15\ days}$	4,266	7.65***	42.67	11.71	-8.36	4.87	18.54
$\Delta Spread_{15\ days}$ -ΔSpread	4,266	1.73***	42.07	2.68	-13.12	-0.96	11.96

Panel B: Excess return							
	N	Mean	SD	*t*-Statistic	P25	P50	P75
Excess return	13,787	-8.00***	10.64	-88.25	-12.59	-7.10	-2.29
Excess return $_{15\ days}$	4,266	-11.26***	48.39	-15.20	-31.01	-12.01	8.92
Excess return $_{15\ days}$ - Excess return	4,266	-2.65***	46.53	-3.72	-20.27	-3.09	13.67

Table 3. Summary Statistics: Overpricing across Bond Characteristics, Issuer Characteristics, and Years

This table presents the summary statistics of the first trading day spread change, ΔSpread, across different bond ratings, maturities, issuers' total assets, issuing histories, issuer and underwriter types, and issuing years. Number of observations, the mean, the standard deviation, the *t*-statistics, the 25th percentile, the median, and the 75th percentile are presented.

Panel A: By rating		N	Mean	SD	*t*-Stat.	P25	P50	P75
AAA		5,752	6.38	12.75	37.95	-0.27	4.33	10.44
AA+		4,301	4.26	8.82	31.68	-0.33	3.45	8.24
AA		3,524	4.95	8.88	33.08	0.17	4.42	8.58
AA- and A+		210	5.84	10.08	8.40	0.96	5.57	9.57
Panel B: By rating and maturity		N	Mean	SD	*t*-Stat.	P25	P50	P75
	Maturity							
AAA	⩽1 year	3,647	8.41	14.37	35.36	0.29	6.47	13.49
	1–2 year	548	5.80	10.51	12.92	0.57	6.28	10.29
	>2 year	1,557	1.82	6.90	10.42	-1.41	1.57	4.66
AA+	⩽1 year	2,223	5.48	9.00	28.71	0.17	5.34	9.60
	1–2 year	839	4.99	9.71	14.90	0.33	5.67	8.78
	>2 year	1,239	1.59	7.15	7.80	-1.51	1.25	3.96
AA, AA-, and A+	⩽1 year	1,334	6.33	9.85	23.47	0.63	6.23	10.03
	1–2 year	1,193	6.67	9.35	24.63	1.97	6.64	10.13
	>2 year	1,207	1.88	6.32	10.31	-0.93	1.68	4.39
Panel C: By rating and total assets		N	Mean	SD	*t*-Stat.	P25	P50	P75
	Total Assets							
AAA	Larger	2,879	7.07	14.08	26.95	-0.33	4.39	11.16
	Smaller	2,873	5.69	11.22	27.16	-0.22	4.25	9.78
AA+	Larger	2,152	4.27	8.83	22.40	-0.45	3.22	8.26
	Smaller	2,149	4.26	8.82	22.39	-0.21	3.74	8.22
AA, AA-, and A+	Larger	1,872	4.96	9.16	23.44	0.08	4.38	8.55
	Smaller	1,862	5.03	8.74	24.86	0.37	4.68	8.79
Panel D: By bond issuing history		N	Mean	SD	*t*-Stat.	P25	P50	P75
IPO issuance		1,044	3.41	7.51	14.68	-0.50	2.47	6.94
Non-IPO issuance		12,743	5.50	10.91	56.93	-0.14	4.30	9.27
Panel E: By issuer type		N	Mean	SD	*t*-Stat.	P25	P50	P75
Central SOE		1,274	9.94	15.28	23.24	1.16	7.15	16.14
Other		12,513	4.88	10.01	54.50	-0.25	3.88	8.71
Panel F: By underwriter type		N	Mean	SD	*t*-Stat.	P25	P50	P75
Big-four banks		4,968	5.55	10.87	35.96	-0.12	4.25	9.46
Other		8,819	5.23	10.62	46.29	-0.18	4.06	8.93
Security firms		1,221	3.10	8.99	12.04	-1.04	1.86	6.12

Other	12,566	5.56	10.84	57.56	-0.08	4.39	9.34
Panel G: By issuing year	N	Mean	SD	*t*-Stat.	P25	P50	P75
2015	3,379	7.03	11.14	36.67	1.45	5.96	10.88
2016	3,441	7.82	10.80	42.48	3.27	7.37	10.66
2017	2,880	5.55	11.31	26.31	-0.71	3.44	9.10
2018	4,087	1.72	8.67	12.72	-1.88	0.61	4.35

Table 4. Summary Statistics: Excess Return across Bond Characteristics, Issuer Characteristics, and Years

This table presents the summary statistics of the first trading day excess return across different bond ratings, maturities, issuers' total assets, issuing histories, issuer and underwriter types, and issuing years. Number of observations, the mean, the standard deviation, the *t*-statistics, the 25th percentile, the median, and the 75th percentile are presented.

Panel A: By rating		N	Mean	SD	*t*-Stat.	P25	P50	P75
AAA		5,752	-8.03	10.53	-57.89	-12.09	-6.72	-2.58
AA+		4,301	-7.10	10.07	-46.24	-11.46	-6.25	-1.37
AA		3,524	-8.78	11.33	-46.04	-13.87	-8.84	-3.24
AA- and A+		210	-10.08	11.14	-13.10	-16.89	-10.46	-6.13
Panel B: By rating and maturity		N	Mean	SD	*t*-Stat.	P25	P50	P75
	Maturity							
AAA	⩽1 year	3,647	-7.77	8.88	-52.82	-12.07	-6.62	-2.41
	1–2 year	548	-8.34	10.65	-18.33	-13.83	-7.36	-2.81
	>2 year	1,557	-8.55	13.58	-24.85	-11.65	-6.66	-2.89
AA+	≤1 year	2,223	-6.20	7.81	-37.40	-10.17	-5.65	-1.12
	1–2 year	839	-8.34	9.87	-24.46	-13.77	-8.16	-2.35
	>2 year	1,239	-7.87	13.17	-21.04	-11.82	-6.46	-1.35
AA, AA-, and A+	⩽1 year	1,334	-7.67	9.17	-30.57	-12.78	-7.66	-2.34
	1–2 year	1,193	-11.08	9.84	-38.89	-16.03	-10.76	-5.50
	>2 year	1,207	-8.31	14.24	-20.29	-13.59	-8.69	-2.37
Panel C: By rating and total asset		N	Mean	SD	*t*-Stat.	P25	P50	P75
	Total Asset							
AAA	Larger	2,879	-8.21	10.86	-40.54	-12.30	-6.63	-2.41
	Smaller	2,873	-7.86	10.18	-41.40	-11.90	-6.82	-2.77
AA+	Larger	2,152	-6.92	10.56	-30.38	-11.08	-5.95	-1.28
	Smaller	2,149	-7.28	9.54	-35.36	-11.80	-6.61	-1.45
AA, AA-, and A+	Larger	1,872	-8.59	12.49	-29.75	-13.71	-8.53	-3.21
	Smaller	1,862	-9.35	10.04	-40.20	-14.53	-9.37	-3.51
Panel D: By bond issuing history		N	Mean	SD	*t*-Stat.	P25	P50	P75
IPO issuance		1,044	-8.46	12.75	-21.44	-13.77	-8.23	-2.59
Non-IPO issuance		12,743	-7.96	10.45	-85.99	-12.45	-7.04	-2.28
Panel E: By issuer type		N	Mean	SD	*t*-Stat.	P25	P50	P75
Central SOE		1,274	-10.64	12.07	-15.45	-9.03	-3.97	1,274
Other		12,513	-7.73	10.44	-12.32	-6.93	-2.17	12,513
Panel F: By underwriter type		N	Mean	SD	*t*-Stat.	P25	P50	P75
Big-four banks		4,968	-8.21	10.06	-12.95	-7.29	-2.45	4,968
Other		8,819	-7.87	10.95	-12.36	-7.02	-2.24	8,819
Security firms		1,221	-6.89	9.36	-11.53	-5.95	-1.73	1,221
Other		12,566	-8.10	10.75	-12.69	-7.20	-2.37	12,566

Panel G: By issuing year	N	Mean	SD	*t*-Stat.	P25	P50	P75
2015	3,379	-11.97	12.11	-57.47	-17.49	-11.13	-5.49
2016	3,441	-11.03	11.19	-57.82	-15.18	-11.03	-6.94
2017	2,880	-6.27	8.42	-39.96	-8.62	-4.91	-0.34
2018	4,087	-3.38	8.00	-26.97	-7.20	-3.70	-0.90

Table 5. Logit Regression of Underwriters Switching

This table reports the logit regression results of an issuer's underwriter change on the outcome of the issuer's last bond issuance. The dependent variable, $Switch_{i,n+1}$, equals 1 if the issuing firm i changes all the underwriters on its $n+1^{th}$ issuance as compared to its n^{th} issuance, and 0 otherwise. The performance is measured by an indicator variable, $Underperformed_{i,n}$, which equals 1 if the spread of the issuer i's n^{th} bond issuance is greater than the corresponding benchmark spread. *Underwriter Share*$_{i,n}$ is the percentage of the underwriter's purchase on the issuer i' n^{th} issuance. Heteroscedasticity-consistent z-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Dependent: $Switch_{i,n+1}$	(1)	(2)	(3)
$Underperformed_{i,n}$	0.246***	0.181***	0.217***
	(6.18)	(4.00)	(3.89)
Underwriter Share$_{i,n}$			-0.297***
			(-3.36)
Ln(Issue amount)		0.045	0.055
		(0.85)	(0.83)
Subscription Ratio		-0.005	-0.036
		(-0.18)	(-0.97)
Maturity		-0.036**	-0.025
		(-2.57)	(-1.49)
Ln(Trading Volume)		-0.020	0.027
		(-0.64)	(0.68)
IPO		-0.115	-0.093
		(-0.96)	(-0.63)
Recent Issuance		0.778***	0.730***
		(9.26)	(6.93)
$Dummy_{AAA}$		0.846***	1.081**
		(3.01)	(2.26)
$Dummy_{AA+}$		0.681**	1.007**
		(2.49)	(2.14)
$Dummy_{AA}$		0.498*	0.910*
		(1.83)	(1.94)
Leverage		0.924***	1.281***
		(4.49)	(5.09)
ROA		-2.641***	-2.062*
		(-3.00)	(-1.96)
Ln(Asset)		0.221***	0.216***
		(4.92)	(3.85)
Ln(Sales)		0.056***	0.063**
		(2.63)	(2.35)
Ln(Cash)		-0.146***	-0.160***
		(-4.66)	(-4.09)
Constant	0.370***	-3.359***	-4.073***
	(14.89)	(-8.46)	(-6.90)
Observations	11,244	10,790	6,991
Pseudo R-squared	0.00256	0.0564	0.0567

Table 6. Difference-in-Difference Analysis Using the Underwriter Rebate Ban: Evidence from the Issuers

This table reports results of the difference-in-difference tests on how exogenous changes in underwriter rebates due to the policy shock affect bond issuance overpricing. Treat equals 1 if the bond is issued by a central SOE, and 0 otherwise. Post equals 1 in the months following the policy shock. Columns (1) and (2) use the full sample. Columns (3) and (4) use the matched sample that includes only issuers with sequential bond issuances before and after the event. Heteroscedasticity-consistent *t*-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Full sample		Matched sample	
Dependent: ΔSpread	(1)	(2)	(3)	(4)
Treat	9.709***	6.441***	9.772***	6.545***
	(6.26)	(4.32)	(5.17)	(3.52)
Post	-6.043***	-6.273***	-7.043***	-7.139***
	(-19.89)	(-20.82)	(-13.78)	(-13.81)
Treat × Post	-7.225***	-6.182***	-8.407***	-7.861***
	(-3.66)	(-3.29)	(-3.79)	(-3.85)
Ln(Issue amount)		0.430		1.839*
		(0.70)		(1.85)
Subscription Ratio		-0.741***		-0.950***
		(-3.90)		(-2.64)
Maturity		-1.206***		-1.636***
		(-13.40)		(-8.53)
Ln(Trading Volume)		-0.071		-0.282
		(-0.20)		(-0.46)
IPO		0.624		2.420
		(1.03)		(0.99)
Recent Issuance		0.113		0.197
		(0.24)		(0.10)
$Dummy_{AAA}$		0.068		-1.017
		(0.10)		(-0.89)
$Dummy_{AA+}$		-0.335		-0.912
		(-0.82)		(-1.37)
Leverage		-2.215		-4.098
		(-1.36)		(-1.55)
ROA		12.641**		11.949
		(2.05)		(1.08)
Ln(Asset)		1.537***		1.861***
		(3.59)		(2.74)
Ln(Sales)		-0.067		-0.180
		(-0.47)		(-0.84)
Ln(Cash)		-1.078***		-1.356***
		(-3.59)		(-3.16)
Constant	6.203***	1.379	7.659***	-3.606
	(24.67)	(0.42)	(18.12)	(-0.65)
Observations	3,252	3,164	1,481	1,445
R-squared	0.153	0.210	0.182	0.246

Table 7. Difference-in-Difference Analysis Using the Underwriter Rebate Ban: Evidence from the Underwriters

This table reports results of the difference-in-difference tests on how exogenous changes in underwriter rebates due to the policy shock affect bond spread change. Treat equals 1, if the bond is issued by one of the big-four banks in China, and 0 otherwise. Post equals 1 in the months following the policy shock. Columns (1) and (2) use the full sample. Columns (3) and (4) use the matched sample that includes only issuers with sequential bond issuances before and after the event. Heteroscedasticity-consistent *t*-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Full sample		Matched sample	
Dependent: ΔSpread	(1)	(2)	(3)	(4)
Treat	-0.791	-1.536***	-2.459***	-2.698***
	(-1.43)	(-2.98)	(-2.78)	(-3.31)
Post	-7.187***	-7.363***	-9.147***	-8.842***
	(-18.60)	(-19.32)	(-13.73)	(-13.80)
Treat × Post	1.362**	1.616**	2.712**	2.316**
	(1.99)	(2.49)	(2.50)	(2.36)
Ln(Issue amount)		0.763		2.375**
		(1.25)		(2.45)
Subscription Ratio		-0.681***		-0.753**
		(-3.61)		(-2.14)
Maturity		-1.216***		-1.549***
		(-13.48)		(-8.20)
Ln(Trading Volume)		-0.110		-0.435
		(-0.31)		(-0.72)
IPO		0.802		2.256
		(1.32)		(0.95)
Recent Issuance		0.137		0.384
		(0.29)		(0.20)
$Dummy_{AAA}$		-0.478		-1.977*
		(-0.69)		(-1.77)
$Dummy_{AA+}$		-0.639		-1.380**
		(-1.58)		(-2.09)
Leverage		-2.748*		-3.257
		(-1.66)		(-1.19)
ROA		14.376**		17.900
		(2.24)		(1.47)
Ln(Asset)		2.167***		2.460***
		(5.34)		(4.02)
Ln(Sales)		0.097		-0.031
		(0.69)		(-0.14)
Ln(Cash)		-1.435***		-1.703***
		(-5.04)		(-4.24)
Constant	7.239***	-4.492	9.699***	-10.431**
	(21.29)	(-1.48)	(16.19)	(-2.05)
Observations	3,252	3,164	1,483	1,447
R-squared	0.119	0.200	0.149	0.232

Table 8. The Portfolio Overpricing Difference: Qualified Investor vs. Licensed Underwriter

This table reports the average spread change of different investor portfolios: each qualified investor's bond portfolio (column 1), each licensed underwriter's bond portfolio that includes only bonds that it does not underwrite (column 2), and each licensed underwriter investor's bond portfolio that includes only bonds it underwrites (column 3). We first calculate both the equal-weighted average spread change and the value-weighted average spread change (using bond purchase amount as the weight) for each institution and then take the average across the institutions in each category. The table also reports *t*-statistic for the mean difference between (1) and (3) and between (2) and (3), with *, ** or *** indicating statistical significance at the 10%, 5% and 1% levels, respectively.

	Overpricing of bonds acquired by qualified investors (1)	Overpricing of bonds acquired by licensed underwriters but underwritten by others (2)	Overpricing of bonds acquired by licensed underwriters that they underwrite (3)	Difference (3)-(1)	Difference (3)-(2)
Equal-weighted portfolio average	4.03	5.13	6.45	2.42**	1.32*
				(2.45)	(1.92)
Value-weighted portfolio average	4.43	5.42	7.52	3.09***	2.10**
				(2.98)	(2.42)
No. of Institutions	57	50	50		

Table 9. Regressions of Overpricing on Underwriter's Purchases

This table reports regressions of issuance overpricing on underwriters' purchase share. The dependent variable is the overpricing measure, ΔSpread. The independent variable *Underwriter Share* is the percentage of the underwriters' purchase of the underlying bond. *Underwriter Dummy* is an indicator variable for the underwriter's purchase, which is equal to 1, if *Underwriter Share* is positive, and 0 otherwise. Heteroscedasticity-consistent *t*-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Dependent: ΔSpread	(1)	(2)	(3)	(4)
Underwriter Share	2.995***	3.076***		
	(7.77)	(8.23)		
Underwriter Dummy			1.665***	1.273***
			(5.65)	(4.41)
Ln(Issue amount)		-0.320		-0.133
		(-0.94)		(-0.39)
Subscription Ratio		-0.415***		-0.646***
		(-3.14)		(-4.87)
Maturity		-1.557***		-1.533***
		(-26.81)		(-26.48)
Ln(Trading Volume)		0.879***		0.714***
		(3.98)		(3.24)
IPO		-0.332		-0.204
		(-0.70)		(-0.43)
Recent Issuance		-0.320		-0.251
		(-0.81)		(-0.64)
$Dummy_{AAA}$		1.398		0.938
		(1.33)		(0.90)
$Dummy_{AA+}$		0.328		-0.131
		(0.34)		(-0.14)
$Dummy_{AA}$		1.173		0.783
		(1.27)		(0.85)
Leverage		-0.460		-0.597
		(-0.43)		(-0.56)
ROA		8.067**		8.143**
		(2.12)		(2.13)
Ln(Asset)		1.464***		1.473***
		(5.82)		(5.83)
Ln(Sales)		0.170		0.183*
		(1.54)		(1.65)
Ln(Cash)		-1.136***		-1.153***
		(-6.38)		(-6.47)
Constant	5.346***	-3.722**	5.174***	-2.930
	(29.76)	(-2.05)	(19.59)	(-1.60)
Observations	8,198	8,057	8,198	8,057
R-squared	0.007	0.104	0.003	0.098

Table 10. Difference-in-Difference Analysis of the Overpricing with the Underwriting License Grant

This table reports the difference-in-difference tests on how the grant of an underwriting license affects institutions' bidding behavior. The test contains bond issuances that are purchased by all institutional investors, including ten institutions that obtained their underwriting licenses during our sample period. The observations include all the successful bidders and bond pairs in each auction. The dependent variable in columns (1) and (2) is $Share\ Purchase_{k,j}$, the shares of bond j's issue amount acquired by the successful bidder k in the auction. The dependent variable in columns (3) and (4) is $\Delta Spread_j$, the issuance overpricing of bond j. The independent variable $Status_{k,j}$ equals 1 if the bidder k has received an underwriting license at the time of bond j's issuance, and 0 otherwise. The independent variable $Self\text{-}underwritten_{k,j}$ equals 1 if the bond j is underwritten by institution k, and 0 otherwise. Heteroscedasticity-consistent t-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Dependent: $Share\ Purchase_{i,j}$		Dependent: $\Delta Spread_j$	
	(1)	(2)	(3)	(4)
$Status_{k,j}$	0.016**	0.006	0.797*	0.729
	(2.06)	(0.73)	(1.78)	(1.58)
$Self\text{-}underwritten_{k,j}$		0.236***		1.472***
		(7.36)		(2.05)
Bond Controls	Yes	Yes	Yes	Yes
Firm Controls	Yes	Yes	Yes	Yes
Institution FE	Yes	Yes	Yes	Yes
Year-month FE	Yes	Yes	Yes	Yes
Observations	42,686	42,686	42,686	42,686
R-squared	0.253	0.256	0.237	0.238

Internet Appendix for
"Overpricing in China's Corporate Bond Market"

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In this Internet Appendix, we report regression results from using the excess bond return from issuance to the first secondary-market trade, as defined in Section II.B of the main paper, as an alternative measure of issuance overpricing in China's corporate bond market. The results are similar to those reported in the main paper from using the yield spread change as the primary measure of issuance overpricing. Tables IA1 to IA5 correspond to Tables 6–10, respectively.

In Tables IA1 and IA2, we conduct difference-in-difference analyses to examine how the underwriter rebate ban affects the excess return across different bond issuers and across different underwriters. Consistent with results from using the yield-spread measure, these tables show that after the ban, the drop in overpricing is significantly greater for bonds issued by central SOEs than those issued by other firms, and the drop in overpricing is significantly smaller for bond issuances underwritten by the top four banks.

Table IA3 reports the average excess return in three portfolios of newly issued bonds: 1) new bonds acquired by qualified investors, 2) new bonds acquired by licensed underwriters but unwritten by others, and 3) new bonds acquired by licensed underwriters that they underwrite. The table shows the average excess return in Portfolio 3 is significantly lower than that in Portfolios 1 and 2, consistent with Table 8 in the main paper.

Table IA4 reports regression results of the initial excess return in each bond issuance on the share acquired by its underwriter in the auction. The table shows that the excess return is negatively associated with the share of the underwriters' purchase, consistent with Table 9 in the main paper.

Table IA5 reports the results of difference-in-difference analyses on how institutions' bidding

behavior in bond issuance auctions changes after obtaining a bond underwriting license. The table shows that after an institution obtains an underwriting license it tends to buy more in bond issuances it underwrites at higher overpricing, consistent with Table 10 in the main paper.

Table IA1. Difference-in-Difference Analysis Using the Underwriter Rebate Ban: Evidence from the Issuers

This table reports results of the difference-in-difference tests on how exogenous changes in underwriter rebates due to the policy shock affect bond issuance overpricing. Treat equals 1 if the bond is issued by a central SOE, and 0 otherwise. Post equals 1 in the months following the policy shock. Columns (1) and (2) use the full sample. Columns (3) and (4) use the matched sample that only includes issuers with sequential bond issuances before and after the event. Heteroscedasticity-consistent *t*-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Full sample		Matched sample	
Dependent: Excess Ret	(1)	(2)	(3)	(4)
Treat	-1.905*	-2.210**	-3.718***	-4.229***
	(-1.95)	(-2.10)	(-3.06)	(-3.31)
Post	5.500***	5.269***	4.948***	4.707***
	(22.25)	(21.63)	(13.40)	(12.90)
Treat × Post	2.456**	2.191*	4.682***	4.553***
	(2.18)	(1.93)	(3.36)	(3.30)
Ln(Issue amount)		0.263		-0.120
		(0.62)		(-0.17)
Subscription Ratio		0.121		0.178
		(0.81)		(0.62)
Maturity		-0.237**		-0.503*
		(-2.51)		(-1.89)
Ln(Trading Volume)		-0.421*		-0.197
		(-1.67)		(-0.49)
IPO		-0.243		-2.597
		(-0.46)		(-1.46)
Recent Issuance		0.015		-0.544
		(0.04)		(-0.35)
$Dummy_{AAA}$		0.653		-0.102
		(1.24)		(-0.12)
$Dummy_{AA+}$		0.266		-0.168
		(0.74)		(-0.29)
Leverage		0.025		-0.176
		(0.02)		(-0.10)
ROA		2.977		5.331
		(0.55)		(0.67)
Ln(Asset)		-0.098		0.433
		(-0.28)		(0.85)
Ln(Sales)		-0.045		-0.214
		(-0.37)		(-1.12)
Ln(Cash)		0.265		0.296
		(1.21)		(0.99)
Constant	-6.646***	-6.414***	-6.012***	-8.059**
	(-32.78)	(-2.88)	(-20.61)	(-2.11)
Observations	3,252	3,164	1,483	1,447
R-squared	0.143	0.147	0.147	0.157

Table IA2. Difference-in-Difference Analysis Using the Underwriter Rebate Ban: Evidence from the Underwriters

This table reports results of the difference-in-difference tests on how exogenous changes in underwriter rebates due to the policy shock affect the excess return. Treat equals 1 if the bond is issued by one of the big-four banks in China, and 0 otherwise. Post equals 1 in the months following the policy shock. Columns (1) and (2) use the full sample. Columns (3) and (4) use the matched sample that includes only issuers with sequential bond issuances before and after the event. Heteroscedasticity-consistent *t*-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Full sample		Matched sample	
Dependent: Excess Ret	(1)	(2)	(3)	(4)
Treat	0.795*	1.127***	0.835	1.275**
	(1.86)	(2.59)	(1.36)	(2.18)
Post	5.986***	5.873***	5.986***	5.791***
	(20.54)	(19.82)	(13.97)	(13.19)
Treat × Post	-0.759*	-1.210**	-0.985*	-1.427**
	(-1.75)	(-2.42)	(-1.85)	(-2.03)
Ln(Issue amount)		0.260		-0.142
		(0.63)		(-0.22)
Subscription Ratio		0.104		0.074
		(0.69)		(0.26)
Maturity		-0.168*		-0.295
		(-1.87)		(-1.33)
Ln(Trading Volume)		-0.569***		-0.498*
		(-2.87)		(-1.96)
IPO		-0.315		-2.693
		(-0.60)		(-1.56)
Recent Issuance		0.180		-0.364
		(0.50)		(-0.24)
$Dummy_{AAA}$		0.829		0.731
		(1.63)		(0.95)
$Dummy_{AA+}$		0.434		0.295
		(1.30)		(0.58)
Leverage		0.667		-0.692
		(0.57)		(-0.38)
ROA		1.677		-1.716
		(0.30)		(-0.20)
Ln(Asset)		-0.341		-0.109
		(-1.02)		(-0.23)
Ln(Sales)		-0.135		-0.368**
		(-1.16)		(-2.09)
Ln(Cash)		0.386*		0.581**
		(1.79)		(2.02)
Constant	-7.064***	-4.176*	-6.752***	-1.854
	(-28.53)	(-1.94)	(-17.83)	(-0.50)
Observations	3,252	3,164	1,481	1,445
R-squared	0.149	0.155	0.156	0.169

Table IA3. The Portfolio Overpricing Difference: Qualified Investor vs. Underwriter Investor

This table reports the average excess return of different investor portfolios: each qualified investor's bond portfolio (column 1), each licensed underwriter's bond portfolio that includes only bonds it does not underwrite (column 2), and each licensed underwriter's bond portfolio that includes only bonds it underwrites (column 3). We first calculate both the equal-weighted average excess return and the value-weighted average excess return (using bond purchase amount as the weight) for each institution and then take the average across the institutions in each category. The table also reports *t*-statistics for the mean difference between (1) and (3) and between (2) and (3), with *, ** or *** indicating statistical significance at 10%, 5% and 1% levels, respectively.

	Overpricing of bonds acquired by qualified investors (1)	Overpricing of bonds acquired by licensed underwriters but underwritten by others (2)	Overpricing of bonds acquired by licensed underwriters that they underwrite (3)	Difference (3)–(1)	Difference (3)–(2)
Equal-weighted portfolio average	-5.04	-7.39	-8.48	-3.45***	-1.10*
				(4.46)	(1.94)
Value-weighted portfolio average	-5.09	-7.82	-8.89	-3.80***	-1.07*
				(4.63)	(1.77)
No. of Institutions	57	50	50		

Table IA4. Regressions of the Overpricing on Underwriter's Purchases

This table reports regressions of the issuance overpricing on underwriters' purchase share. The dependent variable is the overpricing measure, Excess return. The independent variable *Underwriter Share* is the percentage of the underwriters' purchase of the underlying bond. *Underwriter Dummy* is an indicator variable for the underwriter's purchase, which is equal to 1, if *Underwriter Share* is positive, and 0 otherwise. Heteroscedasticity-consistent *t*-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Dependent: Excess Ret	(1)	(2)	(3)	(4)
Underwriter Share	-3.233***	-3.670***		
	(-8.07)	(-8.93)		
Underwriter Dummy			-1.252***	-1.275***
			(-3.78)	(-3.95)
Ln(Issue amount)		1.040***		0.796**
		(3.10)		(2.39)
Subscription Ratio		-0.609***		-0.323**
		(-4.31)		(-2.32)
Maturity		-0.594***		-0.623***
		(-5.55)		(-5.81)
Ln(Trading Volume)		-1.533***		-1.328***
		(-7.74)		(-6.78)
IPO		0.419		0.259
		(0.76)		(0.47)
Recent Issuance		0.312		0.233
		(0.77)		(0.58)
$Dummy_{AAA}$		2.358**		2.918***
		(2.35)		(2.94)
$Dummy_{AA+}$		2.371**		2.941***
		(2.54)		(3.18)
$Dummy_{AA}$		0.685		1.166
		(0.77)		(1.32)
Leverage		-1.361		-1.176
		(-1.20)		(-1.03)
ROA		-2.540		-2.667
		(-0.56)		(-0.58)
Ln(Asset)		0.130		0.126
		(0.52)		(0.50)
Ln(Sales)		-0.644***		-0.663***
		(-5.29)		(-5.40)
Ln(Cash)		0.749***		0.770***
		(4.46)		(4.59)
Constant	-7.321***	-4.408**	-7.603***	-5.565***
	(-38.78)	(-2.35)	(-24.79)	(-2.93)
Observations	8,198	8,057	8,198	8,057
R-squared	0.009	0.036	0.002	0.027

Table IA5. Difference-in-Difference Analysis of the Overpricing with the Grant of an Underwriting License

This table reports the difference-in-difference tests on how the grant of an underwriting license affects institutions' bidding behavior. The test contains bond issuances that are purchased by all institutional investors, including ten institutions that obtained their underwriting licenses during our sample period. The observations include all the successful bidders and bond pairs in each auction. The dependent variable in columns (1) and (2) is $Share\ Purchase_{k,j}$, the shares of the bond *j*'s issue amount acquired by successful bidder *k* in the auction. The dependent variable in columns (3) and (4) is Excess $return_j$, the issuance overpricing of bond *j*. The independent variable $Status_{k,j}$ equals 1, if the bidder *k* has received an underwriting license at the time of bond *j*'s issuance, and 0 otherwise. The independent variable $Self\text{-}underwritten_{k,j}$ equals 1 if the bond *j* is underwritten by institution *k*, and 0 otherwise. Heteroscedasticity-consistent *t*-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Dependent: $Share\ Purchase_{i,j}$		Dependent: Excess $return_j$	
	(1)	(2)	(3)	(4)
$Status_{k,j}$	0.016**	0.006	-0.446	-0.370
	(2.06)	(0.73)	(-0.72)	(-0.59)
$Self\text{-}underwritten_{k,j}$		0.236***		-1.444**
		(7.36)		(-2.08)
Bond Controls	Yes	Yes	Yes	Yes
Firm Controls	Yes	Yes	Yes	Yes
Institution FE	Yes	Yes	Yes	Yes
Year-month FE	Yes	Yes	Yes	Yes
Observations	42,686	42,686	42,686	42,686
R-squared	0.253	0.256	0.248	0.248