Handbook on China's Financial System

Chapter 6: Chinese Bond Market and Interbank Market[1]

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Contents

1 Overview of Chinese Bond Markets 2
2 Bond Markets and Bond Types 3
2.1 Segmented Bond Markets 4
2.1.1 The Interbank Market (银行间市场) 4
2.1.2 The Exchange Market (交易所市场) 5
2.2 Bond Types 5
2.2.1 Government Bonds (政府债) 6
2.2.2 Financial Bonds (金融债) 8
2.2.3 Corporate Bonds (产业债) 10
2.3 Bond Market Liquidity 13
2.4 Summary 14
3 A Brief History of Chinese Bond Markets 15
3.1 Physical Bond Counter Market 16
3.2 The Exchange Market Era 16
3.3 The Rise of the Interbank Market 17
3.4 Bond Markets and the Growth of Chinese Economy 18
4 Issues and Recent Trends of Chinese Bond Markets 19
4.1 Interest Rate Determination and Monetary Policy Transmission 19

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4.2 The Role of Banks and Shadow Banking 21
4.3 Regulatory Tightening Starting in 2017 24
4.4 Internalization of the Chinese Bond Market 25
5 Bond Ratings and Rating Agencies 27
5.1 China's Credit Rating Scale 28
5.2 Distribution of Credit Ratings 28
5.3 Low Default Rate, Implicit Guarantees, and Rating Migration 30
5.4 Regulatory Framework 32
5.5 Rating Agencies 33
5.6 Outlook 37
6 Credit Spreads and Defaults in the Chinese Bond Market 37
6.1 Bond Defaults in China: A Summary 37
6.2 Defaults, Bond Ratings, and Credit Spreads 38
6.3 Bond Default Cases, Bankruptcy, and Post-default Recovery 40
7 Data Sources on Chinese Bond Markets 44
7.1 Data from Wind 45
7.2 China Foreign Exchange Trading System 45
7.3 PBC Statistic Reports 46
7.4 Issues in Using the Interbank Market Data 46

1 Overview of Chinese Bond Markets

Over the past twenty years, especially the past decade, China has taken enormous strides to develop its bond market as an integral step in its financial reform, along with its tremendous effort in interest rate liberalization and internalization of its currency, the RMB.

Figure 1 Panel A depicts the growth of Chinese bond market capitalization scaled by GDP in the past decade; we observe that bond market capitalization over GDP rises from 35% in 2008 to more than 95% in 2018. For comparison, bond market capitalization over GDP in the U.S. stays slightly above 200% during the same time period. Relative to stock market capitalization, the Chinese bond market has also experienced a steadily increasing trend, reaching 131% in 2017, which exceeded the U.S. level of 128%.[2]

[2] In 2018, the ratio of Bond-to-Stock in China experienced an noticeable up-tick to reach 197%, due to the sluggish Chinese stock market in that year.

Due to historical reasons, there are two distinct and largely segmented markets in today's Chinese bond markets: over-the-counter interbank market, and centralized exchange market. The interbank bond market in China resembles the interbank market observed in developed countries like the U.S., while the exchange bond market in China is part of the Stock Exchanges in Shanghai and Shenzhen. Section 4.2 offers a brief history of the development and evolution of these two bond markets. The interbank market is the more dominant of these two markets; at the end of 2018, about 89% of the total bonds outstanding in China are in the interbank market, while the remaining 11% are in the exchange.[3] Various fixed income securities are issued and traded on these two bond markets, with many multi-layer regulatory bodies interacting with each other in an intricate way.

We first elaborate on the two bond markets in Section 2, together with various bond instruments traded there. Section 3 provides a brief history of Chinese bond markets, and Section 4 highlights their inherent connection with the banking system, together with the internalization of Chinese bond markets in the near future. Section 5 covers the credit ratings and rating agencies, and Section 6 offers an account of ever-rising default incidents in China starting in 2014. We provide some data sources for in-depth study of Chinese bond market in Section 7.

2 Bond Markets and Bond Types

In this section, we first go over the details of the two segmented Chinese bond markets—namely, the interbank market and the exchange market. After explaining the various bond security types traded in Chinese bond markets, we provide a comparison of these two bond markets.

[3] Besides these two major bond markets, there is also a Counter Trading System through which retail investors trade bonds with commercial banks at their bank counters. This retail over-the-counter market can be considered to be a natural extension of the interbank market.

2.1 Segmented Bond Markets

2.1.1 The Interbank Market (银行间市场)

The interbank bond market, often referred to as the China Interbank Market (CIBM, 中国银行间债券市场), was established in 1997 and has become the dominating market for bond issuance and trading in China. Besides spot and repurchase transactions, swaps and futures are also actively traded by participants in the interbank market. The value of outstanding bonds in the interbank market reached 76 trillion RMB at the end of 2018, with an annual issuance of 41 trillion RMB in the same year.

As a wholesale market, the interbank market restricts participation to various qualified institutional investors including commercial banks, mutual funds, insurance companies, and security firms. As shown in Figure 2, commercial banks (e.g., state-owned commercial banks, join-stock commercial banks, urban and rural credit unions) form the largest group of institutional investors, holding about 57% of the outstanding bonds in the interbank market in 2018. The second largest group is mutual funds, broadly defined to include the fast-growing asset management industry thanks to the rise of wealth-management products after 2012; they held about 29% of outstanding bonds in the interbank market. Security firms, insurance companies, and foreign institutions are the next; these three groups of institutional investors formed a market share of 7% in the interbank market.

The main regulator of the interbank market is the People's Bank of China (PBC, 中国人民银行), the central bank in China. Participants in the interbank market trade via the China Foreign Exchange Trade System (CFETS, 外汇交易中心), and all participating institutions are required to open their accounts with China Central Depository & Clearing Co. Ltd (CCDC, 中债登), a leading depository and clearing house in China. After the terms of trades are finalized through bilateral bargaining, CFETS record these transactions and CCDC offers exclusive custodial and clearing services in the interbank market. This

monopolistic position came to an end after the establishment of Shanghai Clearing House (SHCH, 上清所) in November 2009. Led by the PBC, SHCH competes with CCDC by offering clearing services for products like Medium-Term Notes, Commercial Papers, and Private Placement Notes.

2.1.2 The Exchange Market (交易所市场)

The exchange market for the Chinese bond market is part of the two Stock Exchanges located in Shanghai and Shenzhen, which were established around 1991 in the wake of state-owned enterprise (SOE, 国有企业) and financial reform. In August 1995, the exchange-based bond market was designated as the only legitimate bond market in China. This dominant position came to an end in May 1997 when the PBC, which worried about the overheated Chinese stock market fueled by bond repo financing, ordered all commercial banks to switch to the newly established interbank market on June 1997 (see Section 4.2 for more details). Despite this setback, the exchange market has been keeping pace with the rapid growth of the ever-complicated Chinese financial system. At the end of 2018, the value of outstanding bonds in the exchange market reached 9.2 trillion RMB, with an annual issuance of 2.5 trillion RMB in 2018.

The regulator of the exchange bond market is China Security Regulatory Commission (CSRC, 证监会), the powerful agency that oversees the Chinese stock markets. The participants in the exchange bond market include both institutional players and retail household investors, with only spot and repurchase transactions available. Electronic order books aggregate all bids from investors, and matched trades are settled via China Security Depository & Clearing Co. Ltd (CSDC, 中证登).

2.2 Bond Types

We classify the fixed-income securities in Chinese bond market into three broad categories based on issuing entities: government bonds, financial bonds, and corporate bonds (that are issued by non-financial

sectors). There is also another widely used classification among practitioners in China, which groups financial bonds and corporate bonds together as the so-called credit bonds. Note that, in Chinese bond markets, the issuers are primarily the government or entities directly owned by the government (e.g., SOEs, most commercial banks).

Consistent with international practice, overall speaking, the creditworthiness of these bond instruments is decreasing across these three broad categories. Although corporate bonds in some international contexts also include long-term bonds issued by financial institutions, we specifically separate out bonds issued by financial institutions given that almost all entities in the Chinese financial sector are state-owned. Figure 3 compares the outstanding bonds in China and the U.S. from 2008–2018 by these three categories. We observe relatively a large fraction of government bonds (U.S. Treasury) in the U.S. bond market, but the weight of financial bonds and corporate bonds are similar.

We now turn to details of these bond types. Table 1 gives two snapshots of the outstanding balances of these bonds by type in Chinese bond markets in 2008 and 2018, and Table 2 gives the outstanding balance and issuance amount by bond types in 2018.

2.2.1 Government Bonds (政府债)

Treasury Bonds (国债)

Treasury bonds are issued by the Ministry of Finance and backed by the fiscal revenue collected by the central government of China, representing the creditworthiness of China as a sovereign. There are mainly two types of treasury bonds: book-entry treasury bonds that can be traded and transferred in the market, and certificate treasury bonds, which cannot be traded and hence are mainly used as a savings vehicle. As one of the PBC's key instruments for implementing its monetary policy through open market operations, treasury bonds are one of the most important financial products in today's Chinese financial market,

enjoying relatively large issuance and trading volumes with significant secondary market liquidity. At the end of 2018, the Treasury bonds reached 15 Trillion RMB, which is about 17% of the Chinese bond market. This is rather small relative to the importance of U.S. Treasuries in the U.S. bond market (46%). Nowadays, a market mechanism by which participating financial institutions (mainly commercial banks) bid competitively determines the interest rates offered on Treasury bonds. We will come back to this issue in Section 4.1.

Municipal Bonds (地方政府债)

Municipal bonds are issued by local governments in China. The market for municipal bonds almost did not exist until the 2009 four-trillion-yuan stimulus plan pushed out by Beijing in the wake of 2007/08 global financial crisis. The outstanding municipal bonds grew steadily but rather slowly over the next five years, only to dramatically burst in issuance volume in 2015. As explained later in Section 4.3, this is the outcome of a sequence of noticeable regulatory tightening from Beijing to rein in the ever-growing local government debt problem in the second half of 2014, especially the tone-setting guideline "Article 43." As a result, in 2015 local governments issued 2.8 trillion RMB municipal bonds, of which 2 trillion was used to swap the debt initially raised by local government financing vehicles (LGFVs, 地方政府融资平台).

At the end of 2018, the outstanding municipal bonds reached 18 trillion RMB, with a value-weighted average maturity of 6.4 years at issuance. Because municipal bonds are assigned a zero risk weight, most municipal bonds in China are held by commercial banks (85% at the end of 2018).

Policy Bank Bonds (政策银行债)

China has three policy banks today: China Development Bank, Export-Import Bank of China, and Agricultural Development Bank of China. They were established in 1994 to take over the government-directed lending functions from state-owned commercial banks, and are responsible for financing

economic and trade development and state-invested projects. Policy bank bonds are issued by these three policy banks, which are essentially backed by the central government, and hence considered to be quasi-sovereign bonds and risk free (i.e., they receive zero risk weight if held by commercial banks).

At the end of 2018, there were 14 trillion RMB policy bank bonds outstanding, which actually exceeds the Treasury bonds outstanding issued by Ministry of Finance. The weighted average of maturity at issuance is 8.1 years and two major institutional holders are national commercial banks and mutual funds. It is important to highlight that 55% of policy bank bonds are issued by China Development Bank (CDB, 国家开发银行). Thanks to its depth and sheer size, the CDB bond has achieved superb secondary market liquidity (even better than Treasury bonds in some dimension). In addition, from the perspective of most institutional investors, CDB bonds receive the same tax treatment as other fixed-income securities. As a result, CDB bonds are widely accepted as the risk-free benchmark in practice (as opposed to Treasury bonds).

Other Government Bonds

Other government bonds include central bank bills and other bonds with government support. They are negligible in recent years.

2.2.2 Financial Bonds (金融债)

We classify all bonds issued by financial institutions, including commercial banks, insurance companies, and security firms, as "financial bonds." Because the financial industry, which is considered to be a command-high industry for economic growth, still remains largely state owned and often operates with implicit government guarantee, financial bonds are considered to have a better risk profile than corporate bonds issued by non-financial firms. This better risk profile is reflected in a higher rating distribution

received by financial bonds (see Figure 7 in Section 5.2); there is little difference in yield spreads between financial and non-financial bonds given the same rating class.

Negotiable Certificates of Deposit (NCDs, 同业存单)

As a money market instrument, an NCD is a certificate of fixed-term deposit issued by depository institutions in the interbank market. Oftentimes it is also referred to as an interbank CD, or just a CD. As shown in Table 1, there were no NCDs in 2008. But the NCD market grew rapidly since its inception in December 2013, reaching 9.8 trillion RMB at the end of 2018, thanks to its high credit quality (guaranteed by issuing banks), excellent secondary market liquidity, and reasonable premium over risk-free benchmark offered by government bonds. The NCD rates track closely with Shanghai Interbank Offered Rate (Shibor, 上海银行间同业拆放利率), with a premium of 80 bps over CDB bonds in 2018.

The typical issuers of NCDs are relatively smaller joint-stock commercial banks and urban credit unions, while the buyers of NCDs are large state-owned banks (e.g., the Big-Five) or their wealth management products (WMPs, 理财产品), as large state-owned banks enjoy cheap funding sources either from retail deposits or various central bank facilities.[4] Besides large state-owned commercial banks, money market funds and mutual funds (broadly defined to include asset management plans funded by wealth-management products) have also been investing in NCDs for favorable returns.

Other Financial Bonds

For options besides NCDs, investors can also invest in senior and/or subordinate bonds issued by commercial banks (large state-owned banks, joint-stock banks, and urban and rural credit unions),

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[4] The Big-Five banks are Bank of China, Construction Bank of China, Commercial and Industrial Bank of China, and Agricultural Bank of China (these banks are often-called the Big-Four) and the Bank of Communications. The issuance of NCDs, especially for rural credit unions, was severely curtailed by the recent macro-prudential assessment regulatory tightening starting May 2017.

insurance companies, security firms, and other financial institutions. These financial bonds contribute to a relatively small part of the Chinese bond market (about 7% of the market at the end of 2018).

2.2.3 Corporate Bonds (产业债)

The category of corporate bonds broadly covers all fixed-income securities issued by non-financial firms in China, including asset-backed securities and other convertible securities.

Enterprise Bonds (企业债)

Enterprise bonds, which emerged as early as the first half of the 1980s, are an important financial instrument used by non-financial firms in China as an alternative to bank loans. After the establishment of the interbank market in 1997, the interbank market became the only market where enterprise bonds were issued and traded, as back then enterprise bonds were mainly issued by SOEs, which were not publicly listed in stock exchanges. In 2005, the exchange market started to compete for businesses, and issuing entities could choose to sell their bonds in both markets. As a result, about 82% of enterprise bonds became dual listed since then, and at the end of 2018, about 1/3 (2/3) of enterprise bonds were issued and traded in the exchange (interbank) market. Wang, Wei, and Zhong (2015) and Chen et al. (2018) study dual-listed enterprise bonds.

For historical reasons, the issuance of enterprise bonds has always been regulated by the National Development and Reform Commission (NDRC, 国家发展改革委员会), a powerful government agency that oversees SOE reform and is relatively remote from PBC and CSRC. The outstanding value of enterprise bonds has reached 3 trillion RMB at the end of 2018, and their investors are mainly commercial banks and mutual funds.

One important component of enterprise bonds is municipal corporate bonds (MCB, 城投债), which consist of 75% of enterprise bonds outstanding at the end of 2018.[5] MCBs are bonds issued by LGFVs, which are state-owned enterprises, to support infrastructure investment both at the provincial and city level. They are one of the perfect examples of the mixture between planning and market in today's Chinese economy: they have the implicit backing of the corresponding local government (hence *municipal*), but in a strict legal sense they are issued by LGFV entities just like other regular corporations (hence *corporate*).

Exchange-Traded Corporate Bonds (公司债)

Exchange-traded corporate bonds are corporate bonds issued in the exchange market and regulated by the CSRC. When first launched in 2007, exchange-traded corporate bonds could only be issued by publicly listed companies. In 2015, the CSRC expanded the eligible list of issuing entities in a significant way by allowing all firms registered as "corporations" to issue exchange-traded corporate bonds. Besides, the CSRC also loosened the bond-issuance criterion, and gave the greenlight to both public issuance as well as private placement. Since then exchange-traded corporate bonds have grown rapidly, reaching 6 trillion RMB at the end of 2018.

Medium-Term Notes (中期票据)

Issued in the interbank market, medium-term notes are mainly used by large SOEs as well as prominent private enterprises since 2008. The typical debt maturity at issuance is between three to five years, but also can go as high as ten years. At the end of 2018, the outstanding bond value of medium-term notes reached 5.7 trillion RMB.

[5] In other papers, these bonds have also been called urban investment construction bonds or chengtou bonds, the transliteration of its Chinese name. Bai and Zhou (2018) offer the first comprehensive study on the pricing of MCBs, and Liu, Lyu, and Yu (2017) investigate the role of implicit local government guarantees for these bonds.

Commercial Papers (including Super Commercial Paper, 短融及超短融)

Issued in the interbank market, commercial papers are short-term (generally below one year) financing instruments mainly used by large SOEs as well as prominent private enterprises. For commercial papers, the typical debt maturity at issuance is less than one year, while for super commercial papers, it is about 270 days. Commercial papers were launched in 2005, and at the end of 2018, the outstanding bond value reached 1.9 trillion RMB.

Asset-Backed Securities (ABS, 资产支持证券)

First launched in 2005 and growing by about 49% per year since then, ABS can be issued and traded in both interbank and exchange markets. As a nascent financial product, ABS is the financing engine behind peer-to-peer lending platforms, a burgeoning sector that has experienced astonishing growth recently (for example, the micro-financing arm under Ant Financial Services Group). It is also common for commercial banks to issue ABS backed by consumer or industrial loans, which essentially moves their on-balance-sheet assets to off-balance-sheet. In 2018, the outstanding value of asset-backed securities reached 2.6 trillion RMB, which was about 13% of corporate bonds and 3% of all bonds.

Private Placement Notes (PPN, 定向工具)

Launched in 2011, PPN represents one of the financial innovations by the interbank market and essentially is a mixture between private debt and public bonds. Non-financial firms can issue PPNs to a relatively small number of select institutional investors, who then may transfer these notes among themselves before their maturity in the interbank market. Relative to other more standard publicly placed bonds, PPNs face much less stringent requirements of information disclosure, as the issuers can even negotiate the particular method of information disclosure with a small number of select investors. This significantly alleviates the concern of information leakage for those small to medium enterprises, especially for start-ups in the

technology sector. After several years of rapid growth, the outstanding value of PPN has reached 2 trillion RMB at the end of 2018, which is about 2.3% of the market.

Other Corporate Bonds

Other bond products include international institution bonds (国际机构债) and railway bonds. They are about only 0.5% of the outstanding bond value in 2018.

2.3 Bond Market Liquidity

The last two columns in Table 2 gives the annual secondary market trading volume and the turnover (trading volume over the average outstanding balance) of each bond during the year of 2018. Among all the categories, financial bonds have the highest turnover of about 4; government bonds rank second with a turnover of 1.6; corporate bonds have the lowest turnover at about 0.9.

Chinese government bonds are far less liquid compared to U.S. Treasuries; the latter is perhaps the most liquid financial instrument in the world, with an annual turnover of about 10 in 2018. The lack of market liquidity for Chinese government bonds is often blamed for hindering efficient price discovery, potentially hurting the effective monetary policy conducted by the PBC.

Chinese corporate bonds are significantly less liquid than Chinese stocks, with an annual turnover of about 2.3 in 2018.[6] For a comprehensive study on the liquidity of Chinese corporate bonds and its evolution in response to Beijing's relentless interventions in the last decade, see Mo and Subrahmanyam (2019). This lack of corporate bonds' market liquidity is a universal phenomenon that holds in other developed financial markets like in the U.S. and Europe, perhaps because natural corporate bond investors, say insurance companies, typically keep their holdings until maturity. By calculating the widely used liquidity

[6] Chinese stock markets have a higher turnover rate than U.S. stock markets, as the investor base in Chinese stock market is mostly retail driven instead of being composed of institutional investors.

measures between the two bond markets in China and that in U.S. based on, Table 3 shows an overall similarity of the corporate bond market liquidity across these two economies.

Given the unique two-market system in Chinse bond markets, it is interesting to compare the market liquidity between the interbank and exchange markets. Figure 5, taken from Chen et al (2018), plots the number of trades and RMB volumes of corporate bonds in these two markets, respectively. Compared to the interbank market, there is significantly more trading activity in terms of number of trades in the exchange market (90% in terms of number of trades, shown in Panel A), but the volume weighted by trading size is miniscule (5% in terms of RMB volumes, shown in Panel B). This is consistent with Table 3, and reflects the fact that retail investors speculate in the exchange market heavily, while in the interbank market sophisticated financial institutions only trade when they need to. In summary, the interbank market is deeper but lacks immediacy, relative to the exchange market.

2.4 Summary

Table 4 summarizes the comparison between the interbank and exchange markets, with a detailed list of various bond products traded there. Though largely segmented, these two markets overlap in several key bond products, mainly government bonds and enterprise bonds. Starting 2015, the exchange market opened its access to enterprise bonds, which had previously been issued and traded only in the interbank market. Chen et al. (2018) provides an analysis on the market segmentation of dual-listed enterprise bonds, whose cross-market arbitrage is severely hindered by the transfer of depository, which is a time-consuming process.[7]

[7] Suppose investors would like to sell their interbank holdings to the exchange market, perhaps for a better exchange price. According to Chen et al. (2018), investors need to apply for transfer of depository from the interbank market (the CCDC) to the exchange (the CSDC), which takes about three to four business days in 2014. The other way around from exchange to interbank will take a slightly longer process (about four to six business days in 2014). The transfer of depository becomes quicker in recent years, but still takes about a few days.

The market segmentation is also reflected in the distinct regulators for these two bond markets. The government agency that oversees the exchange market is CSRC, the powerful watchdog for the Chinese stock market. In contrast, the interbank market is overseen by the central bank PBC, which is the de facto gatekeeper of this market. Under the guidance of the PBC, the National Association of Financial Market Institutional Investors (NAFMII, 银行间交易者协会) is a self-regulatory organization established in October 2007 to formulate rules governing institutional participants in the interbank market. Regulatory competition among different government agencies is a recurrent theme commonly seen in the development of the Chinese financial system. For reference, Table 5 provides a complete list of regulators specializing in each detailed bond product. One notable regulator besides the two mentioned above is the NDRC, which is in charge of issuing enterprise bonds; recently, it has played a greater role in regulating and approving local government debts, including municipal bonds (issued by local governments directly) and municipal corporate bonds (issued by LGFVs).

The coexistence of an over-the-counter--based interbank market and an exchange-based bond market is an important feature that is unique to Chinese bond markets. For historical reasons, these two markets have been developed in a relatively independent fashion. Despite the recent effort made by the NDRC to integrate these two markets, which gives rise to dual-listed enterprise bonds (Chen et. al, 2018), we expect the coexistence of these two bond markets to last for quite a long time in China.

3 A Brief History of Chinese Bond Markets

This section offers a brief account on how the bond market in China has evolved into what it looks like now. The thread that connects all the milestone events in the development of the Chinese bond market is the segmented market system described in Section 2.1: the exchange market and the interbank market.

3.1 Physical Bond Counter Market

The development of Chinese bond markets in the modern era started from the resumption of Treasury bond issuance by the Ministry of Finance in 1981.[8] Besides the government, a few enterprises as well as financial institutions also conducted debt financing from either their own employees or outside investors. These non-bank-loan debt instruments became legal "enterprise bonds" after the release of "Regulatory Guidelines of Enterprise Bonds" by the State Council in 1987. The secondary market for bond trading followed, and in 1988, the Ministry of Finance carried out a pilot project for Treasury bond circulation and transfer in 61 cities. Through this program, individual investors could buy and sell Treasury bonds at bank counters as well as regional trading centers. Trading was done mostly in the form of physical bonds, hence it was called a "physical bond counter market" (Sun, 2015).

3.2 The Exchange Market Era

Many deficiencies emerged during the early 1990s for this physical bond counter market. Among them, the most critical was the lack of a uniform bond custody system. Fake Treasury bonds were common as it was extremely difficult for decentralized custody systems to verify the authenticity of the physical paper bonds.

The centralized exchange market, with electronic "book-entry" Treasury bonds, was considered to be the solution to this problem. Established in December 1991, the Shanghai Stock Exchange provided uniform bond custody service across the country, and the government was explicit in supporting the development

[8] Without market-based mechanisms at play, allocations of treasuries at that time were based on apportionment via administrative channels.

of this exchange bond market.[9] In August 1995, the government officially announced that stock exchanges, including both the Shanghai and Shenzhen Stock Exchanges, were the only legitimate bond market in China. This greatly improved the liquidity and functioning of the secondary market on these two exchanges, and an exchange-based bond market system took shape by 1996.

Before long, another dramatic turn pushed the interbank market onto the stage. Keep in mind that the two exchanges in China were developed mainly for equity financing and stock trading. During the first half of 1997, the Chinese stock market experienced an unprecedented boom, witnessing the Shanghai A-share index rising from 1000 in early 1997 to above 1500 in May 1997. Secondary bond market activities, which involve commercial banks and individual investors, contributed to this speculation-driven stock market surge. Essentially, bond repo transactions in the exchange market allowed investors to use bonds as collateral to obtain debt financing from banks, which in turn was channeled toward the stock market to fuel its rally.

3.3 The Rise of the Interbank Market

Worried about the large amount of bank funds flowing into the overheated stock market, on June 1997 the PBC ordered all commercial banks to withdraw from exchanges and to switch to the newly established interbank market. The PBC also mandated that all commercial banks move their Treasury bonds, central bank bills, and financial bonds issued by policy banks into the interbank market under the custody of CCDC.

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[9] These initiatives include the pilot program of convertible bonds and the short-lived episode of Treasury futures trading on the exchange. Shanghai Stock Exchange introduced Treasury futures contracts in December 1992, but terminated them in May 1995 after the infamous scandal known as “The Event of Treasury Futures Contract 327.” The Treasury futures market in the exchange was resumed in September 2013.

This PBC-led event marked the beginning of the dramatic growth of interbank bond market. Over the intervening twenty years, the “wholesale” interbank market, standing in contrast to the more-or-less “retail” exchange market, has become the dominating pillar of Chinese bond markets. The participants were initially restricted to only 16 head offices of commercial banks in 1997; by the end of 2000, a total of 693 financial institutions, including insurance companies, urban and rural credit cooperatives, and security firms, had become members of the interbank market.

In February 2014, facing the rapid rise of “shadow banking business,” the PBC allowed 16 large commercial banks to invest their own WMPs in the interbank market. In May 2016, direct access to the interbank market was further granted to all qualified institutional investors, including WMPs, investment funds, and trust companies. The total number of the interbank market members has reached 6,543 as of December 2018, and these financial institutions cover almost the entirety of the financial system in China nowadays.

3.4 Bond Markets and the Growth of Chinese Economy

The rapid and steady development of the Chinese bond market offers great benefit for various economic agents in Chinese economy. First, the interbank market has become the primary place for the Ministry of Finance and government-backed entities like policy banks to issue bonds to finance their activities. Second, it helps the central bank, the PBC, to implement its open market operations and other monetary policies. For instance, in April 2003 the PBC conducted the first formal open market operation in the interbank market, by issuing central bank bills valued at 5 billion RMB with a maturity of 6 month. We will come back to this topic in Section 4.1.

But the Chinese bond market plays perhaps an equally important role by channeling household savings toward the real sector, which was critical for the Chinese economy to achieve its astonishing growth in the last three decades. Various forms of debt instruments have been developed in both markets. In the

interbank market, commercial papers, a form of short-term, high-quality enterprise bonds with a typical maturity of below one year, emerged in May 2005; and medium-term notes with a typical maturity of five years saw their debut in April 2008. As far as instruments besides enterprise bonds, the first asset-backed securities were issued in the interbank market in December 2005; and the first municipal bonds were issued by local governments via the Ministry of Finance in April 2009. On the exchange market, listed companies first issued exchange-traded corporate bonds in 2007, and in 2015, the CSRC expanded the eligible list of corporate bond issuers to all incorporated companies (as opposed to only listed companies). All these reform activities gave a significant boost to the development of corporate bonds market in China.

4 Issues and Recent Trends of Chinese Bond Markets

In this section, we first point out that a full market mechanism has yet to be achieved by Chinese bond markets. We then highlight the predominance of commercial banks in China's bond markets; this also explains why the Chinese bond markets are deeply intertwined with the shadow banking system in China. We finally discuss the recent trend since late 2017 in authorities' hardline stance on deleveraging and restraining shadow banking activities, together with opening up Chinese onshore bond markets to international investors.

4.1 Interest Rate Determination and Monetary Policy Transmission

The risk-free benchmark interest rates and the associated term structure, which are implied by the prices of all government bonds with various maturities, "anchor" the pricing of all financial assets in modern financial markets. Like in other modern financial markets such as in the U.S., interest rates of newly issued Chinese government bonds are determined via competitive bidding of participating financial institutions (mainly commercial banks and securities firms) in the primary market; they then can trade among each

other in the secondary market. Today, it is fair to say that market mechanisms are at work in Chinese bond markets after more than two decades of successful and continuous development.

Figure 6 plots the yields for Treasury bonds and CDB bonds for 1 and 10 year maturities, respectively. These four series of interest rates have moved mostly in parallel and varied between 1.5% and 6% since 2012, with slightly lower yields for Treasury bonds (than CDB bonds) due to their tax advantage. Overall, in the past half decade, the term structure of interest rates in China has been upward-sloping, and the steadily falling interest rates over the period of 2013–2016 made this episode the "bull" market for Chinese bond traders.

Despite the rapid growth in the size of the bond market, it is well recognized among policy makers and practitioners that Chinese bond markets are still underdeveloped in many key dimensions. Compared to the deep and liquid market for U.S. Treasuries, the market for Chinese government bonds still lacks sufficient liquidity, and is often blamed for hindering efficient price discovery. The latter role of price discovery is key to effective PBC-led monetary policy stabilizing the Chinese economy.

There are several institutional reasons for the steady but somewhat slow development of the Chinese government bond market toward a full market mechanism. A well-functioning primary and secondary market for risk-free rate determination is an integral part of interest rate liberalization, which started in the late 1980s and saw its formal completion when the PBC finally lifted the banks' deposit rate cap and rolled out the deposit insurance scheme in 2015. Second, the "12th five-year plan" in 2011 has made it clear that future monetary policies should put more emphasis on market-driven, price-targeted tools (e.g., repos with the PBC, and various Standing Lending Facilities), although quantity-targeted tools (e.g., M2 growth, total bank credit) and "guidance rates" frequently published by the PBC still remain the most effective measures taken by Chinese monetary authorities. Third, from a market design perspective, an entry barrier exists for the primary market, which limits participation in the auctioning of government bonds to qualified

financial institutions. Most market-makers, who serve the secondary market in the interbank market, are commercial banks with an unpleasantly high degree of homogeneity in trading strategies and funding sources. Finally, the above-mentioned segmentation between the interbank and exchange markets, with potential violation of the “law of one price,” hurts price discovery and the liquidity of the Chinese government bond market.

4.2 The Role of Banks and Shadow Banking

Another distinct feature that seems to be inconsistent with the fast development of Chinese bond market is that the participants remain highly concentrated in one particular type of financial institution: commercial banks. As explained in Section 3.3, the Chinese interbank bond market has been closely intertwined with the banking system ever since the establishment of the bond market in 1997, when commercial banks were mandated by the PBC to be the first participants of bond issuance and trading.

It is crucial to recognize that the official statistics significantly underestimate the dominance of commercial banks in Chinese bond market. It is well known among practitioners and regulators that in China, commercial banks participate in the bond market via two channels: the direct on-balance-sheet channel, through which the bank’s so-called financial market division buys and sells bonds (and engages in even arbitrage trades) in the interbank market; and the indirect off-balance-sheet channel, where the bank’s asset management division sets up some wealth management plans (just like special purpose vehicles in the U.S. market) financed by WMPs to invest in both interbank and exchange markets. The dominating share of commercial banks (57%) of the interbank bond market in Figure 2 only counts the first channel.

This perspective suggests that in China’s financial system, corporate bonds, to a significant extent, can be considered to be another form of disguised bank financing. Facilitated by increasingly sophisticated shadow-banking activities, the transfer of on-balance-sheet loans (inside the traditional banking system)

to off-balance-sheet assets outside (say corporate bonds) is commonly observed, especially when banks have faced tightened regulation on the overheated real estate sector and LGFV financing. This is why practitioners often argue that, unlike in other developed countries, in China shadow banking is literally just the "shadow" of commercial banks.

Let us take the example of WMPs, which are the biggest component of shadow banking in China and the most important vehicle to connect back to the banking system. Starting in 2014, China Banking Wealth Management Registration System has released its annual report on WMPs, which gives an official account on the role played by WMPs in the contemporary Chinese financial system. According to these reports, a majority of WMPs are invested in the bond market, with the percentage to be 44% in 2016 and 42% in 2017.

In fact, many industry reports corroborate this view. Ehlers et al. (2018) estimate that 38% of the net issuance of all bonds was funded via bank-issued WMPs in 2014; the funding percentages were 35% and 31% in 2015 and 2016, respectively. In a more recent study, Lei et al. (2018) find that 7 trillion out of 18 trillion outstanding corporate bonds' balance is funded by WMPs; and as explained in footnote 8, these numbers are likely to be biased downward. Overall, evidence suggests that bond market is an integrated part of bank-dominated shadow banking in China.

Chen, He, Liu (2018) argue that China's shadow banking problem is connected to its local government debt problem, which is further rooted in the four-trillion stimulus rolled out in 2009. They document that three to five years after the 2009 stimulus plan, LGFVs needed to refinance their maturing bank loans and/or fund ongoing infrastructure projects. However, soon after the mid-2010s, indebted LGFVs were squeezed by tightening credit standards from traditional banks. As a result, these LGFVs then started issuing municipal corporate bonds (MCBs, as explained in Section 3.3) in the interbank market. The

majority of these MCBs were bought by WMPs, which were sold and implicitly guaranteed by commercial banks.[10]

There is another important channel through which commercial banks facilitate industrial firms to issue bonds in the interbank market and hence are exposed to default risk. In China, commercial banks often engage in guarantee provisions on corporate bonds, though it is hard to estimate the severity of this risk exposure.

To illustrate this point, consider the interesting case of the scandal of Cosun bonds (侨兴债事件), which involves financial innovations, shadow banking, and (some malfunctioning of) the commercial banking system. In December 2016, the Cosun Group, a privately owned telecommunication company in Guangdong, defaulted on a series of its private placement notes issued two years ago.[11] Shocked by the default news, retail investors went to Zheshang Insurance, the insurance company which provided insurance on this credit event. But Zheshang Insurance immediately made a public announcement stating

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[10] Chen, He, Liu (2018) find that about 60% of investments in MCBs are by WMPs by the end of 2016. This 60% number is likely to represent an underestimation of the extent to which MCBs rely on WMPs with the ultimate endorsement of banks. Before the 2017 regulation tightening on China's shadow banking activities, it was popular for managers of WMPs to invest in asset management plans (or several layers of asset management plans, like CDO square in the U.S. market before the 2007/08 financial crisis), which then eventually invest in MCBs. The official statistics ignore this indirect exposure of WMPs in MCB (hence introducing a downward bias of our estimate). According to practitioners in this market, the rough estimate of the true exposure is that around 2016, about 70% of investment in MCBs was by WMPs.

[11] These notes were placed in a local-government owned (Guangdong) exchange market but sold through some peer-to-peer platform to retail investors, with the help of financial innovation. Recall that only a select group of sophisticated institutional investors are only allowed to invest in PPNs. However, it turns out that many retail investors are buying pieces of PPNs issued by Cosun Group, thanks to the financial innovation of some peer-to-peer lending platform.

that China Guangfa Bank, one of the earliest-incorporated joint-stock commercial banks, had promised some guarantee provision to repay Zheshang Insurance at the bond issuance but reneged on its promise. It turned out the Huizhou Branch of China Guangfa Bank provided a counterfeit letter of guarantee for this bond issuance;[12] this guarantee helped Cosun to issue these bonds, only to rollover Cosun's maturing loans extended by the Huizhou Branch itself several years ago.

4.3 Regulatory Tightening Starting in 2017

The Chinese government is well aware of these so-called shadow-of-bank activities that essentially tie the commercial banking sector to financial products offered in the interbank market. The dramatic regulatory change started in 2017 is expected to reshape the Chinese financial market in a profound way, bringing a sea change in the interbank market. Under this new framework, WMPs will be put under the scrutiny of the PBC for the first time and factored into its calculations on prudence, capital adequacy, and loan growth guidelines. Another equally important regulatory tightening concerns the rules of new asset management plans, first proposed in Nov 2017 and released in April 2018 (though still yet to be finalized). The new rules aim to prohibit implicit guarantees and multi-layer structures, the two important ingredients that had contributed to excessively high leverage in China's shadow banking system over the past decade.

Not surprisingly, in response to policy tightening, the Chinese bond market experienced a dramatic downward adjustment in 2017. The annual increment of the value of outstanding bonds, adding together the interbank and exchange markets, experienced about a 35% drop, decreasing from 16 trillion RMB in

[12] After the credit event, Zheshang Insurance released documents carrying Guangfa Bank's official seals, showing that the bank's Huizhou branch had promised the guarantee. However, the headquarters of Guangfa Bank claimed that the guarantee documents presented by Zheshang Insurance, together with official seals and personal seals, were "all fake." For details, see https://www.reuters.com/article/uk-china-banks-fraud/china-imposes-record-fine-on-guangfa-bank-over-guarantees-for-defaulted-bonds-idUKKBN1E21KU.

2016 to 10 trillion RMB in 2017 and 2018. We will come back to this topic in Section 6.2 together with the recent insurgence of corporate default in Chinese bond market.

Looking forward, we believe that Beijing's recent effort in streamlining and tightening regulations in the ever-complicated Chinese financial market is well justified. Though it is inevitably painful for market participants in the short-run, a transparent regulatory environment is tremendously important for building a healthy and sophisticated bond market in a modern financial system where market participants fully understand the consequences of their own decisions, including issuance, underwriting, trading, and investment.

4.4 Internalization of the Chinese Bond Market

Despite the fact that the Chinese bond market has developed to be third largest in the world, foreign participation is miniscule. At the end of 2018, the total foreign holdings of the Chinese bonds reached 2.6 trillion RMB, or around 3.1% of bond market capitalization. [13]

Historically, to gain access to Chinese bond markets, offshore investors were required to go through some quota-based foreign investment programs. One of them is the Qualified Foreign Institutional Investor (QFII, 合格境外机构投资者) program, which was launched in 2002 and regulated by the State Administration of Foreign Exchange (SAFE, 国家外汇管理局, a powerful arm of the PBC) which monitors the remittance and repatriation of funds across the border. Initially QFIIs could only invest in the exchange bond market; since March 2013, they are allowed to get access to the much bigger interbank market.

[13] On the other way around, many Chinese firms have actively sought oversea funding sources by issuing foreign-currency denominated bonds (Huang, Panizza, and Portes, 2018).

Another closed related program is the Renminbi Qualified Foreign Institutional Investor (RQFII, 人民币合格境外机构投资者) program. This program allows domestic financial institutions to establish RMB denominated funds in Hong Kong, attracting offshore RMB in the hands of oversea investors back to the onshore bond market. At the end of 2018Q3, the total quota combining QFII and RQFII was about 1.34 trillion RMB, though the actual usage was just 0.3 trillion RMB (of which about 10% was invested in bonds while the rest was in equities).[14]

As a milestone effort in the internalization of the RMB, Beijing launched the PBC bond direct-access program in 2010. Based on a case-by-case approval system, this program attracted offshore institutional investors (e.g., foreign central banks, offshore RMB clearing banks) to the Chinese interbank bond market. In July 2015, the PBC further eased regulation by allowing institutions with long-term investment mandates—such as foreign central banks and sovereign wealth funds—to participate in the interbank market without quota limits. More importantly, these qualified institutions can follow a registration system, rather than a pre-approval system, to participate in the interbank market. In February 2016, similar access was granted to a much wider range of institutional investors, including commercial lenders, insurance companies, securities firms, and asset managers (excluding short-term or "speculative" investors). One year later in February 2017, the SAFE was giving overseas investors access to its foreign-exchange derivatives market to allow hedging of bond positions, a crucial step in attracting foreign inflows.

In a separate and mostly independent effort, motivated by the success of Stock Connect started in November 2014, China launched Bond Connect (债券通) on July 2017. Like Stock Connect, Bond Connect is a mutual market access scheme that allows investors from mainland China and overseas to

[14] Unfortunately, we only have data for stock investments for QFII. We hence estimate the total investment of QFII and RQFII using 90% invested in stock and 10% in bond and assuming the same investment structure for RQFII.

trade in each other's bond markets, through connections between the related mainland and Hong Kong financial infrastructure institutions. Thanks to Hong Kong being a leading world-class financial center, foreign investors offered a warm welcome to Bond Connect: The rise of foreign ownership of mainland bonds in July and August in 2017 was almost double the pace of the prior year.

No doubt, the sophistication and development of mainland bond markets are crucial for advancing RMB internalization, one of the policy goals that has been a top priority for the Chinese government. Looking forward, given Beijing's strong intention to push forward the liberalization of the mainland bond market, we can expect a more and more relaxed regulatory environment for foreign investors to participate. Likewise, overseas investors are flocking to China's mainland bond market for its strong value and potentially tremendous opportunity. This process is likely to be expedited by the decision of Bloomberg, which announced that, starting in April 2019, it will add over 300 of China's government bonds to the Bloomberg Barclay's Global Aggregate Bond index. Of course, this progress might be interrupted by concerns of capital flight in the wake of a potentially significant slowdown of the Chinese economy.

5 Bond Ratings and Rating Agencies

A key characteristic of bonds is their credit risk as reflected in ratings. Rating agencies are vital in any financial market. While rating symbols used in China closely follow global standards, the rating scale itself differs. Currently, China has only three de facto rating categories. This section illustrates and discusses the skewed rating distribution. Reasons for this observation include low default rates, an ongoing trend of more upgrades than downgrades, implicit guarantees, regulatory requirements, and fierce competition among the domestic rating agencies, which differ little in their ratings assessments. The

previous section introduced three different bond types. As ratings for government bonds are always AAA rated, this section focuses on "credit bonds" including financial and corporate bonds.[15]

5.1 China's Credit Rating Scale

China's domestic rating scale includes nine long-term grades (AAA, AA, A, BBB, BB, B, CCC, CC, C) and six short term grades (A-1, A-2, A-3, B, C, D) as officially set by the PBC. This is in line with international standards as set by the three globally dominant U.S.-based rating agencies Moody's, Standard & Poor's, and Fitch. However, there are two main differences in the rating scale used by Chinese versus global rating agencies. First, the definition of investment grade differs. In China AA is generally seen as the lowest investment-grade level while this is BBB in global ratings. Despite the higher threshold, the issuance of non-investment grade bonds is much scarcer in China. Second, China's domestic rating scale includes an additional, informal rating grade: the "AAA+" or "super AAA" category provided by investors. These AAA+ issuers keep an official and legally relevant rating of AAA provided by rating agencies. However, the AAA+ issuers enjoy a higher weighting in valuation indices, reflecting lower default probability assigned by investors who expect these corporates bonds to essentially have a credit risk similar to government bonds. By 2018, there were ten central government–owned issuers in this category (Table 6).

5.2 Distribution of Credit Ratings

The distribution of the Chinese ratings is widely known to be skewed to the upside (Kennedy 2008, Poon 2007, Standard Chartered 2017; and more recently, Deng and Qiao 2019). Despite the large market size (about 2,000 corporate issuers) by global standards, over 95% of the outstanding amount of non-financial

[15] "Non-financial credit bonds" and "corporate bonds" are used as synonyms in this section.

corporate bonds are rated in only three categories (Figure 7 Panel A).[16] By the end of 2018, 54% of the corporate bonds outstanding in China enjoyed an AAA rating, versus about 6% in the U.S. corporate bond market; 23% were AA+, another 19% were AA rated, and only 2% were rated as AA- and below and therefore were non-investment grade; 1% of the outstanding amount of corporate bonds are not rated. For financial bonds, the shares are AAA 82%, AA+ 13%, AA 4% and AA- or lower 1% of the outstanding amount of corporate bonds respectively, reflecting the explicit government guarantees. The high share of AAA rated corporate bonds in value terms is partly explained by large amounts of bond issuance of just a few issuers who are mostly linked to government. Of the top 10 issuers (Table 7), only one is privately owned, which is a real estate corporation, while the others are all central SOEs. However, clustering in only three categories also holds in terms of the number of issuers. Of the Chinese corporate issuers, 14% hold an AAA rating, 19% an AA+ rating, and 41% an AA. About 8% of corporate bonds are private placement where credit ratings are not mandatory. Only 18% hold a non-investment grade rating of AA- and below (Figure 7 Panel B). Consequently, China currently has essentially no high yield or speculative grade bond market.

The tilted distribution is the source of some disagreement. On one hand, the low credit risk differentiation is generally seen as a hindrance to the development of the bond market. For domestic investors, the absence of more granular credit risk opportunities and the lack of a speculative, high yield market might lower the attractiveness of the bond market particularly relative to the stock market. For international investors, the low guidance offered by the current rating distribution is often given as one reason why they

[16] Our sample of corporate issuers include LGFVs (see Section 2.2.3), through which local governments carry out their infrastructure projects (especially during the 2009 stimulus package; see Chen, He, and Liu 2019). These firms often have explicit or implicit guarantee from local governments. As a result, the rating distribution documented here is more upward-skewed compared to Deng and Qiao (2019) who exluded LGFVs from their sample.

currently take up only a small part of the investor base in the Chinese bond market, despite a steady loosening of investment restrictions (Section 4.4). On the other hand, implicit guarantees entailed in the credit assessments of a good part of corporate issuers with links to government may partly justify a higher rating.[17]

5.3 Low Default Rate, Implicit Guarantees, and Rating Migration

Low default rate

One main reason for the high credit ratings is the very short and limited history of defaults in China. The first onshore public bond default occurred only in 2014. The amount defaulted in the Chinese bond market was only 1.26 billion RMB in 2014, reached a first peak at 30.1 billion RMB in 2016, before falling to 27.7 billion RMB in 2017. The amount of defaults jumped to a new high of 128 billion RMB in 2018 (Figure 8 Panel A in Section 6.1). This surge in corporate defaults was triggered by challenging refinancing conditions and increasing redemptions (mentioned in Section 4.3) due to tightened regulation starting at the end of 2017. However, from the first default in 2014 until the end of 2018, these defaults represented only 0.2% of the overall outstanding amount, suggesting a rather small default probability relative to global counterparts. See more details on corporate bond defaults in Section 6.

Rating migration

As the number and amount of defaults start to increase, though at quite low levels, one would expect that this trend slowly but steadily softens the skewness of the ratings distribution. However, the opposite has been the case so far. From the first default in 2014 until 2018, there were about ten times more upgrades than downgrades (Table 8). Of the 2,784 bond issuers, 918 received rating upgrades, only 129 were

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[17] This is similar to the case of "stand alone" versus "support" ratings assigned to some international banks, which enjoy a lower default risk and higher all-in rating due to government support schemes.

downgraded, and the vast majority of 1,737 remained the same rating level over those four years until the end of 2018. The biggest rating migration occurred for the AA- rated bonds where over 49% were upgraded and only 6% were downgraded. Of the large share of AAA rated bonds, only 2% were downgraded. The mismatch between increased defaults and an ongoing trend of an upward bias in rating changes lets many commentators doubt whether the upgrades are backed by improvement in credit fundamentals. Alternatively, they suggest that this phenomenon is related to the fierce competition among the many Chinese rating agencies which we cover in Section 5.5.

Rating migrations are also discussed in the context of their timing, which is sometimes seen as too late or too hesitant, despite signs of weakening cash flow and earnings. As illustrated by the examples given in Section 6, rating changes in the cases of bonds that later eventually defaulted often occur alongside announcements and media reports of financial distress. This somewhat limits the use of ratings as an early warning system for investors.

Implicit guarantees

The low default rate and trends in rating migration are often related to implicit guarantees. While it is difficult to quantify the amount of defaults that are prevented by government support, in some cases ratings are obviously adjusted due to an expected, although not legally binding, moral commitment of the Chinese government. As an example we refer to the bonds issued by the four asset management companies (AMCs, 资产管理公司) that were established in1999 to purchase a total of 2.4 trillion RMB in non-performing loans from commercial banks. The rating agencies classified the AMC bonds not as speculative, but as part of the highly rated Chinese sovereign debt, expecting the Ministry of Finance to intervene in case of default. Although implicit guarantees are not a uniquely Chinese feature as the case of Fannie Mae and Freddie Mac in the U.S. illustrates, the degree of implicit guarantees is likely more severe in China due to more widespread or closer links of corporations to the government.

5.4 Regulatory Framework

The regulatory framework is another important factor that supports clustering in only the three highest rating classes.

Rating requirements

For corporate bonds to be qualified for public issuance, minimum ratings are mandatory, but in most cases only one rating is required. This makes it often the main motivation for issuers to buy a rating and invites rating-shopping. The specific regulatory requirements vary with the bond type and are set by the respective regulator. For instance, in the interbank market, NAFMII asks for commercial paper and medium-term note issuers to be rated AA- or above.[18] For exchange-traded corporate bonds that are issued to retail and qualified investors, they generally need an AAA rating, except for issuers in the property sector where a rating of AA or above is sufficient. However, the CSRC removed the rating requirements for corporate bonds that are issued only to qualified investors. Also, the NDRC has its own rating requirement for enterprise bonds. Guarantees are only required for LGFVs with debt-to-assets ratios of 65% or above. No guarantee is needed in the cases of an AAA rated issuer of an enterprise bond with ratios below 85% or an AA+ rated enterprise bond issuer with ratios below 80%.

Repo eligibility and haircuts

The possibility to use a bond as collateral in a repo transaction, which is essentially collateralized borrowing, is an additional value to bondholders. The greater the haircuts, the lower the capacity of collateralized borrowing. Bond issuers may therefore be hesitant to issue bonds that lack this property. The repo eligibility of corporate bonds is limited as they are generally only accepted by non-bank financial

[18] For super commercial papers, two ratings from different agencies are mandatory with one at AA or above.

institutions while banks accept only government bonds. Further, money market funds, as key players in the liquidity provision, are allowed to accept only bonds rated AA+ or higher as repo collateral.

The repo eligibility on the exchange market is even more restricted due to its centralized nature. In this market, investors conduct repo transactions against the CSDC who serves as the Centralized Counter-Party (CCP, 中央对手方) and sets bond-specific haircuts. Chen et al. (2018) document that haircuts are almost entirely determined by bond ratings, and explore the December 2014 policy shock when the CSDC suspended the repo eligibility for enterprise bonds with ratings below AAA. Later in 2017, the CSDC tightened the required minimum rating from AA to AAA for exchange-traded corporate bonds.

Overall, the regulatory framework offers clear incentives to issue ratings only in the very high rated categories. It seems unlikely for bond issuances to receive a broader range of credit categories without at least some further loosening of the regulatory restrictions in that respect.

5.5 Rating Agencies

The specific structure of the rating agency industry in China is a further reason for the upward-skewed ratings in China. After a brief historical review, we discuss the increasing diversification by nationality, the incentive model of rating agencies, and possible impacts on the rating distribution.

A brief historical review and licensing

An early form of rating agencies were already established in 1987 when the State Council issued "Regulatory Guidelines of Enterprise Bonds," which introduced ratings in their guidance of bond issuance. At first, ratings were offered by credit rating departments in provincial branches of the PBC. Later several independent rating agencies were launched, in some cases as spin-offs of the previous rating departments. The PBC regulations on the types of bonds and loans requiring a rating became mandatory from 1993 onward, further fueling the offering of rating services. To assure quality and consistency in the rating agency industry, the PBC has demanded since 1997 that corporate bonds must have at least one rating

from a PBC-approved agency and has limited the number of qualified rating agencies to nine. In 2006, the CSRC followed with a formalized licensing process for credit rating agencies covering bonds regulated by the CSRC. Today, each of the three regulators covering corporate bonds (NAFMII, NDRC, CSRC) issues separate lists of qualified agencies for rating bonds under their respective program. Consequently, a rating agency usually needs to get approval from more than one regulator depending on which types of bonds they are providing rating services for (Table 9).[19] Recognizing the fragmented accreditation process for rating agencies, in 2014, the State Council started to issue notes that simplify and at least partially deregulate the accreditation of domestic agencies.

Nine approved rating agencies

The international rating agency industry is famously dominated by three U.S.-based agencies Moody's, Standard & Poor's, and Fitch. About 95% of all globally outstanding ratings are currently provided by the so-called Big Three.[20] China has a relatively large number with nine recognized domestic credit rating agencies (Table 9 provides an overview on market share and accreditation). However, six agencies (or four, counting the sub-institutes as one) dominate with a market share of 91% of the outstanding bond issuance in China: Chengxin (Chengxin Securities Rating and Chengxin International Rating), Lianhe (China United Rating and China Lianhe Rating), Dagong Global Credit Rating and Shanghai Brilliance Investor Service. Both Chengxin and Lianhe have a domestic agency licensed by the CSRC to offer ratings in the exchange market, and a separate joint venture licensed by the PBC with a minority ownership of an

[19] Further, China Insurance Regulatory Commission, the regulator of the insurance sector (which was merged with China Banking Regulatory Commission in early 2018), once issued a list of recognized agencies for fixed income investments of domestic insurance companies.

[20] The global agencies made earlier attempts to enter the Chinese rating industry but at the time decided to disinvest. Fitch had a joint venture with Chengxin from 1999 to 2003 and Moody's a cooperative agreement with Dagong from 1999 to 2002 (Lee, 2006; Moody's, 1999).

international rating agency to offer ratings in the interbank market. The fully domestically owned Chengxin Securities Rating, China United Rating, and Dagong were founded in 1992, 2002, and 1994, respectively. Chengxin International Rating was established in 2006 and 49% of its shares are owned by Moody's while Lianhe Rating was established in 2007 and 49% of its shares are owned by Fitch ratings. S&P has had a partnership with Shanghai Brilliance Investor Service since 2008. It is worth emphasizing that all the joint-ventured rating agencies mentioned above operate completely separately from their corresponding international global rating agency, which takes no active role in the joint ventures.

Throughout this time, the global rating agencies could have only minority stakes in joint-venture operations. Further, they were not accredited to issue "national ratings," ratings of Chinese firms issuing bonds onshore. Instead, the global agencies assign "international ratings" for Chinese firms issuing bonds offshore. In July 2017, the PBC announced liberalization steps on both accounts. Global rating agencies will be allowed to register for rating services in the China interbank bond market and to own a majority stake in an accredited agency, provided that the agency meets some criteria in terms of market experience and corporate governance.

Aside from the five major agencies mentioned above, there are four domestically owned accredited agencies with a relatively small market share. Shanghai-based Shanghai Brilliance was founded in 1992, Pengyuan Credit Rating based in Shenzhen in 1993, Golden Credit Rating International based in Beijing in 2005 (often labeled as "Orient" in the market), and China Bond Rating Corporation in Beijing in 2010. China Bond Rating Corporation is the only agency operating under an investor-pays model, a topic that is covered in the next section.

Little differentiation of rating agencies

While, in the early days of rating agencies in China, a standardized procedure was missing, the rating industry is seen as too homogenous today. Rating methodologies, including the specific factors and

weights that are used to determine default probabilities, may only differ slightly. Also, rating decisions across domestic agencies offer little variation and are also similar in timing. None of the domestic agencies has gained a clear advantage in reputation or market leadership. Consequently, the rating industry in China is highly competitive with similar fee structures. For agencies, the incentive to proactively downgrade an issuer is low. The problem worsens as bond issuers often aim for just one rating in order to fulfill regulatory requirements. This is obviously only the case under the issuer-pays model, which is the international standard and the model for eight of the nine officially approved Chinese agencies. Recognizing the challenging incentive structure, in 2010 the NAFMII installed an agency China Bond Rating Corporation (CBR, 中债资信) that operates under the investor-pays model. On average, CBR offers a stricter rating scale, with ratings two to three notches below those given by the issuer-pays model. There is little difference in rating assignments between the joint ventures and fully domestically owned agencies. It remains to be seen to what extent the recently allowed entrance of foreign rating agencies will change the upside bias in ratings. Comparing ratings from domestic versus global agencies, Jiang and Packer (2017) find the latter to be six to seven notches lower on average. Furthermore, they find differences in underlying drivers. Domestic agencies weigh size more positively in the risk assessment, while global agencies weigh profitability and state-ownership more positively and leverage more negatively. These findings can only serve as an indication since currently the sample of bonds rated by both domestic and global agencies is limited. Moreover, as long as a single domestic rating fulfills the regulatory requirements, the appetite of domestic issuers to buy an additional global rating remains unclear. This status quo might change, however, once Chinese issuers see value in broadening their investor base and tapping the large but still underutilized pool of foreign investors, particularly institutional investors.

5.6 Outlook

The large and increasing Chinese bond market contrasts with its low diversification in credit risk as measured by ratings. We have mentioned a series of contributing factors. Therefore, a change might not be imminent for the ratings provided by the approved agencies covered here, though shortcomings of the current narrow and upward skewed rating distribution are obvious. Consequently, there is a strong appetite for alternative rating procedures, especially due to rising interest from overseas investors. A straightforward approach already used by some market participants is to complement the third-party rating agencies with market-implied credit ratings, which are determined by comparing the bond's secondary market value against valuation indices. Along these lines, in October 2017, CCDC announced a plan to offer market-based ratings using available information through their oligopolistic custodian and clearing services. We can expect more market-driven initiatives of this kind.

6 Credit Spreads and Defaults in the Chinese Bond Market

Ever since early 2014, China has witnessed a wave of credit events, which quickly peaked in 2016 mainly driven by the tightened liquidity and a deepening financial deleveraging campaign. Despite the relatively tiny amount of defaulted bonds relative to the entire market, the jitters aroused by the default shocks have expanded far beyond the bond market, even to the entire Chinese financial system and the macro economy. Investors' expectations of an implicit government guarantee gradually broke down; financial institutions ceased taking it for granted that corporate bonds are absolutely safe and began to put more and more emphasis on the credit risks underneath the firms.

6.1 Bond Defaults in China: A Summary

The unprecedented bond default event of "11 Chaori Bond" on March 5th, 2014 marked the elimination of an implicit government guarantee, opening a new era of Chinese bond market. The issuer, "Shanghai

Chaori Technologies Inc." failed to pay its interests in full in the exchange market, constituting the first-ever default in Chinse bond markets. We will review several landmark default cases in the Chinese bond market in Section 6.3, together with a discussion of recent progress in bankruptcy rulings in China.

As of December 31, 2018, there have been 263 defaulted bonds, involving 111 issuers in total. Figure 8 of Panel B plots the distribution of these default events since 2014, as a fraction of the entire corporate bond market in China, based on the Wind database. A total of 94 private firms have defaulted, constituting the majority of the issuers sunk in defaults. For state-owned firms, there are 11 defaulting SOEs owned by local governments, while only 6 are central SOEs. Industry-wise, before 2017, defaults were concentrated in those over-capacity "old economy" sectors like coal, steel, and commodity-related industries; but in 2018, the fraction of defaulting firms in the "new economy" rises. Finally, the percentage of total RMB value amount of defaulted bonds remains quite low, standing at 0.6% in its peak year of 2018. In contrast, the global counterpart during 2008–2017 was 1.8% according to a recent report by Moody's.[21]

6.2 Defaults, Bond Ratings, and Credit Spreads

Credit ratings should reflect the bonds' default probabilities. Before 2014, ratings were not that indicative in China, due to the widely perceived "implicit government guarantee" among bond investors. The uptick of bond defaults in recent years brings investors' attention back to ratings. Figure 9 plots the credit spreads of enterprise bonds, which are defined as the bond yield minus the matched CDB yield, across all ratings classes since 2013. The credit spreads of lower-rated enterprise bonds (A and BBB+) experienced a clear upward trend since early 2014, dipped a bit in 2017, but soared again in early 2018.

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[21] This estimation is derived from "Annual Default Study: Corporate Default and Recovery Rates, 1920–2017" by Moody's, which covers the credit histories of more than 25,000 corporate issuers that had long-term rated bonds between 1920 and 2017.

Typically, both bond-level and issuer-level ratings are downgraded before the default event, following negative public announcements by firms. This partly explains the dispersion of credit spreads across ratings in Figure 9. For example, before the default of “16 Katie Bond” on June 1, 2018, the bond rating status was adjusted to “Negative” on September 1, 2017, and the issuer, Sunshine Katie Co., Ltd., was downgraded by Pengyuan (one of the rating agencies) to “BBB” and put in the “credit risk” watch list on May 8, 2018.

The evolution of the credit spreads and their dispersions in Figure 9 reflect not only the perceived default probabilities across various rating classes, but also the credit conditions of the bond market as a whole. The surge of bond defaults in the Chinese bond market, the continually tightening credit and policy environment in combination with investors’ jitters contribute to the spiking credit spreads.

The ever-growing default incidents in recent years have ignited investors’ concerns about credit risks, though in our perspective, these temporary market disruptions are inevitable pains that China has to go through in order to reach a more market-oriented financial market. For instance, credit risk mitigation agreement (CRMA) and credit risk mitigation warrant (CRMW), which are essentially credit default swaps (CDS) derivative products and were initially introduced in 2010, gained their popularity following the recent wave of corporate defaults. Moreover, tightened regulations by Beijing starting in late 2017 on wealth management plans, together with the government-led deleveraging campaign, further curbed the inflow of funds towards corporate bonds, especially those lower-rated ones on the edge of defaulting. This worsens their default probability and, in turn, makes institutional investors even more cautious in

purchasing the bonds newly issued by these firms. This type of negative rollover spiral due to market liquidity dry-up is responsible for the explosion of bond defaults in early 2018.[22]

6.3 Bond Default Cases, Bankruptcy, and Post-default Recovery[23]

This section discusses several recent prominent bond default cases in China. These cases also illustrate the underdeveloped legal environment in China, and the uncertain bankruptcy litigation procedures faced by bond investors when seeking recovery of their defaulted bonds.

Before delving into these detailed default cases, we provide a bit of background on China's bankruptcy laws. A well-functioning bankruptcy law, including terms for restructuring and reorganization, is important to business owners and investors. There are three types of bankruptcy proceedings: liquidation, settlement, and reorganization. China introduced the Enterprise Bankruptcy Law in 1986, though it was the 2006 reform that led China on a path towards convergence with international practice as this reform included reorganization proceedings that are similar in nature to those of Western bankruptcies and restructurings.

Despite these positive changes, many concerns about implementation of the bankruptcy code remain nowadays due to a lack of legal infrastructure, a disparate court system, and potentially ongoing moral hazard issues particularly related to SOEs. Besides, key differences remain between China and U.S./U.K.

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[22] Companies that defaulted in 2018 had much stronger balance sheets than those that defaulted in 2016–17 in terms of simple financial ratios like book leverage and interest coverage cited from an industry report by China International Trust Investment Corporation (CITIC) Securities.

[23] We appreciate Andrew Levin's contribution to this section and have heavily drawn from his term paper for the MBA class "Chinese Economy and Financial Market" at Chicago Booth taught by Zhiguo He in the winter quarter of 2018.

bankruptcy proceedings including a lack of debt-in-possession financing in China and the inability of creditors to propose a plan of reorganization.

Shanghai Chaori Solar (上海超日)

On March 4, 2014, Shanghai Chaori Solar, a privately held solar equipment producer, announced that it would not meet interest payments on its 1 billion RMB bond issued in the exchange market. This was the first case of a publicly issued bond default in China. Despite the small bond size, this event was still a big deal to market participants because until that point it seemed as though the government would support struggling companies to keep defaults from occurring.

What happened in the end? In October 2014, a number of state-owned entities, mostly asset management companies (including China Great Wall Asset Management), worked together to provide loans and guarantees to Shanghai Chaori Solar. With this help, Shanghai Chaori Solar fully repaid its past due principal and interest. This led analysts to say that this action was "good for investors but bad for credit pricing," as many practitioners argue that real credit defaults in China would reduce the guise of moral hazard in the economy and therefore lead the country to develop a healthier credit market.

Baoding Tianwei (保定天威)

On April 21, 2015, Baoding Tianwei missed an interest payment on its 1.5 billion RMB medium-term note. While this was the third onshore default in 13 months, the Baoding Tianwei default was meaningful in that it was the first for a 100% state-owned enterprise. Baoding Tianwei had been established in 1995 as a unit of China South Industries Group, a military and defense company wholly owned by state-owned Assets Supervision and Administrative Commission (SASAC, 国资委). As such, the default of Baoding on 1.5 billion RMB of bonds (and later up to 4.5 billion RMB) was a meaningful shift in the government's stance towards SOEs. With over 90% of corporate bonds outstanding issued by SOEs, this was an important event in China's history. While the company's issues have yet to be resolved, it has since

defaulted on additional debt outstanding and formally filed for bankruptcy. Jin, Wang, Zhang (2018) study this historical event to estimate the value of an implicit guarantee in the Chinese bond market.

Sichuan Coal Industry Group (川煤集团)

Sichuan Coal Industry Group, a local SOE, defaulted on its 1.05 billion RMB bond principal in June 2016. The local government quickly stepped in and provided emergency financing to the company, which was then able to pay back bondholders in full. The company repaid investors with entrusted loans from the state-owned Sichuan Provincial Investment Group, which obtained loans from the Bank of Communications and other state-owned banks. Then, in December 2016, only five months after paying bondholders in full, Sichuan Coal defaulted again, as its operating metrics could nowhere near support its debt-load. The government's intervention in June/July 2016 had only "thrown good money after bad." This example highlighted the uncertain process with which different defaults were handled in China.

Guangxi Non-Ferrous Metal (广西有色)

Another SOE bond default involves Guangxi Non-Ferrous Metal (GNFM), which is owned by the Guangxi provincial government. This case is unique because of the sheer size of GNFM's capital structure that includes 14.5 billion RMB in debt outstanding. Also, after GNFM failed to propose a reorganization plan within six months after a court order, the restructuring period was brought to a close and the company declared bankruptcy; GNFM became the first interbank bond issuer to declare bankruptcy.

The failure of the plan of the reorganization was said to stem from the court-appointed administrator who did not properly take creditor demands into account when forming the plan. In reaction to the proposed plan, one lawyer said, "bankruptcy law in China is not aligned with the interests of the creditors, and the fact that the administrators are always appointed by a court raises the suspicion that there is government

intervention."[24] But one has to see the positive side of this case, in which the Chinese government did not intervene to provide financing to GNFM or have government-backed asset management companies do so. This shows that the "implicit guarantee" is fading away and the Chinese government is letting the Enterprise Bankruptcy Law and the markets determine the fate of an increasing number of private enterprises and SOEs.[25]

Dongbei Steel (东特钢)

In a precedent-setting case for the Chinese bond market, Dongbei Steel agreed to a restructuring plan in 2017 to settle with its outstanding creditors. Dongbei Special Steel Group is a company that is majority owned by the Liaoning provincial government and it defaulted on its 0.8 billion RMB commercial papers in March 2016. In August 2017, creditors mostly agreed to haircuts in order to settle the first restructuring of an onshore bond default in China. The plan, which involves restructuring of 45.6 billion RMB, called for the following:

- Creditors owed less than 500,000 RMB are repaid in full; [26]
- Non-financial creditors and bondholders owed more than 500,000 RMB could elect for a one-time cash payment of 22.09% of the amount owed or have their bonds converted into equity;

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[24] Yu, Zhang and Tongjian, Dong. *Guangxi Nonferrous' Creditors Veto Insolvency Plan*. Caixin, November 2, 2016. The lawyer was reacting to a plan of reorganization that would have seen creditors receive under 20% recoveries and a large amount of equity in lieu of their claims. Instead, the firm was placed in involuntary liquidation, being forced to start selling everything from equity ownership of subsidiaries to office supplies and desk chairs.

[25] "Guangxi Nonferrous Metals is China's first interbank bankruptcy," South China Morning Post, September 20, 2016.

[26] The maximum cut-off of 500,000 RMB to receive full repayment is likely due to the deposit insurance in China implemented in 2015, which likewise sets a limit of 500,000 RMB. Perhaps more importantly, it reduced the number of claimants drastically, paving an easier path towards resolution.

- Financial creditors owed more than 500,000 RMB have their amount owed converted to equity;
- Two strategic investors would inject a combined 5.5 billion RMB into the company in exchange for a 53% equity stake in the company. Creditors convert into the remaining 47% of the equity.

As the first market-led restructuring, Dongbei presented an important test case for future progress in corporate bankruptcy procedures. It set precedents akin to restructurings in the U.S. and the U.K. While this could increase overall default rates in China, it could greatly improve economic efficiency and overall dynamism.[27]

We close this section by highlighting that "government-led/-coordinated solutions," especially by local governments, are one of the most prominent Chinese characteristics when dealing with defaulted bonds. For economic or political reasons, Chinese local governments often rescue failing firms by either issuing relevant guidance documents, or pushing other healthy local SOEs or financial institutions to inject capital. However, local governments do not have unlimited resources. The wave of breaking "implicit guarantees" should help local authorities to escape from the notion of unconditionally rescuing zombie firms, and alleviate the notorious soft budget constraint problem that still looms in China's economic and financial reform today.

7 Data Sources on Chinese Bond Markets

We briefly summarize commonly used data sources for conducting research on China's interbank market. The data on the exchange market can be obtained from the Stock Exchanges.

[27] Goldman Sachs Research, August 10, 2017.

7.1 Data from Wind

Wind Information Co. (Wind, 万得) consolidates various data sources and offers comprehensive data access for interbank bond market data. At the bond level, Wind provides data on individual bonds' characteristics and time series of daily trading. Variables of bond characteristics include bond issuance information, the issuer's financial statement information, etc. Variables of daily trading include close clean price, dollar trading amount, etc. In addition, data on yield-to-maturity based on secondary market transactions calculated by CSDC (available from www.ChinaBond.com.cn) can also be downloaded through Wind. At the market level, Wind aggregates individual bonds' issuance and trading information by bond category, maturity, region, rating, etc. Wind also collects information on depository market and investor composition for various bond types. Besides data on bond characteristics and trading, Wind has several special statistics on interbank market, such as bond credit risk analysis, convertible bonds, overseas bonds, open market operations, asset-backed securities, interest rate swaps, etc.

7.2 China Foreign Exchange Trading System

The secondary market bond trading in the interbank market is conducted through CFETS. CFETS provides several standard bond data products for practitioners and academic researchers, including bond transaction data aggregated at daily frequency, effective bond quote data as of the end of each trading day, interbank market spot and repo transactions aggregated at institutional category level with daily, monthly, quarterly frequency, etc. Among all standard products, the daily bond quote data and transaction by category data are proprietarily provided by CFETS and not available from other data vendors. In addition, customized data service is possible for academic research upon receiving a written research proposal.

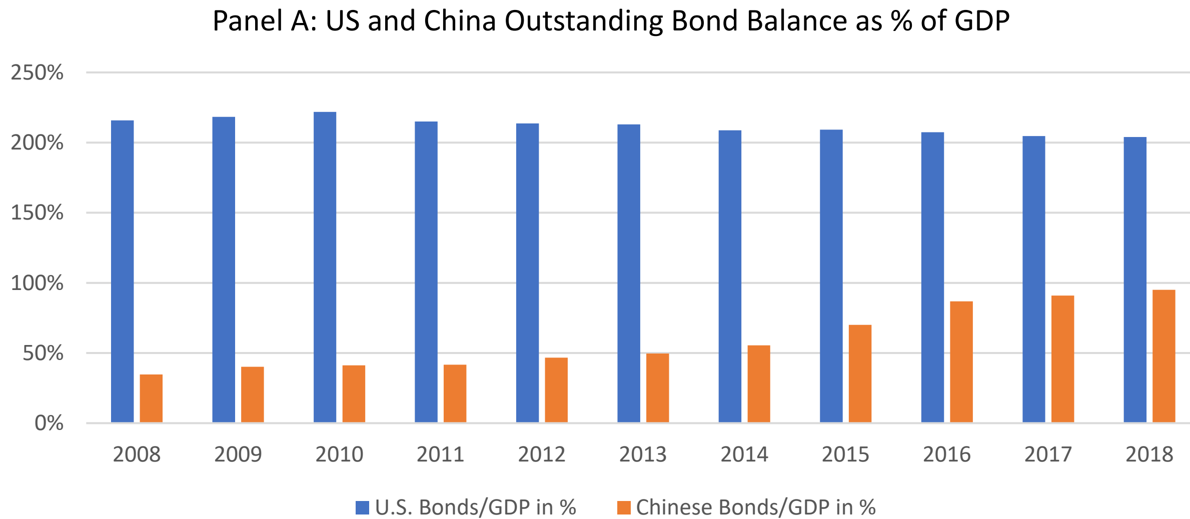
7.3 PBC Statistic Reports

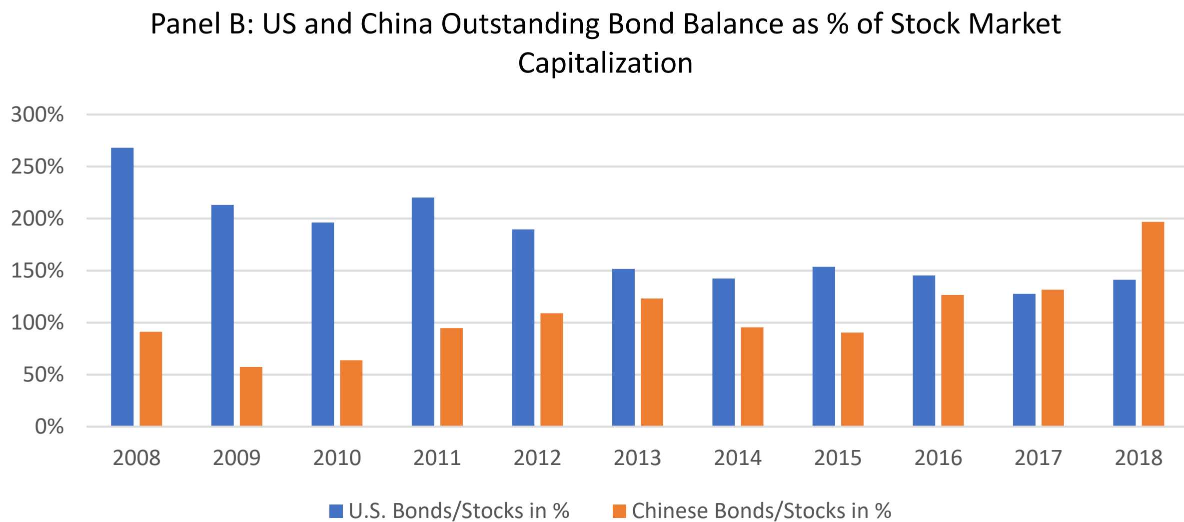
The PBC releases various statistic reports covering the interbank market, including Financial Market Statistics, Financial Statistics Data Report, China Financial Stability Report, etc. Most the PBC statistics are available from Wind and can be directly downloaded from the PBC website (under the Department of Statistics). Some reports, such as the China Financial Stability Report, are only available in hard copy.

7.4 Issues in Using the Interbank Market Data

Bond data quality of commercial vendors in China is on average lower than those in the U.S. market (i.e., the TRACE dataset). Due to the complexity of the interbank market, sometimes the same variables provided by two different data sources can be inconsistent. Researchers have to dig into details of the original data description files and regulatory documents to pick the right one. Finally, researchers should pay special attention to noticeable changes in time-series variables, as the measurement of statistics changes more frequently in China than other developed countries, due to volatile policy and regulatory guidelines.

Figure 1: A Comparison of U.S. and China Bond Market Growth





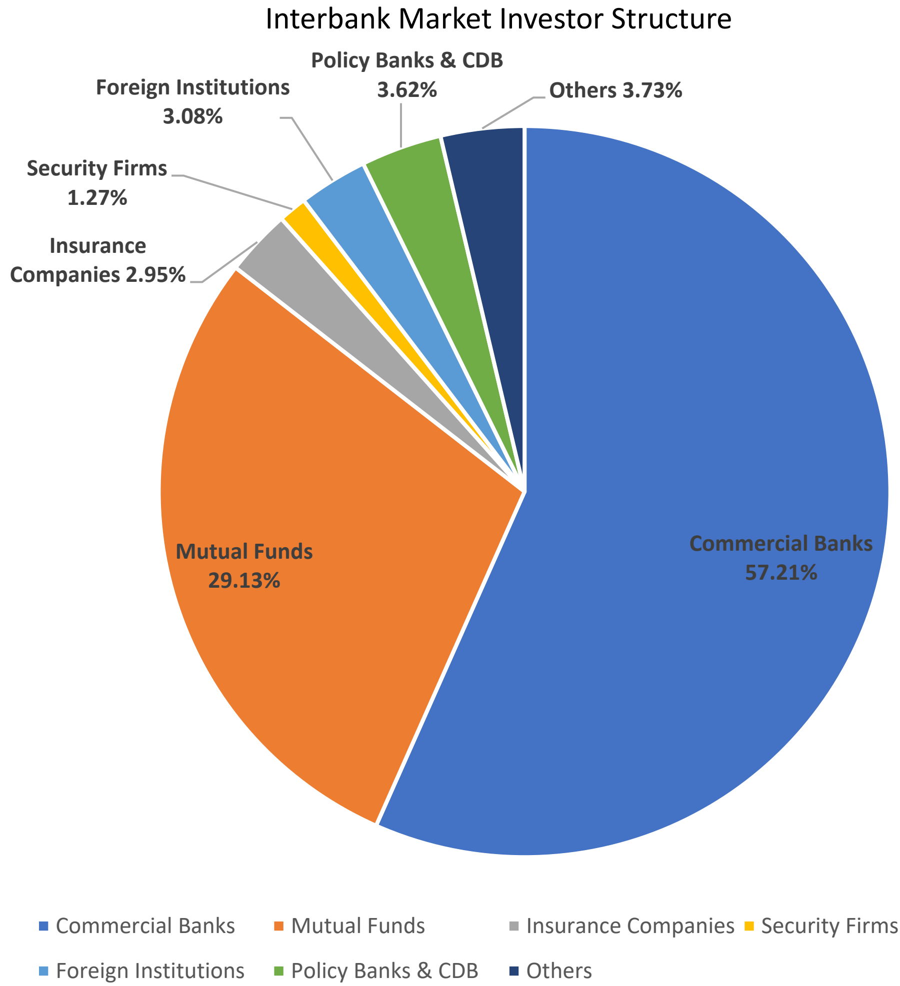
Data Source: China: Wind Bond Overview
U.S.: SIFMA U.S. Bond Market Issuance and Outstanding (www.sifma.org/resources/research/us-bond-market-issuance-and-outstanding/)

GDP:
China: Wind Macroeconomic Database
U.S.: FRED Economic Data (https://fred.stlouisfed.org/series/GDP)
We use nominal GDP because outstanding numbers are market value of bonds (also nominal).

Stock Market Capitalization:
China: Shanghai Stock Exchange (SSE) + Shenzhen Stock Exchange (SZSE) from Wind Stock Market Overview
U.S.: World Bank Database. (https://data.worldbank.org/indicator/CM.MKT.LCAP.CD)

All numbers are as of the end of each year.

Figure 2: Chinese Interbank Market Investor Structure, 2018

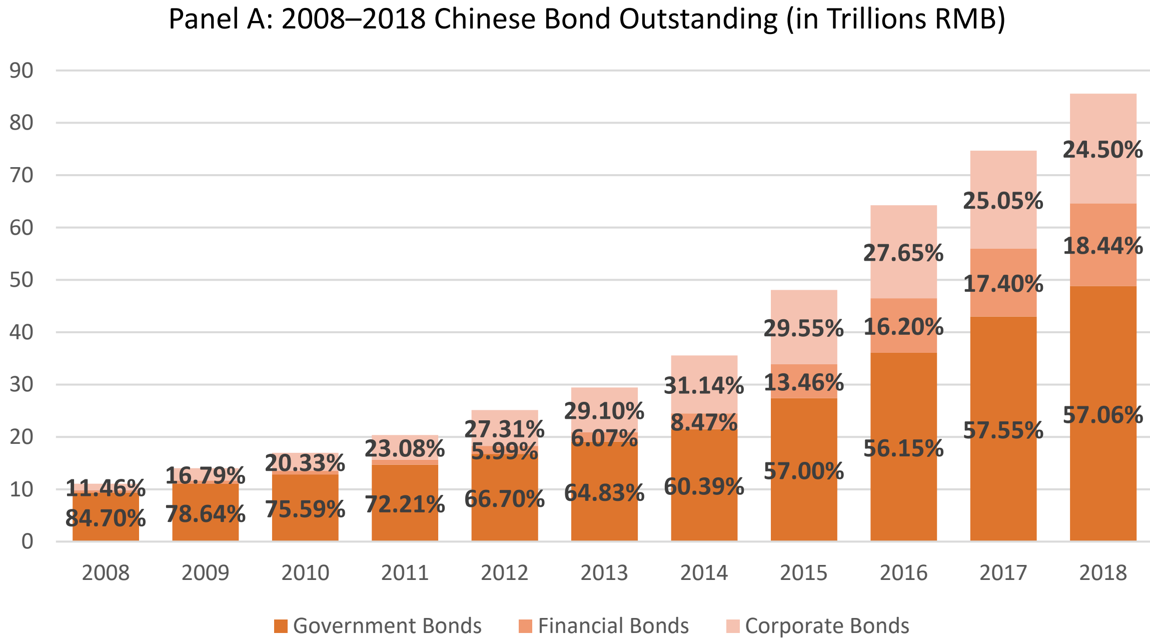


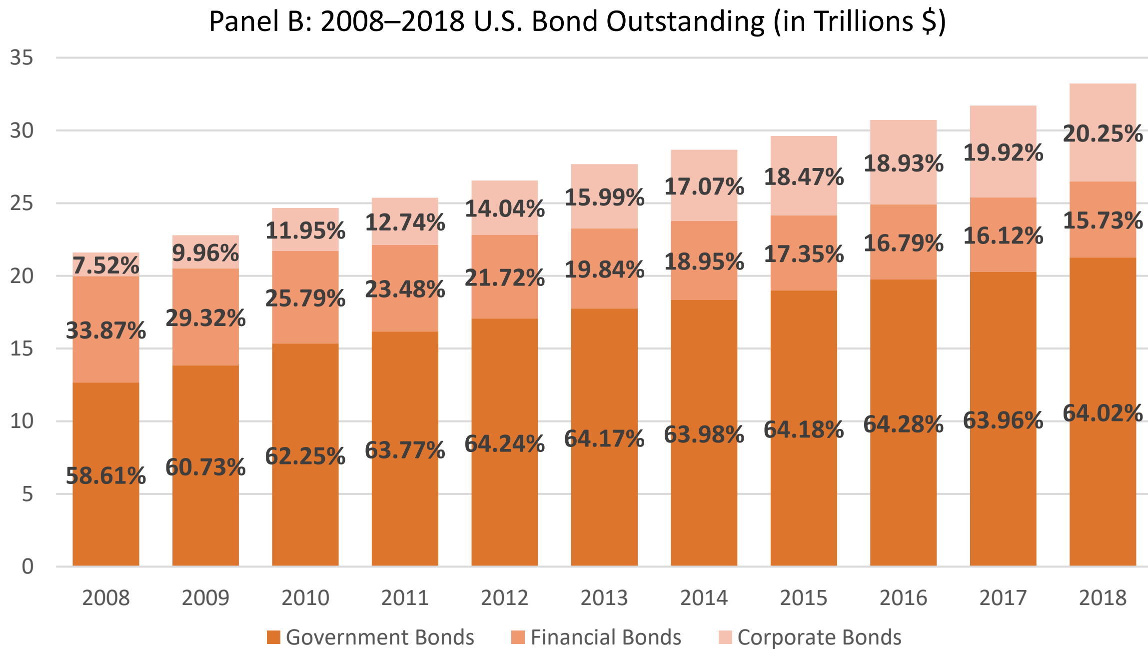
Data source: CCDC: http://www.chinabond.com.cn/Channel/19012917?BBND=2017&BBYF=12&sPageType=2#
SHCH: http://www.shclearing.com/sjtj/tjyb/

SHCH only reports investor structure information for major bond securities. As a result, the aggregated investment amount is lower than the total outstanding balance. We adjust the outstanding balance for each investor while maintaining their corresponding shares.

The numbers are as of 12/31/2018.

Figure 3: Outstanding Bond Balance in Chinese and U.S., 2008–2017



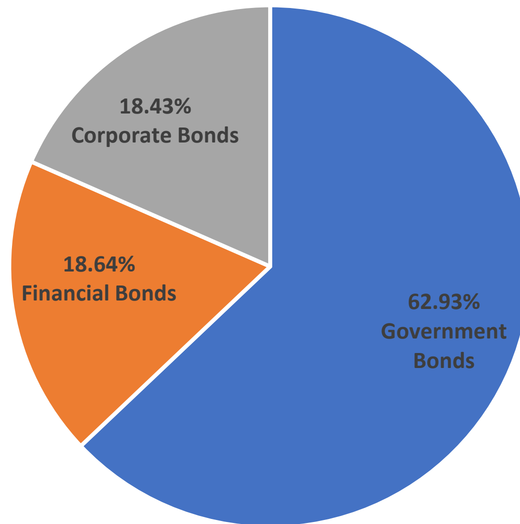


Data source: China: Wind Bond Overview
We reorganize bond types into the three categories as in Section 2.2 year by year.
U.S.: Government/Non-government Bonds: SIFMA U.S. Bond Market Issuance and Outstanding (see Figure 1 footnote)
Financial Bonds: Financial Accounts of the United States (https://www.federalreserve.gov/releases/z1/current/): Domestic Financial Assets (L.108): Financial Bonds = Open Market Paper + Corporate and Foreign Bonds
Corporate Bonds = Non-Government Bonds (from SIFMA) – Financial Bonds (from the Fed)
We exclude mortgage-related (agency- and GSE-backed) securities, which are a significant part of U.S. bond market, in calculating the composition of U.S. bonds, because there are no comparable mortgage-related securities in Chinese bond markets.

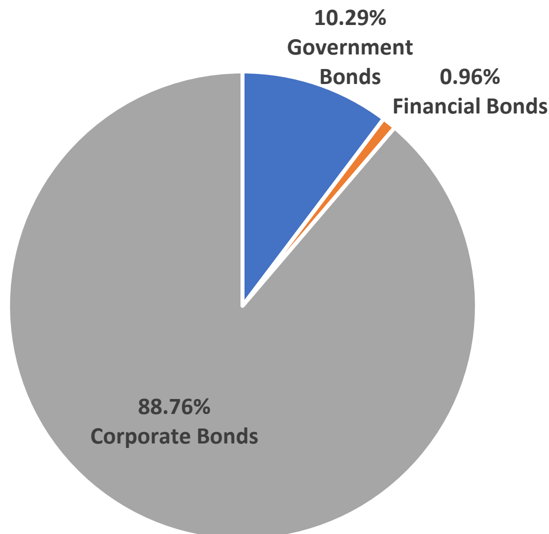
All numbers are as of the end of each year.

Figure 4: Composition of Bonds in Chinese Interbank and Exchange market, 2018

Panel A: 2018 Chinese Interbank Market Bond Composition



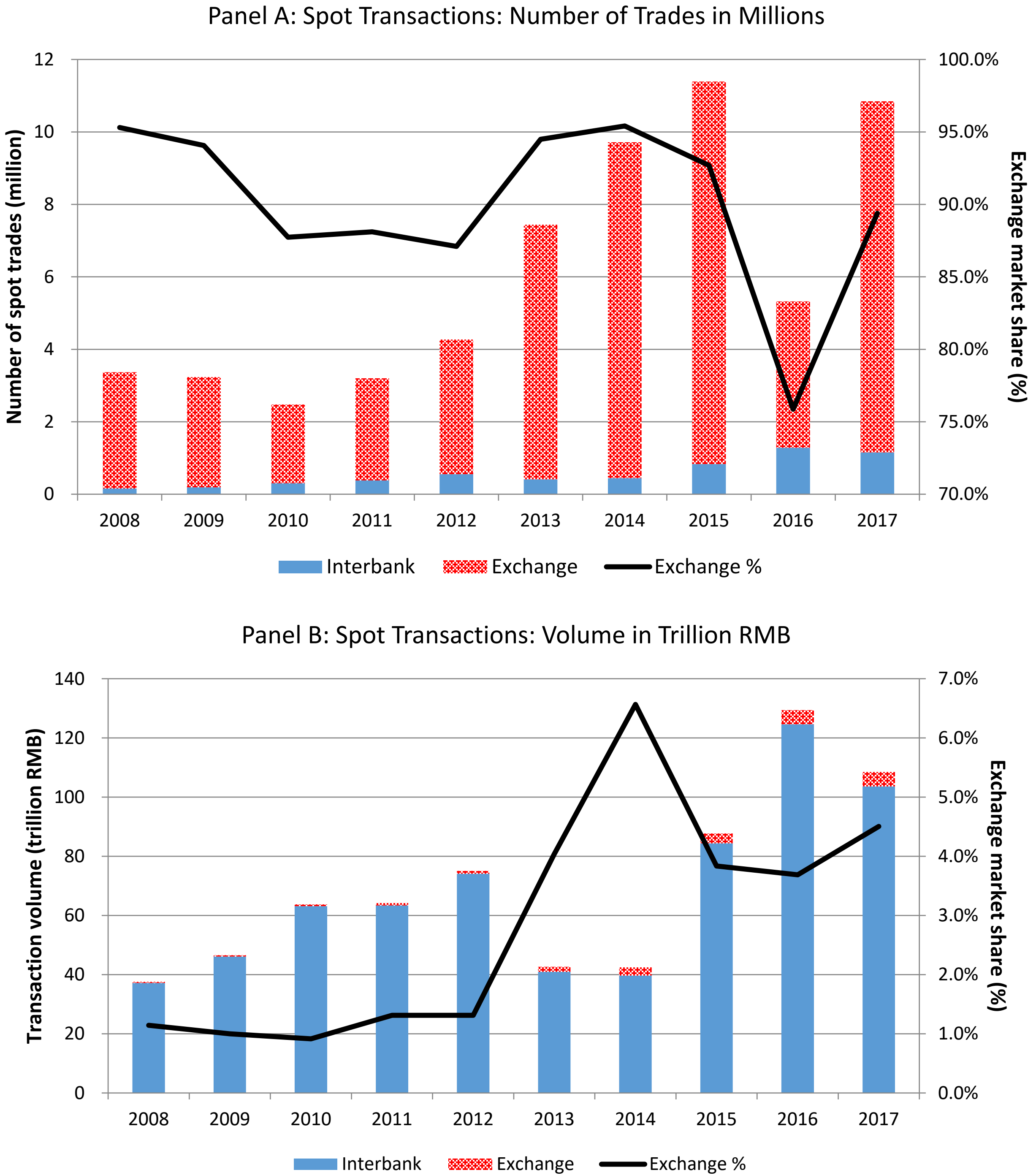
Panel B: 2018 Chinese Exchange Market Bond Composition



Data source: Interbank: China Central Depository & Clearing (CCDC) + Shanghai Clearing House (SHCH)
(CCDC: http://www.chinabond.com.cn/Channel/19012917?BBND=2017&BBYF=12&sPageType=2#; SHCH:
http://www.shclearing.com/sjtj/tjyb/)
Exchange: China Securities Depository and Clearing Corp. (CSDC) (http://www.chinaclear.cn/zdjs/tjyb1/center_tjbg.shtml)
For CCDC, we only include bonds in the interbank market, the OTC market, and the Free Trade Zone market that are in custody of CCDC (i.e., excluding those bonds that dual-listed in the exchange market).

All numbers are as of 12/31/2018.

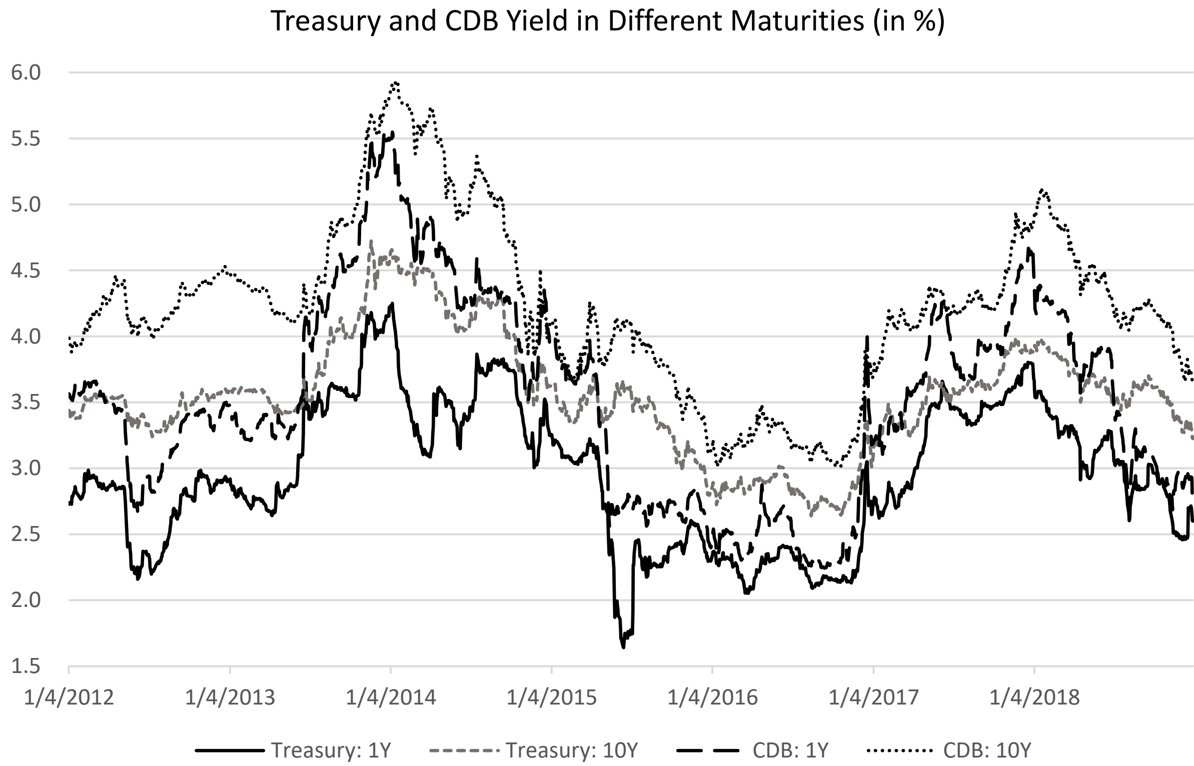
Figure 5: China's Interbank and Exchange Market Spot Transactions



These figures plot China's interbank and exchange market spot transaction RMB volume from 2008 to 2017.

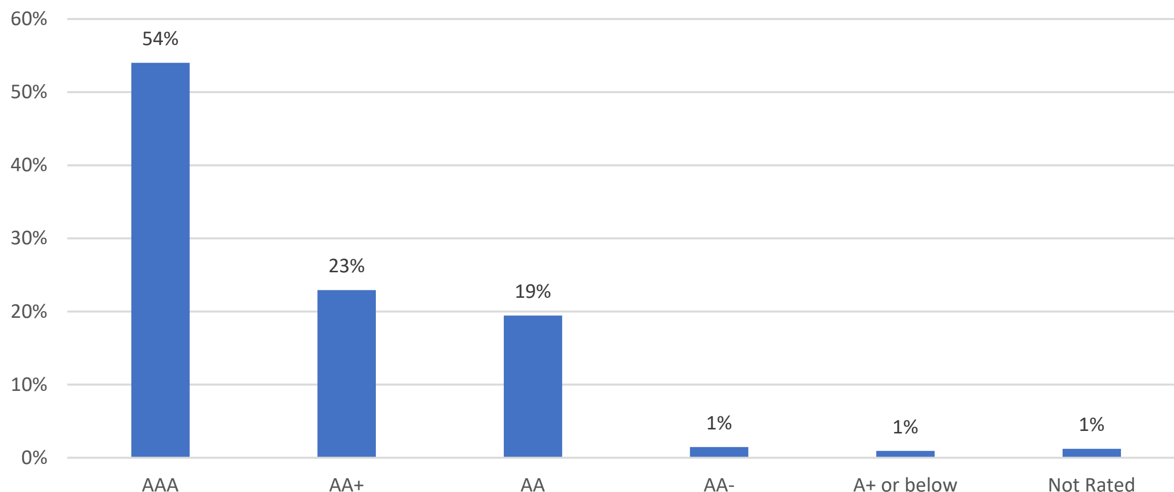
Panel A plots number of trades for spot transactions in these two markets. Panel B plots spot transaction RMB volume of all bonds on the interbank and exchange markets. Data on the interbank-market transactions are from China Foreign Exchange Trade System and data on the exchange-market transactions are from the Statistics Annuals of Shanghai exchange and Shenzhen exchange.

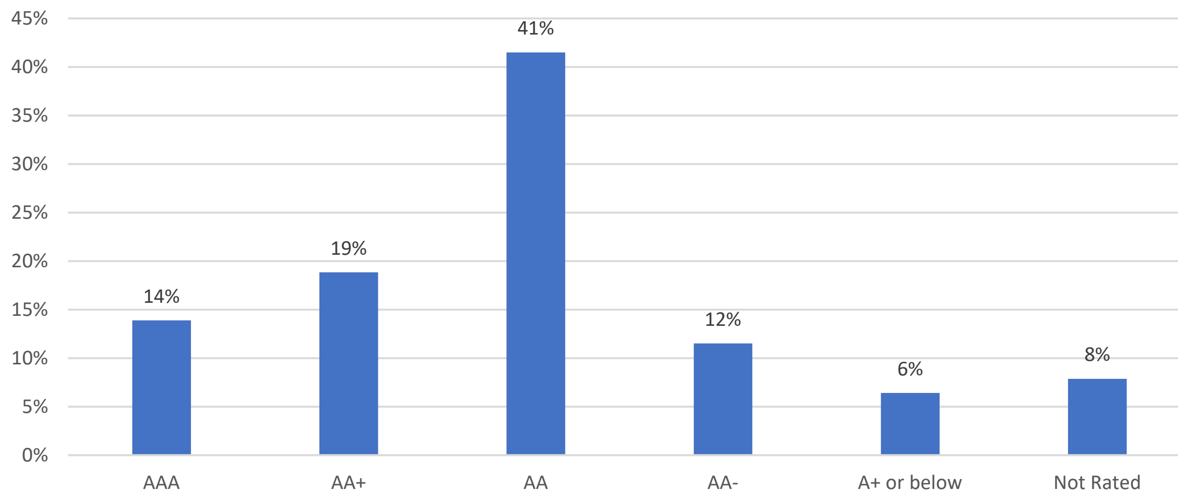
Figure 6: Treasury and CDB Yield Curve in Different Maturities



Data Source: Wind Database Bond Yield Analysis

Figure 7: Rating Distribution by Outstanding Bond Balance & Number of Issuers, 2018

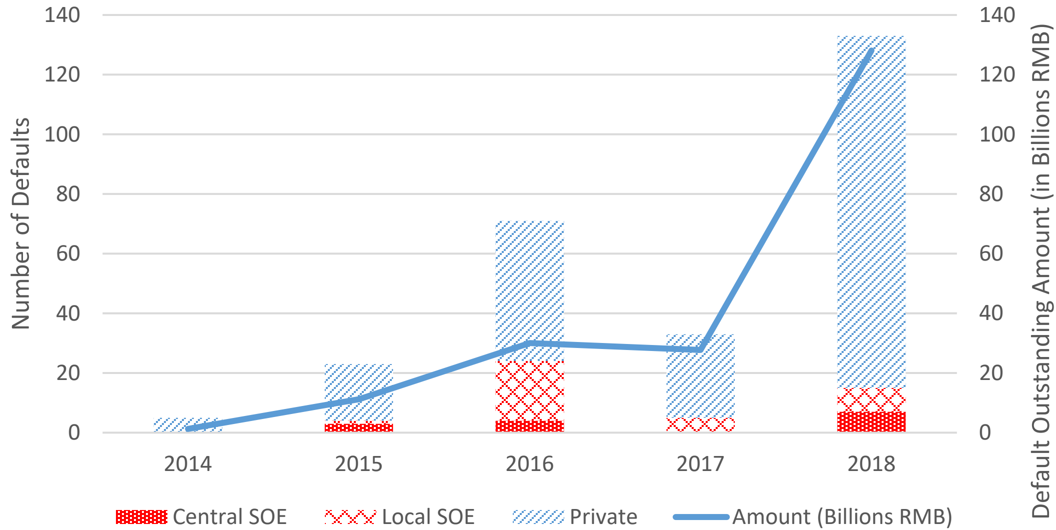


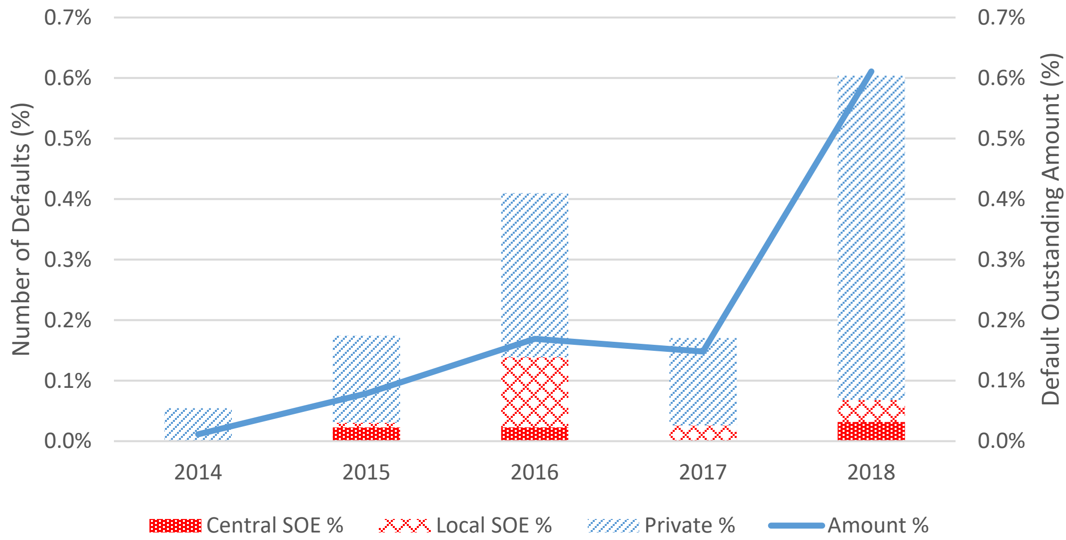


Data Source: Wind Database

We sum up the outstanding bond amounts and count the number of issuers for each rating class using all corporate bonds available on 12/31/2018 (see Table 1 for our definition of corporate bond categories). We exclude all asset-backed securities (ABS, 资产支持证券) in the corporate bond category. Since the “issuer” performs an “underwriter” role to these ABS securities, the issuer ratings do not represent the creditworthiness of the security.

Figure 8: Number and Amount of Defaults by Year





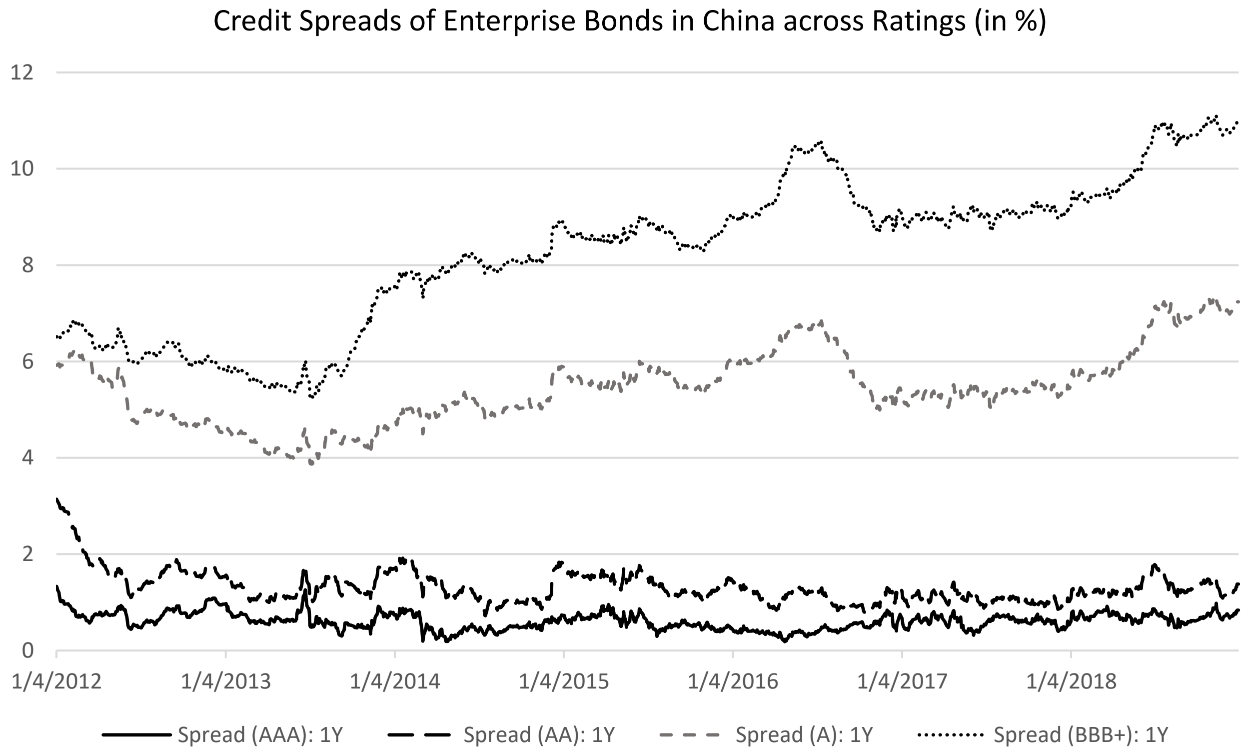
Data Source: Wind Database Credit Bond Research (Defaulted Bond Summary Table and Issuers First Default Table)

We report the number and the amount of defaulted bonds, both in amounts (Panel A) and percentage (Panel B, relative to all corporate bonds). We count the principal value of defaulted bonds only (excluding interests). We only keep one record for duplicate events caused by defaulted dual-listed bonds, except Jiangquan and Hongchang Gas (for these two issuers, the two records on the same date are separate default events: one for principal and the other for interest).

Private firms include all firms in our sample that are not SOEs.

All numbers are as of the end of each year.

Figure 9: Credit Spreads of Enterprise Bonds in China across Ratings



Data source: Wind Database Bond Yield Analysis

This figure depicts the 1-year credit spreads of bonds with different ratings (AAA, AA, A, BBB+) from start of 2012 to 2018. Credit spread is the bond yield minus the corresponding CDB spot yield for each rating.

Table 1: Outstanding Bond Balance in Chinese Bond Markets, 2008 and 2018

2008	Market	Outstanding (Number)	Outstanding (% Number)	Outstanding (RMB Billions)	Outstanding (% RMB)
Total		**1,211**	**100.00**	**11,066.91**	**100.00**
Government Bonds	**Interbank, Exchange, OTC**	**408**	**33.69**	**9,373.55**	**84.70**
Treasury Bonds	Interbank, Exchange, OTC	149	12.30	5,478.32	49.50
Policy Bank Bonds	Interbank, Exchange	234	19.32	3,698.33	33.42
Other Government Bonds	Interbank, Exchange	25	2.06	196.90	1.78
Financial Bonds	**Interbank**	**109**	**9.00**	**424.94**	**3.84**
Other Financial Bonds	Interbank	109	9.00	424.94	3.84
Corporate Bonds	**Interbank, Exchange**	**694**	**57.31**	**1,268.42**	**11.46**
Enterprise Bonds	Interbank, Exchange	272	22.46	485.37	4.39
Exchange-Traded Corporate Bonds	Exchange	20	1.65	40.00	0.36
Medium-Term Notes	Interbank	39	3.22	167.20	1.51
Commercial Papers	Interbank	256	21.14	419.31	3.79
Asset-Backed Securities	Interbank	68	5.62	49.26	0.45
Others	Exchange	39	3.22	107.29	0.97
2018	Market	Outstanding (Number)	Outstanding (% Number)	Outstanding (RMB Billions)	Outstanding (% RMB)
Total		**42,423**	**100.00**	**85,587.11**	**100.00**
Government Bonds	**Interbank, Exchange, OTC**	**4,828**	**11.38**	**48,836.20**	**57.06**
Treasury Bonds	Interbank, Exchange, OTC	278	0.66	14,831.84	17.33
Municipal Bonds	Interbank, Exchange	4,064	9.58	18,071.05	21.11
Policy Bank Bonds	Interbank, Exchange	336	0.79	14,323.81	16.74
Other Government Bonds	Interbank, Exchange	150	0.35	1,609.50	1.88
Financial Bonds	**Interbank**	**15,717**	**37.05**	**15,784.06**	**18.44**
Negotiable Certificates of Deposit	Interbank	14,218	33.51	9,851.43	11.51
Other Financial Bonds	Interbank	1,499	3.53	5,932.63	6.93
Corporate Bonds	**Interbank, Exchange**	**21,878**	**51.57**	**20,966.84**	**24.50**
Enterprise Bonds	Interbank, Exchange	2,550	6.01	2,568.20	3.00
Exchange-Traded Corporate Bonds	Exchange	5,252	12.38	5,820.43	6.80
Medium-Term Notes	Interbank	4,309	10.16	5,653.90	6.61
Commercial Papers	Interbank	1,894	4.46	1,923.71	2.25
Asset-Backed Securities	Interbank	5,136	12.11	2,643.21	3.09
Private Placement Notes	Interbank	2,437	5.74	1,943.84	2.27
Other Corporate Bonds	Exchange	300	0.71	413.54	0.48

Data source: Wind Bond Overview

We reorganize the original dataset based on the three categories in Section 2.2: Government Bonds, Financial Bonds, and Corporate Bonds.

All numbers are as of 12/31/2008 and 12/31/2018.

Table 2: Chinese Bond Issuance, Outstanding and Spot Transaction Volume by Types, 2018

2018	Market	Issuance (Billions RMB)	Issuance (%)	Outstanding (Billions RMB)	Outstanding (%)	Transaction Volume (Billions RMB)	Turnover
Total		**43,771.07**	**100.00**	**85,587.11**	**100.00**	**149,940.81**	**1.87**
Government Bonds	**Interbank, Exchange, OTC**	**11,484.24**	**26.24**	**48,836.20**	**57.06**	**74,083.08**	**1.61**
Treasury Bonds	Interbank, Exchange, OTC	3,601.10	8.23	14,831.84	17.33	18,743.05	1.33
Municipal Bonds	Interbank, Exchange	4,165.17	9.52	18,071.05	21.11	4,349.93	0.27
Policy Bank Bonds	Interbank, Exchange	3,464.98	7.92	14,323.81	16.74	50,386.57	3.64
Other Government Bonds	Interbank, Exchange	253.00	0.58	1,609.50	1.88	603.53	0.39
Financial Bonds	**Interbank**	**22,879.49**	**52.27**	**15,784.06**	**18.44**	**57,048.47**	**3.96**
Negotiable Certificates of Deposit	Interbank	21,098.56	48.20	9,851.43	11.51	54,863.32	6.15
Other Financial Bonds	Interbank	1,780.93	4.07	5,932.63	6.93	2,185.16	0.40
Corporate Bonds	**Interbank, Exchange**	**9,407.33**	**21.49**	**20,966.84**	**24.50**	**18,809.26**	**0.95**
Enterprise Bonds	Interbank, Exchange	241.84	0.55	2,568.20	3.00	1,611.75	0.57
Exchange-Traded Corporate Bonds	Exchange	1,657.92	3.79	5,820.43	6.80	797.94	0.15
Medium-Term Notes	Interbank	1,696.72	3.88	5,653.90	6.61	7,399.58	1.41
Commercial Papers	Interbank	3,127.53	7.15	1,923.71	2.25	7,027.94	4.09
Asset-Backed Securities	Interbank	2,005.60	4.58	2,643.21	3.09	458.96	0.20
Private Placement Notes	Interbank	546.39	1.25	1,943.84	2.27	929.82	0.47
Other Corporate Bonds	Exchange	131.35	0.30	413.54	0.48	583.27	1.58

Data source: Wind Bond Overview and Wind Bond Secondary Market Statistics.

We reorganize the original dataset based on the three categories in Section 2.2: Government Bonds, Financial Bonds, and Corporate Bonds.
We report transaction amount for spot transactions. RMB volume and turnover are calculated as spot transaction amount divided by average beginning and ending balance.
All numbers are as of 12/31/2018.

Table 3: China's Corporate Bond Market Liquidity

	China: Interbank	China: Exchange	U.S.
ZDays	0.88856	0.81326	0.78820
$ZDays_{w/trade}$	0.88768	0.79798	0.70940
Turnover	0.01212	0.00099	0.00150
Amihud	0.00016	2.54233	0.48810

This table, which is taken from Panel A of Table A.1 in Chen et al. (2018), reports various measures of China's corporate bond market liquidity and its comparison with the U.S. bond market. ZDays is the time series average of the fraction of bonds that do not trade on a given day. $ZDays_{w/trade}$ is the time series average of the fraction of bonds that do not trade on a given day, excluding bonds that do not have any single trade over the sample period. Turnover is the average daily turnover across all bond-day observations where a zero is recorded on days without trade. Amihud is the average Amihud (2002) measure across all bonds, where a bond's Amihud measure is estimated using its all non-zero daily trading observations and multiplied by 10^6. The sample period is 1/1/2012 to 12/31/2017 for China's two markets and the sample period is 1/1/2010 to 12/31/2014 for the U.S. market, where the U.S. market liquidity measures are from Anderson and Stulz (2017).

Table 4: Chinese Interbank and Exchange Market Comparison, 2018

	Interbank Market		Exchange Market
	CCDC	**SHCH**	**Exchange**
Depository Institution	China Central Depository & Clearing Co. Ltd (CCDC)	Shanghai Clearing House (SHCH)	China Security Depository & Clearing Co. Ltd (CSDC), Shanghai Stock Exchange, Shenzhen Stock Exchange
Products	Treasury Bonds, Municipal Bonds, Policy Bank Bonds, Central Bank Bills, Enterprise Bonds, Medium-Term Notes, Commercial Bank Bonds	Commercial Papers, Medium-Term Notes, NCDs, Asset-Backed Securities, etc.	Treasury Bonds, Municipal Bonds, Policy Bank Bonds, Enterprise Bonds, Exchange-traded Corporate Bonds, Convertible Bonds, etc.
Investors	Commercial Banks, Rural Credit Cooperatives, Security Firms, Insurance Companies, Mutual Funds, Foreign Institutions, etc.		Security Firms, Insurance Companies, Mutual Funds, Finance Companies, Individuals, Enterprises, QFIIs (excluding Commercial Banks)
Trade Type	Spot, Repurchase, Forward, Swap, etc.		Spot, Repurchase
Regulator	People's Bank of China (PBC)		China Securities Regulatory Commission
Outstanding Balance (in Trillions RMB)	56.45	19.93	9.21
Amount in %	66%	23%	11%

Data source: Market Overview: *2015 Chinese Bond Market Institutional Investor Manual*, Guotai Junan Securities
Outstanding Balance: CCDC: http://www.chinabond.com.cn/Channel/19012917?BBND=2017&BBYF=12&sPageType=2#
SHCH: http://www.shclearing.com/sjtj/tjyb/
Exchange: CSDC: http://www.chinaclear.cn/zdjs/tjyb1/center_tjbg.shtml

All numbers are as of 12/31/2018.

Table 5: Chinese Bond Market Regulators

<table>
<tr><th colspan="2">Market Type</th><th>Regulator</th></tr>
<tr><td colspan="2">Interbank Bond Market</td><td>PBC</td></tr>
<tr><td colspan="2">Exchange Bond Market</td><td>CSRC</td></tr>
<tr><th colspan="2">Bond Type</th><th>Regulator</th></tr>
<tr><td rowspan="2">Government Bonds</td><td>Treasury Bonds</td><td>PBC, MOF, CSRC</td></tr>
<tr><td>Central Bank Bills, Policy Bank Bonds</td><td>PBC</td></tr>
<tr><td rowspan="3">Financial Bonds</td><td>Special Financial Bonds,</td><td>PBC</td></tr>
<tr><td>Commercial Bank Bonds,
Non-Bank Financial Bonds,</td><td>CBRC, PBC</td></tr>
<tr><td>Securities Firm Bonds, Securities Firms Commercial Papers</td><td>PBC, CSRC</td></tr>
<tr><td rowspan="7">Corporate Bonds</td><td>Commercial Papers, Medium-Term Notes, Private Placement Notes</td><td>NAFMII</td></tr>
<tr><td>Asset-Backed Securities</td><td>CBRC, PBC</td></tr>
<tr><td>Enterprise Bonds</td><td>BC, CSRC</td></tr>
<tr><td>International Institution Bonds</td><td>PBC, MOF, NDRC, CSRC</td></tr>
<tr><td>Convertible Bonds</td><td>PBC, CSRC</td></tr>
<tr><td>Exchange-Traded Corporate Bonds</td><td>CSRC</td></tr>
<tr><td>Privately Placed Small and Medium Enterprise Notes</td><td>Shanghai and Shenzhen Stock Exchange</td></tr>
</table>

Data source: *China's domestic bond market: The Next Financing Engine*, Goldman Sachs Global Market Research, 2015

CBRC: China Banking Regulatory Commission (中国银行业监督管理委员会)
CSRC: China Securities Regulatory Commission (中国证券监督管理委员会)
MOF: Ministry of Finance (中华人民共和国财政部)
NAFMII: National Association of Financial Market Institutional Investors (中国银行间市场交易商协会)
NDRC: National Development & Reform Commission (国家发展和改革委员会)
PBC: People's Bank of China (中国人民银行)

Table 6: China's Super-AAA ("AAA+") Issuers

"AAA+" Issuers	Chinese Full Name	International Issuer Rating (S&P/Moody's/Fitch)	Outstanding (in Billion RMB)
China Railway Corp	中国铁路总公司	NR	1,610.50
China National Petroleum Corp	中国石油天然气集团有限公司	A+/A1/AA	239.96
China Petrochemical Group	中国石油化工股份有限公司	A+/A1	20.00
China National Offshore Oil Corp	中国海洋石油集团有限公司	A+/A1	10.00
China Telecom Corp	中国电信股份有限公司	NR	28.00
China Unicom Corp	中国联合网络通信有限公司	NR	18.00
China Mobile Group	中国移动通信集团有限公司	A+/A1	-
State Grid	国家电网有限公司	A+/A1/A	203.70
China Southern Power Grid	中国南方电网有限责任公司	A+/A1/A+	92.90
China Three Gorges Corp	中国长江三峡集团有限公司	A/A1/A+	81.00

Data source: Outstanding numbers are from Wind Database Credit Bond Research.

International Issuer Ratings are from S&P, Moody's and Fitch database respectively.
S&P: https://www.standardandpoors.com/en_US/web/guest/home
Moody's: https://www.moodys.com/
Fitch: https://www.fitchratings.com/site/home

Here we include all bond types along with corporate bonds. This treatment only affects China Railway Corp in a significant way because some bonds issued by China Railway Corp are categorized as "bonds with government support (政府支持机构债)," which are under the government bond category based on our definition.

Outstanding numbers are as of 12/31/2018.

Table 7: Top 10 Corporate Issuers in China Onshore Bond Market

Issuer	Outstanding (Billion RMB)	Domestic Issuer Rating	International Issuer Rating (S&P, Moody's, Fitch)
China National Petroleum Corporation (中石油)	239.96	AAA	A+/A1/AA
State Grid Corporation of China (国家电网)	203.70	AAA	A+/A1/A
Central Huijin Investment (中央汇金投资)	179.00	AAA	NR
State Power Investment Corporation (国家电力投资公司)	132.67	AAA	A-/A2/A
Tianjin Infrastructure Construction & Investment Group (天津城市基础设施建设投资集团)	125.70	AAA	BBB+/A
China Railway Corp. (中国铁路总公司)	110.00	AAA	NR
Datong Coal Mine Group (大同煤矿集团)	103.45	AAA	NR
China Southern Power Grid (中国南方电网)	92.90	AAA	A+/A1/A+
Shougang Group (首钢集团)	90.00	AAA	A-
Dalian Wanda Commercial (大连万达)	86.81	AAA	BB/Ba1/BB+

Data source: Outstanding numbers and domestic ratings are from Wind Bond Database.

International Issuer Ratings are from S&P, Moody's and Fitch database respectively.
S&P: https://www.standardandpoors.com/en_US/web/guest/home
Moody's: https://www.moodys.com/
Fitch: https://www.fitchratings.com/site/home

Outstanding numbers are as of 12/31/2018.

Table 8: Upgrades Dwarf Downgrades in China's Onshore Bond Market

		Ratings as of 12/31/2018								
		AAA	AA+	AA	AA-	A+ or below	# of Issuers	Upgrades	Downgrades	Maintain
Ratings as of 1/1/2014	AAA	300	4	0	2	0	306		1.96%	98.04%
	AA+	191	240	17	5	5	458	41.70%	5.90%	52.40%
	AA	39	350	736	28	35	1188	32.74%	5.30%	61.95%
	AA-	2	40	231	253	33	559	48.84%	5.90%	45.26%
	A+ or below	0	6	29	30	208	273	23.81%		76.19%
		532	640	1013	318	281				

Data source: Wind Database

Our rating migration matrix consists only of issuers with ratings on 1/1/2014 and 12/31/2018, excluding not-rated issuers. More specifically, we begin with a full list of corporate bonds that are available on 12/31/2018 with their respective issuer ratings. For each issuer, we then match its ratings on 1/1/2014 and 12/31/2018. With the two ratings for each issuer, we assign them to their corresponding cells in the rating migration matrix.

Table 9: China’s Domestic Credit Rating Agencies

Agency	Market Share							
	Bond Outstanding (in Billion RMB)	Number of Issuers	Bond Outstanding (in %)	Number of Issuers (in %)	NAFMII	CSRC	NDRC	CIRC
China Chengxin Securities Rating (中诚信证券)	2,496.36	370	41.35%	28.73%		×		×
China Chenxin International Rating (中诚信国际)	12,548.97	980			×		×	×
China United Rating (联合信用)	1,832.19	357	24.93%	22.54%		×		×
China Lianhe Rating (联合资信)	7,237.97	702			×		×	×
Dagong Global Credit Rating (大公国际)	3,787.82	482	10.41%	10.26%	×	×	×	×
Shanghai Brilliance Credit Rating (上海新世纪)	5,176.71	638	14.23%	13.58%	×	×	×	×
Pengyuan Credit rating (鹏元资信)	778.57	641	2.14%	13.64%		×	×	×
Golden Credit Rating (东方金诚)	1,541.38	376	4.24%	8.00%	×	×	×	×
China Bond Rating Corporation (中债资信)	983.73	153	2.70%	3.26%				
Total	36,383.69	4,699	100.00%	100.00%				

Data source: Wind Database Credit Bond Research

All numbers are as of 12/31/2018.

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