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A Review of China's Financial Markets

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China, government bonds, corporate bonds, stocks, asset-backed securities, derivatives, investment management, foreign exchange

Abstract

The fast growth of China's economy has brought it not only to the center of the global economy but also to a transition point in its growth model, a transition from scale to efficiency, speed to sustainability, input driven to innovation led. How its financial markets can drive this new growth model and facilitate the transition are pressing challenges, for China and for the world. We provide a comprehensive review of China's financial markets, including government bonds, corporate/credit bonds, stocks, asset-backed securities, financial derivatives, investment management, and currency, focusing on their growth paths, distinct characteristics, and unique opportunities. Despite fast expansion at times, their development is often lagging behind market needs, uneven over time, and unbalanced across markets. This developmental pattern is driven mostly by the government's immediate policy objectives rather than by the markets' ultimate efficiency in serving their key functions, including liquidity provision, price discovery, and risk allocation.

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1. INTRODUCTION

Accompanying China's phenomenal economic growth over the past four-and-a-half decades, its financial markets have also grown significantly, especially in recent years. **Figure 1a–c** plots the growth of China's domestic government bond, credit/corporate bond, and stock markets over the past 20 years, measured by market size and the number of securities traded.¹ For comparison, each panel also shows GDP. While the overall size of China's economy, as measured by GDP, has been growing at a fairly fast rate, the three major markets have experienced different growth phases, relatively slow in the 2000s but faster in recent years.²

To better calibrate the growth of China's financial markets relative to its economic growth, **Figure 1d** shows the time trend of the sizes of these markets normalized by GDP.³ Instead of seeing a constant or a slightly upward trend, which would reflect a commensurate or slightly faster

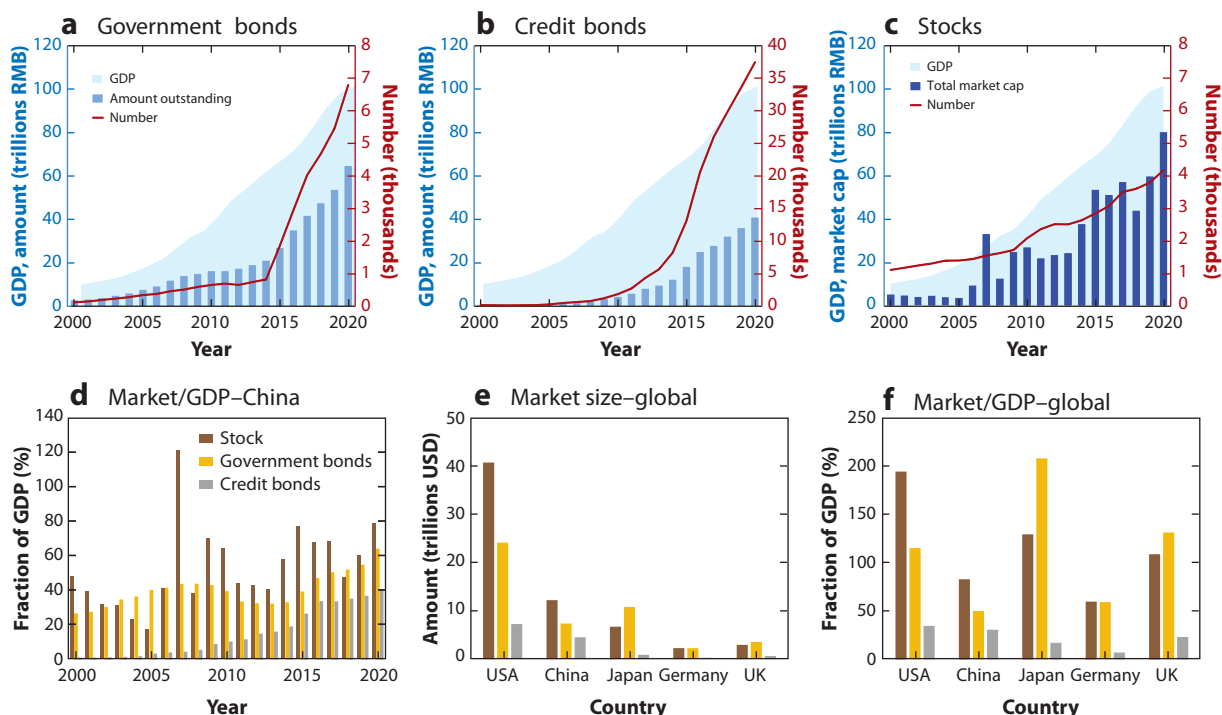


Figure 1

The growth of China's (a) government bond, (b) credit/corporate bond, and (c) stock markets and (d–f) their comparison with other major markets (2000–2020). Data are from Wind Financial Terminal, World Bank, European Central Bank, and the Bank for International Settlements.

¹Except where noted otherwise, values in this review are always denominated in renminbi (RMB) or, equivalently, in Chinese yuan (CNY), whose exchange rate has been between 6 and 7 CNY to 1 US dollar (USD) in recent years. Given that CNY exchange rates with other currencies are closely managed by the Chinese government (see the discussion in Section 8), one needs to be cautious when interpreting the values converted as these exchange rates.

²In this article, the term “China's financial markets” refers only to the domestic or onshore markets, domiciled in Mainland China, and does not include markets domiciled in Hong Kong and Macau.

³Market size is a stock measure, while GDP is a flow measure. In the absence of a better measure for the size of an economy or its wealth, we use GDP as a proxy.

growth due to the markets' early development stage, we actually see substantial fluctuations. After a phase of steady growth in the early 2000s, the government bond market experienced a substantial decline, around the time of the global financial crisis, then reversed the trend in the late 2010s. The credit bond market stayed at a very low level until 2005, then entered a faster growth phase, but slowed down after the mid-2010s. The stock market, despite its early start in 1990, lost its size relative to GDP in the early 2000s. After its explosive increase in 2006–2007 due to the split-share reform in 2005, it entered another phase of slow growth until recently.

Compared with other major markets, China's financial markets have already reached a global status, at least by scale. **Figure 1e** compares the size of China's stock, government bond, and credit bond markets with those of the USA, Japan, Germany, and the United Kingdom, by market capitalization (for stocks) or amount outstanding (for bonds). For both the stock and corporate/credit bond markets, China is second only to the USA. For the government bond market, China ranks third, after the USA and Japan.

In gauging the level of market development, we also normalize the market size by the size of the national economy, as measured by GDP. According to this measure, the ratio of market size to GDP, for the corporate/credit bond market in China, is already comparable to the USA, exceeding other major markets. By contrast, for the stock market China is still substantially behind the USA, which also reflects the growth opportunity of the Chinese stock market.⁴

China's financial markets have mostly played a secondary role in facilitating resource allocation, driving growth, and improving welfare. For the Chinese economy, out of the three major markets (the labor, goods and services, and financial markets), it is the financial market that has been behind in relying on market mechanisms to serve its basic economic functions and being integrated with the global market. As China searches for a more efficient and sustainable growth model, more-advanced financial markets ought to play a key role in improving resource allocation, raising productivity, and driving innovation. This raises many challenging questions: What kind of financial market system should China have to support its developmental needs? What are the major limitations of the current system? How can the system be improved to reach the desired outcome?

In this article, we provide a comprehensive review of China's financial markets, including (a) government bonds, (b) credit/corporate bonds, (c) stocks, (d) asset-backed securities (ABS), (e) derivatives, (f) investment management, and (g) currency. We focus on the development of these markets, their distinctive characteristics, major issues associated with these characteristics, growing research on these issues, and remaining questions for future studies.

The growth of these markets exhibits several broad patterns. First, their growth often lags substantially behind the growth of the economy. As shown in **Figure 1d**, which plots the size of China's capital markets relative to its GDP, the growth of China's financial markets has experienced different phases and sometimes substantial cycles, and has not always followed the trend of China's economic growth. For example, the stock market shrank from 48% to 17.3% of GDP between 2000 and 2005, peaked at 121% in 2007, and has since fluctuated between 38% and 78.7%. The government bond market developed quite slowly from 26% of GDP in 2000 to 38.7% in 2015, but it has grown rapidly in recent years, reaching 63.6% in 2020. The credit bond market was the last market to take off, staying below 10% of GDP until 2010, then rising to 37.2% in 2020. As discussed below, other markets exhibit similar patterns.

⁴As noted above, the size of China's stock market does not include shares listed offshore, including in Hong Kong and the USA. Inclusion of offshore shares would substantially increase the overall size of Chinese stocks traded globally. Nonetheless, the fact that a nontrivial fraction of China's stock shares is listed abroad partly reflects the current limitations of China's domestic market.

Second, growth has been uneven both over time and across different markets. While some markets, such as the stock and government bond markets, started relatively early and quickly reached global prominence, many other markets started quite late and remain at an early stage. For example, the market for ABS did not really get started until 2012, the market for financial futures started in 2010, and the market for financial options started only in 2015.

Third, even markets that have reached a massive scale, such as the government bond and stock markets, still face major limitations in serving their key functions, such as liquidity provision, risk allocation, and price discovery. Strong government interventions, which can vary significantly over time, substantially influence how markets perform these functions. Moreover, in contrast to the markets for goods and services and even labor, financial markets remain mostly separated from those in the rest of the world because of tight capital controls.

In understanding the growth and current state of China's financial markets, it is important to bear in mind several major factors influencing its development. First, the emergence of China's financial markets is part of the overall transformation of China's economy from a command economy to a more market-based economy. This transformation has been driven mostly by the government rather than by market forces. Thus, the introduction and promotion of various financial markets are often determined by the government's objectives, policies, and constraints at the time. They are less propelled by endogenous market needs or by the ultimate goal of having an efficient market that serves key functions. For example, the opening of the stock market in 1990 was largely motivated by the desire to have an additional source of funding for state-owned enterprises (SOEs). The fast growth of the government bond market since 2014 has been driven mostly by the expansion of local government bonds, which were used as a new source of funding for local governments to promote local growth. The fast opening up of the ABS market in 2016 occurred in part to support public-private partnerships (PPPs) in infrastructure investments. In addition, competing objectives and their evolution over time have often led to policies and regulations that are shorter term, compromising the efficient functioning of the newly developed markets and their long-run growth. Prominent examples include the curbing of the stock market growth after its initial success in the 1990s (until 2005) and the controlling of local government bond growth due to the deleverage policy in the late 2010s.

Second, the government's strong risk aversion in this process has led to a very tight regulatory environment in general, hindering active market accumulation and preparation for the development of a new market. Such a lack of market preparation, including strong and mature intermediaries, adds to the uncertainty brought by the new markets. The government's strong risk aversion also leads to strong restrictions and regulations on the markets introduced. Many of these restrictions aim to protect retail participants or contain risks, but they also limit the roles played by institutional participants and the functions these markets can serve.

Third, the government's desire to develop a modern financial market system and its cautious approach have given rise to a situation wherein financial liberalization often lags the underlying needs of various financial markets. Consequently, the introduction of a new market is usually followed by very fast growth, which inevitably introduces unanticipated risks and challenges to an unseasoned system. The markets are often met with tightening and curbing regulations and even direct interventions, especially when policy priorities shift.

A good example is the stock index futures market. It experienced an explosive growth after its long-awaited opening in 2012, quickly became a global leader in trading volume, and then collapsed completely amid the market turmoil during the summer of 2015, when regulators imposed strict trading limits in response to concerns that speculative futures trading contributed to the extreme market swings. Additional examples include the rapid expansion and subsequent tightening

of the local government bond market as well as the first issuance and subsequent suspension of mortgage-backed securities (MBS), among others.⁵

Fourth, given that China's capital market account remains largely closed, its financial markets are still mostly separated from the rest of the world. As a result, China's financial markets are segmented away from the global financial system in terms of rules, policies, practices, and participation. Such segmentation sustains many of the unique characteristics of these markets.

The importance of China's financial markets and many of their unique features have generated a growing interest in research, which we highlight below. Yet, given the relatively short history of most of these markets and the limited quantity of data available, research coverage is still in an early stage and remains uneven. Research also tends to be focused more on micro issues and framed by the existing literature, which is based mostly on mature markets. We hope that our introduction to these markets will provide a useful background for future research, especially by factoring in their distinctive nature and the underlying drivers.

The rapid growth of China's financial system has generated increasing research interest. Several recent reviews have provided useful background, context, and texture for understanding these developments. Allen, Qian & Gu (2017) provide an insightful overview of China's financial system. Carpenter & Whitelaw (2017) review the Chinese stock market, and Hu, Pan & Wang (2021) examine the empirical characteristics of major asset classes, focusing on government bonds, credit bonds, and stocks. Allen, Qian & Qian (2019) examine developments in China's institutions and their roles in China's economic advancement. A recently published handbook (Amstad, Sun & Xiong 2020) contains a broad coverage of China's overall financial system. Related reviews include those by Song & Xiong (2018) on the risks in China's financial system, Hachem (2018) on China's shadow banking sector, and He & Wei (2022) on China's financial system and its connections to the Chinese economy. Our article aims to provide a comprehensive, detailed, and up-to-date review of major markets such as government bonds, credit bonds, and stocks, as well as newly developed ones, such as ABS, derivatives, and investment management, all of which have experienced significant growth and changes in recent years. In particular, we try to identify the unique characteristics of these markets, their impact on market development and functioning, and the related issues they raise for future research.

In the following sections, we discuss each market separately. The final section contains concluding remarks.

2. GOVERNMENT BONDS

2.1. Development

The Chinese government resumed issuing government bonds in 1981, after a break of more than two decades, marking a new era in the Chinese government bond market.⁶ Since then, it has gone through a period of fast growth, with significant improvements in market structure, trading mechanisms, regulation, and supervision.

⁵Two recent theoretical papers have explored the impact of the Chinese government's interventions on its financial market. Brunnermeier, Sockin & Xiong (2017) point out that the government's gradual approach, while successful in the past, may become ineffective as China's economy and financial system become more complicated. Brunnermeier, Sockin & Xiong (2022) show that frequent government intervention in financial markets could divert investor attention away from fundamentals and entirely toward government interventions, resulting in a trade-off in which the government's goal of reducing asset price volatility may worsen, rather than improve, asset price information efficiency.

⁶After the founding of the People's Republic of China in 1949, only six government bonds were issued in the 1950s and none were issued from 1959 to 1980.

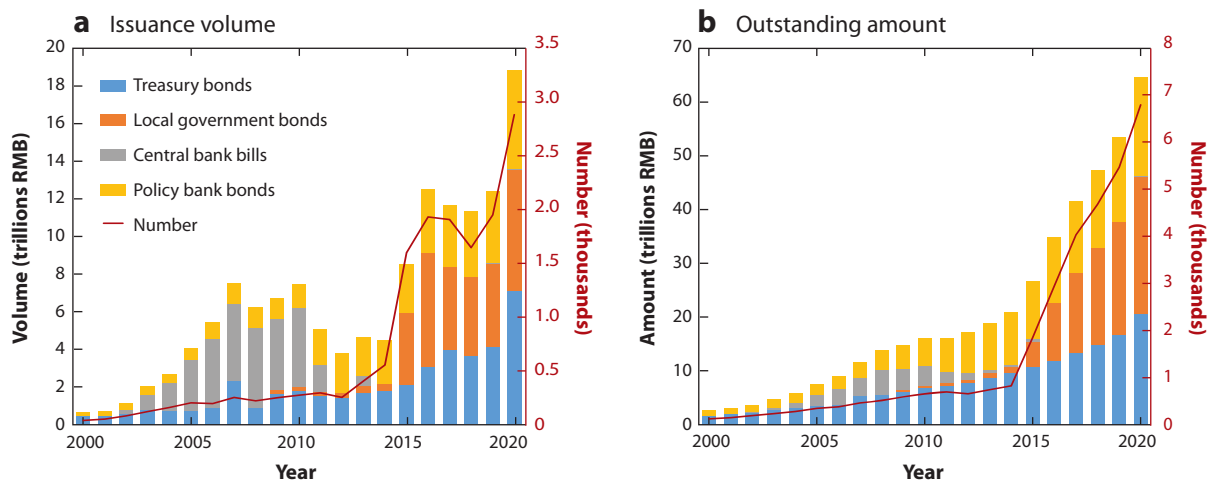


Figure 2

Growth of the Chinese government bond market (2000–2020), showing (a) the total issuance volume and (b) the total year-end outstanding amount. The red lines represent the total number of securities outstanding at year end. Data are from Wind Financial Terminal.

Depending on the issuing body, Chinese government bonds take three main forms: Treasury bonds issued by the central government's Ministry of Finance, local government bonds issued by local governments, and policy bank bonds issued by the three policy banks (i.e., the China Development Bank, the Export–Import Bank of China, and the Agricultural Development Bank of China).⁷ Although not directly issued by the central government, local government and policy bank bonds are generally considered quasi-sovereign and have little default risk. **Figure 2** plots the growth of the government bond market in China. The three forms of government bonds have comparable market sizes—20.2 trillion RMB for Treasury bonds, 25.4 trillion RMB for local government bonds, and 18.0 trillion RMB for policy bonds—as of the end of 2020.

Among the three, Treasury bonds have the longest history. The total issuance amount of Treasury bonds started from only 5.0 billion RMB in 1981, increasing to 1.4 trillion RMB in 2009 and 7.0 trillion RMB in 2020.⁸ Local government bonds were first issued in April 2009 by the Xinjiang Uyghur Autonomous Region. Since then, the local government bond market has grown tremendously, with the issuance size increasing from 200 billion RMB in 2009 to 6.4 trillion RMB in 2020. The policy banks began issuing policy bonds in 1997, with only one issuance of 144 billion RMB. As the policy banks grew over time, so did the policy bond market. The issuance size of policy financial bonds reached 4.9 trillion RMB in 2020, of which 2.3 trillion were issued by the China Development Bank [the issuance and amount outstanding numbers are

⁷Central bank bills, issued by the People's Bank of China (PBOC) and backed by the central government, are also considered to be quasi-sovereign debt and have no default risk. Since 2014, the PBOC has not issued any central bank bills. The total outstanding amount of central bank bills is also small compared with that of Treasury bonds, local government bonds, and policy financial bonds.

⁸Chinese Treasury bonds can take three forms: book-entry bonds, savings bonds, and bearer-form bonds. Treasury bonds were issued mostly in the form of bearer-form bonds during the early years, and were gradually switched to book-entry bonds and savings bonds. Since 1998, no bearer-form bonds have been issued. In 2020, 6.9 trillion RMB in Treasury bonds were issued in book-entry forms, while only 0.1 trillion RMB in Treasury bonds were issued as electronic savings bonds.

from the monthly reports of China Central Depository and Clearing Company (CCDC) (see <https://www.chinabond.com.cn/d2s/engindex.html>).

Initially, the maturity of Treasury bonds was limited to 3–5 years. More recently, the maturity expanded to 15, 20, 30, and even 50 years, as well as to shorter terms below 1 year. The typical maturity of government bonds ranges from 0.25 to 50 years, with the 1-year, 3-year, 5-year, 7-year, and 10-year bonds known as key-term Treasury bonds. The issuance maturity typically ranges from 1 to 30 years for local government bonds and from 0.25 to 30 years for policy bank bonds. Since 2021, policy banks have been approved to issue perpetual bonds.

2.1.1. Primary market. Similar to other developed markets, Chinese government bonds are issued through an auction process.⁹ The participants are mainly large commercial banks and securities firms, selected every 2 to 3 years on the basis of their past underwriting size, trading volume, government bond holdings, business conditions, and other performance measures. After the auction, the underwriters trade with other market participants to redistribute the bonds.

2.1.2. Secondary market. The secondary market for Chinese government bonds has three parts: the exchange market, the interbank market, and the commercial bank over-the-counter (OTC) market. The secondary market for bond trading started in 1988, when investors were allowed to buy and sell Treasury bonds, mostly in the form of physical bonds, at commercial bank counters as well as at regional trading centers. To address various shortcomings associated with trading physical bonds, the government switched to issuing book-entry Treasury bonds. In the early 1990s, the two Chinese stock exchanges, the Shanghai Stock Exchange (SSE) and the Shenzhen Stock Exchange (SZSE), started to provide trading platforms as well as nationwide custody services. They quickly became a very active secondary market for Treasury bonds.

In 1997, the PBOC, China's central bank, banned all commercial banks from participating in spot and repo transactions of Treasury bonds on stock exchanges. Instead, banks were permitted to use bonds deposited at the CCDC, such as Treasury bonds, central bank bills, and policy bank bonds, to conduct spot and repo transactions through the trading system of the National Interbank Funding Center, which later became the interbank bond market. Since then, the majority of the bond trading volume has shifted from the exchange market to the interbank market. By the end of 2020, approximately 96% of the total outstanding Treasury bonds were deposited at the interbank market, while only 4% were deposited at the exchange market.

The commercial bank OTC market began in 2002, when four state-owned commercial banks were allowed to sell Treasury bonds at their branches. Later, they were also allowed to buy back these bonds. Now this market is only an extension of the exchange and interbank markets to individual investors and small- and medium-sized institutional investors. The salient feature of this market is that participants are allowed to trade only with banks.

Among the three markets, the interbank bond market is the largest in size, the exchange market was until recently the most active in trading, and the commercial bank OTC market is only supplementary. In January 2022, Chinese regulators announced that they are seeking to integrate the two long-separated interbank and exchange bond markets by permitting cross-market bond issuance and trading, although the specific procedure has not yet been revealed.

⁹Barbosa et al. (2019) compare the uniform and discriminatory auction mechanisms conducted by the China Development Bank and the Export–Import Bank. They find that the two mechanisms deliver similar auction bond yields and revenues.

2.2. Important Characteristics

Despite its large size, the Chinese government bond market faces substantial challenges in aspects such as liquidity, price efficiency, investor participation, and globalization. Several recent papers (e.g., Huang & Zhu 2007; Amstad & He 2020; Hu, Pan & Wang 2021) provide excellent overviews of the Chinese government bond market. The discussion below focuses on several key features of this market.

2.2.1. Market segmentation. The Chinese government bond market is highly segmented, with three trading venues that have different depositories, regulatory agencies, trading mechanisms, and market participants.

2.2.1.1. Depository structure. The CCDC is responsible for the overall bond depository of all bonds traded in the three markets. The interbank market also uses the CCDC directly for its trading. For the exchange market and the bank OTC markets, however, the CCDC serves only as the primary depository; the China Security Depository and Clearing Company (CSDC) and commercial banks themselves are the secondary depositories, respectively, that support trading activities in these markets. Cross-market depository transfer is time-consuming and is restricted to a given set of bonds.

2.2.1.2. Regulatory agencies. The regulatory framework in China consists of two parts: market regulation and institution supervision. The PBOC and the China Securities Regulatory Commission (CSRC) are responsible for market regulation, covering the interbank market and the exchange market, respectively. Until 2018, the China Banking Regulatory Commission (CBRC) supervised commercial banks and credit cooperatives, the CSRC regulated security firms and investment funds, and the China Insurance Regulatory Commission (CIRC) oversaw insurance companies. In 2018, the CBRC and the CIRC merged into one agency, the China Banking and Insurance Regulatory Commission (CBIRC), with combined responsibilities.

2.2.1.3. Trading mechanism. The exchange market for Treasury bonds is a centralized order book market, similar to stock trading, with the CSDC overseeing its bond registration, depository, and clearing. The interbank market is a wholesale, quote-driven OTC market, with the CCDC overseeing its registration, depository, and clearing.

2.2.1.4. Market participants. The participants in the exchange market are mainly medium- and small-sized investors, including individual investors and nonfinancial firms as well as security firms, investment funds, and insurance companies. Participants in the interbank market are all large institutional investors, such as commercial banks, credit cooperatives, security firms, insurance companies, and fund institutions.

2.2.2. Low liquidity. The trading of Chinese government bonds in the secondary market is much less active compared with other developed markets. Among the three types of government bonds, policy financial bonds enjoy relatively high liquidity. In 2020, the turnover for policy bonds, Treasury bonds, and local government bonds was 5.21, 2.49, and 0.58, respectively. In comparison, the annual turnover for US Treasury bonds is around 9 (see also Amstad & He 2020). The turnover for the US market is calculated on the basis of the annual average trading volume and the amount outstanding reported by the Securities Industry and Financial Markets Association.

There has also been a significant shift in trading and liquidity between the interbank market and the exchange market. Treasury bonds enjoyed high levels of trading frequency and volume

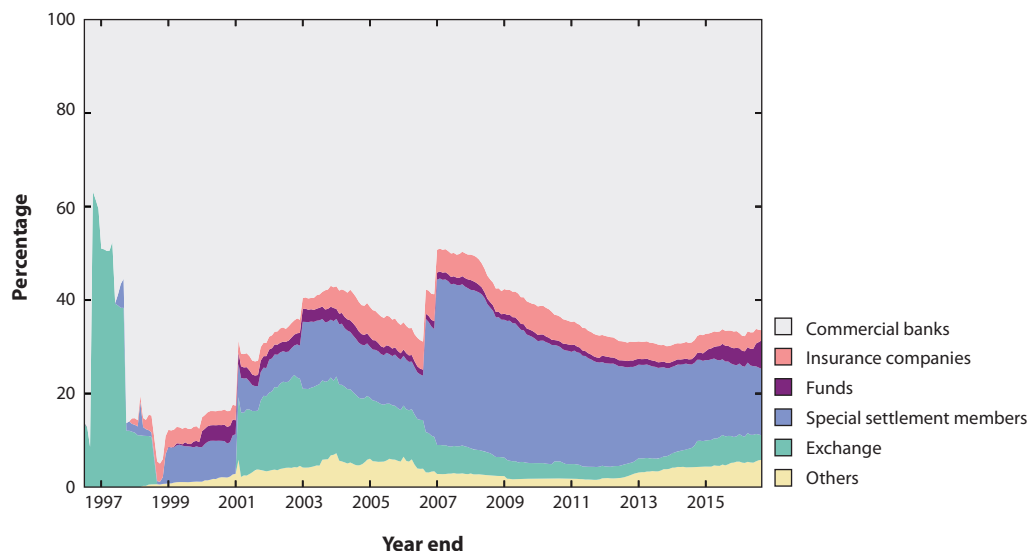


Figure 3

Breakdown of Chinese Treasury bond holdings (1997–2017). The shaded areas represent the breakdown of Chinese Treasury bond holdings among different types of investors. Due to data limitations, the holdings breakdown is plotted only from June 1997 to August 2017. Data are from CDCC monthly statistics reports. The special settlement members include the PBOC, the Ministry of Finance, policy banks, exchanges, the CCDC, and the CSDC. They hold government bonds mainly for liquidity management purposes. Abbreviations: CCDC, China Central Depository and Clearing Company; CSDC, China Security Depository and Clearing Company; PBOC, People's Bank of China.

on SSE during the early period, but there has been a steady switch to the interbank market since 2005.

2.2.3. Investor composition and the role of banks. Most government bonds are held by commercial banks in China. This situation is shown in **Figure 3**, which depicts the breakdown of different classes of investors holding Treasury bonds, including Treasury bonds with all maturities, depositories, and markets, from late 1997 to the end of 2016. Commercial banks have a share of Treasury bonds exceeding 60%, which peaked at more than 90% in 1999 and then gradually dropped to a steadier level of around 60% in 2004. At the same time, special settlement members took on more shares, reaching nearly 40% at the end of 2007 and then decreasing to slightly below 20%. Clearly, the commercial banks and the special settlement members dominate the Treasury bond market.

2.3. Term Structure of the Chinese Treasury Yield Curve

The term structure of the Treasury yield curve serves as an important benchmark for the capital market and the economy. Therefore, it is crucial to understand the dynamics of the yield curve and its determinants. In many developed markets such as the USA, the monetary authority targets the short-term interest rate, leaving the medium- and long-term interest rates to the market. This is not the case in China, where the interest rates (both lending and deposit rates) of all maturities are tightly controlled by the government.

The tight government control on interest rates has important implications for the term structure of Chinese Treasury bonds. Fan & Johansson (2010) show that the 1-year deposit rate, which is the most important policy rate in China, and the spreads between the 1-year deposit rate and

the 1-year market rate are important state variables determining the dynamics of the Chinese Treasury yield curve. To incorporate the fact that Treasury bond investors have an alternative investment in loans that follow an official term structure of lending rates set by the government, Fan, Li & Zhou (2013) develop an affine preferred-habitat term structure model for the Chinese Treasury bond market. Loechel, Packham & Walisch (2016) also show strong government control of the Treasury market. They find that macroeconomic variables, such as policy rate, consumer confidence, M2 money supply, consumer price index expectations, foreign exchange reserves, and foreign exchange rate expectations, all have a greater impact on government bond yields in the offshore market than do the corresponding yields in the onshore market. These authors also find weak spillover effects from the onshore government bond yield curve to the offshore yield curve, but no effects the other way around.

Several studies focus on the term structure models that best capture the Chinese government bond market dynamics. Hong, Lin & Wang (2010) test a variety of popular spot-rate models and find that GARCH (generalized autoregressive conditional heteroskedasticity), regime-switching, and jump-diffusion models capture some important features of the dynamics of Chinese spot rates. However, they perform tests on the Chinese 7-day repo rates instead of short-term Treasury yields. Tong, He & Sun (2018) develop an improved nonparametric Bayesian smoothing-splines model to estimate the Chinese Treasury yield curves. Luo, Han & Zhang (2012) and Umar, Yousaf & Aharon (2021) find that the dynamic Nelson–Siegel model used by Diebold & Li (2006) has a good in-sample fit and out-of-sample forecast.

2.4. Bond Returns

Another strand of the literature investigates the return characteristics of the Chinese government bond market. Hu, Pan & Wang (2021) construct short-, medium-, and long-term Treasury return indexes from bond prices and present a review of the historical return and risk characteristics of these Treasury indexes over the past three decades. They find that Chinese Treasury bond indexes, across all maturities, have higher returns and volatilities than their US counterparts. Earlier, Wang, Yang & Ye (2010) studied Chinese Treasury bonds from 2003 to 2006 and found that their returns have three common factors, which are well captured by three indices composed of short-, medium-, and long-term bonds.

Several papers focus on bond return predictability in the Chinese Treasury market. Fan, Tian & Zhang (2012) find that bond excess returns are far more predictable than those in developed markets, which they attribute to the inflexible short- and long-term official interest rates set by the PBOC. Li et al. (2022) find that several macroeconomic variables and financial factors can predict future bond excess returns, above and beyond the information contained in the current yield curve.

2.5. Informational Efficiency

Despite its large size in terms of outstanding amount, the secondary market trading in the Chinese government bond market is highly segmented and far from active. The segmentation and illiquidity in the Chinese government bond market, coupled with frequent government interventions, raise concerns about the informational efficiency of the market.

Many studies have rejected the hypothesis that the Chinese government bond market is informationally efficient. Wang, Yang & Ye (2010) find that the common bond return risk factors exhibit strong momentum, indicating market inefficiencies in the Chinese bond market during the period from 2003 to 2006. Bai, Fleming & Horan (2013) test the market efficiency using the

standard Kendall tau test and the variance ratio test, both of which reject the hypothesis that daily bond prices followed a random walk during the period from 1999 to 2011.

Several papers examine how information of different macroeconomic announcements is transmitted in government bond markets. Bai, Fleming & Horan (2013) find that certain announcements of macroeconomic news, such as China's producer price index and manufacturing purchasing managers' index, have significant effects on daily bond yields. Sun (2020) investigates three announcements by the PBOC and finds that daily government bond yields respond to the two quantitative announcements, changes in the regulated retail interest rates, and the required reserve ratio, but not to the qualitative announcement of the PBOC's quarterly monetary policy committee meetings.

Other papers examine the informational efficiency of the Chinese government bond market from the angle of cross-market price discovery. Girardin, Lunven & Chen (2021) try to determine, between the Chinese Treasury and corporate bond markets, which market takes a leading role in the discovery of the level, slope, and curvature factor of the yield curve. They find that the corporate bond market is the source of price discovery for the level factor and that the government bond market is the source for the slope factor. Umar, Yousaf & Aharon (2021) investigate the static and dynamic connectedness, in both returns and volatilities, between the government yield curve and the stock market indexes. They find a strong connection between the government bond and stock markets. In particular, they find that the level component of the government yield curve is a net transmitter of return spillovers, whereas the curvature component of the government yield curve is a net transmitter of volatility spillovers.

The special characteristics of China's government bond market raise many interesting questions. For example, what are the advantages and disadvantages of the two trading platforms, the interbank market and the exchange market? How would better coordination and integration between them improve market efficiency in different dimensions, such as liquidity provision and price discovery? What are the driving factors behind liquidity level and liquidity risk in these markets? What impacts do different types of major players in the market have on market behavior, especially commercial banks and special settlement members? What are the different roles that treasury bonds, policy bonds, and local government bonds play? What are their return and risk characteristics?

At a more macro level, the fact that most of the government bonds are still held by banks, which are owned mainly by the government, raises additional questions. To what extent are the prices of these bonds true market prices? Can they be used as benchmark prices in asset pricing? To what extent do these bonds offer long-term investment opportunities for households and private institutions? How might the opening up of the market to global investors (discussed in Section 8) influence the functioning of this market?

3. CREDIT BONDS

3.1. Development

China's credit bond sector has two major types of issuers: financial firms and nonfinancial firms. Financial firms consist of commercial banks, insurance companies, and securities firms. Because financial firms are often state owned and carry implicit government grantees, their bonds, also called financial bonds, are considered to have relatively high credit quality. By the end of 2020, a total of 19.9 trillion RMB in financial bonds were outstanding. Among them, 11.1 trillion RMB are certificates of deposit (CDs) and 8.8 trillion RMB are senior and subordinate debt issued by commercial banks, insurance companies, securities firms, and other financial institutions.

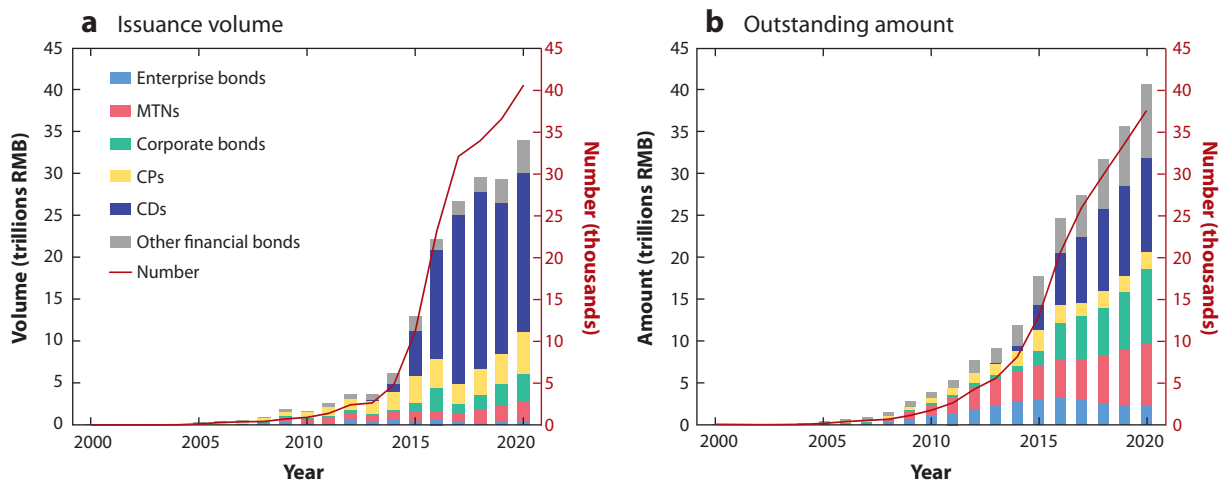


Figure 4

Growth of the Chinese credit bond market (2000–2020), showing (a) the total issuance volume and (b) the total year-end outstanding amount. The red lines represent the total number of securities outstanding at year end. Abbreviations: CDs, certificates of deposit; CPs, commercial papers; MTNs, medium-term notes. Data are from Wind Financial Terminal.

Bonds issued by nonfinancial firms take four major forms: enterprise bonds, (exchange-traded) corporate bonds, medium-term notes (MTNs), and commercial papers (CPs). Nonfinancial issuers in China are mainly SOEs, large private enterprises, and publicly listed companies. By the end of 2020, there were a total of 20.8 trillion RMB in nonfinancial bonds outstanding, comparable to the size of financial bonds. Among the outstanding nonfinancial bonds, there were 2.3 trillion RMB in enterprise bonds, 8.9 trillion RMB in corporate bonds, 7.5 trillion RMB in MTNs, and 2.1 trillion RMB in CPs.

Figure 4 plots the growth of the credit bond market in China. We discuss the development of each of the major credit bond instruments below.

3.1.1. Certificates of deposit. CDs are short-term instruments issued by depository institutions in the interbank market. The typical issuers of CDs are state-owned, joint-stock, and urban and rural commercial banks, which collectively account for more than 99% of the issuance amount. CDs are guaranteed by the issuing banks and have high credit quality. They enjoy relatively good liquidity in secondary markets. The interest rates on CDs track closely with the Shanghai Interbank Offered Rate and offer a higher premium than do government bonds, making them popular money market instruments. Major investors of CDs are commercial banks and investment funds [e.g., bank wealth management products (WMPs), securities investment funds, corporate annuities, social security funds, insurance products, trust products, pension funds, private equity funds]. Of the 11.1 trillion RMB deposited at the Shanghai Clearing House at the end of 2020, 4.1 trillion RMB were held by commercial banks and 5.5 trillion RMB were held by investment funds.

3.1.2. Senior and subordinated financial bonds. Financial firms can issue long-maturity senior and subordinated bonds. At the end of 2020, the total amount of financial bonds outstanding was 5.9 trillion RMB for commercial banks, 1.9 trillion RMB for securities firms, and 0.3 trillion RMB for insurance companies. These bonds can only be traded in the interbank market.

3.1.3. Enterprise bonds. Enterprise bonds are long-term debt issued by government agencies, enterprises under collective ownership, and SOEs. They are traded in both the interbank market and the exchange market, under the general depository of CCDC. The issuance of enterprise bonds is subject to the approval of the National Development and Reform Commission (NDRC). Most of the enterprise bonds are issued by SOEs. On the basis of the bond issuers' data from WIND, we estimate that approximately 90% of the enterprise bonds outstanding at the end of 2020 were issued by SOEs. Moreover, a substantial portion of these SOEs are local government funding vehicles (LGFVs), which are set up to support infrastructure investment at the provincial and city levels. These bonds are often referred to as Chengtou bonds.

3.1.4. Corporate bonds. Corporate bonds are long-term bonds issued by listed and non-listed companies. The corporate bond market has expanded quickly, especially after 2015, when the CSRC adopted new regulations to expand the issuer list and placement methods. In 2020, 3,617 corporate bonds were issued, with a total value of 3.4 trillion RMB. Of these bonds, 1,212 (1.5 trillion RMB) are general corporate bonds and 2,405 (1.8 trillion RMB) are private placement notes. Corporate bonds can be traded only in the exchange market and are deposited at the CSDC.

3.1.5. Commercial papers. CPs are issued by nonfinancial firms, with typical maturities not exceeding 1 year. CPs first appeared in China in 1989. During the early years, the issuance of short-term CPs was tightly regulated by the PBOC and was eventually halted in 1997 amid a series of scandals. The market reopened in 2005, when a new regulation policy allowed the issuance process to switch from the old approval system to the new registration system, and it has grown rapidly since. In 2020, there were 4,842 CPs issued, with a total size of 5.0 trillion RMB. CPs are issued and traded in the interbank market and are deposited at the CCDC.

3.1.6. Medium-term notes. MTNs, with typical maturities ranging from 2 to 5 years (and occasionally up to 10 years), fill the gap between short-term CPs and long-term enterprise and corporate bonds. The first issuance of MTNs occurred in April 2008, when the Ministry of Railways and six other companies issued a total of 119 billion RMB of MTNs. The MTNs were deposited at the CCDC before June 17, 2013. Afterward, newly issued MTNs were deposited at Shanghai Clearing House. In 2020, 2,120 MTNs were issued, with a total size of 2.3 trillion RMB. MTNs are traded in the interbank market.

3.2. Important Characteristics

The Chinese credit bond market shares some features with the government bond market, such as lack of liquidity and market segmentation. It also has its own unique features, including issuance process, pricing, and implicit government guarantee.

3.2.1. Market segmentation. For historical reasons, the Chinese credit bond market is highly segmented in terms of regulatory agencies, depository institutions, trading venues, and investor composition. CDs, CPs, financial bonds, and MTNs can be traded only in the interbank market; corporate bonds can be traded only in the exchange market; and enterprise bonds can be traded in both markets.

Institutional investors, mainly banks, participate in the interbank bond market, while retail investors and nonbank financial institutions participate in the exchange market. Although certain types of nonbank financial institutions, such as mutual funds, insurance companies, and securities firms, are active in both markets, strong restrictions on market access and trading frictions cause the two markets to be largely segmented.

3.2.2. Low liquidity. The credit bond market exhibits substantial heterogeneity in liquidity. Short-term bonds such as CDs and CPs enjoy reasonable liquidity in the secondary market. As reported by Amstad & He (2020), in 2019 the annual turnover was 4.85 for CDs and 4.26 for CPs, comparable to the level in the USA, which was around 5 for corporate bonds. Longer-maturity securities, however, have significantly lower liquidity. The annual turnover in 2019 was 0.62 for financial bonds, 0.56 for enterprise bonds, 0.10 for exchange-traded corporate bonds, and 1.51 for MTNs.

3.2.3. Default and implicit government guarantee. In 1986, China introduced the Enterprise Bankruptcy Law, which focused exclusively on how to address SOE insolvency. In 2016, the National People's Congress approved a new bankruptcy law reform, aiming to provide a unified legal insolvency framework resembling international practices. Despite the substantial changes in bankruptcy rules, implementation of bankruptcy proceedings has remained challenging due to court inefficiency, low creditor protection, and frequent interventions by local government.

Credit bond defaults are rare in China. The first case of a publicly issued bond default occurred in 2014, when Shanghai Chaori Solar, a privately held company, missed interest payments on its 1 billion RMB bond issued in the exchange market. The amount of default has increased in recent years but still represents only around 0.3% of the overall amount outstanding—much lower than in many developed markets.

A significant proportion of issuers in the Chinese credit bond market are SOEs. Investors have long held the view that the Chinese government would not let large SOEs default because of undesirable consequences. Indeed, most of the credit bond default in China is by non-SOE issuers. Only a handful of SOE issuers have defaulted so far, mostly in overcapacity industries. Financial bonds, Chengtong bonds, and bonds issued by large SOEs are still considered to have extremely low credit risk.

3.2.4. Bond ratings and rating agencies. Similar to international standards, China has adopted nine long-term credit ratings (AAA, AA, A, BBB, BB, B, CCC, CC, and C) and six short-term ratings (A-1, A-2, A-3, B, C, and D) for domestic issuers. Despite this similarity, the distribution of ratings is largely skewed toward the top. Close to 97% of Chinese credit bonds are rated no lower than AA, which is generally considered the lowest investment-grade rating, versus BBB in international rating standards.

China has nine major rating agencies. Six of them (or four agencies by grouped subsidiaries) dominate the market, having approximately 80% of the market share. They are Chengxin (Chengxin Securities Rating and Chengxin International Rating), Lianhe (Chin United Rating and China Lianhe Rating), Dagong Global Credit Rating, and Shanghai Brilliance Credit Rating. Chengxin International Rating, China Lianhe Rating, and Shanghai Brilliance Rating are joint-venture rating agencies, minority shares of which are owned by the three major international rating agencies, Moody's, S&P, and Fitch. The remaining three are relatively smaller rating agencies: Pengyuan Credit Rating, Golden Credit Rating, and China Bond Rating Corporation. Eight of the nine rating agencies have adopted the international standard of the issuer-pay model. The China Bond Rating Corporation is the only one that uses the investor-pay model.

3.3. Role of Banks in the Credit Bond Market

As the dominant player in China's financial system, banks play an important role in the development of the Chinese credit bond market. Banks participate in the credit bond market through two different channels: the direct on-balance-sheet channel and the indirect off-balance-sheet channel via WMPs. For the direct channel, Amstad & He (2020) estimate that commercial banks hold

approximately 57% of the credit bonds in the interbank bond market. The second channel is more difficult to measure. Ehlers, Kong & Zhu (2018) estimate that 30–40% of the net issuance of all credit bonds were funded via bank-issued WMPs in 2014–2016, and Amstad & He (2020) estimate that approximately 42–44% of the WMPs were invested in the credit bond market in 2016–2017. In other words, a large portion of the credit bonds are held either directly or indirectly by banks.¹⁰

Chen, He & Liu (2020) also demonstrate the important role of banks in the credit market through the example of Chengtou bonds. They show that the growth of the Chengtou bond market is directly linked to the large amount of maturing bank loans borrowed by local governments as part of the 2009 stimulus plan during the global financial crisis. To refinance these bank loans, LGFVs were set up to issue Chengtou bonds in the interbank market, most of which were bought and implicitly guaranteed by commercial banks through their WMPs.

3.4. Credit Risk Pricing and Government Guarantee

Several recent papers have studied price informativeness in the Chinese credit bond market. Geng & Pan (2019) find that credit spreads in China became informative only after the first corporate default in 2014. Even though occurrences of defaults bring the credit market pricing in line with the underlying credit risk, the explanatory power of the default measures remains limited in comparison to other developed markets. These authors focus on medium- and long-term bonds issued by publicly listed companies and construct credit measures based on Merton's model of default. Using a structural approach similar to credit risk modeling, Huang, Liu & Shi (2022) find that illiquidity is much more important than default risk in explaining variations in the spreads of short-term CPs.

A unique feature of China's credit bond market is that many bonds may carry implicit government guarantees. Geng & Pan (2019) document a severe market segmentation structure of SOEs and non-SOEs. They find that non-SOE issuers have suffered from explosive credit spreads, unprecedented defaults, and shrinking new issuance amid waves of default events post-2018 but that SOE issuers have remained largely intact. Jin, Wang & Zhang (2018) study the first large SOE default in 2015, when Baoding Tianwei Group shocked the market by announcing that it would miss the interest payments on its onshore corporate bonds. These authors hypothesize that bond investors perceived the event as a reduction or even removal of implicit guarantees on SOEs and find that implicit government guarantees account for 1.45% to 1.77% of bond value. For Chengtou bonds issued by LGFVs, both Liu, Lyu & Yu (2017) and Ang, Bai & Zhou (2019) show that credit spreads depend not only on the financial conditions of the issuing LGFVs but also on the fiscal conditions and risk characteristics of the local governments that are closely connected to the LGFVs.

3.5. The Impact of Market Segmentation on Pricing and Liquidity

Due to severe market segmentation, dual-listed bonds could show different prices despite having the same fundamentals. Liu et al. (2019) find that enterprise bonds with higher demand from retail investors are traded in the exchange market at prices significantly higher than those of the same bonds traded by institutional investors in the interbank market. Mo & Subrahmanyam (2019) find similar patterns and also attribute the price differential to clientele differences across the two

¹⁰Wang et al. (2021) argue that the shadow banking system in China, consisting mainly of WMPs, trust loans, and entrusted loans, serves as a dual-track reform mechanism to gradually liberalize the restrictive interest rate control policy by channeling credit to underfunded private enterprises at market-determined interest rates.

markets. H. Chen et al. (2019) use a policy shock in December 2014, which rendered a class of AA+ and AA enterprise bonds ineligible for repo at the exchange market, to study the value of pledgeability in bond pricing. They estimate that an increase in the haircut from 0% to 100% would result in an increase in bond yield in the range of 40 to 83 basis points.

Market segmentation also affects market liquidity. Mo & Subrahmanyam (2019) find that the levels of liquidity vary substantially across bond types and trading venues. They attribute these variations to cross-market and within-market clientele effects. They also find that government policies have a large impact on the credit bond market liquidity and that the presence of foreign investors improves liquidity in the interbank market.

3.6. Bond Issuance and Firm Behavior

With a market-based mechanism of credit allocation and pricing, the bond market provides a new channel of debt financing, potentially cheaper and more efficient, for firms that do not have access to traditional bank credit. Several recent papers focus on credit bond issuance and its impact on the issuing firms. Ding, Xiong & Zhang (2022) find that there is robust overpricing in the issuance of CPs and MTNs at the interbank market, in contrast to bond and equity issuance underpricing in Western countries. They identify two channels that drive the overpricing: rebates and self-purchases by underwriters. Flannery, Hong & Wang (2020) study USD-denominated Chinese corporate bond issuance in the overseas market. They find that the issuance of two USD-denominated government bonds in 2017 helped reduce yield spreads, bid-ask spreads, and volatility of offshore USD-denominated Chinese corporate bonds. Huang, Panizza & Portes (2021) find that offshore USD-denominated Chinese corporate bond issuance is related to differences between the domestic and foreign interest rates. Furthermore, they find that firms in risky sectors use the proceeds to do more interfirm lending in comparison to firms in less risky sectors.

3.7. Credit Ratings, Enhancements, and Their Impact on Pricing

Even though the credit rating scales in China are in line with international standards, the actual ratings seem highly inflated (Kennedy 2008; Poon & Chan 2008; Jiang & Packer 2019; Gao, Huang & Mo 2020). Despite the absence of more-granular ratings, Poon & Chan (2008) show that credit ratings in China are informative. In particular, they find a positive certification effect of initial rating announcements and a negative signaling effect of rating downgrade announcements. Gao, Huang & Mo (2020) find that more than 25% of credit bonds in China received improved issuance ratings. Among them, 96.6% used credit enhancement, which effectively lowers credit spreads.

China's unique political, legal, and economic environment, which is complex and evolving, brings a rich set of issues, some quite fundamental, to the credit bond market. For example, given that property rights are not always clearly defined, the rights of creditors face similar challenges. The corresponding legal resolution process is far from established. Recent cases of default provide a glimpse of what may happen. A very large proportion of the issuers have government connections or support of a different nature. The associated guarantees or possible interventions are major factors in credit risk assessment and pricing. How do we model and quantify them? How do these guarantees and interventions influence credit allocation and the real economy? The recent growth of CDs and corporate bonds also raises interesting questions. In particular, how has the CD market facilitated the liberalization of interest rates? How has it improved credit provision to smaller banks and firms? How does the corporate bond market help private firms obtain long-term capital and influence their behavior? What is the corresponding pricing mechanism? What determines

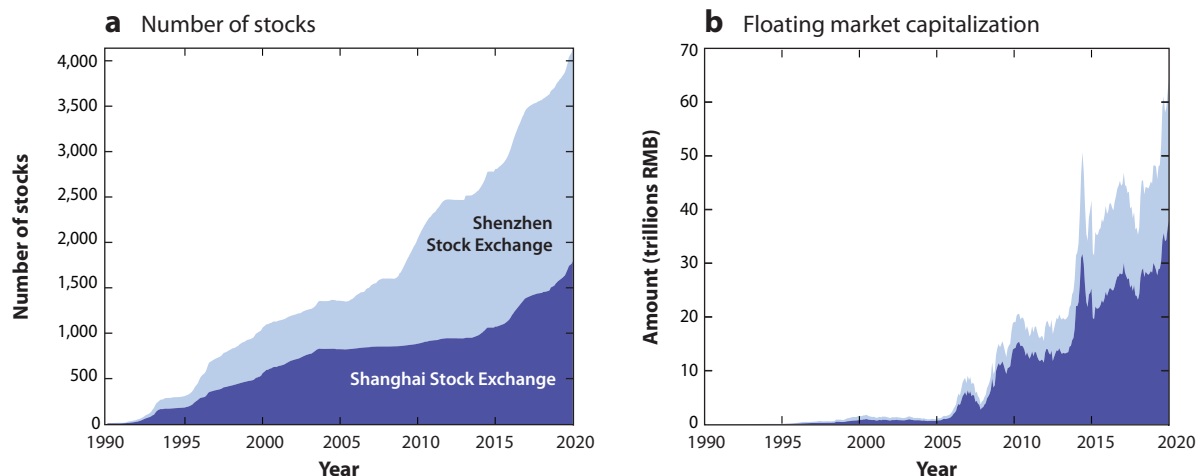


Figure 5

Growth of the Chinese stock market (1990–2020). (a) Number of stocks listed on the two major Chinese stock exchanges. (b) Floating market capitalization of the two exchanges. Data are from the authors' own calculations, based on data from Wind Data Feed.

these bonds' liquidity and liquidity risks? What kind of new opportunities are they providing to investors?

4. STOCKS

4.1. Development

The two major Chinese stock exchanges, SSE and SZSE, were established in 1990.¹¹ SSE is the largest stock market in Mainland China in terms of total market capitalization and trading volume, while SZSE hosts more small companies. The Chinese stock market has experienced tremendous growth since its establishment (**Figure 5**). During the initial experimental phase, from 1990 to 1992, only eight stocks (the so-called old eight) were listed in SSE, and six were listed in SZSE in 1991. By the end of 2020, the number of listed firms reached 1,794 in SSE and 2,347 in SZSE. The total market capitalization is close to 65 trillion RMB, second only to the USA's.

The Chinese stock market is characterized by the coexistence of different types of shares. A shares represent the shares listed on the two main stock exchanges, denominated in RMB; B shares, introduced in 1992 in both SSE and SZSE, are denominated in USD and Hong Kong dollars, respectively. H shares are shares of companies registered in Mainland China but listed on the Hong Kong Exchanges (HKEX). Many companies list their shares simultaneously on HKEX and on one of the two exchanges in Mainland China. Our discussion in this section focuses primarily on the domestic A shares. We briefly discuss B shares in Section 8.

There are four major classes of investors in China's stock market: domestic individual investors, financial intermediaries, domestic institutional investors, and qualified foreign institutional investors (QFIIs).¹² In Mainland China, Chinese commercial banks are forbidden by law

¹¹There are several regional security exchanges, but they have played only a relatively minor role in China's overall stock market in terms of both total market capitalization and trading volume. Our discussion therefore focuses exclusively on the two major exchanges.

¹²The Chinese government has implemented several programs to gradually open its capital market to foreign investors. We discuss these programs in Section 8.

from participating in securities underwriting and investing. They also cannot lend funds to their clients for securities purposes. Insurance companies are permitted to invest in common stocks only indirectly, through asset management products operated by investment funds.

The main regulator of the securities industry in China is the CSRC. The CSRC oversees China's securities and futures markets, with the power to regulate and supervise market participants and securities issuers in their related behavior.

4.2. Important Characteristics

The Chinese A shares market has many distinctive features. Below we describe some of the major ones, which are important in understanding its behavior and underlying forces.

4.2.1. The split-share structure and its reform. The split-share structure refers to the co-existence of both nonfloating and floating shares in China's stock market. Nonfloating shares are equity shares that were converted from state ownership early in the privatization of large SOEs. They are traded between different governmental and semigovernmental entities and, more recently, other legal entities through negotiations, typically at book value. Floating shares are issued to the general public and are listed and traded on the two stock exchanges. The Chinese government has been attempting to reduce state ownership in most SOEs since 1998, first through a trial program and then through a full-scale split-share structure reform in April 2005. Through terms negotiated with the owners of floating shares, nonfloating shares were gradually converted into floating shares. By the end of 2020, the proportion of the market capitalization of nonfloating shares had dropped to below 20% from a peak near 80% in the early 1990s.

4.2.2. Exchange listings. In contrast to the registration-based initial public offering (IPO) process used in most developed markets, IPOs in China follow an administrative approval process, with greater reliance on regulatory agencies to determine and endorse the quality of the issuing firm. Over time, this process has gone through several phases. Prior to 2001, IPOs were regulated by an administrative review and approval procedure wherein the State Planning Commission and the CSRC determined the total stock issuance quota each year. Candidate firms needed to first apply for the issuance quota from the local governments or central government ministries, then submit the application to the CSRC for review and approval. In March 2001, China switched to an approval system that gradually lifted the issuance quota and local government approval requirements. Under the new system, the CSRC is the only approval authority and a sponsor security firm is responsible for the underwriting process. The CSRC relies on a series of accounting and financial metrics to determine the quality of the issuing firm and has restrictive requirements for the issuance size, IPO price, and use of proceeds raised from the issuance.

To circumvent the restrictive IPO process, many Chinese companies choose to list in HKEX and other overseas markets to raise funds globally. As of December 2020, 291 H shares (companies incorporated in Mainland China), 176 red chip stocks (shares of SOEs incorporated outside Mainland China), and 852 mainland private enterprises are listed on HKEX, accounting for 80.1% of its total market capitalization. Some Chinese companies also choose to list on US exchanges such as NASDAQ and the New York Stock Exchange. As of February 2019, 156 Chinese firms (11 of which are SOEs) are listed in the USA, with a combined market value of 1.2 trillion USD.¹³

¹³These numbers are obtained from the monthly statistics provided by the HKEX (see <https://tinyurl.com/HKEXhighlights>) and from the US–China Economic and Security Review Commission Report (USCC 2022).

In recent years, Chinese regulators have gradually reformed the IPO process to embrace a full registration-based IPO system. On July 22, 2019, China created a pilot program, the Science and Technology Innovation Board (STAR), at SSE. STAR uses a registration-based IPO process for firms in several technology industries. In 2020, the ChiNext Board at SZSE, a high-tech board inaugurated in October 2009, was reformed to include a registration-based mechanism. The CSRC also issued a guiding opinion on June 3, 2020, regarding the transfer of companies listed on the National Equities and Exchange Quotations (NEEQ), allowing eligible NEEQ companies to apply for listing directly on ChiNext or STAR, without going through the process of delisting from NEEQ and resubmitting the listing application (CSRC 2020). Chinese regulators have emphasized that the overall adoption of the registration-based IPO procedure is one of their primary capital market reform priorities in the next few years.

4.2.3. Trading rules. The exchanges impose a set of trading rules that aim to limit speculative trading and stabilize the market. Stock trading in China is settled under the $T + 1$ rule; that is, investors can sell the stocks they purchase on day T only on day $T + 1$ and onward. Short-selling and leverage trades were introduced only recently, in 2010, and are limited to a selected group of stocks.

There is also a daily price limit, which sets the maximum price change within 1 trading day relative to the previous day's closing price. The size of the price limit, however, has changed over time. In the 1990s, the exchanges imposed daily price limits of various sizes, ranging from 0.5% to 10%, either to discourage speculating or to counter low market sentiment. Since 1996, both SSE and SZSE have settled on a daily price limit of 10%.

Market-wide circuit breakers in China's stock market were installed in January 2016, with the goal of limiting extreme market volatility. They were triggered on the first day (January 4) and the fourth day (January 7) following their introduction, and were abandoned on January 8, the fifth day.

4.2.4. Taxes. There is no tax on capital gains on stock investments in China. Tax is, however, levied on dividend income. The tax rate was initially set at 20%, then reduced to 10% in June 2005. To lower the tax rate for long-term investors and restrain speculation on securities with high dividend income, a new differential dividend income tax policy based on the holding period of the dividend distributing security has been applied since January 2018. Another tax feature of China's stock market is the transaction tax, also referred to as the stamp tax. The stamp tax rate started rather high, at 0.6% on both sides of a transaction, and was recently reduced to a fairly low level of 0.1% on the sell side.

4.2.5. Investor composition. China's A share market is dominated by retail investors, who account for more than 80% of the total trading volume—significantly higher than in most developed markets. As of March 2021, retail investors hold 33% of the total floating market capitalization, which is comparable to the US market. However, the majority of institutional investors in China are legal-person entities, who represent large shareholders (such as government entities owning major stakes in SOEs), rather than institutional investors, such as insurance companies, mutual funds, and pension funds. Legal-person entities hold 45% of the total floating market capitalization—substantially higher than professional institutional investors, who hold 17%.

4.2.6. Delisting and special treatment. Firms can be delisted from exchanges either voluntarily or involuntarily. Voluntary delisting is usually due to privatization or mergers and acquisitions, while involuntary delisting is triggered when firms no longer satisfy the rules set by the exchanges

and regulators. In China, firms that experience losses for three consecutive years would receive warnings for delisting and would be delisted if the loss continued in the subsequent 6 months. Despite these rules, delistings are very rare in China due to the huge demand for reverse mergers, whereas a private firm could go public by merging with a listed firm, bypassing the lengthy approval process required by IPOs. It is estimated that fewer than 1% of firms are delisted in China every year, a rate substantially lower than in developed markets.

Special treatment (ST) status refers to a listed company facing financial abnormality. In April 1998, SSE and SZSE announced that firms with financial abnormality will have the prefix “ST” added to their stock.¹⁴ The daily price limit for ST stocks is 5%, half the limit for normal stocks.

4.3. Risk and Return Properties

A growing literature is studying the performance and behavior of the Chinese stock market. Hu, Pan & Wang (2021) compare the statistical properties of returns on seven major asset classes in the Chinese capital market, including stocks. They find that, from 1993 to 2020, the Chinese stock market yielded an average annual return of 13%, with a volatility of 43%. For the same period, the US stock market yielded an average annual return of 10%, with a volatility of 19%. On a risk-adjusted basis, the performance of China’s stock market is rather disappointing—its Sharpe ratio is one-third that of the USA. In addition, its annual volatility of 43% is much higher than that of any other major market, despite its large size. Allen et al. (2020) also discuss the poor performance of the Chinese stock market. They show that domestically listed Chinese firms have performed rather poorly relative to both China’s overall economic growth and other large developed or emerging countries.

Many papers have also studied the effect of well-known factors in explaining Chinese stock returns. Studies by Hu et al. (2019) and Liu, Stambaugh & Yuan (2019) explore size and value effects in the Chinese stock market. Other studies have investigated other factors such as momentum, short-term reversals, illiquidity, volatility, investment, profitability, and so forth (Chen et al. 2010; Hilliard & Zhang 2015; Cakici, Chan & Topyan 2017; Nartea, Kong & Wu 2017; Gu, Jiang & Xu 2019; Yao et al. 2019; Cheema, Man & Szulczyk 2020; Gao, Guo & Xiong 2021; Hou, Qiao & Zhang 2021; Jansen, Swinkels & Zhou 2021; Ma, Yang & Su 2021; Yang, Zhou & Zhu 2021). Researchers tend to agree that size, illiquidity, short-term reversals, and volatility appear to be robust predictors of returns in the cross section. Results on other factors, such as value, momentum, investment, and profitability, are mixed and often depend on sample size and test methodologies. Some researchers also investigate China-specific variables or interpret the results under unique China-specific settings (see, e.g., Choi, Jin & Yan 2016 on information asymmetry; Chen, Demirer & Jategaonkar 2015 on return dispersions; Liu, Shu & Wei 2017 on political uncertainty).

4.4. Price Informativeness

Several papers focus on the information content of stock prices in China. Morck, Yeung & Yu (2000) and Morck, Yeung & Yu (2013) use a stock’s market model *R*-squared as an inverse measure of firm-specific information content in the stock price; they point out that China is an example with especially high synchronicity. Gul, Kim & Qiu (2010) find that ownership concentration can

¹⁴According to the CSRC, there are four types of ST stocks. ST refers to firms with losses for two consecutive years, *ST refers to firms with losses for three consecutive years, SST refers to firms with losses for two consecutive years and the stock split-structure reform not completed, and S*ST refers to firms with losses for three consecutive years and the stock split-structure reform not completed.

explain the variation of stock synchronicity in the cross section. Carpenter, Lu & Whitelaw (2021) measure stock price informativeness as the predicted variation in a cross-sectional regression of future earnings on the logarithm of past market valuations. They find that while stock prices were uninformative in the early years, as of 2004 they have become as informative about future profits in China as they are in the USA.

4.5. Privatization and Ownership Structure

Given the importance of SOE privatization, much of the literature has been devoted to studying the impacts of these reforms. Sun & Tong (2003) evaluate the impact of China's share issue privatization during 1994 and 1998 on SOEs' performance. They find that share issue privatization is effective in improving SOEs' earnings ability, real sales, and worker productivity but not successful in improving profit returns and leverage after privatization. Wei, Xie & Zhang (2005) extend the analysis to a sample from a longer period, from 1991 to 2001, and find that state and institutional ownership has negative effects on Tobin's Q while foreign ownership has positive effects.

Other papers focus on the second stage of privatization in China, the so-called split-share structure reform begun in 2005. Liao, Liu & Wang (2014) find that the expectation of privatization quickly boosted SOEs' output, profit, and employment but did not improve their operating efficiency and corporate governance. Chen et al. (2012) document that firms on average reduced cash holdings after the split-share reform, and the reduction in cash holdings was greater for firms with weaker governance and firms facing more financial constraints prior to the reform. Li et al. (2011) and Firth, Lin & Zou (2010) investigate the determinants of the compensation ratio, that is, the compensation paid to holders of floating shares as a fraction of the share value. Liao, Liu & Wang (2011) and Lou, Wang & Yuan (2014) study the impact of the split-share reform on stock returns and stock price informativeness.

Prior to the successful implementation of the 2005 split-share reform, the Chinese government had made several other attempts at privatization, many of which failed. Calomiris, Fisman & Wang (2010) study the surprising announcement of government sales in 2001 and the later cancellation of the announcement. They find that the stock market responds negatively to unanticipated privatization and positively to the cancellation of this proposed policy.

4.6. Initial Public Offerings and Multiple Listings

A large literature studies IPO underpricing and the after-IPO performance of Chinese stocks (Mok & Hui 1998; Su & Fleisher 1999; Chan, Wang & Wei 2004; Chen, Firth & Kim 2004; Ting & Tse 2006; Fan, Wong & Zhang 2007; Jia, Pownall & Zhao 2014; Cong, Howell & Zhang 2017). In a recent paper, Shi, Sun & Zhang (2018) found that large IPO issuance could have a negative impact on the values of other stocks because of a regulation that effectively freezes massive amounts of cash throughout the IPO subscription process.

Several studies examine Chinese firms' overseas listings or cross-listings. Pan & Brooker (2014) find that the attitude of the government and the effect of proximity preference affect Chinese firms' overseas listing activity. Allen et al. (2020) argue that problematic IPO and delisting processes lead to adverse selection of firms entering and staying in the market.

The domestically listed A shares of cross-listed firms are traded at a significant premium. Early studies often focused on the premium in A share prices relative to B share prices. They give several different explanations (see, e.g., Ma 1996 on investors' attitudes toward risks, regulatory changes, and the diversification value of the stocks in emerging markets; Chen, Lee & Rui 2001 on the low liquidity of B shares; Fernald & Rogers 2002 on the limited investment opportunity set available to domestic investors; Chan & Kwok 2005 on the relative supply of A shares versus B shares;

Chan, Menkveld & Yang 2008 on information asymmetry). Mei, Scheinkman & Xiong (2009) use the coexistence of A and B shares to test the theory that speculative trading in the presence of short-sales constraints can lead to overvaluation. Karolyi, Li & Liao (2009) find that the B share discount decreased significantly after February 2001, when the CSRC announced that Chinese residents would be allowed to own B share classes of stocks traded on both SSE and SZSE.

More recent papers focus on the price disparity between domestic A shares and Hong Kong-listed H shares, where the domestic A shares are traded at a significant premium. Guo, Tang & Yang (2013) find that the A share-to-H share price premiums are related to corporate governance and that A share premiums are higher for firms in which the controlling shareholders and corporate insiders have greater potential to expropriate wealth from outside investors. Chung, Hui & Li (2013) estimate a structural model for equity pricing using a Bayesian approach and argue that investors' parameter uncertainty, represented by the posterior standard deviation of the firm's asset volatility, could help explain the A share-to-H share price disparity. Other papers (e.g., Li, Brockman & Zurbuegg 2015; Hu et al. 2016; Kot & Tam 2016; Jia, Wang & Xiong 2017) focus on the informativeness of A share and H share prices.

4.7. Retail Investor Behavior and Its Market Impact

Dominated by retail investors, the Chinese stock market provides an ideal setting for the study of retail investors' behavior and its impact on the market. Using account-level data, Jones et al. (2021) observe strong heterogeneity in retail investors' trading dynamics and performance. They find that retail investors with small account sizes, in contrast to large retail investors, fail to process public news and display behavior biases such as overconfidence. Li et al. (2017) find that retail investors with small account sizes cannot properly assess future returns, whereas investors with large account sizes can. Hu, Liu & Xu (2021) and Titman, Wei & Zhao (2022) find that small retail investors acquire shares following the announcement of stock dividends, while sophisticated investors accumulate positions before announcements and sell in the postannouncement period to make a profit.

Several other papers investigate factors that drive retail investors' behavior biases. Hong et al. (2014) find that keeping-up-with-the-Joneses preferences explain retail investors' excessive trading in small local stocks. Feng & Seasholes (2004) find that trading is highly correlated among investors who are geographically close. Chang et al. (2015) show that investors living in linguistically diverse areas express more diverse opinions on stock message boards and trade stocks more actively. Liu et al. (2022) design and administer a survey to elicit individual retail investors' responses to a list of behavioral biases. They take an integrated approach, combining survey responses with actual investing activity, and conclude that overconfidence in having an information edge and a gambling preference outweigh other trading incentives in explaining observed turnover. Focusing on the 2014–2015 bubble-crash episode, An, Lou & Shi (2018) find that there was significant wealth redistribution from the bottom 85% of households (in terms of equity market balance) to the top 0.5% of households. Liao & Zhu (2021) propose an extrapolation model of bubbles to explain the sharp rise in prices and volume during this period.

4.8. Trading Restrictions and Their Market Impact

Several papers investigate the market impact of trading restrictions in China. Bian, Su & Wang (2022) find that the $T + 1$ settlement rule, which effectively imposes a 1-day lockup on newly purchased shares, lowers the prices of the underlying stocks. They find that investors tend to purchase more stocks toward the market close, when the 1-day trading lockup becomes less binding, and then switch to the warrant market, which is not subject to this trading constraint for intraday trades. T. Chen et al. (2019) find that the daily price limit may lead to unintended and

destructive market behavior, in which large investors tend to buy a stock on the day it reaches the 10% upper price limit, then sell it the next day, resulting in a stronger price reversal in the long run. Ni & Yin (2020) document unintended real effects of short selling by exploiting a pilot program that gradually removed the short-sale bans on certain stocks in March 2010. They find that pilot firms undertake less risk and have worse short-term and long-term market performance after the removal of short-sale bans. Chen, Petukhov & Wang (2019) examine the impact of market-wide circuit breakers (which were briefly put in place in China during the sharp stock market downturn in 2015) on market behavior and welfare.

The longer history and greater data availability of China's stock market have allowed extensive and detailed studies of its behavior, yet many questions remain. The stock market has yielded a fairly low return since its inception (with an annual return of 3% from 1993 to 2020 in real terms), despite the tremendous wealth creation process in China, yet it has carried very high risk (with an annual volatility of 54%). How can we understand these returns and risks of listed firms? What is driving the high volatility? What is the impact of the stock market on listed firms and households? What role do institutional investors play in the market? What are the costs and benefits of the government's various interventions in the market, ranging from the listing process, transaction taxes, price limits, and $T + 1$ rules to short-sale constraints and ST? At a more macro level, how should the government balance the temptation to use the stock market as a tool to achieve certain policy goals, such as promoting entrepreneurial and technological innovation, with the desire to have a well-functioning market for efficient resource allocation? Many of these questions may be more prominent in China, but they also have general implications for our understanding of how financial markets function and affect welfare and the economy.

5. ASSET-BACKED SECURITIES

5.1. Development and Characteristics

Despite the recent surge in issuance volume, the ABS market in China is still in a nascent stage. Here, we use the term ABS in its generic sense; MBS represent a particular subcategory but not a dominating part. The first residential MBS issued by the China Construction Bank in 2005 marked the pilot of China's ABS program. It was temporarily halted in 2007, in the wake of the US subprime mortgage crisis. Since it restarted in 2012, China's ABS market has experienced rapid growth, especially since 2014. In 2020, the total volume of ABS issuance reached 2.9 trillion RMB. The total outstanding volume of ABS by the end of 2020 stood at 4.6 trillion RMB, the largest in Asia and the second largest globally. However, the size of the ABS market is still small relative to the overall size of the capital market. **Figure 6** plots the growth of China's ABS market from 2006 to 2020.

There are three main categories of ABS in China: credit ABS, corporate ABS, and asset-backed notes (ABNs). Credit ABS are backed by loans, such as mortgages, auto loans, credit card payments, and other consumer loans, typically originated by financial institutions. MBS account for the lion's share of credit ABS, around 80% as of the end of 2020. Corporate ABS and ABNs are typically issued by nonfinancial corporations, backed by their own assets, with account receivables and financing/leasing receivables being the most popular. Initially, credit ABS were issued and traded only on the interbank market, but since 2014 they have also been traded on the exchanges. Corporate ABS are issued and traded on exchanges, while ABNs are issued and traded on the interbank market.

As shown in **Figure 6**, in 2020 there were 184 credit ABS issued, with a total volume of 804 billion RMB; 1,473 corporate ABS issued, with a total volume of 1.6 trillion RMB; and 446 ABNs issued, with a total volume of 509 billion RMB. These accounted for 28%, 54%, and 18%

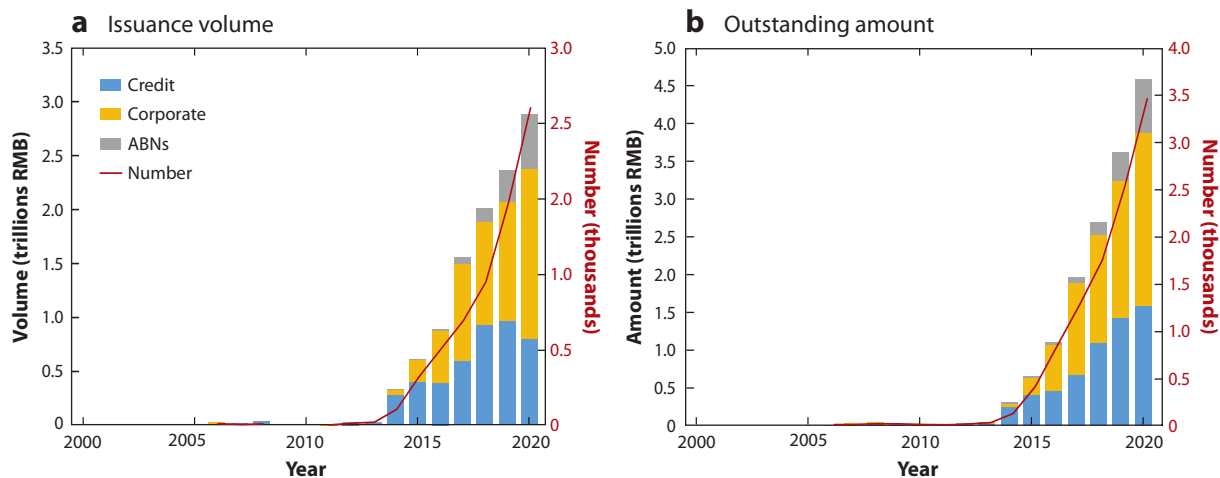


Figure 6

Growth of the Chinese ABS market (2000–2020), showing (a) the issuance volume and (b) the outstanding amount. “Credit” stands for credit ABS backed by loans (e.g., mortgages, auto loans, consumer loans). “Corporate” stands for corporate ABS. “ABNs” stands for ABNs backed by assets of nonfinancial firms. The red lines represent the total number of securities outstanding at year end. Abbreviations: ABNs, asset-backed notes; ABS, asset-backed securities. Data are from Wind Financial Terminal.

of the total issuance volume, respectively. By the end of 2020, there were a total of 475 credit ABS with an outstanding amount of 1.6 trillion RMB, 2,323 corporate ABS with an outstanding amount of 2.3 trillion RMB, and 666 ABNs with an outstanding amount of 708 billion RMB. These accounted for 35%, 50%, and 15% of the total amount outstanding, respectively.

Alongside the fast growth of the more conventional ABS, new types of assets have emerged in the securitization market. PPPs in the infrastructure sector are a notable example. This was the direct result of government policy initiatives. In December 2016, the NDRC and the CSRC encouraged the participants in PPPs to finance through asset secularization. Subsequently, the market infrastructure was updated to facilitate fast-tracking of secularization for PPPs.

Another notable recent market development is real estate investment trusts (REITs). In April 2020, the NDRC and the CSRC jointly issued a circular detailing a long-awaited pilot scheme for the creation of listed REITs in China (CSRC & NDRC 2020). Unlike REITs in other markets, which can invest in commercial real estate, China’s REITs will be managed and traded through a mutual fund, investing in ABS backed by infrastructure projects. The idea is to circumvent the China Securities Investment Fund Law, which prohibits mutual funds from making direct equity investments into private companies. The first batch of nine public REITs—five on SSE and four on SZSE—was listed in June 2021, marking the official launch of China’s public REIT market. The REITs include assets ranging from sewage treatment plants and toll roads to industrial parks, and they raised approximately RMB 30 billion in well-subscribed offerings. In July 2021, the NDRC issued a circular expanding the public REIT pilot area to the whole country and permitting the inclusion of indemnification rental apartments as underlying assets (NDRC 2021).¹⁵

¹⁵The asset types for Chinese REITs now include warehouses; transport infrastructure, such as highways, airports, and seaports; public utilities, such as electricity, water, and gas plants; waste treatment facilities; information network-related infrastructure and other types of new infrastructure; high-tech industrial parks; industrial parks hosting strategic emerging industries; and indemnification rental apartments.

5.2. Government Policy and Market Behavior

Like the other financial markets in China, the development of the ABS market has been heavily influenced by certain policy objectives and regulated by a set of different, sometimes competing authorities, including the PBOC, CBIRC, CSRC, and NAFMII (National Association of Financial Market Institutional Investors). In recent years, for example, the development of the ABS market has been driven by particular policy initiatives, such as financial market reforms led by the NDRC and the Belt and Road Initiative. Related products, such as PPPs and REITs, were then fast-tracked and received more favorable treatment from regulators.

Buchanan (2015) and Tang et al. (2017) study the early period of the Chinese securitization market and recognize that its development was driven largely by specific government objectives. Buchanan (2015) argues that the Chinese securitization market was initially established to deal with nonperforming loans, in contrast to the US securitization market, which was developed as a means to improve liquidity. Tang et al. (2017) collect data on all asset securitization projects in China from 2005 to 2015. They argue that the securitization market is policy driven, regulation segmented, and highly illiquid. They find that, in this period, the underlying assets are mainly corporate loans and assets rather than mortgages and consumer loans. Risk-isolation and credit-enhancing techniques significantly improve the rating of ABS. These authors also find that state-owned commercial banks and SOEs enjoy significantly lower interest rates at issuance.

Several papers focus on the more recent development of the Chinese securitization market, in terms of issuance in the primary market and pricing in the secondary market. Zhang, Yin & Zhang (2019) study the securitization determinants of ABS backed by commercial bank loans. They find that the determinants of Chinese banks' securitization include cost advantage exploitation, performance promotion, and capital regulatory arbitrage. Yang et al. (2020) focus on ABS backed by financing leases. They find that originators play a key role in determining the issuing price of ABS, in addition to conventional risk factors such as credit enhancement, underlying asset characteristics, credit rating, and deal structure. In particular, state-owned and high-profitability originators are able to issue at lower spreads. Zhao, Yue & Wei (2021) study the financing cost advantages of green corporate ABS. They find that the issuance rates of China's green corporate ABS are on average lower than those of traditional corporate ABS.

Although China's ABS market has grown rapidly since its relaunch in 2012, it is still at an early stage. Given that banks, with total assets approaching 320 trillion RMB by the end of 2020, are holding a large number of assets (loans), which are opaque and illiquid, there is tremendous room for securitization. An obvious question is: What is holding this process back? What are the costs and benefits for banks to hold onto the loans? How is this situation influencing the overall credit market and economy? Given the size of China's real estate market, what is hindering the securitization of mortgages? China has made massive investments in infrastructure to support its economic growth. The securitization of suitable infrastructure assets can bring many benefits, ranging from returning capital to introducing new investment opportunities to the market to providing much-needed pricing information for these assets for future investments. It would be very interesting to assess these benefits and examine the possible impediments and opportunities in securitizing these assets.

6. FINANCIAL DERIVATIVES

6.1. Development and Characteristics

Although the first commodity futures exchange was set up in 1990 and the first futures brokerage firm opened in 1992, China's financial derivatives market was fully established only much later. In this section, we focus on the development of financial derivatives, including futures, options,

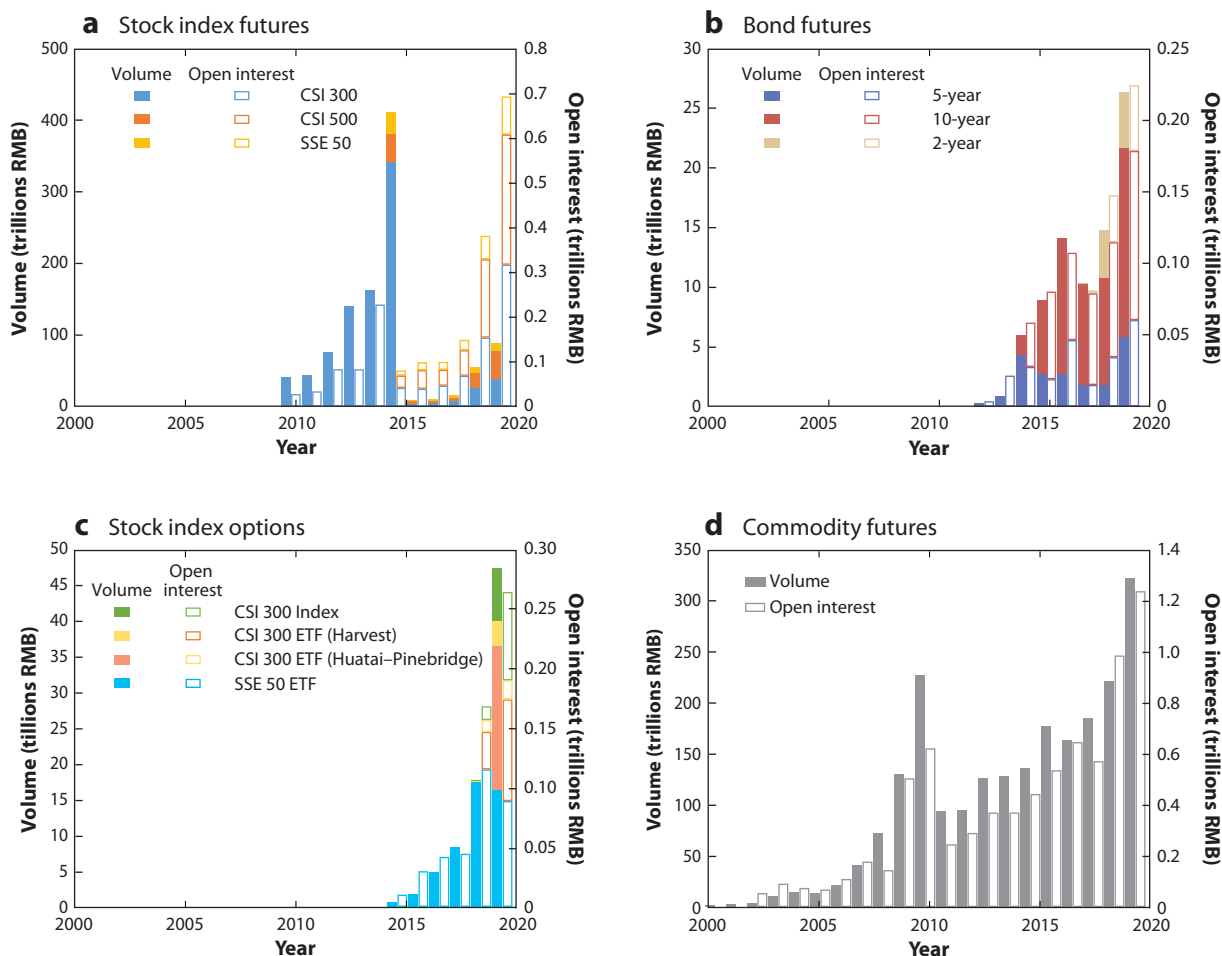


Figure 7

Growth of the exchange derivatives market in China (2000–2020), showing the annual trading volume and year-end open interest for (a) stock index futures, (b) bond futures, (c) stock index options, and (d) commodity futures. Abbreviations: CSI, Chinese Securities Index; ETF, exchange-traded fund; SSE, Shanghai Stock Exchange. Data are from Wind Financial Terminal.

and warrants, traded on exchanges and OTC. **Figure 7** illustrates the growth of exchange-traded stock index futures, interest rate futures, and stock index options in terms of annual total trading volume and year-end open interest.

6.1.1. Financial futures. In September 2006, the CSRC established the China Financial Futures Exchange (CFFEX) to launch the trading and settlement of financial derivatives. Two types of products are traded on CFFEX: stock index futures and government bond futures.

6.1.1.1. Stock index futures. In April 2010, 4 years after its establishment, CFFEX rolled out the Shanghai and Shenzhen 300 Chinese Securities Index (CSI 300) futures. Subsequently, the CSRC, CBRC, and CIRC issued guidelines for relevant institutions to participate in stock index futures trading. In April 2015, on the occasion of the fifth anniversary of the listing of the CSI 300 stock index futures, CFFEX launched the CSI 500 stock index futures and SSE 50 stock

index futures. The CSI 300 index consists of 300 large and actively traded A share stocks listed on SSE and SZSE, the CSI 500 index covers more small- and medium-sized firms listed on the two exchanges, and the SSE 50 index includes only the 50 largest firms listed on SSE.¹⁶

CFFEX enforces strict eligibility requirements for investors, retail and institutional, to trade in stock index futures. Currently, the requirements include a minimum balance of 500,000 RMB account balance for at least five consecutive trading days before a new futures account application, passing of the qualification exam, and previous derivatives trading experience.

Despite its relative short history, the stock index futures market has experienced three distinctive phases (**Figure 7a**). Following its inception, the CSI 300 index futures experienced several years of rapid growth in trading. The trend was cut short in the summer of 2015 when the stock market experienced a large crash after a fast run-up. Many blamed speculative futures trading for driving this market cycle. In response to these concerns, CFFEX took strong measures to limit trading, including limiting the maximum number of open positions in a single day, increasing the margin requirements, and significantly hiking up the transaction fees.¹⁷ Consequently, the trading volume of stock index futures fell sharply, from 335 million contracts (notional value of 441.75 trillion RMB) in 2015 to only 9.4 million contracts (notional value of 9.32 trillion RMB) in 2016. Since February 2017, CFFEX has begun to gradually relax these restrictions. As a result, futures market trading has rebounded, but it is still far below the pre-2015 level. In 2020, the trading volume was 29,998,722 contracts (notional value of 39.39 trillion RMB) for CSI 300 stock index futures, 32,755,400 contracts (notional value of 38.53 trillion RMB) for CSI 500 stock index futures, and 11,749,399 contracts (notional value of 11 trillion RMB) for SSE 50 stock index futures. The open interest at the end of 2020 was 203,224 contracts (notional value of 317.72 billion RMB) for CSI 300 stock index futures, 228,652 contracts (notional value of 291.17 billion RMB) for CSI 500 index futures, and 78,189 contracts (notional value of 85.4 billion RMB) for SSE 50 stock index futures.

6.1.1.2. Government bond futures. Chinese government bond futures were introduced on SSE for trading by brokerage firms in 1992 and for trading by the public in 1993. While trading grew fast initially, it was permanently halted only a year-and-a-half later, in May 1995, after a scandal that led to the bankruptcy of the country's then-largest brokerage firm.

In September 2013, China's government bond futures trading was restarted at CFFEX, which now offers futures contracts on 2-year, 5-year, and 10-year Treasury bonds, covering the short, medium, and long term of the yield curve, respectively. On October 24, 2021, CFFEX announced that it is preparing to launch 30-year government bond futures.

Investors in the bond futures market are subject to the same requirements as those for stock index futures trading at CFFEX. Currently, the minimum margins are 0.5% for the 2-year, 1% for the 5-year, and 2% for the 10-year bond futures. The bond futures are settled on the $T + 0$ rule.

¹⁶For the CSI 300 and SSE 50 stock index futures, the notional value of one contract is 300 RMB times the value of the underlying index level. For the CSI 500 stock index futures, the contract multiplier is 200 RMB. The current minimum trading margin of all three stock index futures is 8% of the contract value, and the maximum daily price fluctuation limit is $\pm 10\%$ of the settlement price of the previous trading day. The stock index futures are settled on the $T + 0$ rule.

¹⁷CFFEX increased the margin requirement on unhedged positions to 40% and the margin requirement on hedged positions to 20% on September 7, 2015. On August 25, 2015, it announced that the maximum volume for new open positions would be 600 contracts per product per day. This number was then reduced to 100 contracts on August 31 and to 10 contracts on September 7. From August 3 to September 7, CFFEX increased the transaction fees for closing positions that were opened on the same day several times to 23 basis points, up from 0.25 basis points previously.

Figure 7b plots the steady growth of trading in the Chinese bond futures market. In 2020, the trading volume was 2,312,956 contracts (notional value of 4.67 trillion RMB), 5,809,792 contracts (notional value of 5.87 trillion RMB), and 15,912,311 contracts (notional value of 15.83 trillion RMB) for 2-year, 5-year, and 10-year bond futures, respectively. At the end of 2020, the open interest was 22,984 contracts (notional value of 45.97 billion RMB), 60,354 contracts (notional value of 60.35 billion RMB), and 118,210 contracts (notional value of 118.21 billion RMB) for 2-year, 5-year, and 10-year bond futures, respectively.

6.1.2. Stock index options. At present, only stock index options are traded on the two main stock exchanges, SSE and SZSE, and on the financial futures exchange, CFFEX. They have different underlying assets from each of the exchanges, representing different stock market indices. All options are European style.

SSE opened trading of the SSE 50 exchange-traded fund (ETF) options in February 2015, using a designated fund as the underlying asset.¹⁸ In December 2019, both SSE and SZSE opened trading in their respective CSI 300 ETF options. Each designated its own listed CSI 300 ETF as the underlying asset.¹⁹ The stock index options offered by the two stock exchanges include both call and put options, with one at-the-money, four out-of-the-money, and four in-the-money exercise prices. The contract size is 10,000 units of the ETF share, with physical delivery at maturity. The expiration months are the current month, the next month, and the next two calendar quarter months, where quarter months refer to March, June, September, and December.

The two stock exchanges also set additional thresholds for trading in stock option trading. Individual traders, for example, need to have a balance of at least 500,000 RMB in their trading accounts, maintain a trading account at a securities or futures brokerage firm for at least 6 months, have certain financial futures or margin trading experience, and pass the relevant basic financial knowledge tests.

CFFEX offered its own CSI 300 stock index options in December 2019. The underlying security is the CSI 300 index compiled and released by the China Securities Index Company. The notional value of the contract is 100 RMB times the level of the CSI 300 index, with cash settlement at maturity. The contract expiration months are the current month, the next two months, and the following three quarter months. The strike price covers $\pm 10\%$ of the closing price of the CSI 300 index on the preceding trading day.

In 2020, the trading volume of the SSE 50 ETF options was 519 million contracts (notional value of 16.35 trillion RMB), and open positions at year end were 2.45 million contracts (notional value of 89.19 billion RMB). The trading volume of Huatai–Pinebridge CSI 300 ETF options (SSE) was 464 million contracts (notional value of 20.34 trillion RMB), and the position at year end was 1.62 million contracts (notional value of 85.71 billion RMB). The trading volume of Harvest CSI 300 ETF options (SZSE) was 78.77 million contracts (notional value of 3.48 trillion RMB), and the position at year end was 0.31 million contracts (notional value of 16.04 billion RMB). The trading volume of the CSI 300 stock index options was 16.7 million contracts (notional value of 7.32 trillion RMB), and the position at year end was 0.14 million contracts (notional value of 74.59 billion RMB).

¹⁸The full name of this ETF is the SSE 50 Exchange Traded Open-Ended Index Securities Investment Fund. It was the first ETF listed in Mainland China and traded on SSE.

¹⁹For SSE, the designated CSI 300 ETF is the Huatai–Pinebridge CSI 300 Exchange Traded Open-End Index Securities Investment Fund (stock code 510300). For SZSE, the designated ETF is the Harvest CSI 300 Exchange Traded Fund (stock code 159919).

6.1.3. Warrants. China has experimented with exchange-traded warrants twice, from 1992 to 1996 and from 2005 to 2011. In June 1992, SSE listed its first warrant on Feile. Heavy speculation often pushed prices significantly away from their proper values. The regulatory authorities halted warrant trading at the end of June 1996. During the split-share reform in 2005, SSE listed the warrants on Baosteel in August. SZSE followed suit with its own warrant listings. Compared with the underlying stocks, the warrants are settled on the $T + 0$ basis, incur lower transaction costs, and have a wider price limit. The warrants market soon attracted a speculative frenzy. The trading volume of warrants on the two exchanges reached 938.9 billion RMB in the first half of 2006, ranking second in the world. As the exchanges stopped listing new warrants, the market shrank rapidly and finally ended in August 2011 as the last warrant expired, marking the end of another 6-year cycle in the Chinese warrant market.

6.1.4. Over-the-counter derivatives. The earliest OTC derivatives traded in China are the forward foreign exchange contracts between commercial banks and SOEs in the mid-1990s. Foreign banks played a leading role in this market, which relied mostly on the OTC Derivatives Master Agreement issued by the International Swap and Derivatives Association (ISDA 1992).

Toward the late 1990s, the PBOC started setting up trading platforms such as the Foreign Exchange Trading Center, also known as the National Interbank Funding Center, to support interbank transactions. These platforms issued master agreements for OTC derivatives transactions, mainly for RMB foreign exchange and financial derivatives, in 2007, and later launched the unified Master Agreement for Financial Derivatives Transactions in China's Interbank Market, also known as the NAFMII Master Agreement (NAFMII 2009).

More recently, the Securities Association of China (SAC) and the China Futures Association successively introduced relevant systems and regulations for security firms and futures companies to trade OTC derivatives. In 2013, the SAC issued the Master Agreement for Financial Derivative Transactions in China's Securities Market, also known as the SAC Master Agreement (SAC 2013).

Currently, the Chinese OTC derivatives market consists of an interbank market based on the NAFMII Master Agreement, led by the PBOC; a securities and futures market based on the SAC Master Agreement, led by the CSRC; and an OTC market based on the International Swap and Derivatives Association master agreements, led by foreign institutions. The main institutional participants in the OTC derivatives market are banks, securities companies, and futures companies. The types of derivative products include exchange rate derivatives (including RMB foreign exchange swaps, forwards, and options), interest rate derivatives (including interest rate swaps and bond forwards), and total return swaps.

Commercial banks are the largest financial institutions to participate in the OTC derivatives market. They trade mainly in the interbank market. According to the PBOC (2020), the total trading volume of the interbank RMB interest rate derivatives market was 19.9 trillion RMB in 2020, an increase of 6.8% from 2019. Among them, the total trading volume was 19.4 trillion RMB for interest rate swaps, 453.23 billion RMB for bond forwards, 14.93 billion RMB for credit risk mitigation certificates, and 1.2 billion RMB for credit default swaps. The total trading volume of interbank exchange rate derivatives was 17.6 trillion USD in 2020, an increase of 1.3% from 2019.

Compared with the interbank market, the OTC derivatives market for security and futures companies is much smaller. According to the statistics from the SAC for 2020, the total trading volume (notional amount) is 4.2 trillion RMB, with 1.3 trillion RMB in open interest at year end. Total return swaps and equity options are the two most popular products. The former has 1.9 trillion RMB in trading volume and 0.5 trillion RMB in open interest at year end, and the latter has 2.3 trillion RMB in trading volume and 0.8 trillion RMB in open interest at year end.

6.2. The Role of Derivatives

Despite the significance of derivatives in modern finance, in both theory and practice, the development of China's derivatives market has been choppy. This is in part due to policy makers' concerns about the benefits derivatives may bring, for example, in risk and resource allocation, and the additional risks and uncertainty they may give rise to, as experienced during unsuccessful experiments in bond futures and warrants.

Many empirical studies have been devoted to this topic and related issues, mostly from micro perspectives (see, e.g., Yang, Yang & Zhou 2012, Chen et al. 2013, Xie & Mo 2014, and Han & Liang 2017 on stock index futures; Li et al. 2018, Ahn, Bi & Sohn 2019, Arkorful et al. 2020, Dong et al. 2021, and Wang & Zhou 2021 on stock index options; Tang, Yang & Yu 2018 on bond futures). The results, however, remain mixed and limited. While some papers find that the derivatives market lead the spot market in terms of price discovery and volatility spill over, others find no such evidence, citing high barriers to entry and strict trading restrictions in the derivatives market as the main reasons.

Other papers focus on the unique characteristics of the Chinese derivatives market. For example, several papers study the Chinese warrant market from 2005 to 2008, a period that offers an unique example to study asset bubbles in an incomplete market dominated by retail investors and with severe market frictions (e.g., Xiong & Yu 2011; Chang et al. 2013; Tang & Wang 2013; Powers & Xiao 2014; Cai et al. 2020; Li, Subrahmanyam & Yang 2021; Pearson, Yang & Zhang 2021; Wang, Zhou & Zhu 2021).

While the important function the derivatives market serves in modern finance has been well established in both theory and practice, at least in mature markets, the perception of its role remains ambivalent in China. More research is needed to help sort out the issues. Given that the exchanges maintain the trading records of end investors, even with reported trading motives, more informative studies can be conducted on different participants' trading behavior, their impact on the derivatives' market, and their potential influence on other markets (for a study of US commodity futures using daily trading records of different classes of investors, see, e.g., Llorente & Wang 2020). One can also study how changes in trading restrictions affect trading behavior and the resulting market dynamics. Given that China is still in the process of interest rate liberalization, it would also be interesting to examine how bond futures have helped in interest rate management for both financial and nonfinancial firms.

6.3. Commodity Futures

In contrast to the late and choppy start of financial derivatives, the development of China's commodity futures market began as early as October 1990, the same year the stock market was launched, and has enjoyed steady growth. The trading volume of the commodity futures market as a whole has increased rapidly from 1.6 trillion RMB in 2000 to 322 trillion RMB in 2020 (Figure 7*d*). The open interest reached 1.2 trillion RMB by the end of 2020, comparable to the open interest of China's financial derivatives market. Energy and industrial, agriculture, and metals are the three primary commodity categories in China, with comparable trading volumes and open interest.

Research on China's commodity market remains limited. Fung, Leung & Xu (2003), Hua & Chen (2007), Fung et al. (2013), and Li & Hayes (2017) study the dynamic relationship between the Chinese commodity futures market and the international commodity futures market. Liu, Tse & Zhang (2018) and Zhang, Ding & Scheffel (2018) investigate the link between the commodity futures market and the stock market in China. Wang & Ke (2005), Fan et al. (2020), and Fan & Zhang (2020) focus on the risk dynamics, liquidity, and market efficiency of the Chinese commodity futures market.

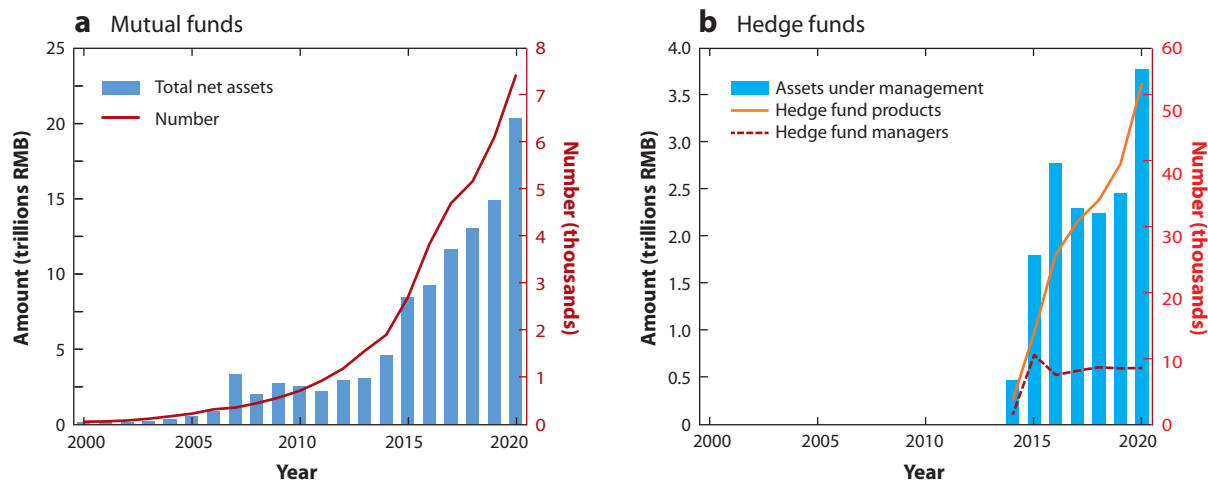


Figure 8

Growth of (a) the mutual fund and (b) the hedge fund industries in China (2000–2020). Data are from Wind Financial Terminal and statistics released by the Asset Management Association of China.

7. INVESTMENT MANAGEMENT

7.1. Mutual Funds

The opening of the first two investment funds to the public in March 1998 marked the beginning of China's mutual fund industry, which has since experienced tremendous growth. By 2020, the total number of funds had reached 7,403, with a total net asset value close to 20 trillion RMB (**Figure 8**). The major fund types are money market funds, with 333 funds and 40% market share; bond funds, with 2,370 funds and 25% market share; mixed funds, with 3,060 funds and 24% market share; and stock funds, with 1,276 funds and 9% market share.²⁰

Despite the fast growth of the mutual fund sector, its share of the Chinese capital market remains relatively small. Overall, mutual funds own less than 5% of the total market capitalization of Chinese capital markets, significantly lower than for mature markets. In addition, China's mutual fund industry has several unique features. As recently reported by Jiang (2020), Chinese mutual funds charge higher fees compared with their counterparts in more mature markets. The average expense ratios are 1.2% for active funds and 0.8% for passive funds, respectively, while in the USA they are 0.8% and 0.2%. Most mutual fund investors are retail investors who allocate less of their savings to mutual funds in comparison to mature markets, invest with short horizons, and show a strong tendency to chase past performance.

There has been extensive research on China's mutual fund performance. Chi (2013, 2016) shows that actively managed mutual funds in China have a significantly positive alpha. Chi & Yin (2018) find that active stock funds exhibit a preference for growth stocks over value stocks, even though value stocks on average outperform growth stocks. Feng & Johansson (2015) examine mutual funds' stock-picking skills in the IPO market. Tang, Wang & Xu (2012) document an inverted-U shape for the size–performance relationship, different from that of the USA. Chua & Tam (2020) investigate the motivation and performance consequences of intentional style

²⁰The rest of the funds, including alternative investment funds, qualified domestic institutional investor funds, and funds of funds, are quite small and account for only 1% of the market share.

drift in an exclusively in-house fund management sector in China. Jun, Ren & Sun (2021) study managerial skills by dissecting holding changes of mutual funds. Hong, Kang & Wang (2021) find that talented fund managers tend to leave mutual funds and establish their own hedge funds when side-by-side arrangements are not feasible.

Platform distributions of mutual funds emerged in 2012 and have quickly become a formidable presence. Hong, Lu & Pan (2019) find that platform distribution of mutual funds can induce a marked increase in flow sensitivities to performance. Some studies have also investigated the impact of mutual funds of the firms they invest in. Yuan, Xiao & Zou (2008) find that mutual fund ownership increases a firm's Tobin's Q and other measures of firm performance. Firth, Lin & Zou (2010) study the role of mutual funds in the split-share reform and find that mutual fund ownership has a negative effect on the compensation ratio, especially for state-owned firms.

7.2. Hedge Funds

In 2013, legislation amended the Securities Investment Fund Law to legalize private fund management. Since then, the hedge fund industry has witnessed rapid growth. **Figure 8b** shows the growth of the hedge fund industry since 2014. By the end of 2020, a total of 54,355 funds were associated with 8,908 investment management firms, and the total assets under management (AUM) were estimated to be 3.8 trillion RMB, approximately 20% of the AUM managed by mutual funds in China.

Most of the hedge funds are relatively small. Depending on their assets and trading strategies, they are typically classified into stock strategy funds, market neutral funds, event-driven funds, bond strategy funds, arbitrage strategy funds, macro strategy funds, managed futures funds, portfolio strategy funds, and multistrategy funds.

Despite the fast growth of the industry, research on hedge funds in China is still in an early stage, in part because of the industry's short history and limited data. Ling, Yao & Liu (2015) and Hong et al. (2016) provide a comprehensive study of Chinese hedge fund performance and risk exposure. Li et al. (2021) study the limited attention to hedge funds as well as their performance and managerial multitasking. L. Li et al. (2020) investigate the impact of social networks on the return comovement of stock hedge funds. Zhang et al. (2022) find that hedge funds nurture mispricing in Chinese financial markets.

7.3. Venture Capital and Private Equity Funds

The venture capital and private equity industry in China has experienced tremendous growth during the past decade, and it is now the second largest venture capital market globally in terms of deal value. While this sector was dominated by experienced foreign venture capitalists during the 1990s and early 2000s, domestic venture capitalists are now driving most of the growth. Unlike in more mature markets, the boundary between venture capital and private equity firms is blurry in China, and the two terms are often used interchangeably. By 2020, there were a total of 39,802 venture capital and private equity funds under the management of 14,986 investment companies, with total AUM of 11.1 trillion RMB.

Research on China's venture capital and private equity sector is still limited, largely due to a lack of high-quality data. Ahlstrom, Bruton & Yeh (2007) and Bruton & Ahlstrom (2003) provide an excellent overview of China's venture capital sector during its early period, and Huang & Tian (2020) present a detailed description of the recent developments in the venture capital and private equity industry. Several papers focus on venture capital investment and IPOs. Guo, Jiang & Mai (2015) and Otchere & Vong (2016) study venture capital participation and IPO performance. Wang & Wu (2020) study politically connected venture capitalists and their IPO activity. Other

studies (e.g., Guo & Jiang 2013; Hua, Wang & Wang 2016; E. Li et al. 2020; Wu & Xu 2020) consider the impact of venture capital investment on firm performance. Zhang & Mayes (2018) study the performance of governmental venture capital firms, which play an important role in China's venture capital sector.

8. CURRENCY AND CAPITAL ACCOUNTS

A distinctive feature of China's financial markets is that they are mostly segmented from global markets. The main reason is tight cross-border capital controls, which have several consequences. First, RMB, the Chinese currency, is not fully convertible. Second, its exchange rates with other currencies are not really market rates. The observed rates are largely dictated by the PBOC, China's central bank. Third, there is limited international participation in China's financial markets. Such separation hinders the integration of China's financial markets into the global financial system, in terms of not only participation but also rules, standards, and practices.

8.1. Currency Market and Exchange Rates

With tight control over capital flow and the convertibility of RMB, the PBOC closely manages its exchange rates. Note that there are two types of RMB: onshore RMB, denoted by CNY, traded within Mainland China, and offshore RMB, denoted by CNH, traded outside Mainland China (mostly in Hong Kong but also in Singapore and London). Because the PBOC manages the supply of RMB in both markets, the prices of CNY and CNH are quite close; from 2010 to 2020, the average difference between the CNY and CNH exchange rates against the USD was within 6 basis points. The below discussion focuses mainly on CNY.

The evolution of RMB exchange rates has gone through several phases. **Figure 9** plots the evolution of the exchange rates of CNY and CNH against the USD. During the planned economy era (1949–1976), RMB exchange rates were pegged at highly overvalued levels. Since China opened

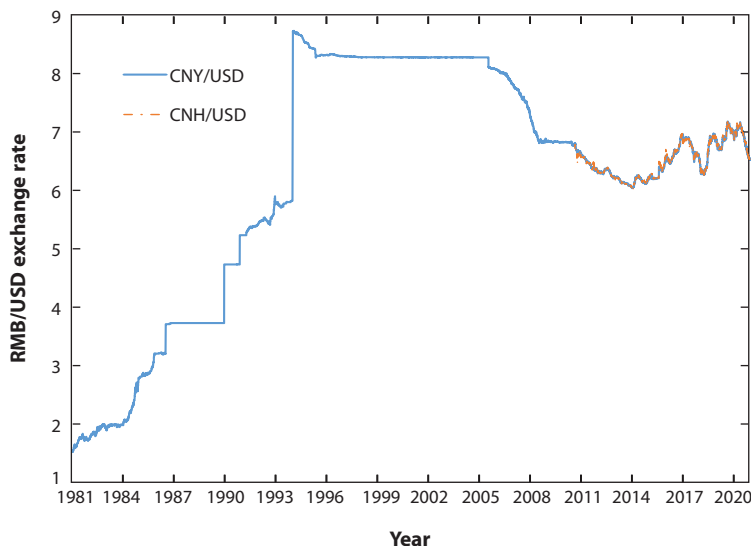


Figure 9

China/US foreign exchange rates (1981–2020) for both onshore RMB (denoted by CNY) and offshore RMB (denoted by CNH). Data are from Bloomberg Terminal.

its economy in 1978, the government has taken steps to allow its exchange rates to be more market oriented. Starting in the early 1980s, RMB was slowly depreciated from CNY1.53 to CNY5.81 per USD by the end of 1993, followed by an overnight depreciation of 33.3% to CNY8.72 per USD on January 1, 1994. After a period of minor adjustments, RMB was maintained at a fixed rate of CNY8.28 per USD until 2005.

On July 21, 2005, China switched from a fixed exchange rate regime to a so-called managed floating regime, which sets a daily fixed rate (also called central parity) against a basket of currencies but allows some variation within a narrow band. The band was initially set at 0.3% and was gradually broadened, reaching 2% on March 17, 2014. After that, the RMB gradually appreciated against the USD, reaching a peak of CNY6.04 per USD in January 2014. At that time, the trend started to reverse.

In August 2015, the PBOC added more transparency to its rate-setting policy by specifying the factors influencing its decisions, including the closing rates on the previous business day and the stability of RMB relative to the currency basket, the so-called two-pillar policy, and a later-added countercyclical factor. Since then, the RMB exchange rate has been fluctuating between 6 and 7 CNY per USD.

8.2. Renminbi Under-/Overvaluation and Exchange Rate Policy

Given China's tight control over RMB exchange rates, many early papers focused on the misalignment or undervaluation of the RMB. Goldstein & Lardy (2006) use the underlying balance approach to estimate that the RMB was undervalued by 20% to 40% in 2015. Frankel (2006) estimates that the RMB was undervalued by approximately 35% in 2000 and by at least as much in 2006. Cheung, Chinn & Fujii (2007), however, argue that there is little statistical evidence that the RMB is undervalued, using a framework based on the relationship between relative price and relative output levels. Yu (2007) estimates the market-implied realignment intensity of RMB and finds that this intensity increased dramatically after February 2002. Despite different estimates of the undervaluation of the RMB, most studies agree that the de facto USD-pegged exchange rate policy has outlived its usefulness for China.

Given the opacity of the PBOC's exchange rate policy, many papers have tried to better understand it. Early research (e.g., Frankel & Wei 2007, Frankel 2009, Sun 2010) found that the value of the RMB remained strongly pegged to the USD after 2005 but gradually switched a substantial part of the USD weight to other major currencies. More recent research (e.g., Clark 2017; Cheung, Hui & Tsang 2018; McCauley & Shu 2019) finds that changes in the daily fixing rates are highly predictable and the USD index still plays a significant role after the 2015 reform. With regard to stability against a currency basket, Cheung, Hui & Tsang (2018) find no evidence of a rate-fixing role against the currency basket, and McCauley & Shu (2019) find that the basket management period is mostly from February 2016 to May 2017. Jermann, Wei & Yue (2021) construct empirical measures of the two pillars, finding that they explain as much as 80% of the variation in the daily fixing rates and that both pillars receive roughly equal weight in setting the fixing rates. They also develop a tractable nonarbitrage model of RMB exchange rates under the two-pillar policy. Their model predicts the modification of the two-pillar policy in May 2017, when a discretion-based countercyclical factor was introduced.

8.3. Global Participation in China's Financial Markets

Under tight capital account controls, China's financial markets have largely remained closed to foreign investors. Over the years, the Chinese government has implemented several programs to gradually open these markets to cross-border investments, ranging from the B shares market

to the establishment of the QFII and RMB QFII (RQFII) programs to, more recently, the stock and bond connect programs.

The Chinese B shares market, established in 1992 at SSE and SZSE, refers to shares of Chinese companies listed on the two exchanges but traded in foreign currencies, USD and Hong Kong dollars, respectively. This market was originally open only to foreign investors, but in 2001 it was opened to domestic investors as well. In its initial growth period, the total number of listed companies on both exchanges reached 109 in 1998, but then started to decline. Since 2000, no new B shares have been listed and some have been delisted. As of the end of 2020, only 93 companies remain listed, accounting for a tiny proportion of the Chinese equity market.

China established the QFII program in 2002 and the RQFII program in 2011 to allow global institutional investors to invest directly in its domestic capital market. QFII allows investments with USD, while RQFII allows investments with RMB. However, institutions are subject to approval on their qualifications, and they need to apply for investment quotas. The QFII program started with an initial maximum quota of 10 billion USD, and the RQFII program started with an initial maximum quota of 20 billion RMB. Over time, China has gradually relaxed the eligibility requirements and investment quotas for both programs. In September 2019, it removed the limit on the maximum investment quota for both QFII and RQFII. One year later, China announced that it will further relax the qualification requirements and expand the scope of investment asset classes under QFII and RQFII. As of May 2020, there were a total of 333 overseas institutions with QFII status and a total approved quota of 116 billion USD, while there were a total of 272 with RQFII status and a total approved quota of RMB 723 billion.²¹

China has recently launched several stock and bond connect programs, mainly between the mainland and Hong Kong, which allow cross-border mutual access to each other's markets. The Shanghai–Hong Kong Stock Connect, launched on November 17, 2014, covers large-cap index component stocks listed on SSE and HKEX. The Shenzhen–Hong Kong Stock Connect was launched 2 years later, on December 5, 2016, and covers large-cap index component stocks as well as small- and middle-cap stocks. By the end of 2020, the total cumulative net purchases of northbound funds through the two stock connect programs (overseas investors trading in the mainland market) had reached 1.2 trillion RMB.

The bond connect program with Hong Kong was launched on July 3, 2017. Initially it allowed only northbound trading, with no quota limit. The program has been warmly received. By December 2020, 2,352 institutional investors had registered under the program and the monthly trading volume had reached 447.8 billion RMB, mostly in Chinese Treasury bonds and policy bank bonds. The bond connect program has boosted the total foreign holdings of Chinese bonds from 0.84 trillion RMB, right before the opening of the bond connect, to 3.33 trillion RMB by December 2020. On September 15, 2021, China announced that it will open southbound trading (mainland investors trading overseas bonds) for the bond connect program.

While the market connect programs are relatively successful, foreign investment still accounts for only a tiny fraction of China's capital market. By the end of 2020, foreign investments in equities and bonds accounted for 3.41 trillion RMB and 3.33 trillion RMB, respectively, representing only 4.3% and 2.8% of the overall market. The impact of the segmentation of China's financial markets from world markets remains an interesting research and policy question.

The literature on the impact of China's financial liberalization programs has just begun. Given the availability of data, much of this literature focuses on the recent stock connect programs and finds evidence that they lower the cost of capital of connected stocks and improve price

²¹The total approved investment quotas of QFII and RQFII have not been disclosed since May 2020.

informativeness. Chan & Kwok (2017), Ma, Rogers & Zhou (2019), and Liu, Wang & Wei (2021) document that the opening of the stock connect programs reduced the connected stocks' cost of capital, which they attribute to better risk sharing between domestic and foreign investors as well as the demand effect associated with the launch of the program. Tanling & Lu (2018) and Ma, Rogers & Zhou (2019) find that the prices of connected stocks are more informative after the launch of the China connect programs. Chen, Wang & Zhu (2019) find that weekly changes in northbound shareholdings (from Hong Kong to Mainland China) have cross-sectional predictive power for A share returns, and they present evidence that northbound investors are well informed about firms' fundamentals, especially for firms with higher global exposure. Carpenter, Lu & Whitelaw (2021) find that China's stock market prices have become more informative about future profits in recent periods, and they provide some weak evidence that QFII ownership is associated with greater price informativeness.

9. CONCLUSIONS

In this article, we have reviewed China's major financial markets, focusing on their development, their distinctive features, and the underlying circumstances. We have also discussed a growing literature studying these markets. Given the tight legal and regulatory environment, the government and its various agencies, rather than market forces, are the main drivers behind the development of these markets, governed by policy objectives and constraints and implemented with a cautious and experimental approach. As a result, the development of these financial markets has often failed to keep pace with economic growth in facilitating efficient allocation of resources and risks. The structural design and development path of these markets are also dictated by specific government policy goals, including a strong desire to limit risk, which gave rise to many of their unique features.

This process is less conducive to more-organic growth of these markets, driven by the need for the services they provide and their capacity to do so effectively. A well-functioning financial market system can play a critical role in China's efforts to establish an efficient and sustainable growth path. More research is needed to identify a way to develop such a system, given China's unique circumstances.

DISCLOSURE STATEMENT

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