



Trading climate opportunities in the Chinese bond market: A practitioner's perspective

Ulf Erlandsson, PhD
Aziz Sunderji

Anthropocene Fixed Income Institute
www.anthropocenefii.org

September 2021

Executive Summary

China has committed to achieving carbon neutrality within the next forty years. Meeting those long-term goals entails changes today, including directing capital towards cleaner sources of energy and constricting financial flows towards the ‘dirty’ segments of the economy. This transition presents opportunities for global fixed income investors.

But there are some steep challenges. Vast portions of the Chinese market remain highly illiquid and some remain difficult to access. And the infrastructure found in more developed markets – impartial credit rating agencies, default procedures, and strong legal protections for creditors, for example – are less sophisticated in China, if not entirely absent. Socially-mandated investors will be frustrated that much of the most meaningful shift in financing is happening via bank loans rather than via bonds.

For fixed income investors seeking to use financial flows to catalyze the climate transition in China, the question is whether the difficulties of participating in the Chinese market are sufficiently thorny to overshadow the opportunities. The aim of this publication is to shed some light on this question. Our sense is that the Chinese bond market is not quite developed enough to allow the deployment of active climate-focused strategies, but with further deepening in the market and the development of more hedging options for international investors, it may soon be. International, hard currency markets can already today offer some climate impact opportunities for global investors.

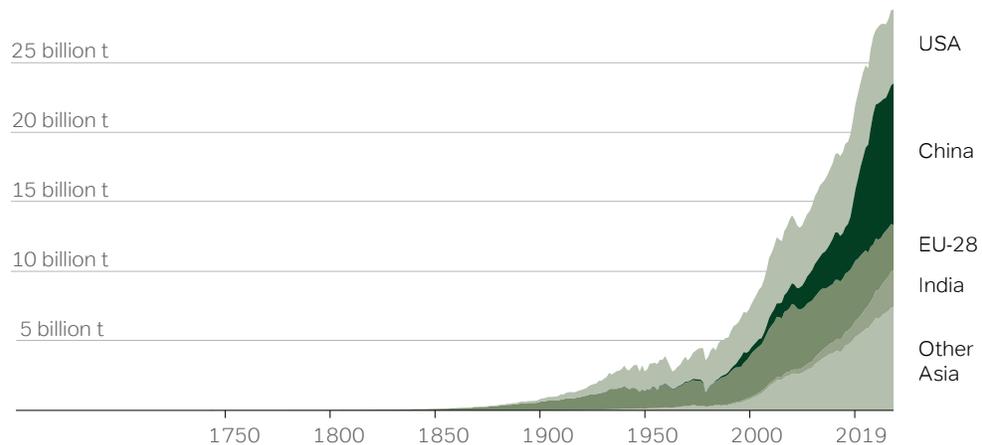
INTRODUCTION

China is key to the global climate transition

It may seem, at first glance, that China should be an afterthought for fixed income investors seeking to influence the global climate transition. After all, the country has – cumulatively, over time – emitted half as much in greenhouse gases (GHGs) as the United States or Europe. And, even today, China emits substantially less on a per capita basis than the more developed countries in North America, Western Europe, and Australasia.

Yet, there is no single country with more leverage over the global progress towards the goals set out in the Paris Climate Agreement than China. The most populous country on Earth is fast growing, focused on heavy industry, and highly reliant on fossil fuels for both household consumption and industrial production. As a result, China is now the largest source of CO₂ emissions: in 2020 China emitted 14 billion tonnes, accounting for more than a quarter of global emissions.

Figure 1: CO₂ emissions by country: China is now the largest source of emissions



Source: Our World in Data

China is aiming for zero net emissions by 2060

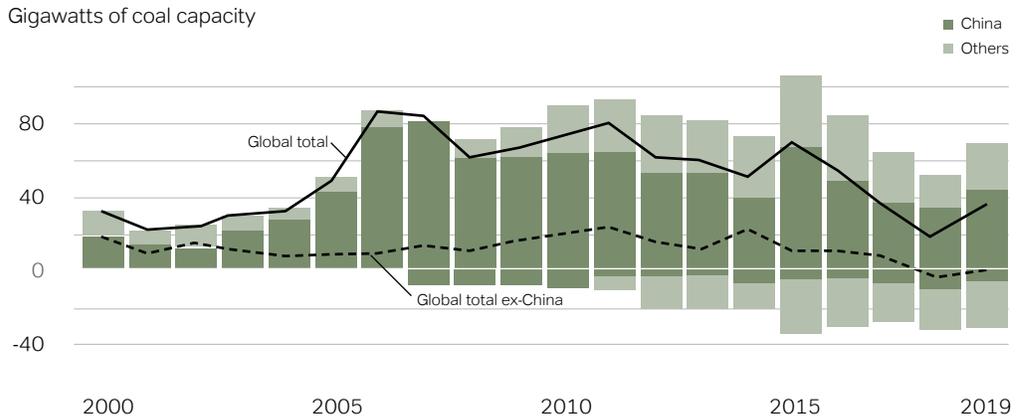
China has seized a moment when the United States has, at least recently and perhaps only temporarily, ceded its global leadership on climate issues. In committing to carbon neutrality within the next forty years, President Xi Jinping has set out a long-term goal that is consistent with China's importance to the global climate transition.

For investors seeking to participate in this transition, forty years may seem like an unappealingly long wait for returns. But carbon neutrality by 2060 is an ambitious goal that will require immediate changes in the structure in China's economy and financial markets.

Meeting those long term goals entails changes today

Indeed, China has been criticized for short-run policies which are inconsistent with these long run goals. Most tangibly, the country continues to bring coal power plants online, both domestically and in other countries in which China is making ‘Belt and Road’ investments. Such power plants are the largest source of CO₂ emissions, and China stands in stark contrast to most countries, which are decommissioning their coal power plants.

Figure 2: China continues to add coal capacity



Source: Global Energy Monitor

Still, President Xi Jinping recently announced that China intends to be on a path of declining net emissions by 2025 – five years earlier than previously planned. China’s most recent five-year plan referenced long term climate goals, and included specific policy measures. This is the first time climate was included in a five-year plan. In another indication of progress, the government stated a commitment to stop funding non-domestic coal plants, which could have large effects on the expansion of coal in emerging economies.

Directing capital towards cleaner sources of energy will be an important part of the energy transition in China

Just as capital markets have fueled the country’s rapid industrial development over the last thirty years, markets will play a critical role in building the green infrastructure China needs to meet its climate goals. China already has the world’s second largest green bond market. Superficially speaking, this is consistent with the Paris climate agreement, which aims to render “finance flows consistent with a pathway towards low green-house gas emissions and climate-resilient development.” However, one could raise question marks both around the credibility of certain green bonds in China, as well as the absolute sizes of the marketplace relative to other areas, such as fossil funding.

The transition will also entail a constriction of financial flows towards the ‘dirty’ segments of the economy

This should be exciting for fixed income investors, since this transition will present opportunities for profitable short positions. Bond defaults – in both the private corporate and the state-owned enterprise (SOE) sectors – are now rising. Several factors suggest these defaults are likely to continue, if not accelerate (See e.g. [“Chinese Junk Bonds Flash Warning Signs”](#), WSJ.) At the time of writing, we are in the midst of one of the biggest tests of the Chinese bond market as real-estate developer Evergrand has been nearing default.

The shadow banking system (essentially, household savings channeled via wealth management products sold by banks into project financing vehicles associated with local governments) is thought to have grown too rapidly, and is now a source of financial instability. It is being increasingly regulated and constricted. As this source of capital dries up, the projects that rely on shadow bank financing will find it more difficult to refinance.

In the past, the government has typically bailed out insolvent projects via lending through policy banks. But the coal sector, and other ‘dirty’ industries, are no longer part of the government’s long term strategy; this support is likely to wane. The government’s tolerance for Japanese-style ‘zombie industries’ is declining, especially in such non-strategic sectors.

Bridging theory and practice

In theory, the climate transition in China will offer tantalizing opportunities for global fixed income investors. Until recently, access to the Chinese market was only permitted through highly regulated channels. But over the past five years, access has been liberalized. BondConnect, for example, allows global investors to trade in Chinese bonds by registering in Hong Kong. This is much easier than registering in mainland China.

Yet, the Chinese bond market remains relatively untouched: non-Chinese investors only own about 2% of the market. And since domestic investors are largely buy-and-hold insurance companies and households, the lack of foreign participation has permitted a relatively high degree of inefficiency compared to similarly large markets. For example, policy changes are resulting in increasing differentiation in credit quality across issuers, yet credit spreads across issuers are often similar. This combination of accessibility and inefficiency hints at a compelling opportunity for alpha generation for global investors.

But low foreign participation is not without reason. Vast portions of the Chinese market remain highly illiquid. Some important parts of the Chinese market remain difficult to access. For example, a large portion of China’s corporate bonds are available only via the ‘exchange market’. Trading in this market requires onshore registration with the attendant bureaucratic hurdles. Socially-mandated investors will be frustrated that much of the most meaningful shift in financing is happening via bank loans rather than via bonds (loan debt is five times higher than bond debt).

And the infrastructure found in more developed markets – impartial credit rating agencies, default procedures, and strong legal protections for creditors, to name but three – are less sophisticated in China, if not entirely absent.

The goal of this publication: a practitioner’s perspective

For fixed income investors seeking to use financial flows to catalyze the climate transition in China, the question is whether the difficulties of participating in the Chinese market are sufficiently thorny to overshadow the opportunities. The aim of this publication is to shed some light on this question. It is organized into two sections as follows.

The first section provides an overview of the Chinese bond market – its size, taxonomy of instruments, idiosyncrasies compared to European or US markets, its ratings system, and history and prospects for defaults.

The second section focuses on the practical challenges of trading in the Chinese market: regulations, liquidity, and the availability of hedging foreign exchange exposure, interest rate risk, and credit risk.

OVERVIEW OF CHINA’S BOND MARKETS

China is a highly leveraged country but most debt is loans, not bonds

China is a highly leveraged country, especially considering its still-low level of economic development. IMF staff estimate that China’s augmented debt will rise from 68 percent of GDP in 2017 to about 92 percent of GDP by 2023, a high ratio by international standards.

Sadly for bond investors, most of this debt is not extended via capital markets but via bank loans. There are two primary channels for these loans. The largest volume of loans flow through the three large policy banks: the Agricultural Development Bank of China, China Development Bank and The Export-Import Bank of China. Such loans account for \$25trn of debt outstanding (for reference, current world nominal GDP is between \$90-100trn).

The second major channel for loans is via the shadow banking system.

A lot of credit is extended by ‘shadow banks’ to LGFVs

Shadow bank loans are loans from commercial banks funded by retail deposits. The largest borrowers via this channel are local government financing vehicles (LGFVs; off-balance sheet entities with implicit guarantees from local governments). The shadow banking system has grown rapidly over the past decade and now accounts

for close to \$10trn in loans outstanding.

This growth is perhaps not surprising; it is a reaction to government restrictions on borrowing and lending. The local governments who constitute the main borrowers from shadow banks were legally unable to borrow directly from banks or via capital markets until recently. The shadow banking system met an unmet need for capital, and LGFV loans are off-balance sheet and do not add to fiscal metrics.

For the intermediaries, it has been a profitable and scalable business, since such loans are also off-balance sheet and not subject to caps on lending.

And the wealth management products which fund these loans have been compelling for households, since these products have much higher yields than bonds (bond yields have been depressed by loose monetary policy).

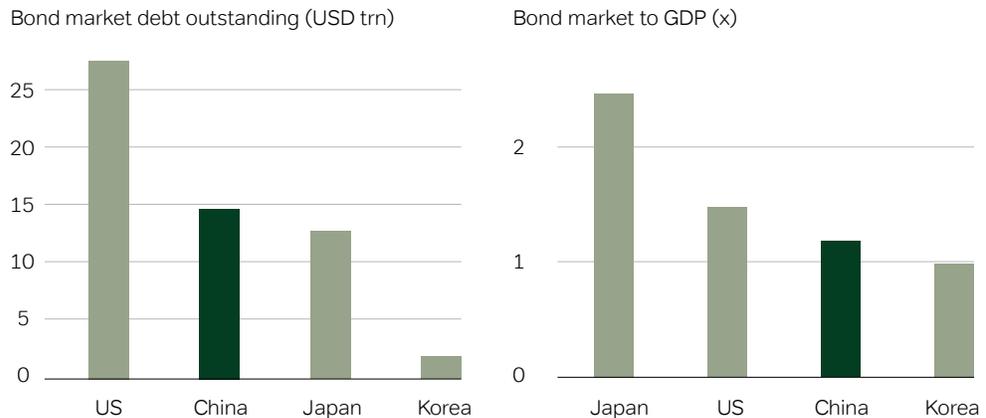
The Chinese government is now focused on deleveraging the shadow banking system, both due to financial instability and the declining effectiveness of credit in boosting growth.

Growth prospects for the Chinese bond market

China's financial development has followed the bank-led path of European countries (although China's has been government driven) – and both China and European countries like Germany have bond markets that are roughly the same size as their GDP. That said, recently China is moving towards the US model; bank debt is being curbed in favor of the bond market. In particular, local governments are refinancing their LGFV bank loans into bonds issued directly by the governments themselves.

Over the coming years the bond market is likely to continue to expand, partly because of economic growth but also because of a shift from loans to bonds. If the US – where the bond market is 135% of GDP – is any example, the Chinese bond market has plenty of room for further growth.

Figure 3: China's Bond market is amongst the largest in the world



Source: IMF, JP Morgan Asset Management

There are three Chinese bond markets; the onshore market is by far the largest...

There are three Chinese bond markets: CNY (onshore), CNH (offshore), and USD/EUR (offshore hard currency, or HC). The three markets differ substantially across most metrics:

- **Tenor:** While all three markets are more heavily weighted towards short-term issuance, with the CNH market especially dominated by 0-3y, the hard currency market is more tilted towards longer issuance (~25% of the market is 7y+).
- **Size:** The onshore market (\$13.4trn) dwarfs the offshore (\$19bn/\$52bn) and the USD/EUR markets (\$455bn).
- **Government dominance:** The onshore market contains much more government-related issuance than the others: government-related issuance (central gov, local gov, policy banks) is 75% of the onshore market. These sectors are only 25% of the CNH market, and virtually unrepresented in the USD market. Meanwhile, the corporate sector (SOEs and private companies) are more highly represented in the USD market.
- **Quality / volatility / yield / returns:** Naturally, given the very different compositions, the offshore USD market is lower quality, higher yield, more volatile, and has generated higher returns.

Figure 4: Comparing sector exposure across the three markets

	Offshore USD	Offshore RMB	Onshore RMB
Financial	39%	81%	49%
Real estate	22%	3%	8%
Industrial	3%	5%	12%
Infrastructure	4%	0%	7%
Oil & Gas	11%	0%	5%
Utilities	3%	2%	4%
TMT	15%	2%	1%
Consumer	2%	5%	3%
Transport	0%	1%	2%
Metals & mining	1%	1%	2%
Pulp & paper	0%	0%	0%
Medicine	0%	0%	0%
Diversified / other	0%	0%	7%

Source: Seafarer

Corporate exposure within the three markets: offshore USD is the most diversified

All three markets are highly dominated by financials, especially the small, RMB offshore market (which contains little else aside from financials, except for some small exposure to consumer and industrial firms). The offshore USD market contains substantial real estate, telecoms/media/technology (TMT), and oil and gas exposure. The onshore market contains some exposure to these sectors, and a heavier industrial weighting.

Should foreign investors register onshore to gain access to the exchange market?

The onshore Chinese bond market has two sub-markets: the commercial inter-bank market (CIBM) and the exchange market. The CIBM contains issuance from all types of issuers, but the exchange market only hosts issuance from SOE and private non-financial firms.

From an administrative perspective, BondConnect is the simplest way to access the Chinese onshore bond market, but it does not allow access to the exchange market, it only provides access to the CIBM. Investors can access the exchange market via other older regulatory channels (QFII and RQFII), but both of these require registering onshore – with all the bureaucratic hurdles that this entails.

An important question for international ESG investors preparing to invest in Chinese bonds is therefore whether gaining access to the exchange market is worth the additional administrative burden.

There are several stylized facts that suggest this burden is not worth it:

- SOE and private firms issue in roughly equal sizes in both the CIBM and the exchange markets. However, exchange issuers are tilted more heavily towards real estate firms, which will likely be of less interest to ESG investors.
- Some of the largest and most liquid issuers in the exchange market are also listed in other markets (CIBM and the offshore USD market).
- Liquidity in the exchange market is a fraction of that in the CIBM.

The offshore market punches above its weight in green and ‘dirty’ bonds

The offshore USD market is 1/20th the size of the onshore market, but a fifth of green bonds are issued there (the green bond market is ~\$140bn). It is harder to trace the coal market, since it’s not a distinct sector but rather a subset of the energy sector.

The energy sector is 5% of the onshore market (~\$180bn) and 11% of the offshore market (~\$70bn). In our screening, we find only 5 credits in benchmark USD size that carry a sector code of “coal”, for a total of almost USD3bn of notional, recognizing that many coal exposures will we carried under other codes.

For example, a lignite-based electricity generator will tend to also mine the lignite, but still go under a “Utility” sector code. The Electricity generation sector has around USD38bn outstanding in benchmark bonds – if this is prorated along the lines of Chinese power production (where approximately 55% of electricity comes from coal), it would add another USD19bn of coal exposure.

The onshore market is driving most of the recent interest in Chinese bonds

Despite the greater diversity of sectors represented in the offshore USD market, the onshore RMB market is larger, and contains the largest and most liquid issuance from the central government and policy banks, and the majority of ‘dirty’ and green bonds. Recent deregulation has opened the onshore market further to foreign investors, prompting index providers to add Chinese bonds into their indices. The bonds newly added have come from the government and policy banks sectors of the onshore market. For all these reasons, most international investors newly exploring opportunities in the Chinese bond market are doing so in the onshore market.

Sizing the onshore market

Figure 5: The onshore market is weighted towards government debt (USD trn.)



Note: 'Corporate' here includes SOEs. Source: IMF, BIS, Seafarer, Morgan Stanley, JP Morgan

The Chinese onshore market is more complex than most because there are cross-cutting sectors (eg, government, corporate etc) and types of bonds (eg medium term note, corporate bond, etc). Corporates, for example, can issue medium-term notes, money market instruments, and ‘corporate’ bonds listed on the exchange. Most taxonomies of the Chinese market will list such bonds according to their structure (ie, MTNs), even though it is much more descriptive to refer to the borrower (ie, a corporate entity). The taxonomy presented here focuses on these underlying borrowers rather than the structure of the note.

Because of the sheer size of the market, the Chinese onshore market offers meaningful corporate exposure

The corporate market is only one third the size of the government-related market. Yet, this is still a sizable chunk of debt: about \$1.5trn (non-financials). For context, this is roughly the same size as the US high yield bond market.

Idiosyncrasies of the Chinese bond market: enterprise bonds

Since the launch of the first credit bond in 1983, the market has developed rapidly. The enterprise bond market is almost exclusively for SOEs (though SOEs can also issue bonds in the other segments of the market); 80 percent of enterprise bonds have been issued by LGFVs, a special type of SOE. Enterprise bonds can be traded on both the interbank and exchange markets.

Idiosyncrasies of the Chinese bond market: LGFVs

LGFVs are SOEs established by local governments with capital, land, or other public resources and that in turn either borrow from banks or issue urban construction bonds (these are referred to as “chengtou” bonds within China). While chengtou bonds were first issued in 1992, issuance surged following the global financial crisis. Legally, they are distinct from local government bonds because they are liabilities of enterprises, albeit government-owned ones. They are issued as enterprise bonds and medium-term notes in the interbank market (CIBM), and as corporate bonds in the exchange market.

Initially, local governments relied on LGFVs to circumvent the budget law, which prohibited local governments from borrowing. Market pricing suggests that investors often assume that those bonds carry an implicit guarantee by the government. In the past, some local governments even explicitly provided “letters of comfort.” However, since the 2014 budget law and subsequent reforms, the government has tried to break the perception of this link. For example, the National Development and Reform Commission and the Ministry of Finance in 2018 jointly reiterated the ban on local government guarantees for LGFVs.

Idiosyncrasies of the Chinese bond market: Local government bonds

China’s local government bond market developed rapidly and now exceeds the size of sovereign bonds. Before 2015, local governments were largely prohibited from

borrowing. Instead, and especially since the large stimulus program following the global financial crisis, they have relied on off-balance sheet activities through the LGFVs described above, effectively circumventing borrowing constraints. To reduce reliance on LGFVs and minimize financial sector risks, local governments can now issue bonds subject to an annual ceiling set by the National People's Congress, a strategy introduced under the motto "opening the front door" while "closing the back door." To facilitate the transition, the government announced a large-scale debt-swap program, reaching RMB 15 trillion (23 percent of GDP in 2017), making China's local government bond market one of the largest in the world.

Idiosyncrasies of the Chinese bond market: MTNs

Starting in 2008, a new segment of the credit bond market was established, allowing companies to raise financing through so-called medium-term notes. These notes are issued on a registration basis and traded on the interbank market. Unlike in other countries, where the interbank market is limited to financial entities, corporations and large institutional investors have access to the market.

The growth of the green bond market in China

China's green bond market has grown rapidly since the 2016, when the People's Bank of China (PBoC) and the National Development and Reform Commission (NDRC) issued green bond guidelines.

China has a local definition of a green bond which differs from the internationally recognized definition. The international guidelines pay more attention to climate change mitigation and adaptation, while China's domestic ones also emphasise environmental benefits such as pollution reduction, resource conservation and ecological protection in addition to the reduction of greenhouse gas emissions. In addition, China's local green bond guidelines also allow the proceeds of some types of green bonds to be used as general corporate operating capital (For a comparison of China bond standards vis-a-vis the EU taxonomy, see [Climate Bonds Initiative \(2019\)](#)).

In recent years there has been around 60bn USD of green bond issuance, roughly split between domestic and labelled issuance. China has cumulatively issued a similar amount of labelled green bonds as the other leaders in this market: the Netherlands, USA, France, and Australia.

About a fifth of green issuance takes place in the offshore market; most of this is denominated in USD. The green bond market used to be dominated by financial issuers, but is now roughly split between financial and non-financial corporates, with ABS, policy banks, and other government-affiliated issuers making up a much smaller fraction of issuance. Clean transport and clean energy comprise the bulk of the use of proceeds. Most issuance matures within 5 years.

Major China Bond Market Indices

Index family	Bloomberg Barclays			JP Morgan		FTSE Russell	S&P
Index name	Global Aggregate (and subindices: global treasury, EM local currency government)	Bloomberg Barclays Liquid China Credit (LCC)	China Aggregate (separate from Global Agg)	JPM GBI-EM Global Diversified	J.P. Morgan China Custom Liquid ESG Capped Index	FT World Government Bond (and subindices: Citi Chinese (Onshore CNY) Broad Bond Index and an Interbank-only variant)	S&P Pan Asia Bond index (includes S&P China bond index)
China inclusion / index launch date	Apr-19	Nov-20	Jan-04	Feb-20	N/A	Oct-21	Dec-13
Phase in period end	Dec-20	--		Dec-20	N/A	Sep-22	
Final China weight	6%	100%	100%	10%	N/A	6%	
Estimated AUM tracking index	\$2.5trn	N/A	N/A	\$0.2trn	N/A	\$2.5trn	N/A
Estimated flow impact (AUM x weight)	\$120bn	N/A	N/A	\$20bn	N/A	\$150bn	N/A
Number of Chinese bonds	386	125	1959	N/A	N/A	N/A	N/A
Number of Chinese issuers	4	48	N/A	N/A	N/A	N/A	N/A
Only China		x	x		x		
Sovereigns	x		x	x	x	x	x
Policy Banks	x		x	x	x	x	x
Corporates		x (incl. SOEs, based on BCLASS)	x			x	x
Ratings	IG with one of Moody's, S&P, Fitch (Unrated non-U.S. bonds may use an implied issuer rating to determine index eligibility when not rated by an agency.)	IG with one of Moody's, S&P, Fitch	No requirement			Entry: A- by S&P and A3 by Moody's. Exit: Below BBB- by S&P and Baa3 by Moody's	
Maturity	Min 1y	Min 1y	Min 1y	Min 13 months	>2.5 years remaining to maturity at issuance, >13 months for index inclusion.		Min 1 month
Issue size	Asian-Pacific securities must have a par amount outstanding of Yen 35bn currency equivalent.		Par value of at least CNY 5bn for Treasuries & Government-related, and CNY 1.5Billion for Corporates.	\$500mn for global bonds, \$1bn for local bonds	CNY 50bn min issue size.		
Market	CIBM	CIBM & Exchange	CIBM & Exchange	CIBM	CIBM		
Caps		Issuers capped at 10%.			19% cap of China policy bank issuers.		
Other		Bonds are included if they have traded on at least 10% of the business days over the past three months and have at least RMB250mn in aggregate trading volume over that period. Non-subordinated only.	Convertible securities, floating-rate notes, perpetuals, warrants, linked bonds, structured products and private placements are excluded. Contains bonds that trade in the CIBM and in the exchange market.		Only senior bonds. The index applies J.P. Morgan ESG (JESG) issuer scores to adjust the market value of index constituents from the baseline index.	Entry: At least USD 50 billion, EUR 40bn, JPY 5trn. Exit: Below USD 25bn, EUR 20bn, JPY 2.5trn. Minimum 1y maturity	Min mat 1 month. Fixed and floating, bullets, callables, and perps.

Tracking the onshore market with indices

Major index providers including Bloomberg-Barclays, JP Morgan, and FTSE Russell have published indices tracking the onshore Chinese bond market for several years. In 2016, these providers announced their intention to add Chinese onshore bonds in their widely followed global indices. Each of these now also provide a China sub-index within their global indices.

There are therefore three types of indices which track the Chinese bond market today: Global indices, China sub-indices within global indices, and China-specific indices which predate China's inclusion in these global indices.

Effects of inclusion in global indices

For all three major index providers, the decision to add China into global indices follows reforms from the PBoC which resulted in Chinese securities meeting certain criteria: a local currency debt market classified as investment grade, and a freely tradeable currency which is convertible, hedgeable, and free of capital controls. The index providers also stated that their intention to add China to their global indices was made in anticipation of three further reforms: (a) real time delivery-versus-payment ("DVP") settlement; (b) clarification that value added tax ("VAT") and withholding tax will be waived for three years, and (c) the establishment of block trading.

Based on the AUMs benchmarked against each index, and the weight of Chinese bonds in each index, the inclusion of Chinese bond in global indices is estimated to be drawing ~ \$300bn USD into the Chinese market. The table shown on the previous page lists the key characteristics of the major indices tracking the Chinese market.

ESG investors may find two indices particularly useful

Barclays tracks a set of liquid corporate issuers (state-owned enterprises and private corporates) in its Liquid China Credit index. This index is unique since it includes corporates (most indices, including the Barclays Global Aggregate index, exclude Chinese corporates), and only includes bonds which have traded on at least 10% of the business days over the past three months and have at least RMB250mn in aggregate trading volume over that period.

JP Morgan's custom liquid ESG capped index applies J.P. Morgan ESG (JESG) issuer scores to adjust the market value of index constituents from the baseline index. JESG issuer scores are a 0-100 percentile rank calculated based on normalized raw ESG scores from third-party research providers Sustainalytics and RepRisk. An issuer's finalized JESG score incorporates a 3-month rolling average. The JESG scores of eligible issuers are ranked (with 1 being the issuer with the highest JESG score, and 4 being the issuer with the lowest JESG score), and their ranks used to scale each issuer's baseline index market value.

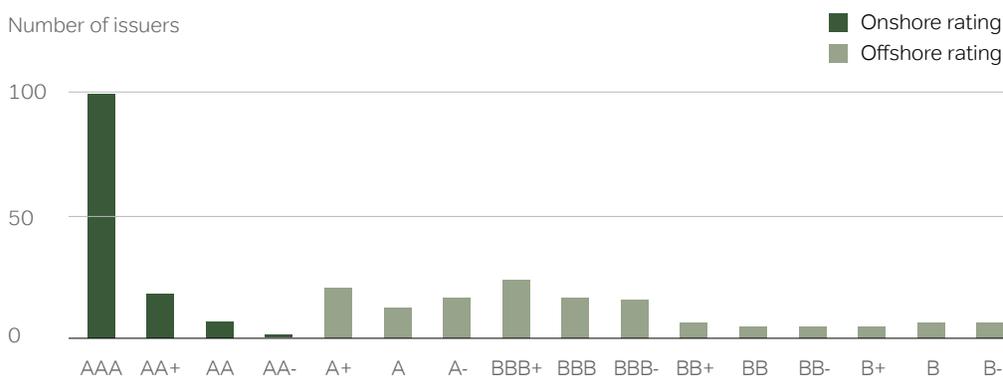
China's ratings system is still under-developed

China's onshore domestic rating scale includes nine long term grades (AAA, AA, A, BBB, BB, B, CCC, CC, C) and six short term grades (A-1, A-2, A-3, B, C, D) as officially set by the PBC. There is also AAA+ rating for the 10 government issuers. There is very little sub-investment grade issuance in China.

Onshore ratings are higher than offshore ratings. In China, AA is generally seen as the lowest investment-grade level. Since the onshore Chinese government bond is rated AAA but the sovereign's offshore rating is only A+, the 'sovereign ceiling' is also higher for onshore credits (see Figure 6).

There are 10 domestic rating agencies in China. The three international agencies—Moody's, S&P, and Fitch—are also now rating Chinese onshore debt, via wholly-owned Chinese subsidiaries. Fitch began rating Chinese government bonds in 2001, S&P in 2004 and Moody's in 2010.

Figure 6: Onshore ratings are higher than offshore



Source: Bloomberg, Wind, Morgan Stanley

Domestic Chinese rating agencies use a different methodology from the international agencies

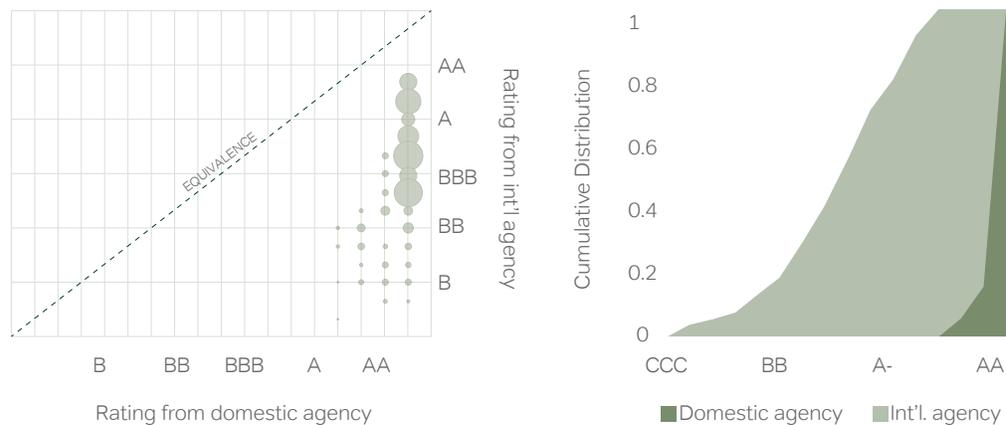
Domestic agencies prioritize size of the entity, while Moodys/S&P/Fitch give more weight to the benefits of profitability and government affiliation. This leads to domestic agencies assessing more generously: on average, in a matched sample of credits, domestic Chinese ratings agencies rated Chinese credits 6-7 notches higher than international agencies.

There are several deficiencies in the domestic ratings system that lead to misleading ratings

- Conflicts of interest: most of the agencies are government-affiliated, but most of the credits they rate are also government-affiliated.

- The ten agencies use a homogeneous rating system; there is little value-add in ratings from several agencies.
- Poor incentives: the agencies compete on fees and have been found to rate more leniently for better customers.
- Issuers do ‘ratings shopping’: the regulations surrounding ratings requirements for issuers are varied and loose, and most issuers require only one rating.
- Concerns about accurate reporting of solvency have arisen with several recent accounting scandals.

Figure 7: Domestic vs. int'l ratings for a matched set of Chinese onshore credits



Note: Bubbles in left chart denote nominal volume of debt. Source: Xianfeng Jiang, Frank Packer (2019)

This presents problems using ratings for investment decisions, in practice

The result of these systematic deficiencies in China’s credit rating system becomes evident in practice. Ratings have clearly not traced the path of weakening fundamental credit quality, the removal of government guarantees, and defaults: even as defaults have risen over the past few years, ratings migration has been positive.

Downgrades remain rare (129 out of 2,784 between 2014 and 2018). Of the 11,000 Interbank listed and rated bonds outstanding as of August 2018, more than 95% of the bonds received ratings of AAA to AA at the time of issuance, and just 0.11% received a rating of BBB+ or lower. Ratings are also not dynamic: changes occur too late, often coincidentally with media reports of impending turmoil for an issuer.

That said, there have been some improvements in the credit rating system. The China Bond Rating corporation (CBR) was established in 2010 under the investor-pays model, and CBR’s ratings do seem to be more stringent than those of the other domestic agencies: it tends to rate issuers 2 or 3 notches below other domestic agen-

cies.

As foreign investors enter the market, it is possible that Chinese issuers will be incentivized to seek out not just one but several ratings from the international agencies.

Historically, defaults have been rare...

Defaults have historically been rare, partly because of the high degree of government-related issues, and the strength of support for them. From 2006 to 2017, only 75 out of 5,000 issuers defaulted on \$14bn of debt, and none resulted in losses for bondholders.

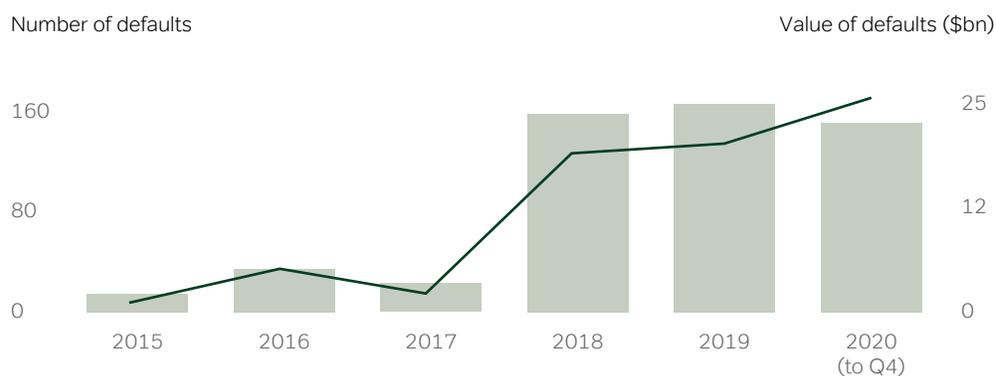
This low default rate is explained by government guarantees—explicit and implicit—over most of the Chinese universe of debt: the IMF writes that “in the corporate bond market, the existence of implicit guarantees is reflected by the trivial bond default rate, generous credit ratings, and compressed risk premiums” (IMF).

The guarantees are likely, at least to some degree, driven by the government’s concern over social unrest after defaults, especially in bonds which are widely held by the public. Another partial explanation may lay in the conflict of interest between the government as regulator—which might, for example, encourage exits of non-performing ventures—and the government as shareholder, where the incentive may be to prolong the life of a ‘zombie firm’.

...but this has changed over the past few years

Defaults have quadrupled in recent years from their normal pace: in 2018-2020, the average number of bonds defaulting per year surged from below 40 in the preceding years to above 140, and the market value of debt being defaulted on per year rose from ~\$5bn to ~\$20bn.

Figure 8: Defaults in the Chinese onshore market are rising



China Central Depository and Clearing (CCDC)

There are several drivers of the rising default rate, but the most important and sys-

temic driver is the government’s shift in policies towards deleveraging the Chinese financial system.

This manifests in various ways. Both lenders and borrowers are being forced to bring more of their assets and liabilities onto their balance sheets. For the shadow banking system, this entails a clampdown on ‘wealth management products’. For borrowers, especially local governments, this entails less borrowing via local government financing vehicles (LGFVs) in favor of issuance directly from the local government itself (regulations were recently updated to allow local governments to borrow directly, whereas they had previously been banned from doing so).

Alongside this constriction of credit, the government is also evincing a greater tolerance for bankruptcies for issuers and sectors which was not systematically important.

Still, by any international measure, the default rate in the Chinese market is low, and defaults are concentrated in the fewer number of private (non-SOE) firms.

A litmus test for the market will be the development of the Evergrande situation which is currently playing out. Evergrande, a real-estate developer with liabilities in excess of USD300bn, and more than USD15bn outstanding in hard-currency large (USD500mn+) bonds is at the time of writing near a potential default, with question marks around coupon payments on certain bonds. Bonds prices have fallen to around 30 cents on the dollar. For a further analysis, please refer to [“The Big Read: Evergrande Real Estate Group”](#), Financial Times, Sep 22, 2021.

Figure 9: Evergrande off-shore USD bonds (dark green) and on-shore CNY bonds (light green).



Source: Bloomberg.

A core question in the Evergrande case will be treatment of international vs domestic bondholders, as well as an indicator on the continued (un)willingness of the central government to prop up the system. In case of an actual default, the process for recoveries will likely give guidance on how the system will be working for the foreseeable future.

The required institutions are not in place to resolve defaults efficiently

China introduced an Enterprise Bankruptcy Law in 1986, though it is the 2006 reform that led China on a path towards convergence with international practice, with the inclusion of reorganization proceedings that are similar in nature to Western bankruptcies and restructurings.

How this is implemented is another question: there is a lack of legal infrastructure, a weak court system, and moral hazard issues with regard to SOEs, which tend to receive much more support than private firms.

In a sample of 11 SOE defaults between 2015-18 examined by the IMF, 2 resulted in controlling shareholders taking over the debt, 2 resulted in debt repayment by the SOEs themselves, and another 2 resulted in debt-to-equity swaps. Altogether, in 7 out of these 11 cases, local governments actively participated in the default settlement.

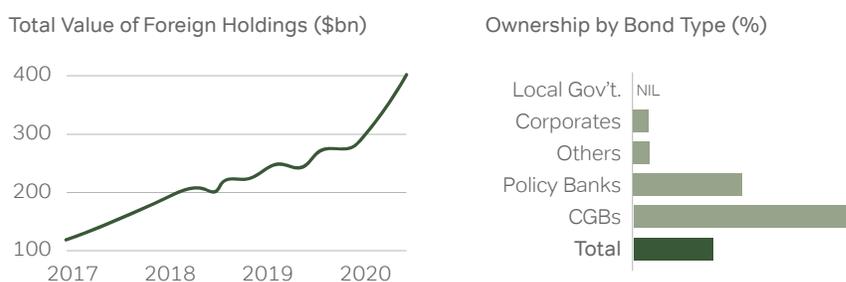
Other key differences remain between China and U.S./U.K. bankruptcy proceedings include a lack of debt-in-possession financing in China and the inability of creditors to propose a plan of reorganization.

Foreign participation in the Chinese onshore bond market is still very limited

Foreigners only hold 4% of the Chinese onshore bond market. Foreign holdings are most concentrated in government bonds (10%) and policy banks (5%), and very limited in corporates and other segments (<1% in each).

Foreign participation is likely to grow; Chinese markets have only recently become more accessible to international investors through Bond Connect, and Chinese bonds have just been added to international indices, and are still being phased into the FT World Government Bond index. Indeed, foreign participation has risen dramatically since the inclusion in global indices.

Figure 10: Foreigner ownership is low



Source: Bond Connect and China Central Depository and Clearing Co.

The median emerging market domestic bond market is 39% owned by foreign investors, but China is unlikely to reach this share of international ownership: many of these EM countries are small, and have limited domestic savings. Japan is perhaps a better model, since its characteristics are more similar to China's than most EM countries: it too has a reserve currency, but high domestic savings, low yields, and is a similarly large market. Eight percent of Japanese bonds are owned by foreigners. The Chinese central bank forecasts foreign ownership rising to 15%.

TRADING ONSHORE CHINESE BONDS

BondConnect is the simplest major access route to the Chinese onshore market

International investors can access the Chinese onshore bond market via four channels: QFII, RQFII, CIBM, and BondConnect.

QFII and RQFII are legacies of older regulatory regimes. Although these have been liberalized to some degree (for example, quotas and holding periods have been eliminated), they require onshore registration (with attendant bureaucratic hurdles) and onshore custodianship.

In 2017, the Chinese government introduced BondConnect, which is now the largest and fastest-growing channel for international access to the onshore market (as of October 2020, there are more than 2,200 approved investors from across 33 jurisdictions on the BondConnect.)

BondConnect obviates the need for an onshore custodian and cash account, enabling bond investment and currency conversion to be completed together, and removing the additional burden of China onshore regulation. With BondConnect, investors can register offshore in Hong Kong and use the Hong Kong Monetary Authority (the de facto central bank) as the clearing bank and counterparty through its Central Money Markets Unit (CMU), an entity with a credit rating (AA+) currently higher than the Chinese government (A+).

Registration is relatively straightforward: investors open a segregated account with CMU and send application forms to Bond Connect Co., Ltd. (BCCL) for onboarding.

After BCCL verifies investor eligibility, application materials are sent to CFETS and PBoC. Upon completion of registration with the PBoC, a 21-digit CFETS ID is sent to investors. Trading can commence from that point onward.

With BondConnect, there are no repatriation and capital account risks since the assets are held and settled offshore. Onshore currency hedging provisions (hedging instruments such as currency forwards, currency swaps, cross-currency swaps and currency options) are also available to help investors manage foreign exchange risk,

and block trading has been allowed for sizable trades.

In practice, BondConnect is also much more straightforward for international investors because the trading platforms are TradeWeb and Bloomberg, with live prices (compared with the CIBM channel, for example, which requires communication with an onshore agent via WeChat).

The major drawbacks of using BondConnect rather than QFII, RFQII, or CIBM are that interest hedging is not currently available and the exchange market is not accessible. Trading hours for the onshore market are 9:00 am – 12:00 pm, 1:30 pm – 4:30 pm China Standard time (GMT +8, EST +3).

Only government bonds are liquid

The Chinese market is large by almost any measure, and so notional trading volumes are similarly large. But turnover metrics show that liquidity is sharply concentrated in the government and policy bank segments, and thin elsewhere.

On-the-run government bonds and policy bank bonds are liquid: bid-offer spreads are in the 1-3bp range, turnover ratios are around 1.5x (per annum), and average nominal trade sizes are up to \$50mn. Liquidity is substantially worse for off-the-run bonds, even in these sectors which are liquid for on-the-run bonds. Liquidity in the other segments, including corporates, is very poor. To the extent that international indices are now including only Chinese government and policy banks, only these segments, and not corporates, will likely see a boost in liquidity.

This illiquidity is explained by the major participants

A large portion of the Chinese onshore bond market is owned by commercial banks. They generally classify about 60 percent of their bond investments as held-to-maturity, compared to less than 10 percent for most developed-economy banks. The types of firms which trade more frequently account for a smaller share of Chinese trading. For example, in the US, broker-dealers account for more than 60% of trading, but in China they account for roughly one quarter.

Liquidity is pro-cyclical

Liquidity is also highly volatile; bond turnover volumes vary with borrowing activity in the repo market and with monetary policy, and liquidity is pro-cyclical (ie higher prices correlate with more turnover), especially for corporate bonds. As a result of all these factors, the Chinese bond market typically experiences one-way positioning during stable or declining interbank interest rates. Liquidity provided through repo is more available for longs than shorts, since all repo is 'pledged'.

Figure 11: Investors cite limited hedging mechanisms as an important weakness of the Chinese onshore bond market



Source: AsianBondOnline

Hedging FX risk, interest rates risk, and credit risk is difficult in practice

Market participants cite the lack of hedging instruments as the most importance weakness of the onshore Chinese bond market.

Foreign exchange risk:

In spot markets, foreign investors can access onshore spot for onshore bond-related investments, but are not allowed to directly trade onshore spot without underlying bonds. This can get complicated in practice (net or gross exposure, duration limit, etc). Current rules make it unclear whether managers can, for example, hedge future expected coupon payments.

In forwards markets, investors can use onshore foreign exchange derivatives to hedge their foreign exchange exposure related to their onshore bond investments up to the tenor and amount of their onshore cash bond holdings. No approval or documentation support is needed, but onshore foreign exchange and derivatives have to be traded through one designated agent. No currency futures are available.

In practice, and especially for those accessing the market via Bond Connect, the primary barrier to being able to hedge FX is that the global custodian banks that most asset managers use are not prepared to offer onshore FX hedging.

Interest rate risk:

Foreign investors can use onshore interest rate derivatives to hedge their onshore cash bond holdings up to the amount and tenor of their onshore cash bond holdings. CGB futures are not available to offshore investors. This is however only available to investors accessing the Chinese market directly, ie, via CIBM - interest rate

derivatives are not available to investors entering the Chinese market via Bond Connect or any other routes. In practice, take-up is low.

The lack of clarity and flexibility on hedging amounts on FX applies here too. Conversations with international asset managers suggest that it is difficult for them to sign NAFMII (National Association of Financial Market Institutional Investors) agreements due to potential conflicts with their ISDA agreements for other markets.

That said, the ability to transact onshore in interest rate derivatives, such as interest rate swaps, is considered “good to have, but not a must” at this stage, given that interest rate swaps are less efficient than Treasury bond futures for hedging cash bonds, and the offshore non-deliverable interest rate swap market is trading at similar levels as onshore interest rate swaps.

Bond futures and repo are not available to international investors.

Figure 12: Comparison of the programs to access the Chinese onshore market

	QFII/RQFII	CIBM Direct	Bond Connect
Requirements			
Approval versus filing	Approval	Filing	Filing
Quota	Yes	No	No
Lock-up requirements	No	No	No
Product Access			
Cash bonds			
Interbank	✓	✓	✓
Exchange	✓		
Bond repo			
Bond lending		✓	
Bond forward		✓	
Onshore foreign exchange			
Spot	✓	✓	✓
Forward	✓	✓	✓
Swap	✓	✓	✓
Options	✓	✓	✓
Onshore interest rate derivatives			
Interest rate swaps		✓	
Cross-currency swaps		✓	
Forward rate agreements		✓	
CBG futures			

Source: Standard Chartered Research

Credit risk hedging:

A Chinese CDS market was created in 2016 but is hampered by several issues. There are no standardized contracts: credit hedging is either ‘certificate-based’ –

credit protection sold by primary dealers, and tradeable in secondary markets – or ‘contract based’: sold done on a bilateral basis with primary dealers. In other words, there is no credit default swap market as in US or European markets.

There are a number of other weaknesses in credit protection used in Chinese markets. Most contracts are based on specific bonds, rather than issuers. The definition a credit event is vague. And cross-default clauses are not widely used, and there are no well-established default and liquidation procedures. Credit protection is therefore not very compelling for investors.

Appendix: the offshore hard currency Chinese bond market

Investors may be deterred from trading in onshore Chinese bonds because of the registration requirements—easier than historically but perhaps still too onerous for many investors—and by the very low liquidity in the vast majority of the market. But the onshore market is only one of three Chinese bond markets.

In particular, the offshore hard currency (primarily, USD) market may offer a more accessible and practical route to the Chinese bond market. Investors seeking to ramp up their involvement in the Chinese bond market might consider this market a way to ‘get their feet wet’ while the onshore market undergoes further development and ultimately becomes more tradeable.

This section provides a broad overview of the offshore hard currency Chinese bond market and the major issuers therein. In particular, we highlight some of the important strengths of this market.

China USD is small vs onshore but dominant in global USD EM corporates

One of the reasons this publication has focussed primarily on the Chinese onshore market rather than the Chinese USD market is a question of size. The onshore market (\$13.4trn) dwarfs the USD/EUR markets (\$455bn).

But size is relative; to diminish the importance of the offshore market by comparing it to one of the largest bond markets in the world (Chinese onshore) massively understates the importance of the offshore market. Indeed, compared to a different universe—global emerging market hard-currency bonds—the Chinese offshore market is highly significant, and becoming more so.

Consider that a decade ago, the global EM corporate bond market (including government-affiliated issuers) was \$780bn, and China comprised one tenth of this. Today, the global EM credit market is twice as large (\$1.5bn) while China’s offshore market has grown six-fold to \$500bn. China now constitutes a third of the global EM corporate market, and is four times larger than the next most important country (Mexico).

China offshore has a dedicated investor base that trades relatively frequently

A lot of the liquidity challenges in the onshore market arise because of the nature of the investors—primarily buy-and-hold commercial banks. These investors do not trade frequently, leading to thin liquidity in all but on-the-run government bonds.

By contrast, the investor base of hard currency Chinese bonds is, to a large extent, global institutional investors ‘dedicated’ to the asset class of global EM credit. Many of these access the market via active mutual funds. These investors trade relatively frequently, boosting market liquidity.

Major Chinese bond issuers in the offshore, hard currency market with >USD5bn outstanding in liquid bonds.

TICKER	Liquid bond deals	Issuer name	Sector	Rating	Benchmark bond	TTM	OAS	CDS 5y	Bmk green bond
SINOPE	28.36	Sinopec Group	Oil&Gas	A+	USG82016AS83	9.5	94	50	CND100046TP8
ICBCAS	26.93	Industrial & Commercial Bank of China	Banks	A	XS1935188422	2.9	70	47	XS1982691153
CHINA	26.17	China Government International Bond	Sovereign	A+	USY15025AC67	9.3	19	36	n.a.
BCHINA	22.85	Bank of China	Banks	BBB	US06120TAA60	3.4	92	46	XS2334572562
TENCNT	22.05	Tencent Holdings Ltd	Internet	A+	US88032XAU81	8.9	107	56	n.a.
HRINTH	17.97	Huarong	Investment Co:s	BBB	XS2076078786	8.4	758	978	n.a.
CNOOC	16.79	CNOOC	Oil&Gas	A+	US12634MAE03	6.8	108	54	n.a.
EVERRE	16.52	China Evergrande Group	Real Estate	B-	XS1627599654	4.0	1985	No CDS	n.a.
BABA	16.40	Alibaba Group	Internet	A+	US01609WAX02	9.6	55	55	n.a.
CHGRID	16.16	State Grid Corp of China	Electric	A+	XS2152902479	9.1	83	44	CND100045LG6
SDBC	16.08	China Development Bank	Banks	A+	XS2247216257	9.3	59	43	XS1711173218
CCAMCL	14.25	Cinda China Asset Management	Diversified Fin Serv	A-	XS2281799572	9.6	218	n.a.	n.a.
HAOHUA	13.97	China National Chemical Corporation	Chemicals	BBB+	XS2226808165	9.2	174	116	n.a.
CCB	13.81	China Construction Bank Corp	Banks	BBB+	XS2140531950	9.0	112	47	XS2208844493
EXIMCH	12.49	Export-Import Bank of China	Sovereign	A+	XS1970942816	7.7	37	34	n.a.
COGARD	10.42	Country Garden Holdings Co	Real Estate	BBB-	XS2280833307	9.5	251	n.a.	n.a.
KAISAG	10.20	Kaisa Group Holdings Ltd	Real Estate	B	XS1627598094	3.0	1075	No CDS	n.a.
BOCOM	9.38	Bank of Communications	Banks	A	XS2227193211	4.2	66	n.a.	CND10000F3H0
SUNAC	7.91	Sunac China Holdings	Real Estate	BB-	XS2287889963	4.6	562	No CDS	n.a.
PRXNA	7.83	Prosus	Internet	BBB-	USN7163RAA16	8.6	139	No CDS	n.a.
ICBCIL	7.25	ICBCIL Finance	Diversified Fin Serv	A	XS2218691256	4.2	110	No CDS	XS2057900552
POSABK	7.25	Postal Savings Bank of China Co	Banks	BB	XS1684793018	Perp	215	No CDS	n.a.
BIDU	6.35	Baidu	Internet	A-	US056752AT58	9.3	97	79	n.a.
TIANHL	5.24	Scenery Journey	Real Estate	B	XS2109191986	1.3	2955	No CDS	n.a.
YANTZE	5.22	Three Gorges Finance	Energy-Alt. Sources	A+	USG8850LAG52	9.2	103	n.a.	XS1577956789
SHIMAO	5.19	Shimao Group Holdings	Real Estate	BBB-	XS2276735326	9.5	271	225	XS2013709220
CITLTD	5.10	CITIC	Banks	BBB+	XS2109790001	8.7	132	86	n.a.
YGCZCH	0.72	Yankuang Group	Coal	BB+	XS1941840859	0.6	227	No CDS	n.a.
CHQENE	0.50	Chongqing Energy	Coal	NR	XS1955255283	0.7	3240	No CDS	n.a.
SHENGY	0.50	China Shenhua Overseas Capital	Coal	NR	XS1165128585	3.6	206	No CDS	n.a.
YZCOAL	0.50	Yancoal International	Coal	BB	XS2128388456	2.3	293	No CDS	n.a.

Source: Bloomberg. Note: as of June, 2021. "Liquid" defined as USD500mn or more in notional issued.

The offshore market provides access to energy-related issuers and green bonds

Because China's large oil and gas firms earn global revenue in dollars, they naturally turn to the USD market to issue liabilities. Unsurprisingly, the weighting of the oil & gas sector is more than twice as high in the USD market (11%) than in the onshore market (5%). Some of the large issuers include Sinopec, CNOOC, and CNPC.

Even though the onshore market is 30x larger than the offshore market, in recent years almost one quarter of Chinese green bond issuance has taken place in the offshore market. In 2019 the green sectors issuing the most in the offshore market were transport and low carbon building; the bulk of this was in USD rather than EUR or other currencies.

Shorting instruments and indices are available in the offshore market

Unlike in the onshore market, standardized credit default swap (CDS) contracts on Chinese issuers exist, even if they trade somewhat infrequently. Moreover, CDS indices like the iTraxx Asia ex-Japan reference the 40 most liquid CDS contracts in Asia. Much of the index references Chinese credits, including Bank of China, China CINDA holdings, China construction bank, China Huarong International holdings, China National Chemical Corporation, China Petrochemical Corporation, and CNOOC, amongst others.

Investors can also take broad long positions in the asset class via bond indices like the widely-followed CEMBI index, provided by JP Morgan. CEMBI is broken down into a number of sub-indices, including a China index. Various ETF and mutual funds, both passive and active, track the CEMBI index and some of its subindices.

Description of select key issuers

As mentioned previously, the EUR/USD offshore market amounts to around USD450bn, meaning that it offers meaningful exposure to Chinese bond issuers. For comparison, the US HY market amounts to approximately USD1trn.

The table on the following page lists the issuers in that market that have over USD5bn in benchmark-sized (\geq USD500m) bonds outstanding, as well as the smaller coal focused issuers. We highlight names that should be relevant for the climate focused investors, either due to fossil or renewables exposures. It should be noted that oil and gas companies Sinopec and CNOOC are quite at the top of non-financial issuance league, with around USD45bn of benchmark-sized hard currency bonds outstanding, as well as with liquid CDS outstanding. State Grid (CHGRID) may be the biggest coal transition play globally: CHGRID is the world's largest utility company and will be central in any net-zero plans for China. With USD16bn equivalent outstanding in benchmark bonds, it is also a company that we would expect to give investors opportunities for engagement in various ways.

References

- ADB Institute (2018), **The Financing of Local Government in the People's Republic of China: Stimulus Loan Wanes and Shadow Banking Waxes**, <https://www.adb.org/sites/default/files/publication/396826/adb-wp800.pdf>
- State Street (2018), **Opening of China's Bond Market: What Global Investors Need to Know**, <https://www.ssga.com/investment-topics/general-investing/2018/05/opening-of-chinas-bond-market-what-global-investors-need-to-know.pdf>
- State Street (2019), **Participating in China's Bond Market: Navigating an Evolving Universe**, https://www.statestreet.com/content/dam/statestreet/documents/Articles/1603_Chinas_bond_market_Digital.pdf
- JP Morgan (2019), **What is in the Chinese Fixed Income Universe**, <https://am.jpmorgan.com/au/en/asset-management/adv/insights/market-insights/market-bulletins/what-is-in-the-chinese-fixed-income-universe/>
- Neuberger Berman (2018), **Welcome to the Real China Bond Market**, https://www.nb.com/documents/public/en-us/t0107_0418_china_onshore_bonds.pdf
- Invesco (2016), **The Opening of China's Bond Markets: Opportunities for Global Investors**, <https://www.invesco.com/corporate/dam/jcr:fa47a916-8192-477d-8a2f-f5e0d8c2dfae/The-Opening-ofChinas-Bond-Markets.pdf>
- Invesco (2017), **Bond Connect: Linking China's Onshore and Offshore Markets**, <https://www.invesco.com.au/home/dam/jcr:fee829f3-de6c-4965-8423-1e8472e-ac763/Invesco-Article-Bond-Connect-Linking-China-onshore.pdf>
- Seafarer (2019), **The Evolution of China's Bond Market**, <https://www.seafarerfunds.com/commentary/the-evolution-of-chinas-bond-market/>
- FTSE Russell, **Chinese Bond Market - Evolution and Characteristics**, https://content.ftserussell.com/sites/default/files/chinese_bond_market_-_evolution_and_characteristics_final.pdf
- Cambridge Associates (2020), **China's Onshore Bond Market: An Update**, <https://www.cambridgeassociates.com/insight/chinas-onshore-bond-market-an-update/>
- Financial Times (2020), **China Corporate Bond Index Draws Interest from Offshore Issuers**, <https://www.ft.com/content/c18ba1e3-26c8-4da7-9008-2f4f2672504c>
- Amstad, M. & He, Z (2019), **Chinese Bond Market and Interbank Market**, https://www.nber.org/system/files/working_papers/w25549/w25549.pdf

Fitch Ratings (2019), **China Corporate Bond Market Blue Book**, https://your.fitch.group/rs/732-CKH-767/images/china-corporate-bond-market-blue-book_fitch_10083315.pdf

HSBC (2019), **China Market Access Primer**, http://www.frinfo.assetmanagement.hsbc.com/06_inews-2019/issue-153-feb-11/hsbc-china-market-access-primer_feb2019.pdf

Christine Shearer, Lauri Myllyvirta, Aiqun Yu, Greig Aitken, Neha Mathew-Shah, Gyorgy Dallos, and Ted Nace, **Boom and Bust: Tracking the Global Coal Plant Pipeline**, https://endcoal.org/wp-content/uploads/2020/03/BoomAndBust_2020_English.pdf

Feng Lin, Li Lei, Lu Zhou, **A Brief Introduction to China's Bond market: Structure, regulation, and opening-up**, ACRA, 2019, <https://www.acra-ratings.com/research/1116>

Xianfeng Jiang, Frank Packer, **Credit Ratings of Domestic and Global Agencies: What drives the differences in China and how are they priced?** BIS Working papers, No. 648, <https://www.bis.org/publ/work648.pdf>

Climate Bonds Initiative, **China Green Bond Market, 2019 Research report**, 2019, https://www.climatebonds.net/files/reports/2019_cbi_china_report_en.pdf

Alfred Schipke, Markus Rodlauer, Zhang Longmei, **The Future of China's Bond Market**, IMF, 2019, https://www.elibrary.imf.org/doc/IMF071/25402-9781484372142/25402-9781484372142/Other_formats/Source_PDF/25402-9781484393147.pdf?redirect=true

