



Invesco Investment Insights

Capital market assumption: China fixed income methodology

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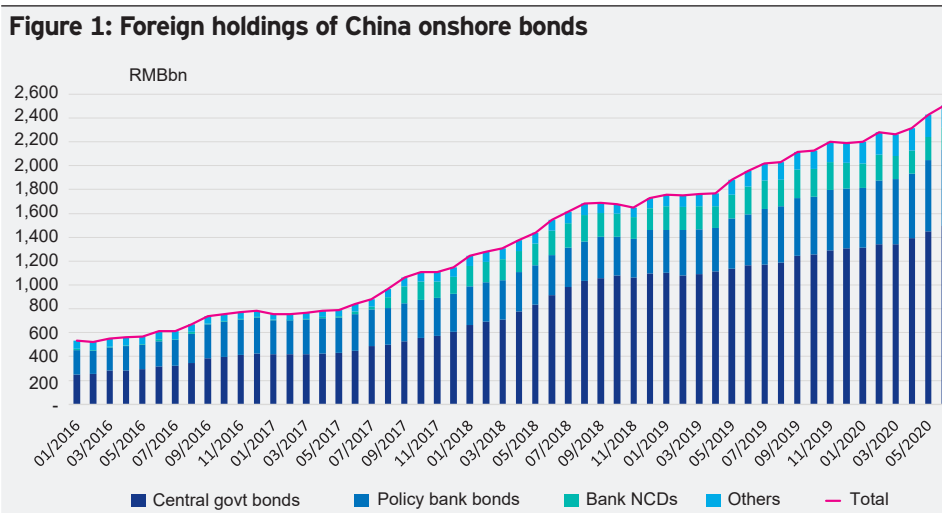
Key takeaways

- Divergence from international credit rating standards and capital-control measures drive stark differences between Chinese onshore and international bond markets. In-depth research on the China onshore bond market is needed to provide local insights to international investors.
- Our research could be helpful to determine the appropriate level of portfolio exposure to the Chinese bond market.
- Based on our research and understanding of the onshore and offshore markets, we explain how we formulate our capital market assumptions for China fixed income.

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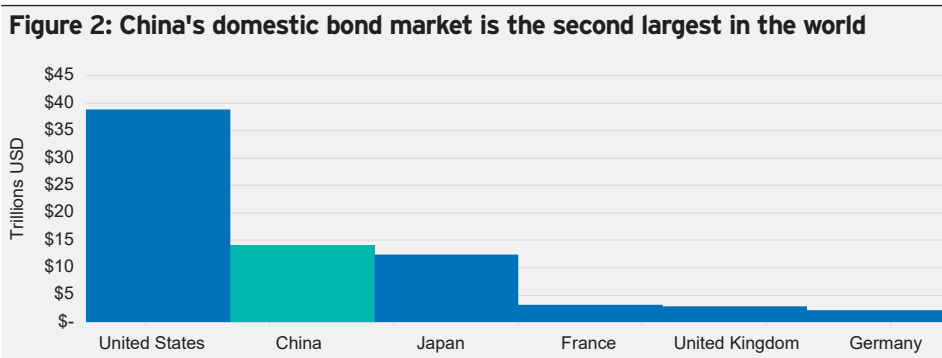
The launch of the Chinese Interbank Bond Market (CIBM) in 2016 and the Bond Connect initiative in 2017 marked significant milestones in the opening of China's Onshore bond market in addition to the QFII and RDQFII programs.

Stable economic growth, financial-system reforms and the move to a market-oriented exchange rate for the renminbi (RMB) have made China's financial markets more appealing to foreign investors, resulting in large increases in the amount of foreign bond holdings and trading volumes. As shown in figure 1 below, foreign holdings of China onshore bonds has more than quadrupled since 2016, to about RMB2.5 trillion as of June 2020. In a nod to the growth of the Chinese onshore bond market and its opening up, two major global index providers have included Chinese onshore bonds in their flagship indices, with their index weighting expected to grow over time.



Source: CEIC, Invesco, as of June 2020

As of Q1 2020, China's onshore bond market totaled RMB99.7 trillion (USD14.2 trillion) (Bank of International Settlements, 2020) in notional amount of bonds outstanding. It is now the second largest bond market in the world, behind the US, but ahead of Japan, the UK and other European countries. It has grown at an average annual rate of over 20% per year for the past five years¹.



Source: Bloomberg, Banks for International Settlements and Invesco, as of March 2020

While Chinese policymakers have made big strides in recent years to provide accessibility to the onshore bond market, foreign-exchange policies, divergence from international credit rating standards and capital-control measures drive stark differences between Chinese and international bond markets. As such, in-depth research on the China onshore bond market is needed to provide local insights to international investors.

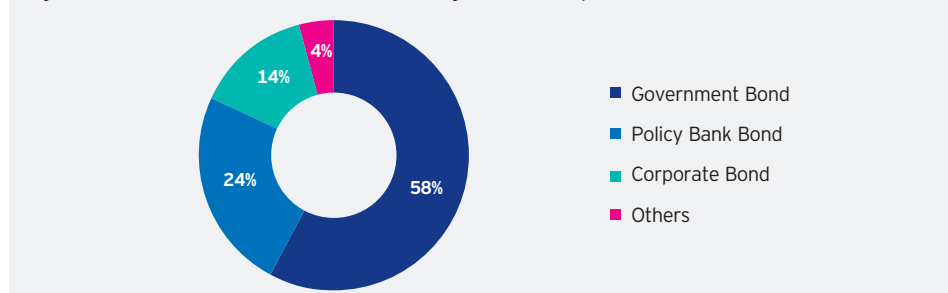
1. Source: Bank for International Settlements, Bloomberg, and Invesco calculations, as of May 2020.

As China's fixed income market opens further, investors are likely to increase their allocation to Chinese bonds. In this paper, we discuss how Invesco formulates our long-term capital market assumptions (CMAs) for both China onshore and offshore fixed income market. Investors may find our research helpful in their portfolio-construction process to determine the appropriate level of exposure to the Chinese bond market.

China's fixed income market

In this paper, we introduce both our approach to building long-term CMAs for China onshore CNY-denominated bonds as well as China offshore USD-denominated bonds. The onshore market is approximately USD12 trillion² (RMB75 trillion) and is much larger than the offshore market which is approximately USD316 billion³. Moreover, the onshore market includes more corporate issuers and therefore offers direct exposure to the dynamics of China's domestic economy with a much lower correlation to international markets. As such, this paper has a greater focus on onshore assets.

Figure 3: Onshore market outstanding bond composition



Source: Invesco as of June 2020

China's onshore bond market is primarily dominated by bonds issued by government institutions. In 2020, government bonds account for 58% of total outstanding bonds, among which 24% are Treasury bonds issued by the Ministry of Finance (MOF T-bonds) and 34% are local government bonds issued by provincial or city governments. Policy bank bonds also make up a significant portion of outstanding onshore bonds, with bonds issued by China Development Bank, Export-Import Bank of China and Agricultural Development Bank of China making up 24% of the market. Onshore corporate bonds make up 14% of the onshore bond market, of which 86% are issued by state-owned enterprises (SOEs) as of the end of 2018 (Fitch Ratings, 2019)⁴. To encapsulate each component of the onshore fixed-income market, we construct three onshore China CMAs using three benchmark indices:

1. Bloomberg Barclays China Treasury Index (CNY)
2. Bloomberg Barclays China Policy Bank and Treasury Index (CNY)
3. Bloomberg Barclays China Corporate Index (CNY)

For the offshore market, due to the lack of recent issuance of offshore government and policy bank bonds as well as its smaller market size relative to the onshore government and policy bank bonds, we decided to only develop CMAs for offshore corporates at this time. It is important to differentiate between onshore and offshore credit markets as the composition of bond issuers are entirely different. Onshore credits are dominated by SOEs consisting of local banks and mining, construction, infrastructure companies. These SOEs are largely driven by the financing of infrastructure investments. Offshore credit, on the other hand, comprises a more diverse set of corporate issuers including financial services, energy, oil and chemical companies, technology companies and banking institutions. We construct our offshore credit China CMA using Bloomberg Barclays Asia ex Japan Credit China IG Index (USD).

2. Source : Wind, as of February 2018

3. Source : Wind, as of February 2018

4. Source: Zhang, S., Huang, J. and Wang, Y., 2020. *China Corporate Bond Market Blue Book*. Fitch China Research Initiative.

China fixed income methodology

The framework for our China fixed-income CMAs embodies our global research, that is, a “building block”-based methodology to estimate returns for fixed income. In constructing our China onshore fixed income CMAs, we make systematic adjustments to account for the unique characteristics of the onshore bond market whilst adhering to this global framework.

Our building blocks provide a bottom-up approach in which the underlying asset-class returns are used to form estimates, with estimated returns being divided into income and capital appreciation components. The income component is measured by yield, while the capital appreciation component is measured by roll return, valuation change, and credit loss. Therefore, for China fixed income CMAs, we:

- Establish income component with the level of yield;
- Estimate capital appreciation via roll return which captures the effect of a bond moving closer to maturity as time passes;
- Estimate capital appreciation by forming valuation-change estimates based on how expensive or cheap the fixed income index currently is, and;
- Estimate capital appreciation by accounting for the impact of potential bond migration and default loss.

We decided to adhere to our global methodology for China offshore bond market. However in accounting for local characteristics of the China onshore bond market, we had to address two major hurdles while applying our global framework.

Our first hurdle concerns the method by which we construct our forward yield curve. The forward yield curve is important when deriving our estimates for yield, roll return and valuation change. For non-US markets, using interest rate parity (IRP) and the Philadelphia Fed survey interest rate forecasts is our usual standard global approach to building our forward yield curve. However, since China has capital restrictions, numerous studies have argued that IRP might not be directly applicable to the Chinese market. To circumvent this issue, we build our forward curve using Chinese forward rates in RMB.

Our second hurdle involves the modelling of credit loss. In our global model, we assume a percentage of spread as the expected credit migration loss from rating downgrades in investment grades (IG). However, historically in China, credit rating migration has been uncommon, and occasionally, we observe IG going straight to default. We adhere to our global approach as we believe the opening of and greater accessibility to China's onshore bond market and the increasing presence of international credit rating agencies within China will drive convergence to international standards in terms of credit ratings and credit migration trends.

Yield

Yield reflects the average income expected to be received when holding a fixed-income security until maturity. For the purpose of our CMAs, yield is calculated using the average of starting (current) and ending (estimated) yield levels.

To get ending yield levels, we examine how the current yield curves change over time as a result of two factors:

1. Changes to government interest rates, as suggested by academic literature (Litterman and Scheinkman, 1991⁵) - and;
2. Credit spreads over government interest rates.

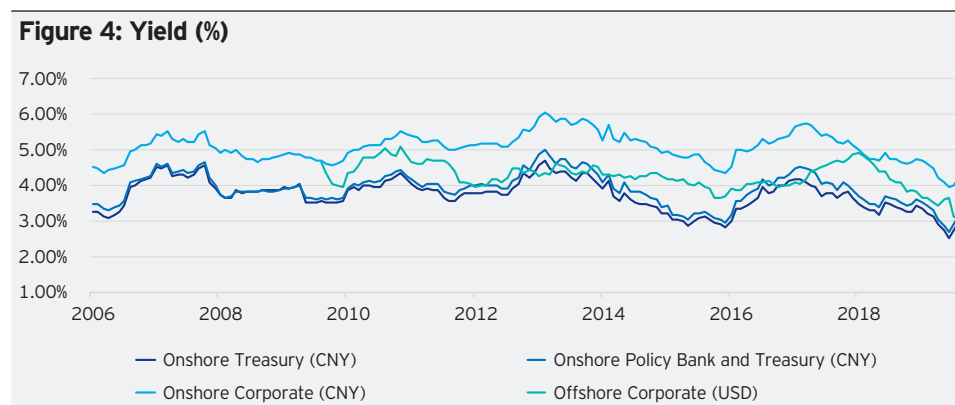
A change in government interest rates affects the level and slope of the current yield curve. To estimate this effect, we construct an ending yield curve.

5. Source: Litterman, R. and Scheinkman, J., 1991. "Common Factors Affecting Bond Returns". *The Journal of Fixed Income*, 1(1), pp.54-61.

For non-US bonds denominated in a foreign currency, the usual global approach is to construct an ending yield curve using IRP and the consensus interest rate forecast of the Federal Reserve Bank of Philadelphia to obtain ending yield for three-month Treasury bills and 10-year Treasury notes. Polynomial interpolation is then applied between these two points to generate the ending yield curve. The impact of the changes in Treasury interest rates is then calculated by taking the difference in yields between the current and estimated yield curves, at a specified duration.

For China, however, we adopt a different approach. According to numerous academic studies, in countries with restrictions on capital flows such as China, the theory of IRP may not hold as well due to transaction costs and political risks arising from differences in tax/tariff structures or capital-control measures (Aliber, 1973⁶; Dooley and Isard, 1980⁷). Thus, when accounting for the impact of changes in Treasury interest rates on onshore China bonds, we believe it is optimal to use China forward rates for building our ending yield curve. For offshore China bonds denominated in USD, we adhere to the global method, and therefore in building the ending yield curve we use consensus forecasts from the Federal Reserve Bank of Philadelphia.

For credit spread changes, if the asset class is a local currency government bond, we assume there is no credit spread since history shows that credit spreads are negligible, and will stay at zero. As such, for onshore China treasuries (MOF T-bonds), yield is determined solely by a change to government interest rates. For indices with substantial credit spread such as onshore credit and offshore credit, the change in credit spread is measured by the difference between the current spread level and the 10-year average spread level.



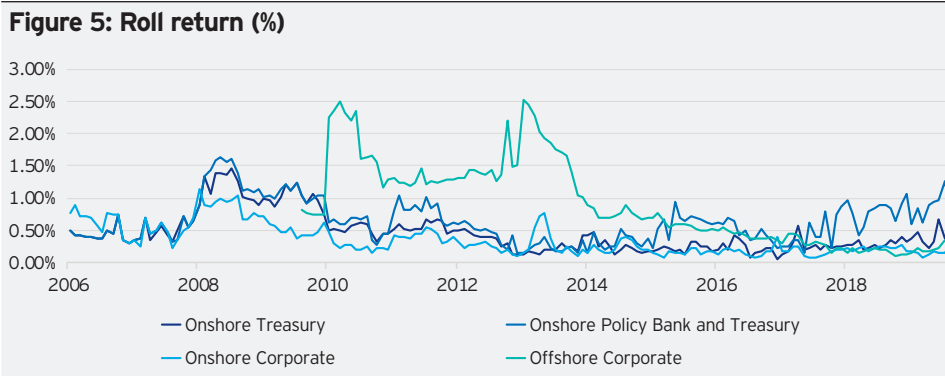
Source: FactSet, Bloomberg and Invesco as of June 2020

Roll return

As a component of capital appreciation, the roll return reflects the impact of bond maturation on bond price, with all else being the same. Given that the yield curve typically slopes upwards, movement along the yield curve (towards maturity) will usually have a positive impact on returns. This is because as the bond moves towards maturity, we mark to market at a lower interest rate. Since there is an inverse relationship between the price and interest rate of bonds, for the yield on the bond to decrease, the price of the bond needs to increase - representing a capital gain. For China onshore bonds, stable yield curves in recent years have resulted in consistent roll return. For China offshore bonds denominated in USD, flattening yield curves in the US have resulted in a decrease in roll return since 2013.

6. Source: Aliber, R., 1973. "The Interest Rate Parity Theorem: A Reinterpretation". *Journal of Political Economy*, 81(6), pp.1451-1459.

7. Source: Dooley, M. and Isard, P., 1980. "Capital Controls, Political Risk, and Deviations from Interest-Rate Parity". *Journal of Political Economy*, 88(2), pp.370-384.



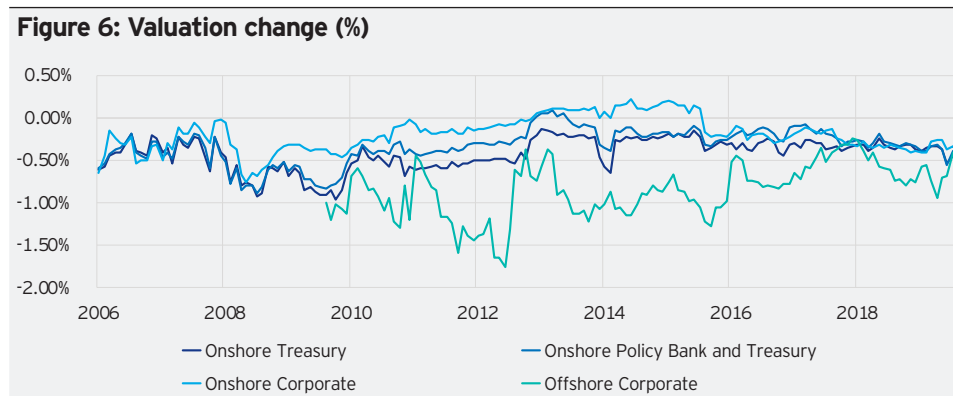
Source: FactSet, Bloomberg and Invesco as of June 2020

Valuation change

Valuation change is our second component of capital appreciation. Valuation change captures the price change in bonds in response to changes in interest rates, representing the movement of the yield curve.

To measure valuation change we account for the impact of changes to Treasury interest rates, as well as changes to credit spreads over Treasury interest rates. The impact on price from changes in Treasury interest rates can be captured by taking the difference between current (starting) and estimated (ending) yield.

For credit spreads, we draw from historical studies exhibiting mean-reverting properties of credit spreads (Prigent et al., 2001)⁸. Thus, we calculate the difference between the current credit spread versus the 10-year average credit spread. For China onshore Treasury (MOF T-bonds), since credit spreads are negligible, valuation change in these assets are mainly driven by changes in government interest rates. For onshore policy bank and treasury (MOF T-bonds), onshore credit and offshore credit, we account for both drivers of valuation change.



Source: FactSet, Bloomberg and Invesco as of June 2020

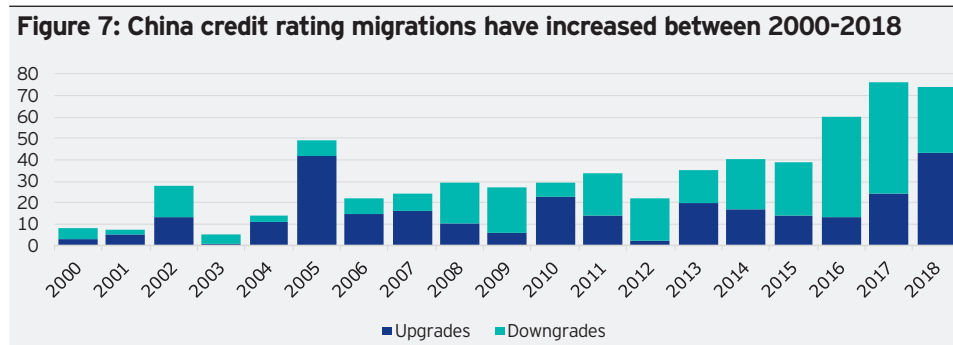
8. Source: Prigent, J-L., Renault, O., and Scaillet, O., 2001. "An Empirical Investigation in Credit Spread Indices". *Journal of Risk*, 3, pp.27-55

Credit migration

Credit migration captures the potential impact on returns from a downgrade in credit rating or debt default.

In our global approach, credit migration is modelled by taking a certain percentage of haircut on credit spreads, based on historical study in the US. International credit rating agencies have long monitored foreign currency and offshore issued Chinese debt so we apply our global approach for offshore Chinese credit. However, the landscape in the onshore credit market is more complex.

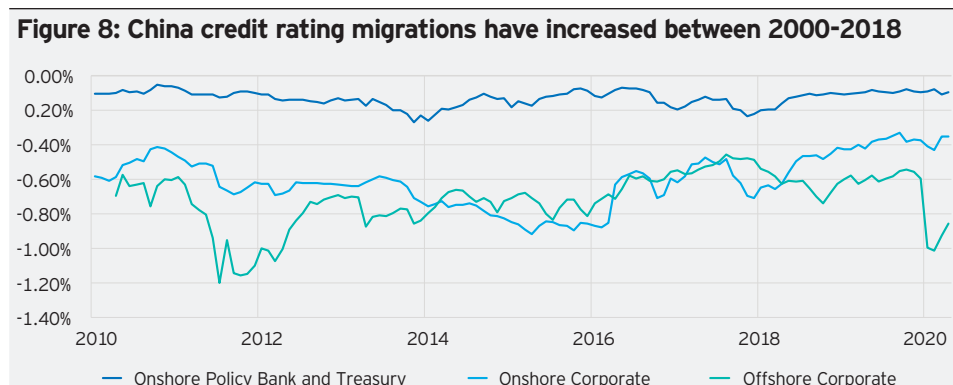
Historically, default trends in China have behaved differently to other markets. Rating migrations were relatively uncommon, and occasionally investment grade bonds went straight to default. In 2017, as part of China's initiative to open up its onshore bond market to foreign investors, Chinese policymakers began allowing overseas credit rating companies to establish wholly-owned Chinese subsidiaries to speed up reforms and foster competition in the domestic credit-rating market. This has prompted a significant influx of credit migration activity in the China onshore bond market (Standard & Poor's, 2018)⁹.



Source: Standard & Poor's as of Dec 2018

As accessibility to China's bond market continues to improve, there is an increasing incentive for greater transparency regarding credit ratings to add confidence to foreign investor decisions in the China onshore market. Furthermore, credit spreads in China are reflective of credit risk events such as downgrades and defaults as they drive down the risk appetite of investors. For example, in 2012, credit spreads rose due to a combination of rising benchmark interest rates and the fear of potential defaults, as well as in 2018, when there was a wave of corporate bond defaults in China. As such, we believe credit migration and rating activities will converge towards international trends in the future.

Thus, we adhere to our global approach when estimating credit migration for both onshore and offshore fixed income in China, taking a fixed percentage cut on credit spreads as expected credit migration.



Source :FactSet, Bloomberg and Invesco as of June 2020

9. Source: Han, X., Kesh, S., Iyer, S. and Sek, D., 2018. "Default, Transition, and Recovery: 2018 Annual Greater China Corporate Default And Rating Transition Study". *Standard & Poor's China Credit Spotlight*.

Conclusion

In this research we discussed how we incorporated additional insights to adjust our global Capital Market Assumptions model to come up with long-term expected returns for various fixed-income asset classes in China.

For Chinese onshore fixed income we use a different approach for building the forward curve compared to our global model, and for the credit loss component of Chinese onshore credit we assume that the Chinese credit market will continue to evolve to become more mature, and that it will see more credit rating migrations in years to come. We believe the entry and expansion of international rating agencies in China, as well as credit events that we witnessed past several years will expedite the development. Based on this we came up with long-term return expectations for Chinese treasuries (MOF T-bonds), treasuries (MOF T-bonds) and policy bank bonds, and investment grade credit.

For the China offshore USD-denominated market, we have followed our global framework to build Capital Market Assumptions for credit only. This is due to the lack of appropriate benchmark for Chinese treasuries and policy bank bonds which come from insufficient new issues.

Table 1: Returns summary (as of June 2020)

6/20/2020	Yield	Roll Return	Valuation Change	Credit Loss	Forecasted 10Y Return (Local Currency)	IRP (Interest rate parity)	Forecasted 10Y Return (USD)
Onshore Treasury (CNY)	3.03%	0.40%	-0.41%	0.00%	3.02%	2.25%	0.77%
Onshore Policy Bank + Treasury (CNY)	3.21%	0.85%	-0.39%	-0.10%	3.57%	2.25%	1.33%
Onshore Credit (CNY)	4.24%	0.32%	-0.41%	-0.35%	3.79%	2.25%	1.55%
Offshore Credit (USD)	2.77%	0.30%	-0.24%	-0.86%	1.97%	0.00%	1.97%

Source: Invesco, as of June 2020. These estimates are forward-looking, are not guarantees, and they involve risks, uncertainties, and assumptions. These estimates reflect the views of the authors, the views of other investment teams at Invesco may differ from those presented here.

“Onshore Treasury” is based on Bloomberg Barclays China Treasury Total Return Index CNY.

“Onshore Policy Bank and Treasury” is based on Bloomberg Barclays China Policy Bank and Treasury Total Return Index CNY.

“Onshore Credit” is based on Bloomberg Barclays China Corporate Index CNY.

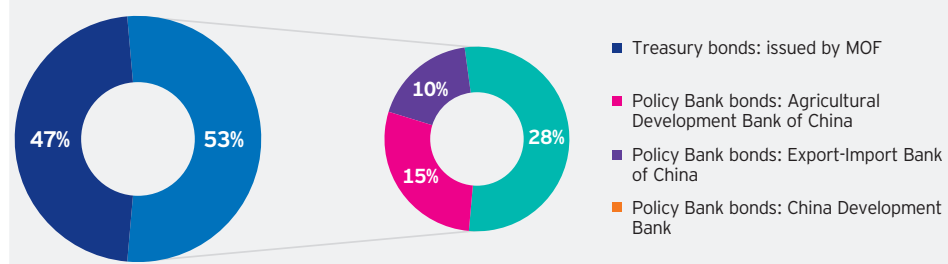
“Offshore Credit” is based on Bloomberg Barclays Asia ex Japan USD Credit China IG.

Appendix

Index constituents (as of June 2020):

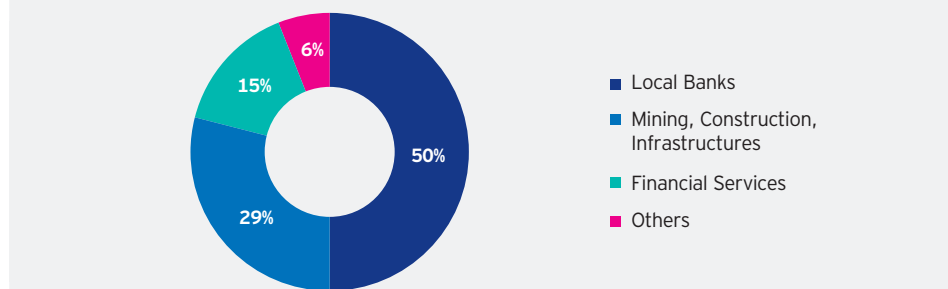
1. Bloomberg Barclays China Treasury Index (CNY) holds 100% treasury bonds issued by the Ministry of Finance (MOF) (Bloomberg, as of June 2020)
2. Bloomberg Barclays China Policy Bank and Treasury Index (CNY) holds 53% policy bank bonds and 43% treasury bonds issued by MOF (Bloomberg, as of June 2020)
3. Bloomberg Barclays China Corporate Index (CNY) largely constitutes of local banks as well as Mining, Construction and Infrastructure state-owned enterprise (SOE) bonds
4. Bloomberg Barclays Asia ex Japan USD Credit China IG Index mainly constitutes of financial services, energy, oil and chemical companies, technology companies and banking corporate bonds

Figure 9: Bloomberg Barclays Policy Bank and Treasury Index (CNY)



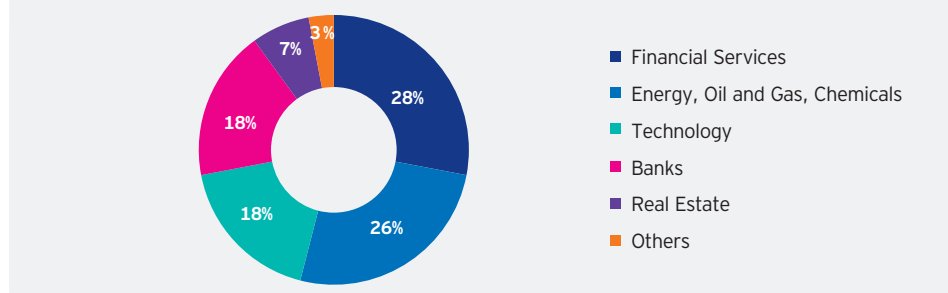
Bloomberg and Invesco, as of June 2020

Figure 10: Bloomberg Barclays China Corporate Index (CNY)



Bloomberg and Invesco, as of June 2020

Figure 11: Bloomberg Asia ex Japan Credit China IG (USD)



Bloomberg and Invesco, as of June 2020

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