

Research Paper

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# The ‘Belt and Road’ Initiative and the London Market – the Next Steps in Renminbi Internationalization

## Part 1: The View from Beijing

**CHATHAM  
HOUSE**

The Royal Institute of  
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## Summary

- The Chinese government seeks a more prominent role for China's currency, the renminbi, in the international financial system. Its efforts to establish the renminbi as an international currency – like the US dollar – have hitherto emphasized relatively limited applications such as trade settlement and exchange rate arbitrage. However, recent market and policy developments point to the internationalization process henceforth being driven more by the renminbi's status as a reserve currency.
- Impetus for further internationalization will come from the currency's inclusion since October 2016 in the IMF's basket of Special Drawing Rights (SDRs), and from outward direct investment associated with the financing of the 'Belt and Road' initiative.
- The internationalization process is complicated by the weakening of the renminbi since 2015, which has resulted in a reversal of market dynamics. Previously, expectations that China's currency would appreciate encouraged international investors to hold renminbi-denominated assets. However, as these expectations have faded, the prospect of the renminbi depreciating against traditional reserve currencies such as the US dollar means that demand for renminbi-denominated *liabilities* is set to increase.
- Macro developments are potentially conducive to renminbi internationalization. Continued growth in the Chinese economy and the addition of the renminbi to the SDR basket have the potential to boost demand for renminbi-denominated bonds as global safe assets.
- Investment in infrastructure in developing countries will need to increase from approximately US\$0.8–0.9 trillion per year in 2008 to approximately US\$1.8–2.3 trillion (at 2008 constant prices) per year by 2020. This works out at a gap of approximately US\$1 trillion between the level of 2008 and that of 2020, over half of which is accounted for by countries with either speculative-grade credit ratings or no credit rating. Raising capital for Belt and Road projects presents an ideal opportunity to fill the gap between demand for and supply of infrastructure financing in the region.
- London is well placed to expand its role as an offshore renminbi financial centre. More products, in addition to debt securities, could be introduced to reinforce London's burgeoning offshore renminbi market. These could include Belt and Road investment products, wealth management products, asset securities, Chinese local government bonds and other more complex instruments. London could coordinate with Chinese investors on the development and issuance of various securities.

# 1. Introduction

In 2009, Zhou Xiaochuan, the governor of the People's Bank of China (PBoC), China's central bank, proposed the establishment of a 'super-sovereign reserve currency' (Zhou, 2009). The idea drew global attention – the announcement came at a time when China was demanding increased say in international economic governance to reflect both the rise in China's share of world GDP and increasing concerns over the adequacy of reforms in response to the global financial crisis.

Supporters of his idea argued that a super-sovereign reserve currency system would be preferable to a single international reserve currency, given the fundamental flaws in the existing system. The proposal also served to deliver a message about China's opinions: that China was dissatisfied with the current international monetary system, and eager to reduce what it saw as that system's over-reliance on the US dollar (Gao and Yu, 2012). As a result, since 2009 the internationalization of the renminbi has become one of China's policy priorities.

**As of September 2016, the renminbi ranked as the fifth most used payment currency in the world, and eighth in global foreign exchange transactions.**

The internationalization process has gone through several stages to date. The Chinese government deregulated renminbi trade settlement in 2009. It followed this with a series of reforms that included lifting strict regulations on renminbi-denominated bond issuance, direct investment, and allowing foreign institutions to conduct transactions in domestic money markets. Partly as a result of such measures, the renminbi rapidly gained popularity in economies neighbouring China; in those countries it has begun performing the functions of a reserve currency. It has become an increasingly widely held portfolio asset for global public and private investors. It is also being more widely used in payments, currency trading, trade settlement and Chinese outward direct investment (ODI). As of September 2016, the renminbi ranked as the fifth most used payment currency in the world, and eighth in global foreign exchange transactions. It also accounted for approximately 29 per cent of China's trade settlement and 10 per cent of the country's ODI (PBoC, 2016). In response to the currency's increased use, on 1 October 2016, the renminbi was added to the IMF's Special Drawing Rights (SDR) basket – following the assessment completed in December 2015.

The internationalization of the renminbi has attracted the attention of policymakers, market participants and economists, prompting extensive discussions of its benefits, costs, preconditions and implications for the international monetary system (Gao, 2016). Hong Kong has become a major offshore renminbi centre. London has also stepped up renminbi activity, serving as a global connecting hub for issuers and investors and establishing a central role in the promotion of the renminbi in international markets (Xiao, 2014; Subacchi and Huang, 2012). New offshore renminbi markets have also emerged in cities such as Singapore, Paris and Taipei (Xiao and Li, 2015; Lu, 2014).

These developments have facilitated cross-border renminbi flows and created a substantial pool of renminbi-denominated assets offshore. However, their unintended consequences include the creation of room for arbitrage, with attendant risks to financial stability in China; and potential changes to renminbi money aggregates, which could make monetary policy less effective (Gao, 2009).

Renminbi internationalization is also facing new challenges. Its previous phases have been driven by expectations that the currency would appreciate, and that the Chinese authorities would steadily remove capital-account restrictions. However, following the PBoC's decisions to relax its active management of the renminbi exchange rate in August 2015 and thereafter to re-peg the currency to a new basket – under the pressure of capital outflows and a sharp decline in foreign reserves – China has tightened its management of capital flows. These less-than-favourable conditions have made it increasingly hard for non-residents to acquire renminbi-denominated assets.

The size of offshore renminbi deposits has begun to shrink as a result. Furthermore, growing concerns over the state of the world economy (reflecting risks such as those arising from ultra-low interest rates in Western economies) and the shift in US monetary policy have resulted in capital flight into the appreciating dollar. This has strengthened the desirability of the US dollar as a 'global safe asset' although the US dollar is arguably not a safe asset in the long term.

Despite the current negative outlook for China's currency, a number of factors look likely to emerge as new drivers of renminbi internationalization in the medium term. These include the 'Belt and Road' infrastructure investment initiative; the creation of new financial infrastructure such as the Cross-Border Interbank Payments System (CIPS); the rapid increase in overseas investment by Chinese enterprises, banks and government; and the establishment of new financial institutions such as the Asian Infrastructure Investment bank (AIIB).

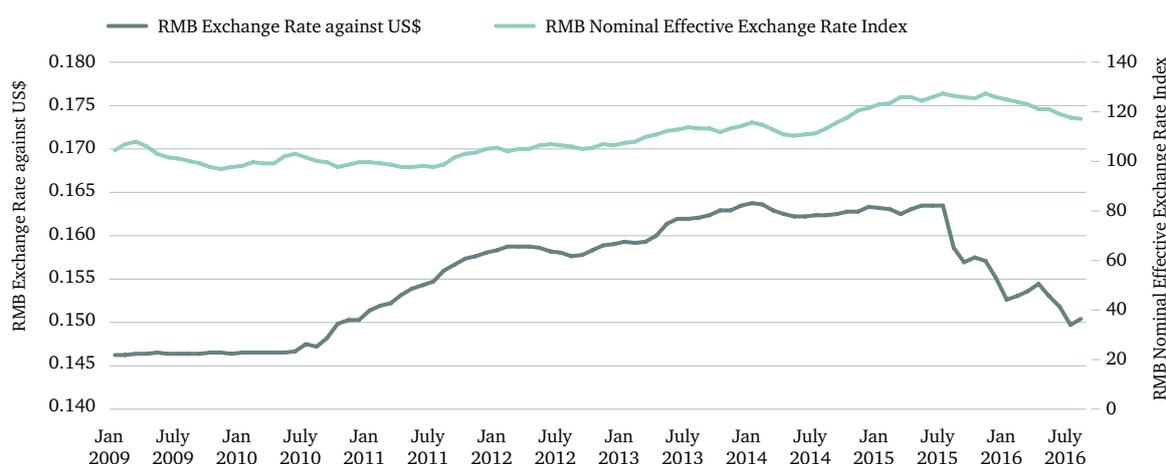
In this research paper we look at these factors. We investigate the investment demand arising from Belt and Road projects and the potential for further cooperation between China and the UK, in particular the opportunities around London's position as an offshore renminbi market and global financial centre. This paper should be read as a companion publication to the January 2017 Chatham House paper, *The 'Belt and Road' Initiative and the London Market – the Next Steps in Renminbi Internationalization. Part 2: The View from London* (Subacchi and Oxenford, 2017).

## 2. New Factors Affecting Renminbi Internationalization

### Evaporating expectations of renminbi appreciation

From 2010 to August 2014, the renminbi enjoyed a prolonged period of appreciation against other major international currencies, including the dollar (Figure 1). However, since August 2015, the renminbi has been on a declining trend against the dollar, significantly altering the pattern of the currency's internationalization.

**Figure 1: RMB exchange rate against US\$, and RMB nominal effective exchange rate index (Jan. 2009–Aug. 2016)**



Source: Wind Database.

The change in market sentiment has been accompanied by a reduction in the use of renminbi to settle cross-border trade transactions. In the third quarter of 2015, the value of such activity had peaked at RMB 2.09 trillion (US\$313 billion),<sup>1</sup> with renminbi-denominated transactions accounting for 32.5 per cent of China's total cross-border trade (PBoC, 2016). Since then, renminbi outflows on the current account – such as China's payments for its imports of goods and services – have declined significantly. Indeed in net terms renminbi have begun to flow back into China through the current account. The number of non-Chinese holders of renminbi and renminbi-denominated assets has fallen. Foreign exporters have become less willing to accept the Chinese currency as payment. At the same time, more importers in countries outside China have chosen to pay Chinese counterparties in renminbi, which has had the effect of returning renminbi to China. In the first half of 2016 only RMB 1.32 trillion worth of cross-border trade was settled in renminbi, and the currency's share of China's total cross-border trade decreased to 22 per cent as market participants switched to using the US dollar and other major currencies to pay each other (PBoC, 2016).

<sup>1</sup> RMB 6.67:US\$1 as of 30 September 2015. Source: Thomson Reuters Datastream.

Although the net inflow of renminbi back into China is hurting the currency's internationalization prospects, long-term factors ought to mitigate this trend. As the country's financial system opens further and policy reforms progress, the renminbi exchange rate and expectations around its future movements are likely to stabilize. This will make exchange rate risk less of a disincentive to using the renminbi. At the same time structural trends – such as the rise in China's share of global exports – are likely to drive an expansion in cross-border trade and renminbi settlement that will entrench the currency more firmly in the international system.

A decline in the foreign-currency exposure of Chinese corporates will likely aid this shift by reducing capital outflows, supporting domestic asset prices and eventually boosting yields to the point that Chinese investments are attractive to international firms. The PBoC will be ready to intervene when necessary to prevent the most severe currency swings (Ding, 2016). Assuming that the exchange rate reaches a new equilibrium, inflows of renminbi back into China through the current account should slow. Expectations of renminbi depreciation increase the yields on offshore renminbi-denominated bonds, which reduces the issuance of offshore renminbi-denominated bonds in the short term. Since China Development Bank (CDB) issued the first 'dim sum bond'<sup>2</sup> in Hong Kong in 2007, these instruments have become the main renminbi-denominated product in the offshore market.

Initially, due to expectations of renminbi appreciation and a lack of any renminbi backflow<sup>3</sup> mechanism before 2015, foreign investors' demand for offshore renminbi-denominated bonds was strong even at relatively low yields. On the supply side low borrowing costs encouraged issuers to use the offshore market, as yields at the time were lower than in the (much larger) onshore market. The total volume of dim sum bond issuance increased dramatically as a result.

However, since 2015 markets have factored in expectations of a weaker renminbi, particularly against the US dollar, which has been strengthening in response to the end of the US Federal Reserve's quantitative easing programme and the subsequent increases in the federal funds rate (Figure 1). This has led foreign investors to request a higher premium on offshore renminbi-denominated bonds to compensate for potential losses on the exchange rate. At the same time, slower economic growth in China has forced the PBoC to cut domestic interest rates and bank reserve ratios, making it cheaper to borrow onshore even as raising capital offshore has become costlier. This has discouraged Chinese enterprises from using the offshore market to raise capital. According to the Chinese Wind Database, only 27 dim sum bonds were issued globally during the first three quarters of 2016, with a total value of RMB 26.1 billion. This was down from 100 issues, valued at RMB 69.9 billion, in the same period of 2015.

When the renminbi was expected to appreciate, non-Chinese investors preferred to hold renminbi-denominated *assets*. However, with the renminbi now expected to depreciate, they are incentivized to hold renminbi-denominated *liabilities*. Foreign investors will prefer to borrow in renminbi in the hope of repaying their loans more cheaply in the future. This creates an opportunity for increased renminbi outflows through the capital account.

There is a parallel with the US's experience in encouraging other countries to create dollar-denominated liabilities, which proved to be an effective tool in promoting dollar internationalization (Engerman and Gallman, 1996). During the First World War, the US developed a domestic bond

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<sup>2</sup> A 'dim sum bond' is a renminbi-denominated debt security issued outside mainland China.

<sup>3</sup> 'Backflow' here is defined as offshore renminbi returning to China through the capital account. China's capital account has not been fully opened, so offshore renminbi cannot necessarily flow back to China freely. To enable renminbi backflow under these circumstances, the PBoC has been introducing a series of mechanisms, shown in Table 2. Indeed, these mechanisms constitute the process by which China's capital account will eventually be opened more fully.

market and encouraged European governments to issue dollar-denominated bonds in New York as a means of financing war endeavours. Having established this market, the US was subsequently able to build on this during the Second World War – when its dollar-denominated lending to other Western countries tripled in comparison to that during the First World War. The US continued to increase its influence in international financial markets after the Second World War, through a series of dollar-denominated loans, donations and grants to European countries (Engerman and Gallman, 1996). If China is able to execute a similar strategy, foreign investors' acquisition of renminbi-denominated liabilities could promote currency flows through the capital account and herald a new dimension of renminbi internationalization.

## The 'Belt and Road' initiative

The 'Belt and Road' initiative – also widely referred to in the West as 'One Belt, One Road' – has the potential to serve as a mechanism for cooperation between China and the rest of the world, and as a vehicle for renminbi internationalization. The aim of the initiative is not to facilitate renminbi internationalization *per se*, but it may have such effect in practice. The initiative consists of a planned series of infrastructure projects that, when complete, will connect China via maritime routes to the rest of the Asia-Pacific region and via Central Asian land routes to Europe.

For financial markets, the Belt and Road initiative is likely to play a crucial role in three particular areas:

- First, it will promote **renminbi settlement through the current account**. One of the initiative's aims is to facilitate bilateral trade between China and countries along Belt and Road routes. In 2015, the volume of bilateral trade between China and these countries reached US\$995.5 billion – up from US\$877.2 billion in 2012 – and accounted for 25.1 per cent of China's total cross-border trade volume (Xinhua, 2016a). China is targeting an annual trade volume of US\$2.5 trillion with these countries within the next 10 years, according to a statement by Chinese President Xi Jinping at the Boao Forum for Asia in 2015 (China Business Network, 2015). Chinese companies are already undertaking a large number of construction projects in these countries. In 2015 Chinese companies signed 3,987 construction contracts, worth US\$92.4 billion in total, in 60 Belt and Road countries. These commitments accounted for 44.1 per cent of the total contracted value of Chinese overseas construction projects in that year. The projects are likely to boost exports of Chinese goods and services to Belt and Road countries, thereby increasing demand for renminbi trade settlement and promoting currency mobility through the current account.
- Second, the Belt and Road initiative promises to boost **renminbi outflows through the capital account**. In recent years, Chinese enterprises have increased investment in Belt and Road regions. Renminbi-denominated outward direct investment (ODI) has risen alongside this trend. In 2015, China's ODI extended to 49 countries in such regions, with investment related to the Belt and Road initiative amounting to US\$14.8 billion, 18.2 per cent higher than in 2014. A significant part of China's ODI is currently denominated in renminbi. From January 2012 to September 2015, the amount of ODI settled in renminbi increased from RMB 0.2 billion to RMB 20.8 billion, the latter accounting for 20 per cent of China's total ODI as of September 2015 (Zhang, 2016). As the Belt and Road initiative scales up and more infrastructure projects are undertaken, China's ODI in the relevant countries will increase, and renminbi outflows on the capital account will rise accordingly. Moreover, as mentioned, the initiative actively promotes

renminbi trade settlement. So the countries in question are likely to be more open to using renminbi in order to avoid exchange rate risk and reduce transaction costs.

- Third, the Belt and Road initiative is encouraging **the international spread of the renminbi as a store of value** – a key feature of any global currency. Demand for investment denominated in renminbi is increasing in Belt and Road countries, which have also become more open to using the currency as a reserve asset (Peng and Liu, 2016). This provides an opportunity to increase the diversity and scale of renminbi-denominated products in offshore markets. Demand for new renminbi-denominated financial products such as local government bonds and asset-backed securities is likely to increase. Involvement in Belt and Road projects will also encourage countries to incorporate renminbi in their foreign exchange reserves. At present, several Asian countries – including South Korea, Malaysia and Cambodia – have made the renminbi one of their reserve currencies. More countries are expected to follow this trend in the near future. As demand for renminbi-denominated financial assets continues to increase, there will be greater potential for both China's central government debt and local government debt to become global safe assets and attract the interest of foreign central banks.

## Inclusion of the renminbi in the SDR basket

The IMF officially incorporated the renminbi into its SDR basket on 1 October 2016, thus making it the first emerging-market currency to be included (the other four component currencies are the US dollar, euro, yen and sterling). The IMF's decision has a number of implications for the renminbi's international status. In particular, it may boost the currency's credibility with international investors sufficiently to encourage them to hold more renminbi-denominated assets as reserves. This is especially likely if financial sector liberalization and relatively solid economic growth continue. The PBoC estimates that, following the currency's inclusion in the SDR basket, the proportion of renminbi in foreign central banks' official reserves could exceed 4 per cent within 'a short period'. Standard Chartered Bank has predicted that total net purchases of China's bonds and stocks could reach RMB 5.5 trillion (US\$791 billion)<sup>4</sup> and RMB 6.2 trillion respectively by 2020 (Xinhua, 2016b).

**The renminbi's inclusion in the SDR basket will encourage the government to continue banking reform, financial sector reform and capital-account liberalization in order to meet rising foreign demand for renminbi-denominated assets.**

The renminbi's inclusion in the SDR basket will also encourage the government to continue banking reform, financial sector reform and capital-account liberalization in order to meet rising foreign demand for renminbi-denominated assets. This process will require market-oriented interest rate reforms, including the development of a stronger independent pricing policy by financial institutions and a process for setting interest rates that more fully takes market forces into account. The exchange rate formation mechanism will also need reform, which will require a widening of the floating band within which the renminbi trades.

If domestic market reform continues, supported by economic growth, renminbi-denominated assets will eventually be more widely considered as 'safe' assets by global investors and sovereigns (Liu, 2015).

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<sup>4</sup> Based on an exchange rate quoted by Reuters of RMB 6.95:US\$1 on 26 December 2016.

According to IMF analysis, global safe assets have many functions: they are reliable stores of value, act as collateral in repurchase and derivatives markets, are key instruments in fulfilling prudential regulation, and function as pricing benchmarks (IMF, 2012). The international reserves of central banks consist mainly of such assets rather than cash. Typical global safe assets include AAA-rated or equivalent bonds, issued by the central governments of developed countries and by multilateral financial institutions such as the World Bank. Some high-quality lower-rated (AA or equivalent) bonds – such as those issued by other developed-country central governments, local governments, and cross-border financial institutions and companies – are considered by investors to be of near global safe asset status.

The renminbi’s inclusion in the SDR basket is an important step towards achieving safe asset status. Its prospects are helped by the fact that in the years since the financial crisis, assets once deemed ‘safe’ by investors are no longer considered as such. Government debt/GDP ratios in countries such as the US and UK have risen sharply since the crisis, owing to a combination of countercyclical public spending and decreased government revenue. The eurozone debt crisis of 2010–12 has negatively affected fiscal stability and sustainability in many eurozone member states. A number of Western governments have lost their AAA or equivalent sovereign credit ratings (see Table 1), signalling that investors do not believe these governments’ bonds to be as safe as they did pre-2008.

Downgrades to benchmark ratings have rippled through other asset markets, damaging the credit ratings of local governments, companies and financial institutions. For example, the downgrade of the US government’s credit rating by Standard & Poor’s (S&P) in 2011 also led to S&P downgrading its ratings for the Federal Deposit Insurance Corporation (FDIC), the Federal Farm Credit Bank, 10 Federal Home Loan Banks (FHLBs), mortgage agencies Fannie Mae and Freddie Mac, the Depository Trust Company (DTC), three clearing corporations (the National Securities Clearing Corporation, Fixed Income Clearing Corporation, and Options Clearing Corporation), and around 11,000 municipal bonds. Soon after that, two other ratings agencies, Moody’s Investors Service and Fitch Ratings, downgraded the credit ratings of many international large banks and US local governments (Chen, 2013).

**Table 1: Downgrades of sovereign credit ratings in developed countries**

	<b>US</b>	<b>UK</b>	<b>France</b>	<b>Austria</b>
Sovereign credit rating before 2008	AAA	Aaa	AAA	AAA
Sovereign credit rating as of Dec. 2014	AA+	Aa1	AA	AA+
Date of downgrade	Aug. 2011	Feb. 2013	Nov. 2013	Jan. 2012
Downgrading agency	S&P	Moody’s	S&P	S&P
	<b>Japan</b>	<b>Italy</b>	<b>Spain</b>	<b>Portugal</b>
Sovereign credit rating before 2010	Aa3	Aa2	AAA	A1
Sovereign credit rating as of Dec. 2014	A1	Baa2	BBB	Ba2
Date of downgrade	Dec. 2014	Aug. 2014	May 2014	May 2014
Downgrading agency	Moody’s	Moody’s	S&P	Moody’s

Sources: Moody’s Investors Service, Standard & Poor’s, Fitch Ratings.

The result of these downgrades has been a decline in the supply of global safe assets that has coincided with an increase in demand for just such instruments in order to meet stricter regulatory standards. The implementation of the Basel III regime in 2013–19 is intended to tighten the regulation, supervision and risk management of commercial banks. Banks all over the world will face higher capital adequacy requirements, lower leverage ratios and more rigid evaluation of their risk-weighted assets. All these measures raise the regulatory thresholds for banks' asset quality, meaning that banks will need more low-risk assets to meet regulatory requirements. In addition to the international Basel III framework, many countries have launched their own comprehensive financial regulatory reforms, which have further increased demand for safe assets. For example, there has recently been an increase in over-the-counter (OTC) derivatives transactions needing safe assets as collateral.

The implication of the above trends is a likely significant mismatch between the supply of and demand for global safe assets for a relatively long time. Traditionally, most global safe assets were provided by developed countries. But as their sovereign debt problems cannot easily be resolved in the short and medium term, this creates an opportunity for emerging economies such as China to develop instruments to satisfy global demand for risk-free (or near-risk-free) assets.

If the renminbi becomes seen as a relatively safe and liquid asset, demand for renminbi-denominated assets worldwide will increase. A report by Standard Chartered Bank predicts that the proportion of renminbi-denominated assets in global foreign exchange reserves (excluding China's foreign exchange reserves) will increase to 5 per cent in five years, up from 1 per cent currently (Ding, 2016). Commercial investors such as mutual funds, pension funds and insurance companies will also increase their holdings of renminbi-denominated assets (Ding, 2016). If China meets this demand for its currency by expanding its bond market and promoting renminbi-denominated bonds (government bonds in particular), its ambitions for renminbi internationalization and a more diversified international monetary system will have taken a major step forward.

## Establishment of the AIIB and 'BRICS Bank'

The Asian Infrastructure Investment Bank (AIIB) and the New Development Bank – widely known as the 'BRICS Bank' – are two newly established multilateral development banks launched by emerging markets. Although the AIIB and New Development Bank, in contrast to Chinese policy banks, do not have renminbi internationalization as their priority, their presence in China will still facilitate the process to some extent.

First, the banks' activities may support renminbi outflows via the capital account. Although the equity capital of the two banks is denominated in US dollars, this should not prevent them from providing finance in renminbi and other currencies in international markets. Indeed the fact that China is the AIIB's largest shareholder, and that both banks have their head offices in China, makes it convenient for them to provide renminbi financing in the Chinese market. Chinese investors will consider the two banks as AAA-rated institutions, so their borrowing costs should be relatively low. The New Development Bank issued its first renminbi-denominated bond in July 2016, with the money raised earmarked for green projects in developing countries. Similarly, the AIIB has stated that it will raise funds by issuing renminbi-denominated bonds for infrastructure projects in developing countries. Additionally, these two banks are able to provide loans to Chinese companies wishing to invest abroad.

The way in which the AIIB and New Development Bank are structured may incentivize them to promote the development of renminbi-denominated products in offshore markets. Both banks can draw on

the sovereign credit of member countries, giving them the ability to issue renminbi-denominated long-term construction bonds with high ratings in offshore markets, and to develop other instruments for infrastructure financing. They can encourage borrowers to finance overseas infrastructure construction with renminbi-denominated bonds issued offshore, and can provide guarantees for these products. So long as markets expect the renminbi to depreciate, borrowers will prefer to issue renminbi-denominated bonds if these can be guaranteed by one of the banks. In addition, the AIIB and New Development Bank can initiate the establishment of offshore renminbi investment funds to support overseas construction projects. All of the above measures can contribute to the expansion of investment channels for offshore renminbi deposits and accelerate the development of renminbi offshore centres.

The activities of the AIIB and the New Development Bank are also likely to be conducive to renminbi trade settlement. Since a significant portion of the global construction sector, particularly in infrastructure, is based in China, infrastructure firms borrowing from the AIIB or New Development Bank are likely to import significant amounts of construction-related products and services from China. Chinese companies are likely to borrow from the two banks as a means of supplementing their borrowing from Chinese commercial banks.

## The renminbi's circulation outside China

Substantive renminbi internationalization will require a drastic increase in the currency's circulation outside China, especially 'third-party use'.<sup>5</sup> By definition, third-party use of a currency – which in China's case would mean transactions where all participants are non-Chinese – is the highest level of currency internationalization. By way of comparison, some 50–70 per cent of US dollar transactions occur outside the US.

**A sharp change in the renminbi's international circulation would expose Chinese domestic financial markets to greater volatility.**

Increased third-party use brings its own challenges, however. A sharp change in the renminbi's international circulation would expose Chinese domestic financial markets to greater volatility. (The dollar's example is instructive: offshore dollars account for almost half of the US's M2 measure of domestic money supply. A decrease in demand for offshore dollars would result in significant dollar inflows into the US domestic market.)

While cross-border renminbi circulation mechanisms – including for outflows and 'backflows' – are currently in place, external circulation and third-party use of the currency remain quite limited. During the past decade, the Chinese government has actively prioritized building outflow and backflow channels for the renminbi (see Table 2 – these measures represent, in effect, the process of capital-account opening). As explained earlier, renminbi can currently flow out of China via ODI and loans through the capital account, and via trade settlement facilities through the current account. In addition to ODI, six channels have been established or are being established for renminbi backflows via the capital account: dim sum bonds, the Renminbi Qualified Foreign Institutional Investor (RQFII) scheme, the domestic interbank market, cross-border renminbi loans, and the Shanghai–Hong Kong

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<sup>5</sup> Strictly speaking, circulation outside China is different from third-party use. The first simply means that renminbi is circulated by any parties outside China. The second refers to the use of renminbi in pure offshore transactions – that is, transactions where neither party is a Chinese person, enterprise or financial institution. For example, when Chinese people pay using renminbi in a shop in London, this constitutes external circulation but not third-party use. Third-party use is more difficult to achieve than external circulation, as all parties must be non-Chinese.

Stock Connect and Shenzhen–Hong Kong Stock Connect schemes (see Table 2). These channels enable cross-border circulation of renminbi (i.e. between China and the offshore markets), but have little impact on the external circulation and third-party use of renminbi.

**Table 2: Backflow channels for offshore renminbi**

Channel	Details
Dim sum bonds	Cumulative issuance: RMB 713.0 bn Current circulation: RMB 363.0 bn, of which: <ul style="list-style-type: none"> <li>• Corporate bonds: RMB 145.8 bn</li> <li>• Financial bonds: RMB 111.2 bn</li> <li>• Treasury bonds: RMB 96.4 bn</li> <li>• Convertible bonds: RMB 9.6 bn</li> </ul> (data as of Aug. 2016)
RQFII	Aggregate quota: RMB 1,460 bn Confirmed quota: RMB 510.3 bn (data as of Aug. 2016)
Domestic interbank market	84 foreign banks, 34 RQFIIs, seven QFIIs, 11 foreign insurance companies, and a few central banks are permitted to enter this market.
Cross-border renminbi loans	Free-trade zones (FTZs) in Guangdong, Shanghai, Fujian and Tianjin, and several industrial parks and special economic zones (SEZs), are permitted to receive offshore renminbi loans.
Shanghai–Hong Kong Stock Connect	No quota limit on total amount; daily quota (i.e. the gap between sales and purchases) is RMB 130 bn.
Shenzhen–Hong Kong Stock Connect	Launched in December 2016, offers same quota as Shanghai–Hong Kong Stock Connect.

Sources: People’s Bank of China website; Wind Database.

One of the main functions of offshore centres has become the promotion of foreign circulation and third-party use of renminbi. Although market forces have driven much of this activity, there is also scope for the Chinese government to develop policies to boost the renminbi’s circulation in offshore markets. Specifically, it could expand the range of offshore renminbi-denominated products, and encourage foreign institutions and overseas subsidiaries of Chinese enterprises to invest in renminbi products and seek renminbi financing in offshore markets. Offshore renminbi funds could be established to invest in foreign or Chinese companies engaged in infrastructure construction outside China. Equally, foreign and Chinese companies could directly issue offshore renminbi-denominated bonds or stocks to support overseas projects, and use the income from these projects to repay debt or pay dividends.

A wider range of renminbi-denominated products in offshore markets could include complex asset management products, renminbi-denominated hedge funds and structured financial products (Ba and Ye, 2015). Third-party use could be expanded by tying commodity pricing to the renminbi and developing renminbi-denominated commodity markets in offshore centres. However, some of these products will take considerable time to develop.

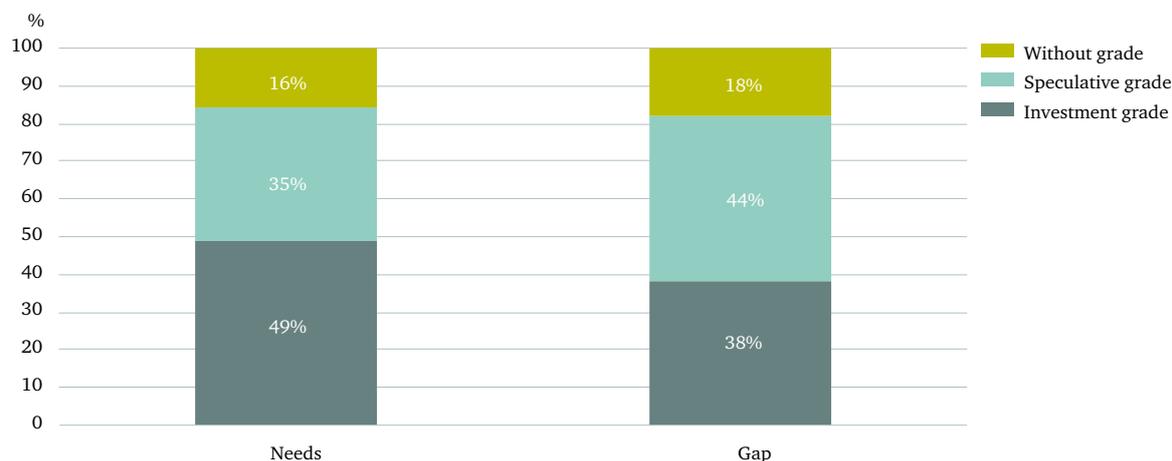
### 3. The Infrastructure Financing ‘Gap’

The existing global development financing architecture has so far failed to provide sufficient financing to meet infrastructure development needs. The Asian Development Bank (ADB) estimates that annual demand for infrastructure investment in Asia will be around US\$730 billion by 2020. Yet the ADB itself provided only US\$21 billion in infrastructure loans in 2014, of which US\$6.6 billion consisted of joint financing.

This implies the existence of a substantial gap between the supply of and demand for funds. According to Bhattacharya, Romani and Stern (2012), investment in infrastructure in developing countries will need to increase from approximately US\$0.8–0.9 trillion per year in 2008 to approximately US\$1.8–2.3 trillion (at 2008 constant prices) per year by 2020, or from around 3 per cent of GDP to 6–8 per cent. This works out at a gap of approximately US\$1 trillion between the level of 2008 and that of 2020.

A country’s financing needs may greatly exceed the amount of capital it is able to raise. Indeed, developing countries in which demand for infrastructure financing is high are often the ones with the least access to debt markets. They typically have poor sovereign credit ratings (indicating a relatively high risk of default) or no rating at all.

**Figure 2: Infrastructure financing needs and gaps of developing countries, 2008–20, distribution by sovereign credit rating**



Note: The data for this chart are for the 56 of the 161 countries (excluding China) in our sample of developing economies for which ratings were available from Standard & Poor’s (48 countries in the sample) or Dagong Global (eight further countries in the sample) as of 12 October 2015. The remaining 105 countries for which no data are available are not included in this chart. While the missing countries are generally high-risk, they represent only 11.6 per cent of the total sample’s GDP, and 13.2 per cent of infrastructure spending, so the effect on the total sample will be minimal.

Sources: World Bank, World Development Indicators Online; OECD, OECD.stat; Bhattacharya, Romani and Stern (2012); Fay et al. (2010); Yepes (2008); S&P, Dagong Global.

Figure 2 maps the financing needs – and corresponding financing gaps – of developing countries with their sovereign ratings. (The sample excludes China, which is expected to be a net exporter of capital by 2020.) Those with investment-grade ratings account for 50 per cent of total infrastructure

financing needs between 2008 and 2020. Countries with speculative-grade ratings account for 35 per cent of financing needs, and countries without any rating for 16 per cent. Among the investment-grade sovereigns, non-China BRICS countries – in particular, India and South Africa – account for the majority of demand. If these countries are excluded on the basis that they could get financing from the New Development Bank, the vast majority of financing demand comes from countries considered of low creditworthiness.

The challenges that less creditworthy countries face in funding infrastructure needs are illustrated by their proportionately higher financing gaps (also see Figure 2). Speculative-grade countries account for 44 per cent of the financing gap between 2008 and 2020, and countries without any rating account for 18 per cent. In contrast, only 39 per cent of the projected shortfall in available finance is associated with investment-grade sovereigns.<sup>6</sup>

### Closing the financing gap: Infrastructure investment funds

China can draw on a number of financing resources to support global infrastructure investment. These include the following:

- The Silk Road Fund (with capital of US\$40 billion)
- 10 major cooperation projects, announced at the FOCAC (Forum on China–Africa Cooperation) summit in 2015 (US\$60 billion in loans by 2018)
- The AIIB (with capital of US\$100 billion – around 30 per cent of which is supplied by China)
- The New Development Bank (US\$100 billion – 20 per cent from China)
- Loans from Chinese policy banks such as China Development Bank and others

As the aforementioned analysis reveals, financing from China could be exposed to sovereign risk or to projects with a high possibility of failure. This underlines the need for financial markets to develop more sophisticated and extensive mechanisms for pricing risk, so that countries have the financial tools to share or insure against risks.

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<sup>6</sup> Figures do not add up to 100 per cent due to rounding.

## 4. Opportunities for London as a Global Financial Centre

This section explores the opportunities and challenges for London's offshore renminbi market in providing finance for infrastructure projects, and the extent to which growth in such activity could have the broader effect of promoting financial and regulatory reform in China. The chapter also includes recommendations for boosting Sino–UK financial cooperation, such as via the extension of cross-border renminbi lending facilities to the UK and the promotion of 'triangular cooperation'.

### **Further development of the offshore renminbi debt security financing market in London**

London's advantages include well-developed financial markets, a sound market infrastructure and a large pool of international investors. The city is the fastest-developing offshore renminbi bond market outside Hong Kong. London's size and sophistication as a financial centre make it potentially highly suitable as a location for raising capital for the Belt and Road initiative and the AIIB, particularly given the amounts of financing needed and the complexity of the projects involved. If successful, this would create new options for global financing of infrastructure – an area in which China is about to have a more prominent role. However, in order to expand to the scale necessary, London's offshore renminbi debt security market still needs to increase its financing capacity and reduce policy and legal uncertainties.

Expanding the London renminbi market would be a natural and effective way of fostering financial cooperation between China and the UK. Both countries stand to benefit from synergies created by the internationalization of the renminbi, the development of the Belt and Road initiative, and the strengthening of the UK's financial services industry. Moreover, if the fallout from the UK's vote to leave the EU reduces European demand for UK-based financial services, the incentive for London to develop new business with other markets such as China will increase further.

The global financing of infrastructure has changed since the 2008–09 financial crisis, reflecting the evolution of creditors' preferences and macroeconomic conditions. European banks, once dominant in international infrastructure project financing, have scaled back lending in this field due to their weakened balance sheets. The reduction in long-term lending has also reflected the tightening of regulatory requirements under the Basel III standards and new European Banking Authority regulations. From a borrower's perspective, this makes bond financing of infrastructure all the more necessary, while for investors its appeal is heightened by the relatively high yields that infrastructure bonds offer compared with other corporate and government bonds with similar ratings. The current international environment of extremely low interest rates – and even negative interest rates in some markets – means that long-term investors are more likely to be interested in buying higher-yielding infrastructure bonds.

The renminbi has a potential role to play in helping China to become both a major supplier of project funding and a source of corporates able to deliver projects. China Development Bank (CDB) and

Export-Import Bank of China (also known as China Eximbank) already provide extensive financing to infrastructure projects in developing countries. Chinese infrastructure companies are well placed to penetrate these markets, as their integrated supply chains and extensive construction/manufacturing capacity render them highly competitive. This combination of Chinese money and expertise suggests that, as more projects are implemented, Chinese firms will expand in significant numbers into Belt and Road countries – either operating directly in project delivery or providing financial or supply chain services in support of projects. The consequent increase in cross-border economic and financial activities will boost the international use of the renminbi, potentially helping it to become the dominant currency for trade and investment in the countries involved.

To date, the US dollar and euro have generally been Chinese enterprises' currencies of choice for both international trade and financial transactions with Belt and Road countries. However, stronger economic and financial cooperation between China and Belt and Road countries could promote the use of the renminbi. In addition, the development of the renminbi cross-currency swap market would make renminbi financing more attractive by lowering currency conversion costs and enhancing treasury management for companies issuing renminbi-denominated debt securities.

### Renminbi project finance for the Belt and Road initiative

In order to reduce the infrastructure financing gap in developing countries, it is necessary to secure significant financing from private investors. This is especially important given the challenges of slower growth and lower commodity prices in many developing countries, and given banks' above-mentioned retreat from risk. As the most common financing option for public-private partnership (PPP) arrangements in infrastructure, project finance can provide off-balance-sheet financing of projects on a limited-recourse basis without affecting the credit of the shareholders or government involved. This is an effective way of allocating a project's risks between stakeholders. It is attractive to investors as it normally bears higher interest rates than corporate debt.

Developing the market for renminbi project finance in London could help to promote the Belt and Road initiative, as well as supporting renminbi internationalization more generally. The UK is very experienced in project financing. Its Private Finance Initiative has been in place since 1992. Government cooperation and the involvement of the UK's financial, legal and other relevant private institutions can ensure that British knowledge and best practice are available for Belt and Road projects.

To support the development of the offshore renminbi project finance market, China should further reform its regulations on foreign debt and build on recent reforms introduced in September 2015<sup>7</sup> and January 2016.<sup>8</sup> The old case-by-case approval system for foreign bonds has already been replaced by a system of pre-issuance registration and post-issuance filing. Chinese financial and non-financial companies can conduct cross-border financing up to a limit linked to their assets or net assets. However, these regulations are still inadequate for offshore project finance by special-

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<sup>7</sup> On 14 September 2015, China's National Development and Reform Commission (NDRC) issued the 'Circular on Promoting Reform on the Administration of Filing and Registration of Foreign Debt Issued by Enterprises', which came into effect on the date of issuance. On 22 January 2016, the PBoC announced that from 25 January 2016 macroprudential management rules instead of administrative approval procedures would apply to 27 financial institutions, as well as to firms registered in free-trade zones in Shanghai, Tianjin, Guangzhou and Fujian.

<sup>8</sup> On 22 January 2016, the PBoC promulgated the 'Notice on the Expansion of a Full Bore Macro-Prudential Cross-Border Financing Pilot Programme' (中国人民银行关于扩大全口径跨境融资宏观审慎管理试点的通知). This allowed 27 financial institutions and enterprises registered in four free-trade pilot zones to conduct cross-border financing in all currencies up to the limit defined by macroprudential parameters. On 3 May 2016, it was announced that the policy would apply nationwide.

purpose vehicles controlled by Chinese enterprises, as project finance is typically highly leveraged. Furthermore, inconsistencies in China's foreign debt management, stemming from the overlapping administrations of the National Development and Reform Commission (NDRC) and the State Administration of Foreign Exchange (SAFE), also need to be resolved.

### 'Dim sum bond' financing with international infrastructure investment companies

Although project finance is a viable means of infrastructure financing in some respects, it is unable to fully meet global demand for infrastructure financing. As mentioned previously, continuing regulatory pressure to maintain minimum levels of liquidity make it hard for commercial banks to lend on a sufficient scale. At the same time, project bonds for financing greenfield developments often require significant undertakings of sponsor support, such as full completion guarantees (Gardner and Wright, 2016). In addition, project finance may not be feasible for infrastructure that generates socio-economic benefits but is difficult to convert into revenue flows.

China's experience in urban development provides a potential financing template, based on the existing use of 'city investment platform companies'. In this model, infrastructure projects yielding low profits are packaged with other more profitable projects ... thus forming an economically attractive business venture.

China's experience in urban development provides a potential financing template, based on the existing use of 'city investment platform companies'. In this model, infrastructure projects yielding low profits are packaged with other more profitable projects (the latter often benefiting from the stimulatory effects of the infrastructure projects themselves on local economies), thus forming an economically attractive business venture. Belt and Road financing can draw on the lessons from this process. For example, promoting the formation of international infrastructure investment companies by Chinese companies in partnership with companies in host countries could allow non-Chinese partners to bring in local assets such as mines, toll motorways and so on – all investments that generate relatively stable revenue streams. Implementing projects on these principles could also boost host countries' credit ratings, thus helping them to diversify the financing tools available to them. It could also promote more equal distribution of benefits and risks between China and partner countries.

### Development of offshore renminbi asset securitization in London

Another way of expanding the pool of offshore renminbi investment products is through the securitization of offshore renminbi assets. This could foster the development of a renminbi-denominated Belt and Road infrastructure asset securitization market in London. Such a market would be able to support incremental funding for infrastructure in 'Belt and Road' locations in which individual project finance might not be feasible. Securing long-term funding from global investors for infrastructure will remain a gradual process. Long-term investors generally choose relatively simple projects with clear returns in areas already familiar to them. As a result, it may be easier to attract investors to Belt and Road infrastructure projects if the cashflows from them are securitized.

## Development of offshore renminbi wealth management products in London

Chinese banks could develop renminbi-denominated wealth management products in the London offshore market. This could serve three goals: developing a wider base of private investors for renminbi assets; mitigating the negative effects of Basel III regulatory requirements on long-term lending; and providing more extensive overseas renminbi asset options.

Potential products could be divided into two categories. The first would take Chinese banks' existing wealth management products, as sold in the domestic market, and simply extend their sales into new territories. The second category would involve issuing wealth management products in London, and investing the funds so raised in Belt and Road projects in the form of trusted loans, securities etc. This latter category would be more technically complicated, and would require significant cooperation between financial product regulators in the UK and China. However, it could be explored as a long-term opportunity.

## Issuance of Chinese local government bonds in London

Currently 'dim sum' bonds issued by Chinese institutions in the offshore market include central government bonds, financial institutions' bonds and corporate bonds. Most provinces in China are equivalent in size to a medium-sized country in Europe, and their local governments have credit ratings equal to or higher than those of China's biggest financial institutions and enterprises. These local governments have the fiscal wherewithal to issue bonds in the offshore market.

The promotion of Chinese local government bonds in London and other offshore markets could achieve a number of aims: it could supplement the pool of global safe assets with renminbi-denominated bonds, promote the renminbi as an international reserve currency, and expand the asset pool of the London dim sum bond market. Such an initiative could also accelerate the establishment of more standardized, legalized and prudent fiscal practices among Chinese local governments.

## Establishment of an offshore renminbi overseas investment fund in London

In order to increase the circulation of renminbi outside China in a more targeted way, the Chinese government could establish an offshore renminbi overseas investment fund for that specific purpose. In order to raise sufficient capital, this could be done in collaboration with UK and Chinese banks. Such a fund could be set up in London to raise offshore renminbi capital for investment in targeted public-private partnerships for Belt and Road projects, or other investments in the Belt and Road area.

Such a fund could be established in such a way that both British and Chinese financial institutions would benefit from contributing. The UK's government and banks are experienced in developing and structuring overseas financing instruments and in cooperation with foreign businesses. Meanwhile, Chinese banks have the largest footprint in the offshore market. In particular, Chinese banks have long provided financing services to Chinese companies operating overseas in renminbi (one of the largest segments of the renminbi market). The combination of UK international financial expertise and Chinese local and renminbi market-oriented expertise would help all partners reduce their risks, while encouraging collaboration throughout the process of funding and delivering each project.

Such a fund would also need to have a governance structure that ensured shared accountability. One possible form this could take would be a partnership arrangement in which financial institutions in both China and the UK (including Chinese policy banks and private UK banks with significant interests in China, such as HSBC and Standard Chartered Bank) acted as the founding general partners in a Belt and Road offshore renminbi investment fund. Smaller financial firms could subsequently be invited to join as limited partners in proportion to the capital they contributed.

Such a fund could function as a demonstration project for Sino–British financial cooperation, and would serve as an important innovation in renminbi internationalization. This model could also be used to stimulate 'green financing' in the offshore market. The Chinese government has already stated that green finance is important to China's future financial development, while the UK has been at the forefront of green finance globally. Green finance could serve as an additional mandate for a Belt and Road fund, or as the prime mandate for a separate fund operating on similar lines. If China and the UK were able to set up a Belt and Road offshore renminbi green investment fund, this could promote sustainable development in the regions involved. The fund could be financed through the issuance of green dim sum bonds, which in turn could help to promote the development of a market for such bonds in London.

## Development of a renminbi cross-border loan scheme in London

The Chinese government piloted cross-border loans between the Qianhai free-trade zone (FTZ) in Shenzhen and Hong Kong in 2013. Since then, the programme has been extended to all the other new free-trade zones (FTZs) in China, and permitted sources of renminbi loans have also been expanded to include Macau and Singapore. As of 30 June 2015, the value of cross-border renminbi loans made to companies in the Qianhai FTZ alone had reached RMB 107 billion.

We recommend that the programme be expanded to the UK, in order to allow British institutions to issue cross-border renminbi-denominated loans in all three groups of approved Chinese FTZs. Cross-border renminbi-denominated lending would serve as an effective extension of the renminbi backflow channel, and would also help to reduce the mismatch between onshore and offshore interest rates. With Europe having entered an era of negative interest rates, the creation of a UK–China cross-border renminbi lending programme would also substantially reduce financing costs for Chinese companies by allowing them to borrow from European lenders offering lower interest rates.

If such a scheme is developed, it is important that it includes significant supervision by the Chinese authorities to ensure that it does not exacerbate the already heavy debt burden of Chinese corporates – an issue that will become increasingly complex if they acquire significant foreign debts. Authorities in both China and the UK should agree on an annual quota for cross-border renminbi lending, so that this business can be safely and continuously developed.

## Sino–UK stock market cooperation

In its 2015 annual report, published in June 2016, the PBoC declared that China would allow foreign companies to issue shares and CDRs (Chinese Depository Receipts) on the 'international board' of the Shanghai Stock Exchange. This initiative has the potential to benefit renminbi internationalization. The UK could encourage listed companies in London to issue renminbi-denominated shares and CDRs on China's stock markets. This would help to address the lack of renminbi deposits in London by increasing the flow of renminbi from China to London through stock market investment.

### **'Triangular cooperation'**

'Triangular cooperation' is a form of development cooperation involving a traditional donor, an emerging-market donor, and a developing-country beneficiary. Triangular cooperation was first proposed in a UN General Assembly resolution in February 2000, and the UN Development Programme designated as the agency to promote this initiative in developing countries. During Premier Li Keqiang's visit to France in July 2015, China and France issued a joint statement on triangular cooperation – this was the first time that China had signed an official triangular cooperation agreement with a developed country.

We propose that the Chinese and British governments actively pursue triangular cooperation as a means to promote joint investment, joint research and joint training etc. – especially in respect of Belt and Road projects. Triangular cooperation would allow China and Belt and Road host countries to benefit from the UK's expertise and infrastructure in finance and technology, and from its experience in overseas investment, thus reducing the investment risks for the projects involved. At the same time, it would showcase China's openness to foreign cooperation in Belt and Road implementation. This form of triangular cooperation could also serve as a template for partnerships between China and developed countries in jointly promoting global objectives.

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# Appendix: Methodology for Calculating the Infrastructure Financing Gap in Developing Countries

## Estimation of infrastructure financing needs in developing economies by 2020

1. We chose 2008 as the base year.
2. We selected 161 developing economies. The sample excluded China, as on its current trajectory the country is likely to be a net exporter of capital by 2020.
3. We acquired 2008 GDP data for 161 economies from the World Bank's *World Development Indicators* online (<http://data.worldbank.org/indicator>).
4. Based on the methodology of Fay et al. (2010), we divided total infrastructure financing into two parts: investment and maintenance.
5. Using the assumptions described in Table A.1 (below) and GDP data from 2008, we calculated each country's investment need and maintenance need in US dollars at 2008 prices. The total investment need in 2008 for 161 countries came to US\$980–1,176 billion.
6. We assumed an average annual rate of real GDP growth for these countries of 4 per cent until 2020. We also assumed that the ratio of infrastructure expenditure to GDP will stay the same in each country over this period. Based on these assumptions, we can estimate total infrastructure financing needs in 2020 at US\$1.6–2.0 trillion<sup>9</sup> in 2008 dollars.

**Table A.1: Infrastructure expenditure needs (% of GDP)**

Country income	Investment	Maintenance	Total
Low-income	7.0	5.5	12.5
Lower-middle-income	4.9	3.3	8.2
Upper-middle-income	1.3	1.0	2.3
Total developing	2.7	4.1	6.6

Note: Columns may not add up due to rounding.  
Sources: Yepes (2008) and Fay et al. (2010).

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<sup>9</sup> China is included in this estimate. We also added an estimate of the expenditure needed to these assumptions to adapt existing infrastructure to make it more resilient to climate change. This has been estimated at US\$30–\$40 billion annually (World Bank, 2009).

## Estimation of infrastructure financing expenditure for developing economies by 2020

1. Based on the methodology of Fay et al. (2010), we divided total infrastructure expenditure into three parts: public spending, official development assistance (ODA) and private participation in infrastructure (PPI).
2. For the ratio of public spending to GDP in 2008, we used the same assumptions as Fay et al. (2010): East Asia and the Pacific (6.8 per cent), Europe and Central Asia (1.2 per cent), Latin America and the Caribbean (1.2 per cent), Middle East and North Africa (4.2 per cent), South Asia (4.2 per cent) and sub-Saharan Africa (5 per cent).
3. ODA data for 2008 are from the OECD.stat database (<http://stats.oecd.org/>), specifically 'Social Infrastructure & Service, Total', and 'Economic Infrastructure & Service, Total'. Gross disbursements are in current US dollars.
4. For 2008 PPI data, we followed the assumptions in Fay et al. (2010) on private participation in total infrastructure: East Asia and the Pacific (0.55 per cent), Europe and Central Asia (2.37 per cent), Latin America and the Caribbean (1.07 per cent), Middle East and North Africa (1.33 per cent), South Asia (2.38 per cent) and sub-Saharan Africa (2.13 per cent).
5. Projected infrastructure expenditure in 2020 was calculated from a base year of 2008, incorporating two hypothetical scenarios for growth rates in the three categories of infrastructure expenditure, based on Fay et al. (2010):
  - a) The pessimistic growth scenario involves public spending contracting by 4 per cent, ODA contracting by 12.9 per cent, and PPI growing by 7 per cent.
  - b) In the optimistic scenario, public spending grows by 1.9 per cent, ODA contracts by 5 per cent, and PPI grows by 13 per cent.

## Estimation of sovereign credit rating structure of infrastructure financing needs and gaps

1. We calculated each country's infrastructure financing needs and gaps in 2020. Where data were unavailable for a particular indicator for a country, such as the ratio of infrastructure expenditure to GDP, we applied to that country our assumption for the region in which it is situated.
2. We used average growth rates based on pessimistic and optimistic scenarios to estimate growth in public spending, ODA and PPI.
3. We assigned a value to each economy based on its sovereign credit rating (or lack thereof). Ideally, we sought to match this value to Standard & Poor's (S&P) credit risk data for each country, current as of 8 October 2015. In the event that these data were not available, we assigned each country a value according to its credit rating from Dagong Global, a Chinese credit ratings agency. For countries without ratings from S&P or Dagong, we assigned a value of N.A.
4. We considered ratings of BBB- (on the S&P scale) or above as of investment grade; those at or below BBB- as of speculative grade.
5. We calculated the infrastructure financing needs and gaps of investment-grade economies, speculative-grade economies and economies without credit ratings.

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