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Transmitting Global Liquidity to East Asia: Policy Rates, Bond Yields, Currencies and Dollar Credit

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Abstract

We review extant work on the transmission of monetary policy, both conventional and unconventional, of the major advanced economies to East Asia through monetary policy reactions, integrated bond markets and induced currency appreciation. We present new results on the growth of foreign currency credit, especially US dollar credit, as a transmission mechanism. Restrained growth of dollar credit in Korea contrasts with very rapid growth on the Chinese mainland and in Hong Kong SAR.

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1. Introduction

This paper analyses the transmission of major economies' monetary policy to East Asia, focusing on China, Hong Kong SAR and Korea. Like Caruana (2012c), we divide the transmission into five somewhat overlapping channels, the first three price channels and the latter two quantity channels.

1. Central banks set lower policy rates than they would otherwise in response to very low interest rates in key currencies in order to lessen pressure for currency appreciation.

2. Large-scale bond purchases reduce bond yields not only in the bond market where the purchases are made but also to varying extents in other bond markets through portfolio balance effects.

3. Higher interest rates than in key currencies lead to upward pressure on exchange rates.

4. Low yields in key currencies lead to easier financial conditions given stocks of foreign currency credit and spur a shift of liabilities into foreign currency, especially if the domestic currency is expected to appreciate.

5. Capital flows cross-border into local currency bond and equity markets.

We review extant work on the price channels and make an original contribution on foreign currency credit. We do not discuss cross-border capital flows into local currency bond and equity markets, which is the focus of most work.

Indeed, the focus of debate on capital flows has often left the other channels neglected. It is worth noting that the four channels that we analyse may, but need not, involve capital flows.

Our review of existing work leads us to the following three conclusions regarding policy rates, bond yields and currency appreciation. First, emerging market policy rates no longer track Taylor rules with standard parameters, which permits the interpretation that central banks have kept policy rates low in response to global monetary accommodation. Estimated open economy Taylor rules also suggest central banks in Asia react to the federal funds rate.

Second, lower bond yields from large-scale central bank bond purchases in major markets seem to be transmitted in part to lower bond yields in local currency bond markets that are integrated into global bond markets.

Third, the more the yield curve of the local currency moves down with the yield curves in the major economies, the less the upward pressure on the exchange rate of the local currency. Thus, currency appreciation is not a summary measure of the transmission of accommodative monetary policy.

Analysis of foreign currency credit growth in mainland China, Hong Kong SAR and Korea leads to three conclusions. First, low interest rates in major currencies make for immediately easier financial conditions where there is a substantial stock of foreign currency credit (Borio et al (2011)). And, to the extent that domestic currencies are expected to appreciate against major foreign currencies, currency expectations reinforce interest rate differentials in encouraging firms to borrow in foreign currency (Bruno and Shin (2012)).

Second, analogous to our typology of the offshore market (He and McCauley (2012)), foreign currency loans can be financed entirely with local deposits (Hong Kong), largely with local deposits (mainland China) or mostly with cross-border interbank funding (Korea). Especially in the last case, the nationality composition of international banking and home factors condition the transmission of global impulses. In particular, the shrinkage since 2008 of European banks' role in intermediating dollars to East Asia could only have slowed foreign currency lending.

Third, policy leans against the incentives provided by low yields in major currencies for firms to substitute foreign currency credit, mostly US dollar-denominated, for local currency credit. Not only may monetary policy seek to limit the policy rate gap, but also capital controls (China) and macroprudential policy (Hong Kong and Korea) can in effect raise the effective interest rate on dollars within the economy. Thus both demand-supply imbalances in particular economies and policy help to explain the paradox of expensive dollars that yield practically zero at their source.

Despite policy efforts, foreign currency credit may still give rise to substantial financial stability risks – not so much currency mismatch risks, but rather maturity and liquidity risks associated with dollar funding. The experience of dollar shortage and dislocation of the dollar funding markets in late 2008 and early 2009 was particularly telling. It is also worth recalling that the deflationary shock from the currency depreciations during the Asian financial crisis in 1997–98 interrupted the tightening phase of the Federal Reserve, with implications for asset markets. The already difficult exit from very accommodative policy over the next several years would only be more challenging in the event of financial instability in East Asia, which has stronger trade links to North America and Europe today than it had 15 years ago. Spillovers of monetary accommodation merit attention because any instability arising from them carries a risk of blow-back effects to major economies.

2. Central Bank Reactions to Low G3 Policy Rates

Taylor (2013) argues that low policy rates in key currencies leads to policy rate setting in the rest of the world that is easy in the sense of keeping policy interest rates lower than those indicated by Taylor rules. BIS (2012) made this argument as well (Figure 1). Avoidance of currency appreciation and capital inflows into fixed income markets could motivate such "follow the leader" behaviour in monetary policy setting.

Such calculations based on standard Taylor rules can be no more than suggestive. In particular, they do not allow the inference that inflation has been allowed to diverge from targets, since they do not take into account other policies, ranging from fiscal to macroprudential, which might well be leaning against inflation. Also, they do not take into account any asymmetric balancing of the risks.

Another approach, which has its own limitations, estimates Taylor rule-type reactions not only to the usual ultimate targets, domestic inflation and growth (or output gap), but also to foreign interest rates and the exchange rate. Such so-called "open economy" Taylor rules are themselves subject to multiple interpretations. An estimated parameter on foreign policy rates can be read as a policy reaction function, a leader-follower relationship (Taylor (2008, 2010)).

However, some would object that the foreign interest rate variable can proxy for all the variables left out of the Taylor rule estimation (Stark (2008)). In particular, if foreign interest rates are set with a view to downside risks and domestic interest rates also take such downside risks into account, then the estimated parameter could reflect not so much follow-the-leader behaviour as a shared assessment of the balance of risk (Chaney (2008)).

Figure 2 presents the coefficients on the Federal Reserve's policy rate (the target federal funds) from open economy Taylor rule estimates (Spencer (2013)). These estimates use quarterly data since 2000, except for India, Indonesia and the Philippines, where the sample period begins in 2004. The short estimation period respects the changes since the Asian financial crisis of 1997–98 in monetary policy frameworks and operating targets. The author attaches most caveats to the Indian estimated rule (see Annex for the full set of estimates). The coefficients are all significant at the 0.10 level, except the near-zero estimate for China.

They suggest that, controlling for domestic inflation, output gaps and the nominal effective exchange rate, foreign interest rates have a substantial if uneven effect on domestic monetary settings in East Asia. The coefficient ranges from a low of zero in China through 0.07 in Malaysia, where the policy rate moves least, to a high of 0.77 in the Philippines. These can be interpreted as indicating that, controlling for local macroeconomic conditions and the exchange rate, local central banks respond to a 100 basis point move in the US policy rate to the extent of 7 to 77 basis points. Taylor (2010) reports an estimate for the euro area of 0.11, which lies between that for Malaysia and the 0.19 estimated for Thailand. The most frequent estimate is about a third, as in India, Indonesia, Korea, and Taiwan. The highest coefficients are for the fairly dollarised Indonesian and Philippine economies.

While changes in the one-year deposit rate for China bear no relationship to the federal funds rate, it is asserted by Yu (2010, p 235) – a former member of the People's Bank of China Monetary Policy Board – that, "Given the US interest rate, the PBOC tried hard to adjust the PRC interest rate to maintain a 3% spread vis-à-vis Libor". Figure 3 plots the one-year dollar Libor plus or minus three percentage points against the administered one-year deposit rate. Indeed, apart from the extremes of

inflation in the early 1990s and deflation at the turn of the century, the People's Bank can be seen as taking such an approach.

Neither the prescriptive Taylor rules of Hofmann and Bogdanova nor the open economy Taylor rule estimates of Spencer provide bullet-proof evidence that central banks in Asia are shading down their policy rate setting to limit the spread over the US policy rate. For the present purpose, it is enough that followership in monetary policy is plausible. Such behaviour would be a means for near-zero policy rates to be transmitted from major currencies. We now turn to the second form of transmission that also occurs in the price dimension, not through policy but rather through integrated bond markets.

3. Large-Scale Bond Purchases and Global Bond Markets

Another price channel that is often overlooked is the transmission of major central bank balance sheet policies through the effect on bond yields. Accumulating evidence suggests that central bank purchases of government bonds in major markets lower yields not only in those markets but also in bond markets elsewhere.

3.1 Substitution across Bond Markets and Yield Curves

In portfolio balance analysis of policy, whether currency intervention or unconventional monetary policy, the degree of substitutability across bond markets plays a key role. Textbook presentations of sterilised currency intervention, for instance, suggest that strong substitutability across bond markets renders such intervention ineffective. A central bank buys foreign currency, sells a domestic bond to sterilise the injection of bank reserves and then invests the proceeds of the intervention in a foreign bond. At the end of the day, market participants' portfolios contain more domestic bonds and fewer foreign bonds. The effect on pricing depends on how closely those two bonds are substitutes for each other. With major bonds like German bunds and US Treasuries thought to be close substitutes, students learn that sterilised intervention has at most ephemeral effects. In this story, high substitution across bond markets means weak policy effects.

Everything changes when analysing the global effects of large-scale bond-buying in major bond markets. Here high substitution between bonds in different currencies in private portfolios means greater spillover and stronger policy effects. A major central bank exchanges excess reserves for government bonds held by investors, who suddenly have a portfolio with lower than targeted duration. They seek to restore duration by buying similar bonds, including bonds of other governments. Such purchases, or the expectation of purchases, serve to spread the lower yields from the targeted market to markets for bonds that are close substitutes.

Note the tension between the condition for effective balance sheet policies *within* a given bond market and the condition for spillovers *across* bond markets. Large-scale purchases of bonds funded by excess reserves reduce the duration of outstanding bonds and work to lower bond yields if there is

imperfect substitution across the yield curve. (Otherwise, only the expected path of short-term rates matters, not the composition of the central bank's balance sheet.) Large-scale bond-buying requires imperfect substitution across the yield curve to succeed at home, but *high substitution across bond*s in different currencies makes it strong abroad.

3.2 Review of Findings

With that as background, we review evidence on the international diffusion of lower bond yields from central bank purchases. Such purchases can have market effects, either intended or unintended. Bernanke et al (2004) point out unintended consequences of the Japanese Ministry of Finance purchases of dollars and US bonds in 2003–04. Indeed, they report that a billion dollars of intervention was associated with about a 1 basis point decline in the 10-year Treasury yield.[1]

Gerlach-Kirsten et al (2012) extend this analysis by examining the effects of these same Japanese purchases of dollars and subsequent investment in US bonds on other bond markets. They find lesser but still significant effects on other advanced economy bond markets, including the UK, German and French markets and even that of Japan (Figure 4, left-hand panel). They also find somewhat outsized effects on the Chinese and Hong Kong bond markets, and a substantial but statistically insignificant effect on the Korean bond market (which may have reflected the idiosyncratic developments in this bond market at that time).

Turning to analyses of balance sheet policies since the global financial crisis, we move from the diffusion of unintended to the diffusion of intended bond market effects. Analysing the Federal Reserve bond-buying announcements of 2008–09, Neely (2010) finds statistically and economically significant spillovers to Australian, UK, Canadian, German and Japanese bond markets (Figure 4, right-hand panel). In follow up work, Bauer and Neely (2012) decompose the bond market effect, and find that it generally reflected lower risk premia rather than lower expected policy rates, with Canada a notable exception.

Chen et al (2012) examine the effect of G4 central bank domestic bond purchases on Asian bond markets. They find sizeable echoes of the lower US yields in Asia around the announcements associated with the first and second rounds of bond-buying by the Federal Reserve (Figure 5). Reactions to the Federal Reserve's second round of bond-buying appear smaller and less consistent, however. Bayoumi and Bui (2011), Fratzscher et al (2012) and IMF (2013, pp 14–17) reach broadly similar results.

[1] Genberg et al (2005) note that the implied effect of the full ¥32 trillion (about $350 billion) in dollar purchases was very large. Event window analysis raises questions about persistence of effects.

It is important to emphasise that such co-movement of yields over short periods need not entail capital flows. Traders and speculators may change their bids based on regular co-movements in the past. There can be action at a distance.

4. Currency Appreciation

As in the last section, we consider accommodative policy and exchange rates in two sections. First, we frame the question and then we review empirical work.

4.1 Unconventional Policy and Exchange Rates: Some Issues

At the outset, it helps to clarify three issues. First, does unconventional monetary policy affect exchange rates through the interaction of monetary quantities or through bond yields? Second, if the latter, how does the exchange rate effect of large-scale bond-buying depend on substitutability in global bond markets? And third, how does the resistance of central banks to currency rate appreciation affect global bond markets?

First, central banks have differed in their presentation of unconventional monetary policy, some focusing on quantities and others on prices. Some, like the Bank of Japan in the early 2000s and now again in April 2013, have summarised their policy in terms of a monetary aggregate, namely base money. Others, like the Federal Reserve, while specifying the scale of bond-buying, emphasise the removal of duration from bond markets, and the associated effect on bond yields. The interval of bond-buying financed with the sale of short-term Treasury securities ("Operation Twist") underscored this interpretation. From this perspective, the much used term "quantitative easing" is a misnomer for large-scale bond purchases.

Given diverse central bank communication and market participants' shorthand, some market participants have taken a (base) monetary approach to the exchange rate. According to this perspective, exchange rate depreciation results when one central bank takes quantitative easing further than the other central bank in an exchange rate pair. Market participants thus plot a bilateral exchange rate against the relative size of the central banks' two balance sheets (or exchange rate changes against relative changes in monetary bases). Discussing the "so-called Soros Chart, i.e., the relationship between the [yen/dollar] exchange rate and relative money supplies", Ueda (2013) argues that the monthly correlation "relies on just a handful of observations from late 2008 and early 2009". The late 2008 period of rapid expansion of the Federal Reserve's assets did track the decline of the dollar against the yen (Figure 6, right-hand panel). But this period also saw the dollar rise against the euro despite the Fed's asset growth (Figure 6, left-hand panel).

Empirically, relative base money performs unevenly at best in a world with excess bank reserves. A naive monetarist analysis assumes that banks predictably turn base money growth into broad money

growth that leads to inflation and currency depreciation given purchasing power parity. If base money grows but broad money does not, this story has limited relevance.

Other analysts have focused on interest rate differentials. According to this view the scale of central bank balance sheet policy is not a good summary measure. Instead, it matters that the Federal Reserve has purchased a Treasury portfolio with a longer duration than the market, while the Bank of Japan until the spring of 2013 bought Japanese government bonds of short maturity. This view benefits from the observable impact of anticipated balance sheet policy (as well as forward guidance) on bond yields. The two-year yield differential until late last year tracked the yen/dollar exchange rate (Figure 7, left-hand panel). Market practitioners have even reached for ratios of five-year US Treasury to Japanese government bond yields in order to track the decline of the yen starting in the fourth quarter of 2012 (Figure 7, right-hand panel). However, after the news on Japanese monetary policy on 4 April 2013, this relationship broke down.

For economies other than the major advanced economies that are growing closer to trend and operating not far from capacity, the monetary base and bond yield differential perspectives have quite different implications. According to the base money view, the possibly competitive balance sheet expansion of major central banks threatens central banks not expanding their balance sheets with exchange rate appreciation. This view might see rapid balance sheet growth through foreign exchange intervention, as in Switzerland, as a defensive response. According to the bond yield differential view, policies that might hold down domestic bond yields could help limit appreciation pressure. For instance, government debt management could favour the issuance of short-term bonds, thereby limiting bond yield differentials and pressure for appreciation.[2]

This brings us to the second question above: how does the exchange rate effect of large-scale bond-buying depend on substitutability in global bond markets? According to the yield-differential view of exchange rates, there is a straightforward answer. The more substitutable the domestic bonds with global bonds, the more unconventional monetary policy in major bond markets lowers domestic bond yields, leaving less adjustment to the exchange rate. Thus, the exchange rate effect of large-scale bond-buying is smaller the more integrated domestic bonds are into the global bond market. As a result, the appreciation of the currencies of emerging market economies cannot be a summary measure of the international effect of unconventional monetary policy focused on reducing bond yields.

The answer to the third question above about currency intervention and bond markets highlights a further reason why exchange rate appreciation in emerging economies is not the measure of the international effect of unconventional monetary policy in major economies. Central banks resist currency appreciation by buying dollars against the domestic currency, sterilise by selling short-term domestic currency bills and invest in medium-term bonds in the major currencies.

[2] See McCauley and Ueda (2009) and Turner (2011) for the relationship between large-scale central bank purchases of government bonds and government debt management. Debt management is an option in addition to fiscal consolidation to reduce pressure on domestic bond yields.

An important and often overlooked feature of the resistance to exchange rate appreciation is this duration mismatch between the domestic currency instrument supplied (in the case of Korea, a monetary stabilisation bond of no more than two years' maturity) and the reserve currency bonds purchased. The most frequent such instrument would be a US Treasury bond of intermediate maturity. The implication is that in resisting currency appreciation, emerging market central banks do their own (incidental) large-scale bond purchases, systematically reducing duration in the hands of private investors. In this, they are buying bonds shoulder-to-shoulder with the major central banks. Currency intervention that resists appreciation of the domestic currency thus incidentally contributes to lower global bond yields.

4.2 Review of Findings

Neely (2010) finds sizeable announcement effects on currency values of five Federal Reserve bond-buying announcements in 2008–09. In particular, he finds that the US dollar depreciation ranged from 4% against the pound sterling to 8% against the euro and 12% against the yen. Glick and Leduc (2011) report broadly similar results. Chen, Filardo, He and Zhu (2012) examine effects on currencies of emerging markets. They find a 4% rise for Asian currencies on the 2008–09 bond-buying announcements but a negligible response to the second round of bond-buying announcements by the Federal Reserve. All these observations come with the caveat that one cannot be sure about the persistence of such event responses.

In view of the resistance of central banks to exchange rate appreciation, it is interesting to look at an exchange rate pressure index. In this version, this index sums the exchange rate change and the reserve accumulation, using their respective volatility as weights. As can be seen in Figure 8, East Asian economies have deflected a substantial if varying portion of appreciation pressure to reserve accumulation.

Note that the more that emerging market central banks hold down their policy rates as a result of low policy rates in the key currencies, the less observed appreciation there will be. Also, the more bond yields in emerging markets participate in the lower yields resulting from large-scale bond purchases, the less pressure for appreciation there will be. And finally, the more emerging market authorities intervene to resist appreciation, the less will be observed. For all these reasons, the extent of appreciation of emerging market currencies cannot be taken as the measure of the international effects of large-scale bond purchases.

5. Cheap Foreign Currency Debt and Shift to Dollar Debt

This section goes beyond the reviews of extant work in the previous three sections to demonstrate how foreign currency credit is growing in the economies of China, Hong Kong and Korea. Low interest rates on major currencies provide an incentive for firms to substitute foreign currency credit, mostly dollar-denominated, for local currency credit. In addition, expectations of currency appreciation provide a further incentive in the form of potential capital losses on liabilities.

The transmission of global monetary ease to these economies starts as described above, with low short-term rates, low bond yields and pressure for currency appreciation. To the extent that foreign currency credit in the region is priced off global benchmarks, monetary accommodation in the key currencies makes for immediately easier financial conditions wherever there is a substantial stock of foreign currency credit (Borio et al (2011); Avdjiev, McCauley and McGuire (2012); He and McCauley (2012)).

But this common external factor hits economies that vary in their positioning among the trilemma of monetary independence, exchange rate stability and open capital accounts. China has a measure of monetary independence and thorough if increasingly flexible management of its exchange rate that is allowed by binding capital controls. Hong Kong has an exchange rate link to the US dollar and capital account openness at the cost of an endogenous monetary policy. And Korea enjoys monetary control and a mostly open capital account along with considerable exchange rate variability, which draws occasional official intervention.

Despite these policy differences, we find that policy in all three economies leans against the common low external rates in the direction of raising the cost of dollar credit above global levels. In other words, policy tends to resist cheap foreign currency credit and thereby to impede the transmission of global impulses. Thus we add a new policy dimension to the paradox of dollars being abundant and cheap at their source and scarce and sometimes expensive in the rest of the world.

5.1 A Typology of Foreign Currency Use

In He and McCauley (2012), we discussed financing flows in the global eurodollar market from the perspective of the issuing country, the United States. We found that the modal transaction in the eurodollar market was a non-US resident lending to a non-US resident. We distinguished such lending from another role of the eurodollar market, namely as a set of balance sheets through which dollars flowed from the United States to the rest of the world, or from the rest of the world to the United States.

Here we change the focus from the country that *issues* the globally used currency to three kinds of economies that *use* it, and so we adapt the typology. First, similar to pure offshore intermediation, is the economy that shows a balanced growth of dollar loans and deposits (extended to and placed by

residents or non-residents). Second is the case of an economy with more dollar deposits than loans, which provides dollars for lending elsewhere in the eurodollar market. Third is the case of an economy with more dollar loans than deposits, which needs to draw in dollars from abroad.

The three economies that we examine approximate these types. China most resembles the balanced case, having had until the mid-2000s more foreign currency deposits than loans, and since then more foreign currency loans than deposits. Since some time after the Asian financial crisis, Hong Kong has served as a dollar funding centre, although its role is evolving. In particular, the regional demand to borrow dollars has been growing in relation to local deposits, changing the nature of Hong Kong as a financial centre. Finally, Korean firms borrow more than all of the locally deposited dollars, and draw in dollar funding from abroad.

By looking at these three cases in detail, we are thus able to propose a typology of answers to the question that was left open by Borio et al (2011), namely, where do the dollars that are lent to non-US borrowers come from? One way of answering the question is in terms of foreign currency loan-to-deposit ratios, which vary from well less than one, to about one, and to well above two. We find that local depositors fund more than all of the dollar credit in Hong Kong, most of the dollar credit on the Mainland and very little of the dollar credit in Korea.

For Korea, but not for China or Hong Kong, we propose including in our measure of foreign currency certain off-balance sheet transactions, as measured with on-balance sheet BIS international banking data. In principle, such transactions could be considered in all cases, but the asymmetric treatment reflects that these transactions have been important in Korea, and, as a result, the authorities have collected data that demonstrate the large role of exporter hedging in these off-balance sheet transactions.

Taking the three economies together, the region's foreign currency credit extension has grown faster than regional foreign currency deposits. As a result, it is becoming more dependent on the global interbank market to provide dollars, as Korea has long been.

It bears emphasising that US banks are by no means the largest players in this market. Notwithstanding the advantages of having the US dollar as home currency, which may have been reinforced by the global financial crisis, most dollar intermediation outside the United States is conducted by non-US headquartered banks. And the industrial organisation of the eurodollar market can make a difference to the transmission of global liquidity when some banking systems are under stress. Before we get down to cases, let us consider the change in the industrial organisation of dollar lending in East Asia.

5.2 The Retreat of European Banks from Asia

Bank credit can flow to Asia only through banks. And when the banks that have accounted for the bulk of credit face capital and liquidity challenges close to home, it tends to impede the flow of credit. After all, even if other banks step in to replace the retreating banks, they need to open credit lines or expand existing ones to extend credit. Whole teams of bankers may move from retrenching banks to expanding ones. While the effect may be transitory, the process of credit finding new channels through which to flow can only slow that flow.

When the Lehman failure exposed the dangerous dependence of European banks on wholesale dollar fund-raising, the Korean economy was one of the most affected. Foreign-bank held claims on borrowers in Korea, both in foreign currency and in won, were not held by Japanese, Chinese or US banks as much as the gravity model's compound of size and distance might predict. Instead, European-headquartered banks held most of the $409 billion in claims on Korea (Figure 9, left-hand panel).

The change since the global financial crisis is remarkable for the region (Avdjiev, Kuti and Takáts (2012); McGuire and van Rixtel (2012)), and no less for Korea. By December 2012, foreign claims on Korea remained lower than before the crisis, at $338 billion. Meanwhile, the share of European other than UK banks had fallen from 34% to 16%. Meanwhile, US and Japanese banks gained market share substantially (Figure 9, right-hand panel).

The change in the who's who of lending to China has been no less marked. Again, at the pre-crisis peak of March 2008, European-headquartered banks accounted for over half of the $300 billion in foreign claims on China (Figure 10, left-hand panel). Four and three-quarter years later, foreign claims on China had risen to $734 billion. But the European share excluding the UK had fallen form 32% to 14%. In the case of China, not US and Japanese but rather regional banks, including Chinese banks in Hong Kong, took up the slack left by European banks.

5.3 Dollar Credit in and to China

Dollar and other foreign currency (mostly Hong Kong dollar) loans have long been a feature of the Chinese banking system, but they have been growing very rapidly in recent quarters.[3] Foreign currency loans grew by 35% in the twelve months through end-March 2013, more than twice the 15% renminbi loan growth. In a year of political transition with a sense of two-way risk regarding the renminbi exchange rate, foreign currency loans and deposits grew in a fairly balanced fashion in 2012. The willingness of depositors to increase their foreign currency deposits contributed to the scant

[3] That the Chinese banking system is partially dollarised is a long-standing observation (McCauley and Mo (2000); Ma and McCauley (2002a, 2002b, 2004)). During the Asian financial crisis, when the renminbi was under depreciation pressure, the authorities decided to allow dollar deposits in banks in the mainland rather than risking that firms and households would find a way around capital controls to deposit foreign currency outside the mainland. One might say that potential capital flight was domesticated. Having allowed deposits, the authorities also allowed dollar loans. Interest rates on dollar loans and deposits have been more liberalised than those on their renminbi counterparts.

increase in China's official foreign exchange reserves in 2012, notwithstanding the ongoing current account surplus.

Taking a longer view, since bottoming out in March 2009, foreign currency loans booked in China and loans extended cross-border to non-banks in China by BIS-reporting banks have grown very rapidly. In particular, they have more than tripled in four years, rising from $270 billion to a conservatively estimated $880 billion in March 2013 (Figure 11). Most of this sum consists of foreign currency loans booked in China, and has been mostly funded with foreign currency on deposit in banks in China.

As a result of such rapid growth, local foreign currency and cross-border loans are rising as a share of overall loans, including those in the renminbi. In particular, the share rose from around 7% to 8% before the crisis, only to fall to 5.3% in March 2009 in response to the global dollar shortage and the domestic policy response to expand credit to fund investment. Since then, the share of foreign currency and cross-border loans has risen to at least 8.5%, the highest proportion over the ten years of data (Figure 11, right-hand panel). Given the scale of exports from firms in China, there is no reason to view this proportion as signalling a currency mismatch.

Where have the dollars come from? For many years, foreign currency deposits of households and firms exceeded foreign currency loans in China – the loan-to-deposit ratio was well below 100% (Figure 12, left-hand panel). But since the renminbi began to rise against the dollar in July 2005, the growth of foreign currency loans has at times outpaced that of foreign currency deposits. The loan-to-deposit ratio rose to 173% by March of 2008, only to fall back in March 2009 in the face of the dollar shortage and the stabilisation of the renminbi against the dollar in mid-2008. It then resumed its rise to over 200% by late 2011, only to fall again as expectations of appreciation of the renminbi waned in the transition year of 2012. More recently, it has again been rising again.

Where did the extra foreign currency come from? The answer is not clear, which may reflect credit flows from outside the BIS reporting area or possibly foreign currency from official sources, perhaps through foreign exchange swaps. The right-hand panel of Figure 12 plots BIS-reporting banks' (including Chinese banks operating in Hong Kong) cross-border claims on banks in China (including their own affiliates) against the excess of foreign exchange loans over foreign exchange deposits in China. Interbank inflows broadly track the gap between foreign currency loans and deposits. One way of interpreting the graph is that, within the limits set by capital controls, cross-border interbank inflows accommodate to some extent the demands of borrowers and depositors in China for foreign currency exposure.

The capital controls do constrain these inflows. Since mid-2004, the State Development Reform Commission has limited the medium-term external debt of foreign banks in China, and the State Administration of Foreign Exchange (SAFE) their short-term foreign debt.[4] In March of 2007, as the

[4] Before mid-2004, the Chinese authorities treated foreign banks operating in China as if they were outside the economy. Foreign banks could freely borrow abroad, but their foreign currency lending to residents was treated as foreign debt and subject to the approval procedures for such debt. After mid-2004, foreign banks in China's medium-term borrowing and

aggregate of foreign currency loans began to exceed the aggregate of foreign currency deposits, the SAFE (2007) reduced the foreign debt quotas sharply.[5]

These loan quotas exact a price and, as a result, interest rates on dollars in China can exceed those on dollars in the rest of the world. Figure 13, updating Tang and Ng (2012, p 11), compares the interest rates on large dollar loans in China and one-year dollar Libor. The tightening of SAFE foreign loan quotas in early 2007 did not lead to a marked widening of sinodollar rates relative to eurodollar rates that year. But as the gap between foreign currency loans and deposits widened in 2008 and induced a cross-border interbank inflow, sinodollar rates remained around 6% even as eurodollar rates fell to 3–4%. Thus, strong demand for dollar credit in China, against the background of limits on banks' ability to borrow dollars abroad, led to spreads over US dollar Libor of as much as 3% just before the global financial crisis.

In 2009, the loan quotas were loosened and the local dollar rates fell to the level of dollar Libor. With the exchange rate stabilised against the dollar and the currencies of regional trading partners depreciating against the dollar, dollar loans on the Mainland fell in relation to dollar deposits.

Since the crisis, the strong demand for dollar loans on the Mainland in 2009–11 led to a rise in local dollar loan rates even as loan quotas were tightened in 2010 and 2011. With dollar Libor around 1%, this once again opened a 3% gap of sinodollar rates over eurodollar rates. Dollar loan rates in China eased in the transition year of 2012, as dollar deposits grew against the background of more balanced expectations for the renminbi/dollar rate and loan quotas were eased.

In 2013, Chinese firms' increased demand for foreign currency loans began to put upward pressure on the renminbi. On 5 May 2013, the State Administration of Foreign Exchange penalised foreign currency loans in excess of 75% of foreign currency deposits for domestic banks, which is less binding than Figure 12 would suggest owing to foreign currency loans of the policy banks, according to Li et al (2013)). As a result, banks will be less keen to extend foreign currency credit and will make it more expensive.

Thus, the foreign currency loan quotas and foreign currency loan-to-deposit ratio regulations for banks in China serve as a rheostat that allows the authorities to re-price dollars on entry into China. As a result, the cost of dollar credit in China is made more compatible with local monetary policy settings.

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short-term borrowing from abroad came under the foreign debt approval rules of the State Development Reform Commission and the State Administration of Foreign Exchange, respectively. At the same time, their local foreign currency lending was treated as merely reportable transactions, like the foreign currency lending of local banks. Every February, foreign banks apply for quotas for medium-term and short-term external debt over the following year.

[5] "The short-term foreign debt quotas for Chinese-funded banks in 2007 shall be decreased to 30% of their respective quotas as determined upon confirmation in 2006, and short-term foreign debt quotas for non-bank financial institutions and foreign-funded banks in 2007 shall be decreased to 60% of their respective quotas as determined upon confirmation in 2006."

To assess the determinants of foreign currency loan growth in China, we followed Tang and Ng (2012) and ran a vector autoregression model on monthly data between March 2003 and December 2012, inclusive (Figure 14). We included industrial production to capture overall economic activity, Chinese monetary policy as indexed both by the ratio of required bank reserves and key administered interest rates, expected renminbi appreciation (as reflected in the discount of the non-deliverable forward before 2004 and Consensus estimates since) and the above measure of dollar interest rates in China. This analysis confirms the immediate positive influence of higher expected renminbi appreciation, and the more gradual positive effect of higher policy rates in China and the negative effect of higher *local* dollar borrowing costs. A parallel analysis using global dollar borrowing costs instead of the measure of dollar interest rates in China finds similar results (see Annex 2).

All in all, this analysis confirms the importance of relative monetary policy stances, exchange rate expectations and capital controls in the determination of foreign currency borrowing by firms in China.

5.4 Hong Kong: Dollar Borrowing by China-Related Firms

Properly understood, the case of Hong Kong should be judged a case of externalities from neighbouring jurisdictions' capital controls, as studied by Forbes et al (2012). In the last section we reached the conclusion that Mainland firms at times have to pay up for dollar credit at home owing to binding limits on banks' funding foreign currency loans abroad. As firms headquartered in China expand their assets outside China, it makes sense for them to shift their foreign currency funding outside the Mainland. It is better to fund trade receivables, sales and distribution operations or even production facilities at eurodollar rates like Libor rather than at the higher sinodollar rates at home. In addition are arbitrage opportunities from onshore/offshore differentials in various market segments.

However, when often thinly capitalised offshore affiliates seek to raise foreign currency loans, they can run into a credit problem. Lenders may be unwilling to extend loans at low yields to an affiliate based on a general understanding that the parent will keep the affiliate healthy. How can the financial strength of the Mainland firm, and the liquidity inherent in its often ample renminbi bank deposits, be somehow transferred across the border?

A credit device that recalls arrangements that led to cross-currency swaps[6] has allowed US dollar credit extended in Hong Kong to China-related firms to become some of the most rapidly growing credit in the world. According to the Hong Kong Monetary Authority (HKMA), firms in China can use deposits in domestic banks to secure letters of credit from Chinese banks in Hong Kong.[7] These are then drawn down in US dollars. Corporate liquidity in the home currency is transformed into borrowing power in foreign currency.

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6 See Eurocurrency Standing Committee (1986, p 40).

7 "Of the HK$440 billion growth in NBMCE [non-bank mainland China exposures] in 2010, it is estimated that about 60% of the total were either fully collateralised by bank deposits on the Mainland or backed by guarantees by major Mainland

From a consolidated corporate point of view, obtaining dollar credit offshore can be seen as an alternative to borrowing dollars on the Mainland or converting renminbi cash on the Mainland into dollars to invest abroad. In the first case, there is an interest cost advantage and in the second case there is the advantage of avoiding the need for SAFE approval as well as lower net interest payments and reduced exposure to renminbi appreciation.

Taken together, HKMA and BIS data show very rapid growth of foreign currency credit booked in Hong Kong as well as extended to Hong Kong nonbanks from outside the territory. After bottoming out in June 2009, foreign currency credit booked in Hong Kong grew 167% through December 2012, while cross-border credit about doubled (Figure 15).

Unlike banks on the Mainland since the mid-2000s, banks in Hong Kong remain well-endowed with US dollar and other foreign currency deposits. To some extent banks that formerly transferred foreign currency funding elsewhere in the world are now using it to fund loans extended in Hong Kong. As a result, the loan-to-deposit ratio in foreign currency in Hong Kong has risen, but it remains only just over half.

Since the regional deleveraging in the wake of the Asian financial crisis of 1997–98, Hong Kong has served as a funding centre for the international interbank market. This has led to local branches with deposits as liabilities and claims on affiliates elsewhere as assets. Under the force of the heavy dollar borrowing by Chinese-related firms, Hong Kong as a financial centre is shifting to a more balanced funding and lending model.

This is evident in Figure 16, which sorts 25 selected branches of US- and European-headquartered banks by their business models. At the far left, the number of branches basically raising funds in Hong Kong for use elsewhere has declined sharply, while on the right-hand side the number of branches that serve as loan providers has risen sharply. All in all, Hong Kong is shifting from a source of global funding to a source and user of such.

While Hong Kong has an open capital account, the rapid growth of this credit has raised financial stability issues. The HKMA has reminded banks to maintain prudent levels of foreign currency liquidity. Suggestive evidence that this has had the effect of driving up the cost of dollar credit in Hong Kong is presented in Figure 17, which shows that spreads on Hong Kong-related syndicated loans have reached levels characteristic of the global financial crisis. Annex 3 presents evidence that deviations from benchmark loan pricing turned positive after the HKMA circular in April 2011. If so, prudential policy, not just capital controls as in the Mainland, may influence the pricing of US dollar credit.

banks. Of the remaining 40%, some of the loans granted by AIs [authorised institutions, ie banks] were collateralised albeit indifferent forms" (Chan (2011)).

5.5 Korea: Virtual Dollar Borrowing through Currency Forwards

In the case of Korea, foreign currency credit is extended not only by banks in Korea and by banks outside of Korea. In addition, banks in Korea extend dollar credit, or perhaps more accurately, convert won credit to dollar credit, when they buy dollars forward from Korean exporters.

Many discussions of this phenomenon do not recognise that a Korean firm that sells dollars forward is essentially redenominating its debt from won to dollars. A transaction that would be in many ways similar would be for the same firm to sell a dollar bond. In the case of the forward sale of dollars, instead of owing dollars to the bondholder at maturity, the firm owes dollars to the bank with which it did the forward transaction. In effect, when the firm sells dollars forward to a bank, the dollar debt of the Korean corporate sector increases. If the operational definition of global dollar liquidity is dollar debt of firms resident outside the US, then dollar liquidity has invisibly entered Korea through the forward foreign exchange market.

Of course, such virtual dollar borrowing by client firms leaves traces in the banking system. In other words, off-balance sheet transactions lead to on-balance sheet transactions. In particular, the hedging of these forward positions involves dollar interbank borrowing from overseas, often by foreign banks operating in Korea. Essentially, as part of the hedging of the forward purchases of dollars, foreign banks borrow dollars abroad, sell them for won, and invest the won in Korean Treasury bonds or monetary stabilisation bonds. The long-won, short-dollar *cash* position thus offsets the long-dollar, short-won *forward* position.[8] At the maturity of the forward, the firm delivers dollars to the bank, the bank pays the firm won raised by the sale of the Korean bond, and the bank repays the short-term dollar advance from its affiliate abroad (Figure 18).

When the stock of such borrowing is mostly at short term and large relative to the dollar assets of the private and public sectors of Korea, it raises financial stability issues (Halm et al (2012)). The Korean authorities have taken a variety of measures to limit this risk, including maturity matching requirements in foreign currency for banks, limits on forward positions in relation to bank capital and, most recently, the so-called macroprudential levy.

Because forward sales of dollars against won have not been recognised as a shift from won borrowing to dollar borrowing, Figure 19, left-hand panel, offers a fresh perspective. As in China, locally extended dollar credit in red well exceeds cross-border lending by BIS-reporting banks in blue. What is new is the yellow area, which represents net local currency assets of BIS-reporting banks. The idea is that the net long position in won is offset by a long-dollar, short-won position forward. And,

[8] This dollar credit was not included in the measure of Borio et al (2011). We propose to measure such credit using BIS data on net local currency assets of BIS-reporting banks. This estimate can be compared to results of surveys by the Korean authorities of the scale of forward positions by the non-bank sector. These surveys allow the positions of nonfinancial corporate sector (ie exporters) to be distinguished from mutual funds investing abroad, which also sell dollars forward.

as argued above, in selling dollars forward, the counterparty has in effect redenominated debt from won into dollars.

According to this view, foreign currency borrowing in Korea rose quite sharply before the global financial crisis of 2008, as in China. In contrast, while foreign currency debt resumed its rapid rise after the crisis in China, it has not done so in Korea. As a result, the share of foreign currency loans in Korea has not been rising as it has in China. Indeed, it has fallen since the crisis (Figure 19, right-hand panel).

Where do the dollars come from in the case of Korea? The high ratio of foreign currency loans to deposits means that the dollars come from outside Korea. This is all the more so if the net won assets of foreign banks are included in the definition of foreign currency loans (Figure 20, left-hand panel).

As in China, the excess of foreign exchange loans over foreign exchange deposits in Korea is funded with cross-border claims on banks in Korea, mostly those of banks headquartered outside Korea. In the case of Korea, the excess demand for dollar credit also arises from forward sales of dollars that result in the net won positions of foreign banks. Thus in Figure 20, right-hand panel, the sum of the excess of foreign currency loans over deposits *and* net won assets tracks the claims of BIS-reporting banks on banks in Korea.

The pressure of hedging, in conjunction with policy towards short-term bank inflows in Korea, has tended to raise the cost of borrowing dollars. Measures taken before the crisis included requiring Korean banks to match maturities across various buckets in their foreign currency operations, and, just before the crisis, moral suasion against short-term borrowing abroad (McCauley and Zukunft (2008)). Measures taken since the crisis include limiting currency forward transactions in relation to bank capital (leverage caps) and, more recently, the macroprudential levy.

The cross-currency basis swap market provides a straightforward measure of the cost of floating rate dollars in Korea. In this market, dollars are swapped against won and the counterparties pay each other streams of interest based on floating rates. In 2005 and 2006, US dollar Libor could be obtained against the won floating rate index – the dashed blue line in Figure 21 was near zero. As a result, a Korean exporter wishing to swap Korean floating rate debt for US dollar debt over two years then paid little more over US dollar Libor than over the Korean floating rate index. Then followed the disruptions of the crisis (Baba and Shim (2010). More recently, the Korean exporter would have to pay 100–200 basis points more to shift from floating rate won to US dollar Libor. That is, though the global price of floating rate dollars is closer to zero than 1%, the Korean price is 1–2%. (Similar observations hold for one-year or three-year basis swaps, or for US dollar interest rates that can be inferred from currency forwards, as in Figure 18.)

The upshot is that dollars in effect carry a higher interest rate in Korea than they do in global markets. This can be seen as a compound of the imbalance of supply and demand in Korea, and the policies that inhibit banks, especially foreign banks, from borrowing short-term dollars from abroad.

Why is foreign currency credit expanding rapidly in China and Hong Kong but slowly in Korea? At least three hypotheses can be advanced:

1. Exchange rate expectations differ: Chinese firms expect more renminbi appreciation than Korean firms expect won appreciation.

2. Korean firms were more burned than their Chinese counterparts by going short the dollar before the crisis, given the depreciation of the won/dollar exchange rate (vs the stabilisation of the renminbi/dollar from mid-2008 to mid-2010).

3. The effects of Korean macroprudential measures.

The first explanation seems consistent with Korean hedging behaviour but not with survey evidence. Ree et al (2012, p 8) display data on hedging collected by the Bank of Korea and the Ministry of Knowledge Economy that show that importer hedging in 2011 was substantially above pre-crisis levels, suggesting more balanced expectations. Yet survey evidence on the gap between forecasts of the exchange rate three months forward and one-year forward (Figure 22) suggest stronger expectations of appreciation of the won post-crisis than pre-crisis.[9] They also show stronger expectations of won appreciation than of renminbi appreciation.

Bruno and Shin (2012) argue on the basis of panel regression analysis of BIS-reporting bank flows that Korean macroprudential measures explain the difference, and Ree et al (2012) also give weight to this explanation. Kim (2013) cites evidence that leverage caps had a greater effect on short-term foreign debt than the macroprudential levy. While Bruno and Shin control for quarterly dollar exchange rate changes, their analysis leaves open the question of whether the same experience of market dislocation and won depreciation that led the authorities to adopt the macroprudential measures might also have made firms more cautious in selling (that is, borrowing) dollars, given their exchange rate expectations.

5.6 Rapid Growth in International Bond Issuance

BIS data show rapid growth in outstanding international debt securities of issuers ultimately owned by firms in China, Hong Kong and Korea. In China, outstanding foreign currency bonds have more than doubled in the three years from Q1 2010 to Q1 2013, albeit from a low base (Figure 23, right-hand

[9] This measure is robust to forecasts not being made simultaneously by all participants in the survey, as long as they make their three-month and 12-month forecasts simultaneously. The large expected appreciation shown in Figure 22 in 2009 reflects that forecasters had inelastic expectations during the crisis – that is, they moved their one-year forecasts only a fraction of the big spot depreciation of the won in late 2008.

panel). Such bonds have grown by about 40% over that period for firms of Hong Kong or Korean parentage (Figure 22, middle and right-hand panels), and have reached respectively a quarter and a half of the bank loans shown in Figures 15 and 19.

The rapid growth of the outstanding stock of foreign currency bonds on nonfinancial corporates in Korea stands in contrast to the limited growth seen in foreign currency bank credit as shown in Figure 19. To the extent that the macroprudential levy and other measures inhibit the arbitrage between global dollar markets and Korean dollar markets (and maintain a cost wedge as shown in Figure 21), firms face an incentive to hedge foreign exchange receipts by selling dollar bonds rather than sell dollars forward. This might seem at first blush to be a case of regulatory arbitrage, but it could better be considered a socially optimal outcome. Instead of dollar hedging through the forward markets polluting the Korean international balance sheet with short-term dollar-denominated bank debt, the ultimate borrowers of dollars are taking advantage of buoyant demand for emerging market bonds by selling term debt. One can argue that nonfinancial Korean firms selling intermediate maturity foreign currency bonds internalises the externalities otherwise imposed by hedging that leads to short-term international indebtedness.

6. Conclusions

The transmission of global liquidity to East Asia takes manifold channels, including both prices and quantities. Policy-makers in the region may set policy interest rates with one eye on the very low settings in major currencies, mindful of the risks of both currency appreciation and foreign currency borrowing. Large purchases of bonds by major central banks may bear down immediately on bond yields in more or less integrated global bond markets. And, despite policy interest rates kept lower than they might otherwise be, bond yields being lower due to unconventional monetary policy through large bond purchases, and the deflection of exchange market pressure into reserve accumulation, currencies can end up appreciated.

We have dwelled on the transmission through the quantity of foreign currency borrowing in mainland China, Hong Kong and Korea. As in He and McCauley (2012), we have emphasised that the growth of foreign currency credit does not depend on capital outflows from the “source” countries but can be funded with offshore deposits. Low interest rates on major currencies not only tend immediately to ease monetary conditions to the extent of outstanding foreign currency credit, but also provide incentives to increase such credit at the expense of domestic currency credit. This is especially so if the domestic currency is expected to appreciate. In the face of such tendencies, capital controls and macroprudential policy seem in effect to raise the interest rates on major currencies from near zero to levels that make foreign currency borrowing less attractive.

We find that foreign currency credit to firms in mainland China and to affiliates of Chinese firms in Hong Kong is growing very rapidly, while that to firms in Korea is growing more modestly. Foreign currency borrowing is growing rapidly in the mainland and in Hong Kong notwithstanding the retreat

by European banks from dollar intermediation. We find that foreign currency credit growth to firms on the mainland is systematically related to renminbi interest rates, currency expectations and the local cost of dollars. We hypothesise that Chinese firms are borrowing foreign currency in Hong Kong in order to fund their foreign assets (instead of using domestic funding). Bruno and Shin's conclusion that Korean macroprudential measures are restraining interbank flows to Korea emerges from our analysis as plausible, especially in the light of the rapid growth of foreign currency bonds outstanding of Korean nonfinancial firms.

The transmission of global liquidity to Asian economies needs to be understood and taken into account by policy-makers in the region and in the key-currency countries. It is worth recalling that the deflationary shock from the currency depreciations during the Asian financial crisis in 1997–98 interrupted the tightening phase of the Federal Reserve, with implications for asset markets. The already difficult exit from very accommodative policy over the next several years would only be more challenging in the event of financial instability in East Asia, which today has stronger trade links to the North America and Europe than it had 15 years ago. In other words, if no account is taken of spillovers, there is a risk of instability with blow-back effects to major economies.

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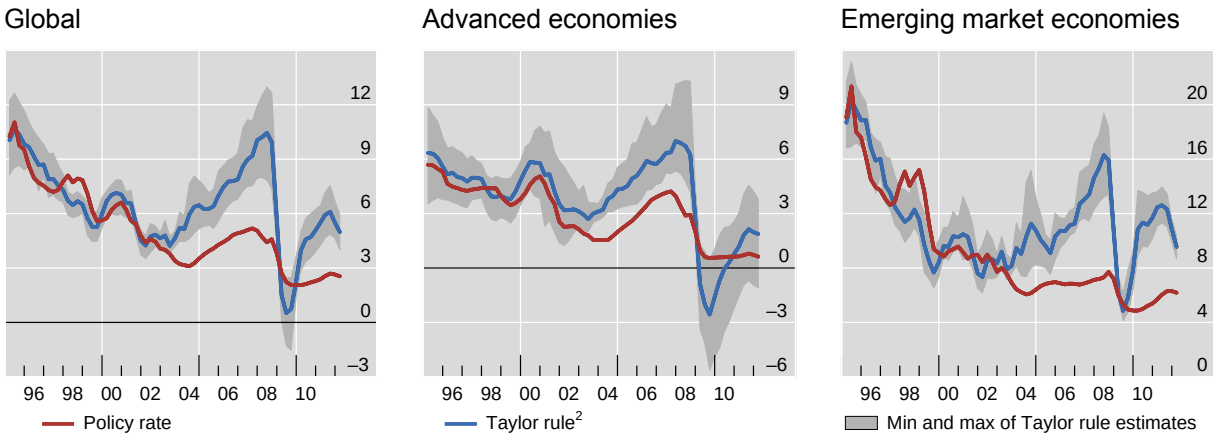
Figure 1. The Taylor (1999) Rule and Policy Rates[1] (In per cent)

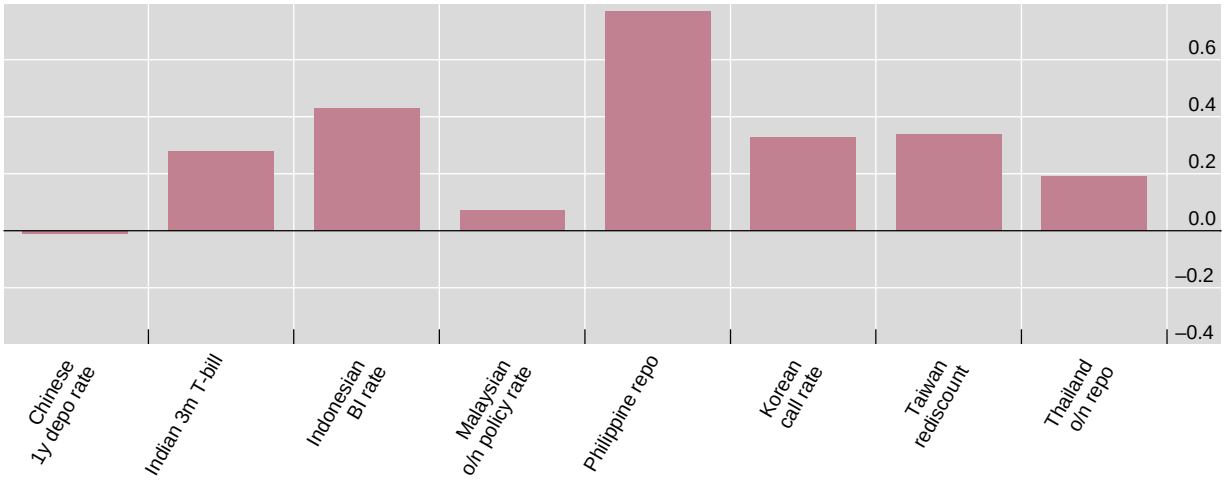


The Taylor rates are calculated as $i = r^*+\pi^* + 1.5(\pi-\pi^*) + 0.5y$, where π is a measure of inflation, y is a measure of the output gap, π^* is the inflation target and r^* is the long-run level of the real interest rate. We compute Taylor rates for all combinations of four measures of inflation (headline, core, GDP deflator and consensus headline forecasts) and measures of the output gap obtained from three different statistical ways to compute potential output (HP filter, segmented linear trend and unobserved components). For the advanced economies, we also use the structural output gap estimate from the IMF WEO. In each case, the long-run real interest rate is set equal to the trend output growth rate as estimated by the trend filter used to construct the respective output gap measure. π^* is set equal to the official inflation target or goal levels when available. Implicit target levels for the inflation measures to which the official inflation target does not refer are constructed by adding the average difference over the sample period between the respective inflation measure and the targeted inflation measure to the official inflation target. For countries that do not have an official inflation target, we use the sample average of the respective inflation measure in the case of advanced economies, and the inflation trend obtained from an HP filter in the case of emerging market economies. For the consensus CPI inflation forecast we use the same target level as for the actual CPI inflation rate. The graph shows the range and the mean of the Taylor rate of all inflation-output gap combinations.

[1] Weighted average based on 2005 PPP weights. "Global" comprises all the economies listed. Advanced economies: Australia, Canada, Denmark, the euro area, Japan, New Zealand, Norway, Sweden, Switzerland, the United Kingdom and the United States. Emerging market economies: Argentina, Brazil, China, Chinese Taipei, the Czech Republic, Hong Kong SAR, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Peru, Poland, Singapore, South Africa and Thailand.

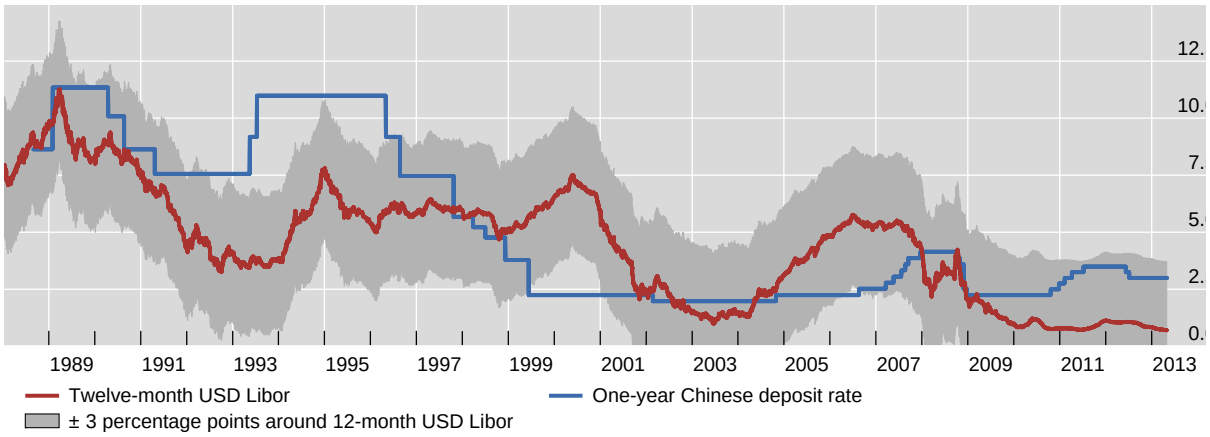
Sources: IMF, *International Financial Statistics*, *World Economic Outlook* (WEO); Bloomberg; CEIC; © Consensus Economics; Datastream; national data; as calculated by Hofmann and Bogdanova (2012).

Figure 2. Coefficient on Federal Funds in Estimated Open Economy Taylor Rules



Source: Spencer (2013).

Figure 3. US Dollar Libor and Chinese Deposit Rates (In per cent, one-year rates)

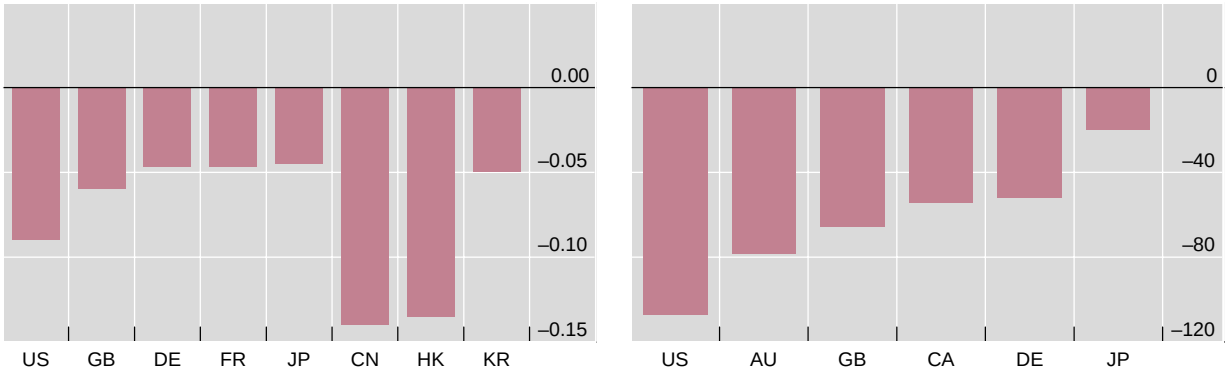


Sources: Bloomberg; CEIC.

Figure 4. Global Bond Market Response to Large-Scale Bond Purchases (In basis points)

Estimated response of government bond yields to a Japanese official intervention of ¥1 trillion[1]

Event window effects of Federal Reserve bond purchase announcements, November 2008–March 2009[2]



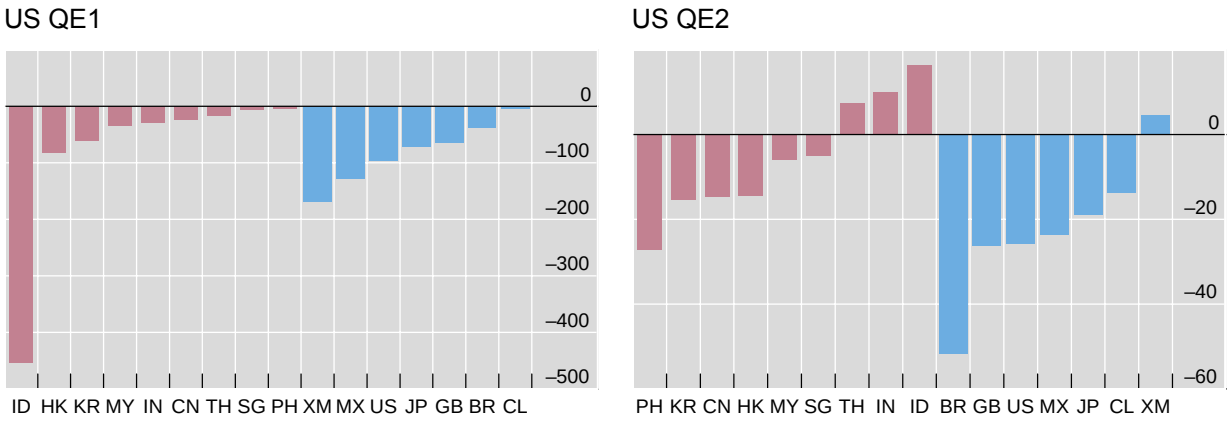
AU = Australia; CA = Canada; CN = China; DE = Germany; FR = France; GB = United Kingdom; HK = Hong Kong SAR; JP = Japan; KR = Korea; US = United States.

[1] For the United States, Japan, China and Hong Kong SAR, significantly different from zero at the 0.01 level; for France, Germany and the United Kingdom, at the 0.05 level; for Korea, not significant.

[2] *p* values for Japan, 0.03; for all others, 0.00.

Sources: Gerlach-Kirsten et al (2012, revised); Neely (2010, Table 1).

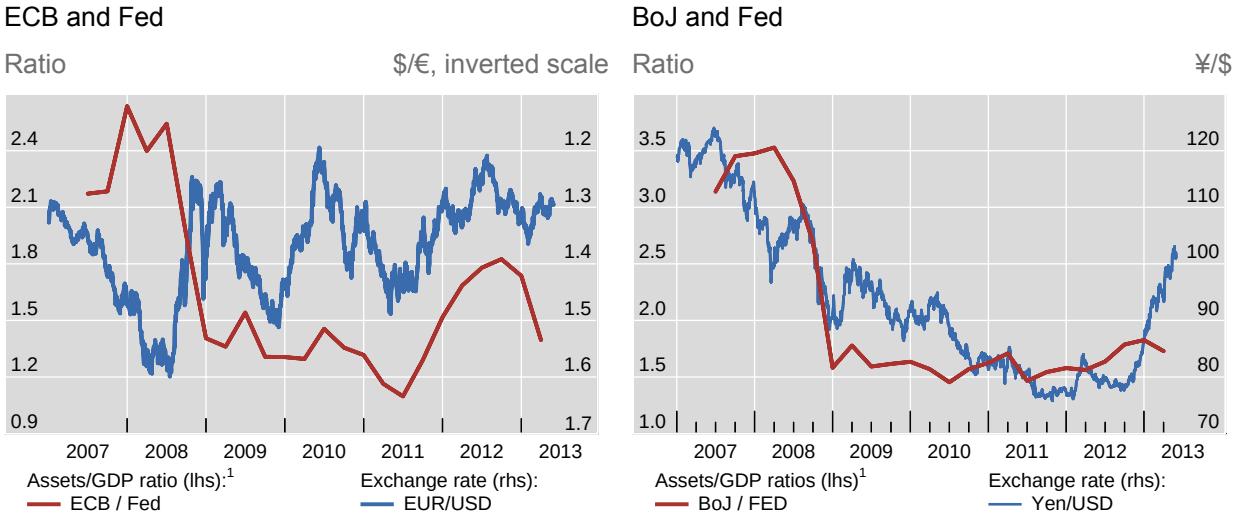
Figure 5. Cumulative Two-Day Changes in 10-year Bond Yields around Announcement Days (In basis points)



BR = Brazil; CL = Chile; CN = China; GB = United Kingdom; HK = Hong Kong SAR; ID = Indonesia; IN = India; JP = Japan; KR = Korea; MX = Mexico; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; US = United States; XM = euro area.

Sources: Chen, Filardo, He and Zhu (2012), citing Bloomberg; CEIC.

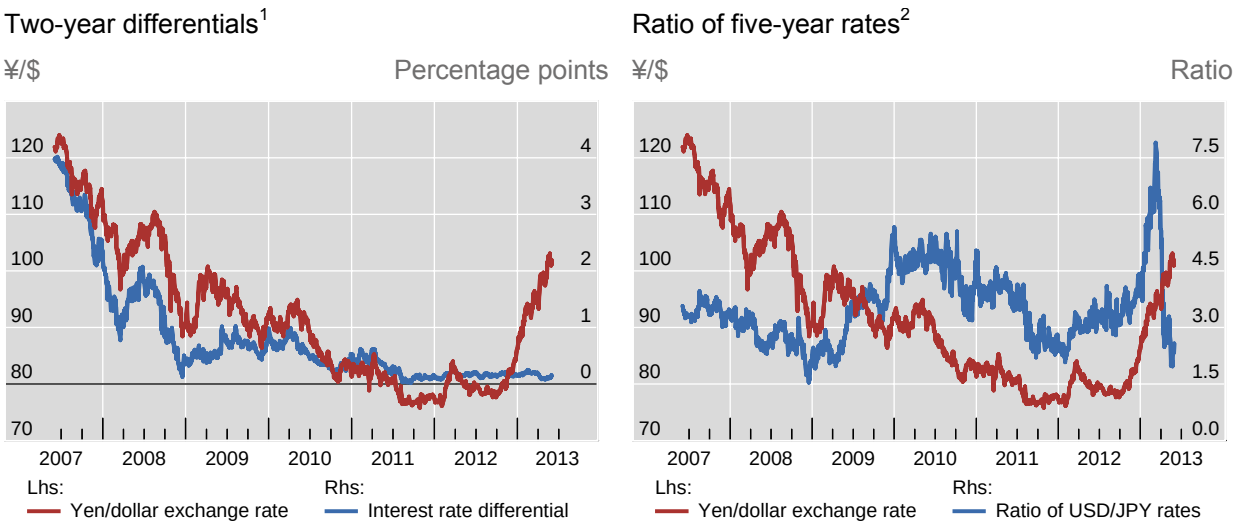
Figure 6. Central Bank Assets and Exchange Rates



[1] Ratio of ratios of central bank assets to GDP.

Sources: Datastream; national data.

Figure 7. Yield Differentials, Yield Ratios and the Yen/Dollar Rate

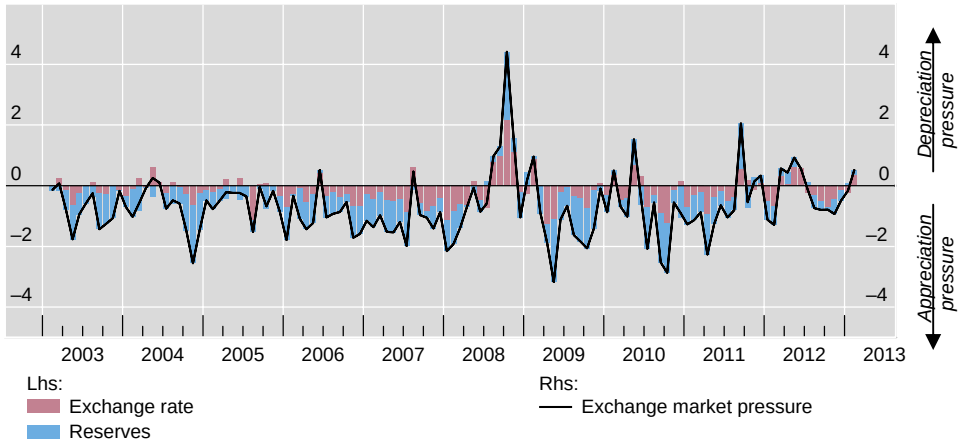


[1] Two-year US Treasury notes versus two-year Japanese government bonds.

[2] Ratio of five-year US Treasury notes to five-year Japanese government bonds.

Sources: Bloomberg; national data.

Figure 8. Exchange Market Pressure Index for East Asia and the Pacific excluding Japan

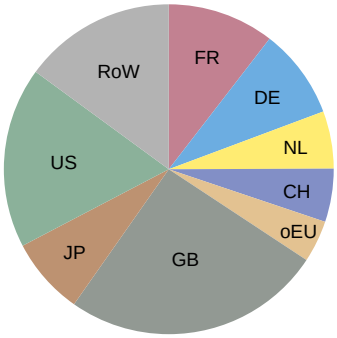


Weights for exchange rate and reserve change based on relative volatility, as in Eichengreen et al (1995). Economy weights are based on GDP at purchasing power parity prices. Includes Australia, China, Hong Kong SAR, Indonesia, Korea, Malaysia, New Zealand, the Philippines, Singapore and Thailand.

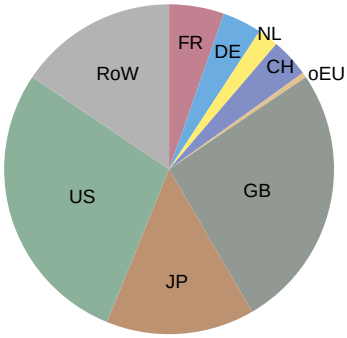
Source: Authors' calculations.

Figure 9. Foreign Claims on Korea by Bank Nationality (In per cent)

Q1 2008



Q4 2012

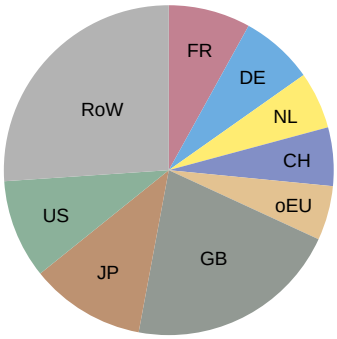


CH= Switzerland; DE = Germany; FR = France; GB = United Kingdom; JP = Japan; NL = Netherlands; oEU = other Europe; RoW = rest of the world; US = United States.

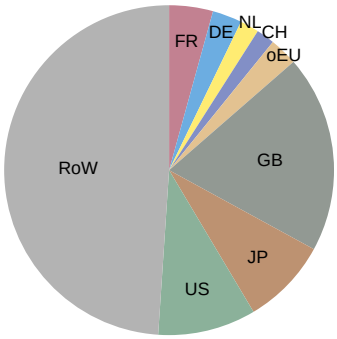
Source: BIS.

Figure 10. Foreign Claims on China by Bank Nationality (In per cent)

Q1 2008



Q4 2012

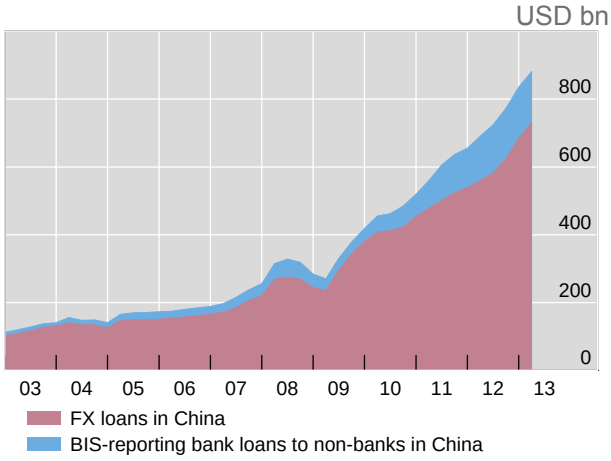


CH= Switzerland; DE = Germany; FR = France; GB = United Kingdom; JP = Japan; NL = Netherlands; oEU = other Europe; RoW = rest of the world; US = United States.

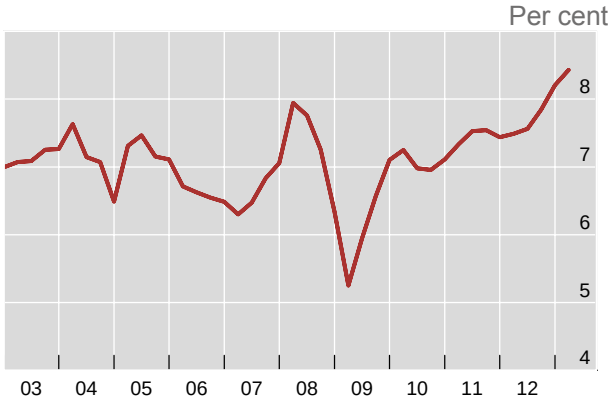
Source: BIS.

Figure 11. Foreign Currency Loans in China and Cross-Border Loans to China

Foreign currency loans in and to China



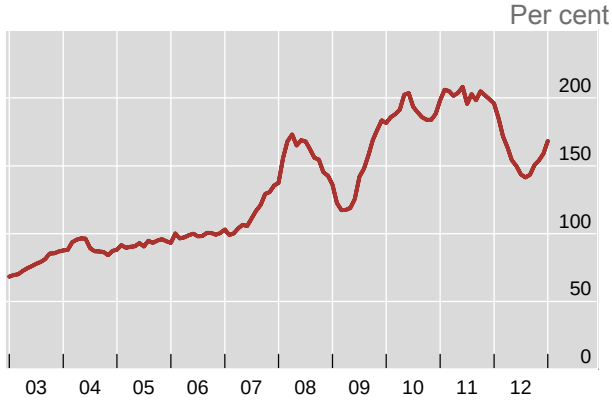
Share of foreign currency and cross-border loans in China



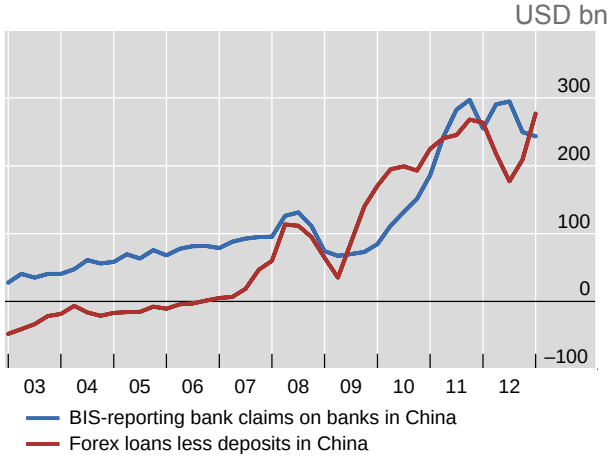
Sources: People's Bank of China; CEIC; BIS; authors' calculations.

Figure 12. Foreign Exchange Loans and Deposits in China and Offshore Funding of the Gap

Ratio of loans to deposits in foreign currency in banks in China

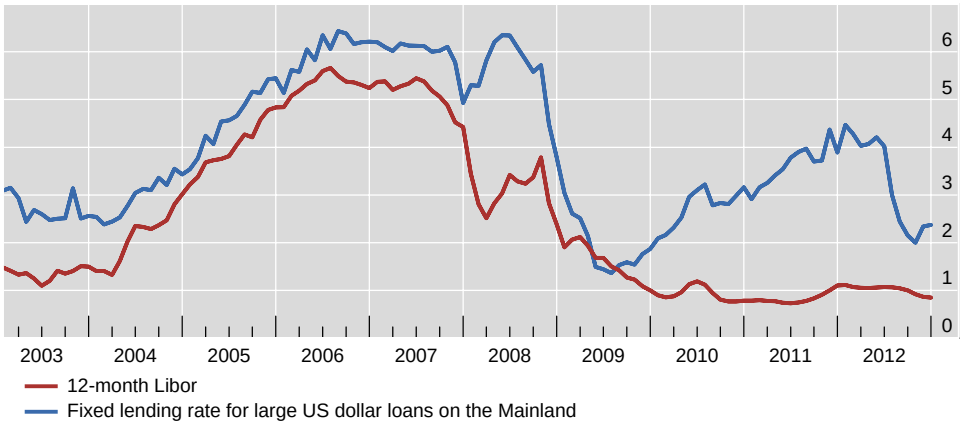


BIS-reporting banks' claims on banks in China and FX loans less deposits



Sources: People's Bank of China; CEIC; BIS; authors' calculations.

Figure 13. Interest Rates on Large Dollar Loans in China and 12-Month Libor (In per cent)



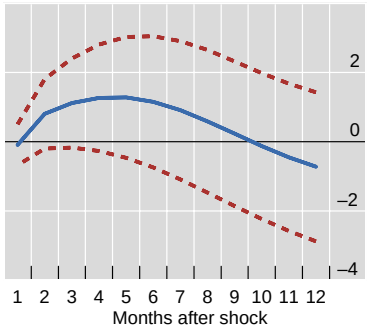
Sources: CEIC; Wind Information Co Ltd; authors' calculations.

Figure 14. VAR Analysis of the Growth of Foreign Currency Lending in China

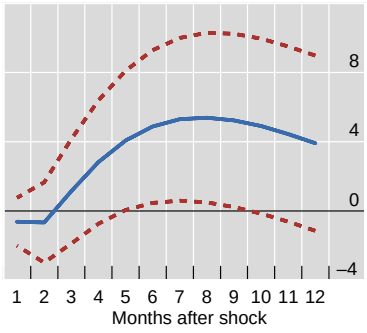
Sample period March 2003–December 2012; in percentage points

Shock:
Yoy growth in industrial production increases by 1 percentage point

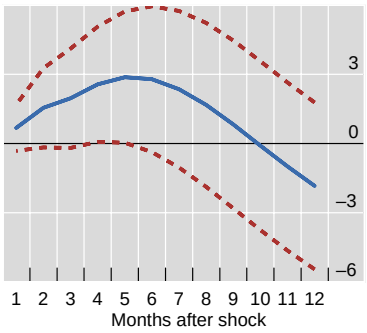
Shock:
Reserve requirement ratio increases by 25 basis points



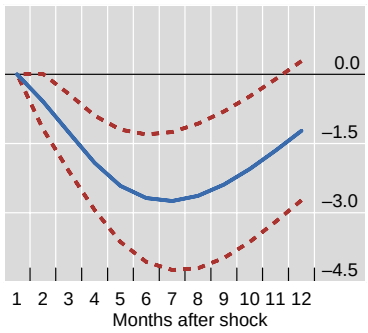
Shock:
Policy interest rate increases by 25 basis points



Shock:
Expected rate of renminbi appreciation increases by 1 percentage point



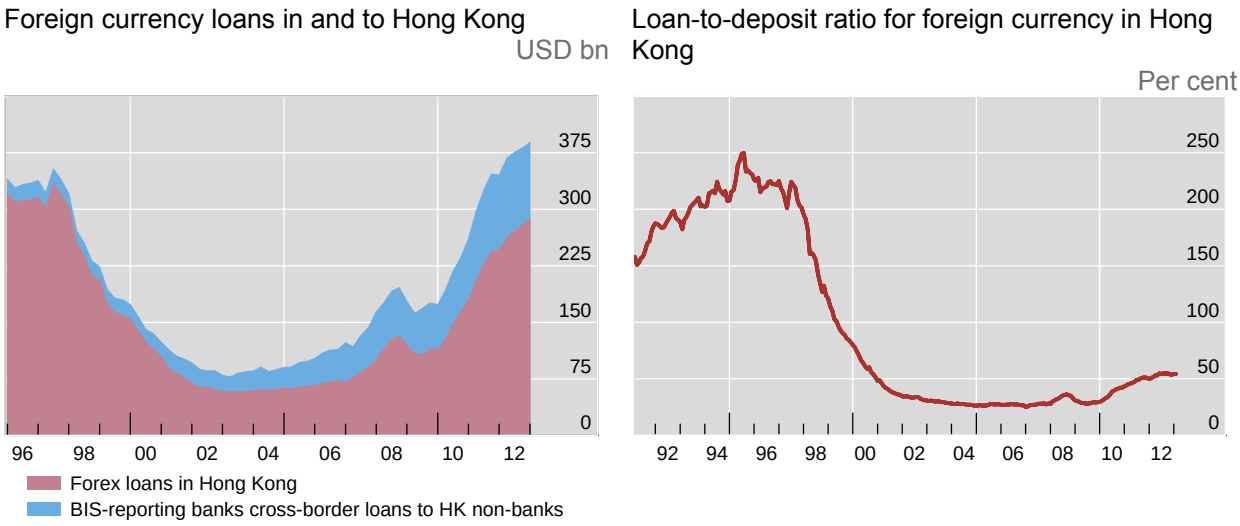
Shock:
US dollar lending rate increases by 25 basis points



For identification of shocks, we adopt a recursive structure (Choleski decomposition). The ordering of the variables is as follows: industrial production, reserve requirement ratios, renminbi policy interest rates, renminbi appreciation expectations, foreign currency loans, and US dollar lending rates. Robustness of the results is checked by using different ordering of the variables. Industrial production and loans are transformed into year-on-year growth in order to ensure stationarity. Dashed lines show 95% confidence bands. The number of lags in the vector autoregression is two.

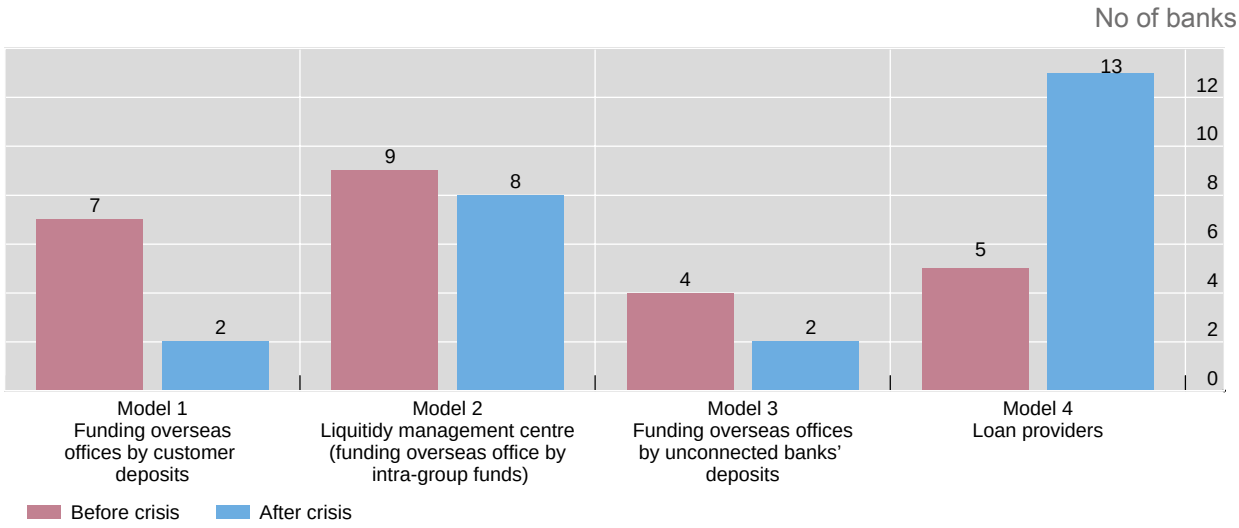
Source: Authors' calculations.

Figure 15. Foreign Currency Banking in Hong Kong



Sources: HKMA; CEIC; authors' calculations.

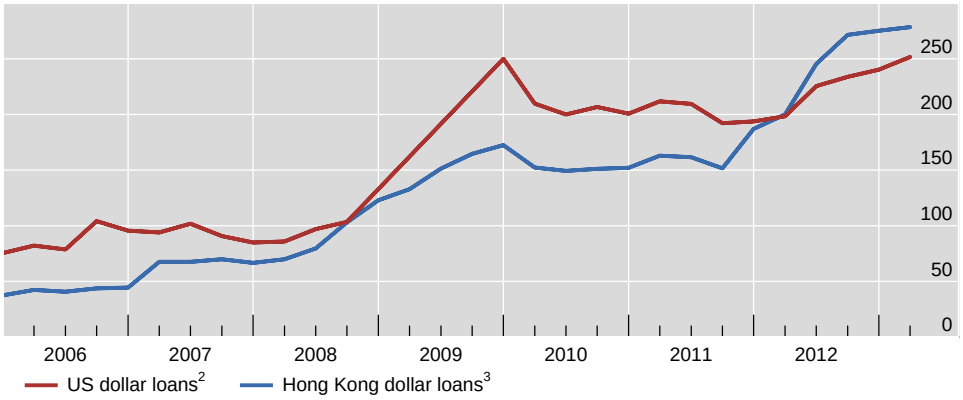
Figure 16. Business Models of Hong Kong Branches of US and European Global Banks



Sources: Hong Kong Monetary Authority (2013, p 81); classification by HKMA staff based on banks' financial disclosure statements.

Figure 17. Spreads on Syndicated Loans[1] Related to Hong Kong

Average basis points above Hibor or Libor; four-quarter moving averages



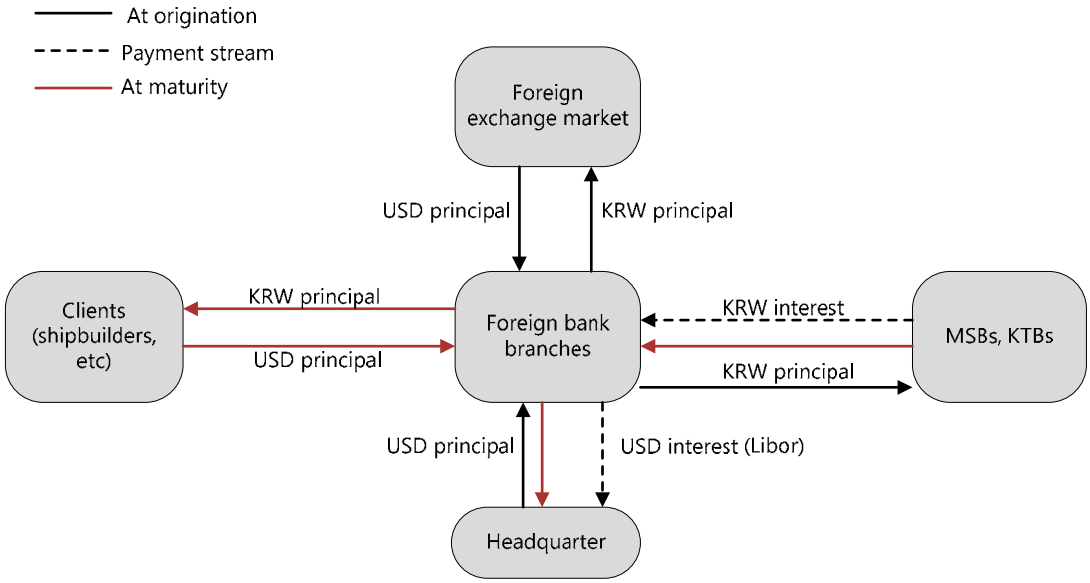
[1] Only those syndicated loans that use Hibor (for the case of HKD) or Libor (for the case of USD) as interest rate indexes are included.

[2] The samples include syndicated loans that at least one Hong Kong-incorporated licensed bank or Hong Kong branch (licensed banks) of major foreign banks as participating banks.

[3] The samples include all syndicated loans denominated in HKD regardless of participating banks.

Source: Bloomberg, authors' calculations.

Figure 18. Korean Exporter in Effect Borrows Dollars through Forex Forwards

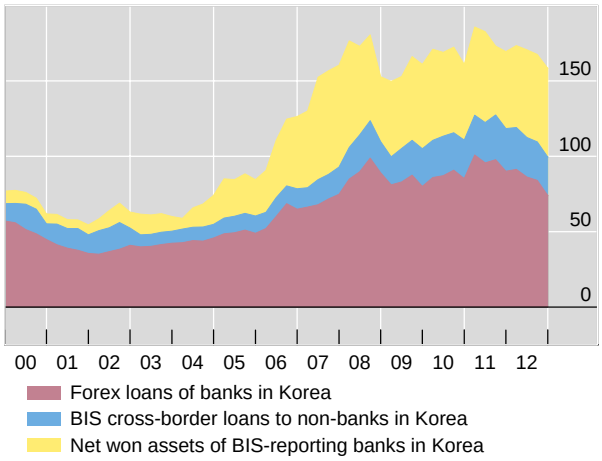


Foreign bank branch buys dollars forward from the exporter, and hedges by borrowing dollars at short term from headquarters, converting it into KRW in the spot market, and investing the KRW in Bank of Korea monetary stabilisation bonds (MSBs) or Korea Treasury bonds (KTBs). This allows the branch to earn the premium yields on dollars in Korea; however, the branch is typically also exposed to FX liquidity mismatches and mark-to-market price risk as the forward contract tends to have longer maturity (particularly when the exporter is a shipbuilder) than the borrowing from headquarters.

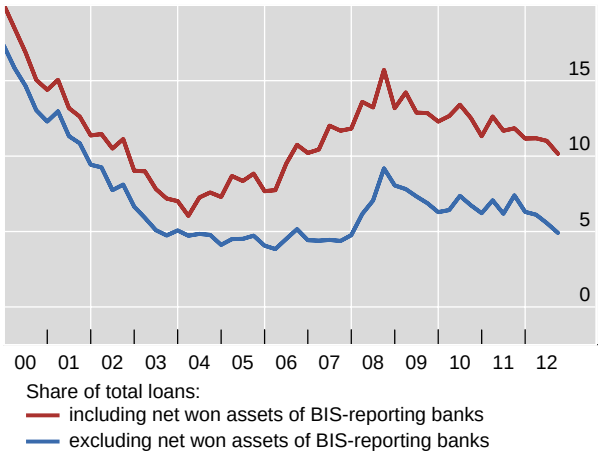
Source: Adapted by the authors from McCauley and Zukunft (2008) and Ree et al (2012, p 11).

Figure 19. Foreign Exchange Loans in Korea

In billions of US dollars



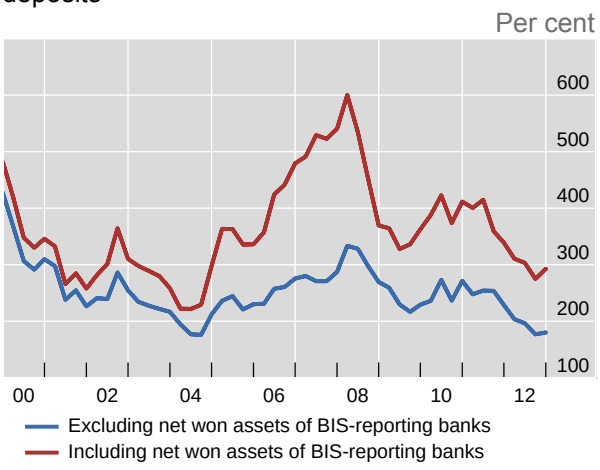
As a share of total loans %



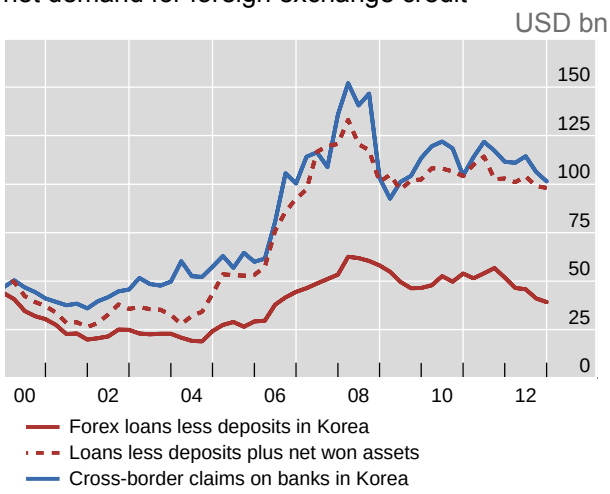
Sources: Bank of Korea; CEIC; authors' calculations.

Figure 20. Funding Foreign Currency Loans in Korea

Ratio of estimated foreign currency loans to deposits



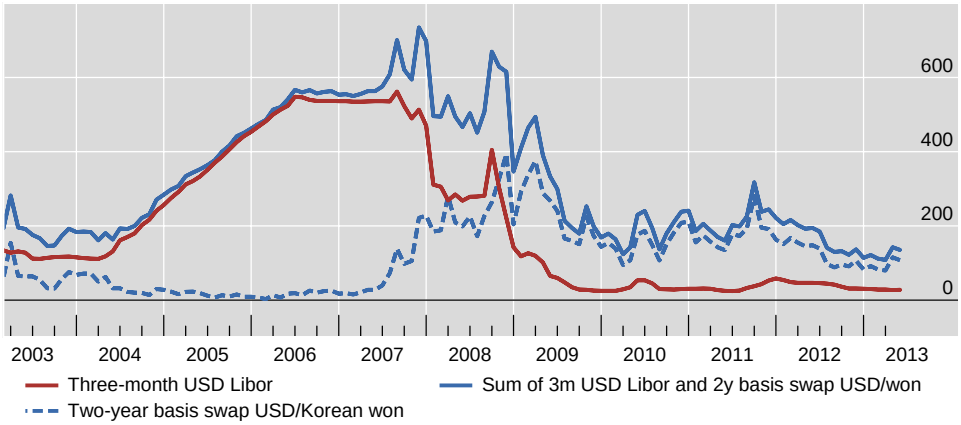
BIS-reporting bank claims on banks in Korea and net demand for foreign exchange credit



Sources: Bank of Korea; CEIC; BIS; authors' calculations.

Figure 21. Cost of Two-Year Dollar Floating Rate Funding In Korea

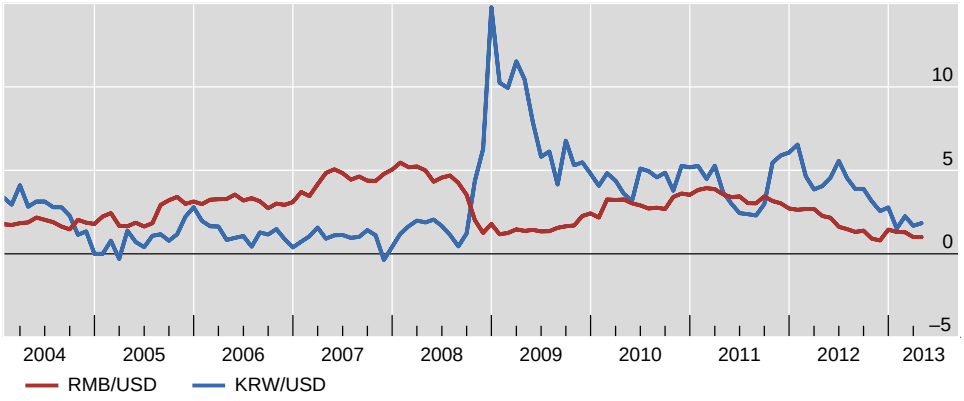
Month-end data, in basis points



Source: Bloomberg.

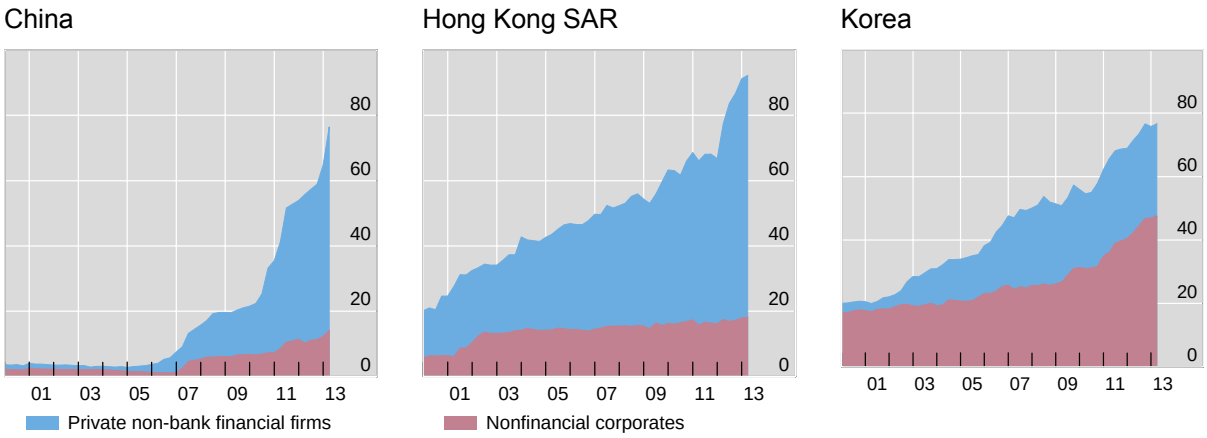
Figure 22. Survey-Based Expected Appreciation of the Renminbi and Won

Per cent appreciation over the three-month to one-year horizon



Sources: Consensus Forecasts; authors' calculations.

Figure 23. International Debt Securities Outstanding in Foreign Currencies (In billions of US dollars)



Source: BIS.

Annex 1. Estimated Open Economy Taylor Rules for Asia

Table A1. Estimated Open Economy Taylor Rules for Asia

	Federal funds	FX	Inflation	Output gap	R^2	Estimated since
China 1 yr depo rate	–0.01	–0.11	**0.09**	**0.20**	0.81	2000
India 3M T Bill	**0.28**	**0.04**	**0.24**	**0.33**	0.43	2004
Indonesia BI rate	**0.43**	–0.01	**0.44**	**–0.84**	0.92	2004
Malaysia o/n policy rate	**0.07**	–0.01	**0.09**	**0.12**	0.75	2004
Philippines repo	**0.77**	**0.12**	–0.08	0.06	0.85	2000
South Korea call rate	**0.33**	**0.01**	**0.32**	**0.31**	0.80	2000
Taiwan rediscount	**0.34**	0.03	**0.16**	0.06	0.72	2000
Thailand o/n repo	**0.19**	**–0.06**	**0.92**	–0.02	0.78	2000
Vietnam refinancing rate	–0.27	0.16	**0.27**	**1.11**	0.72	2000
Sri Lanka reverse repo	**0.35**	0.03	**0.17**	**–0.83**	0.82	2006

Figures in bold significant at 0.10 level.

Source: Spencer (2013, p 7).

Annex 2. Vector Autoregression of Foreign Currency Lending In China Using US Dollar Libor

In commenting on this paper at the Bank of Korea, Simon Potter of the Federal Reserve Bank of New York noted that only Chinese variables entered into the vector autoregression analysis of foreign currency loans in China. This Annex reports the results of such an analysis using US dollar Libor rather than the US dollar lending rate in China, as reported in Section 5.3 above. Given the results, it seems that US policy rates, as reflected in one-year interbank rates, have an important bearing on the pace of foreign currency lending in China.

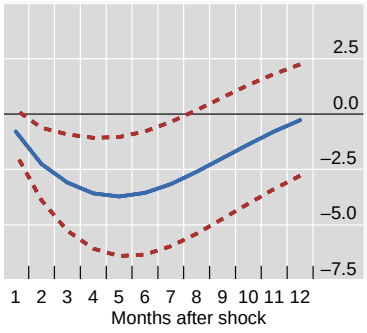
For this alternative analysis, we change the ordering of the variables. Recognising the exogeneity of US dollar Libor to the process of foreign currency lending in China, we place it first (rather than last as in the case of the onshore dollar rate). Then follow industrial output, the reserve requirement ratio, the mainland policy interest rate, expected renminbi appreciation and finally the growth of foreign currency loans. The results are shown on Figure A2.

According to this view, the dollar interest rate has a similar restraining effect on foreign currency lending in China. Again, foreign currency loans respond to industrial output positively but insignificantly. With regard to the response to Chinese monetary policy, foreign currency loans now respond negatively and significantly to higher reserve requirements, whereas before there was a belated response to higher renminbi policy rates. Foreign currency loans now respond more strongly to exchange rate expectations in the absence of an onshore dollar rate that to some extent reflects such expectations.

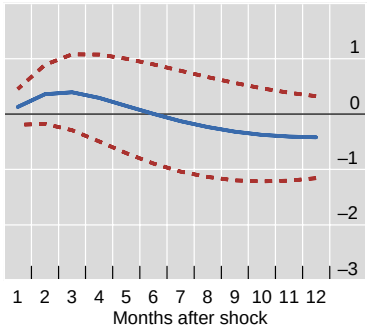
Figure A2. VAR Analysis of the Growth of Foreign Currency Lending in China

Sample period July 2001–Dec 2012; in percentage points

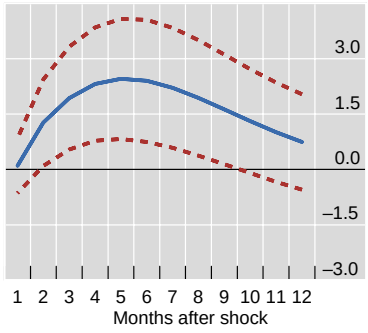
Shock:
12-month Libor increases by 25 bp



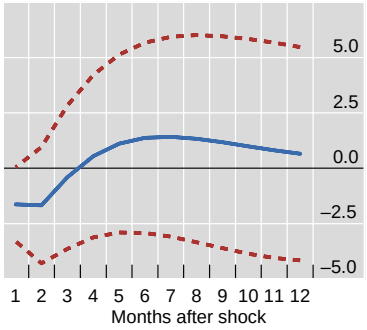
Shock:
Yoy growth in industrial production increases by 1 percentage point



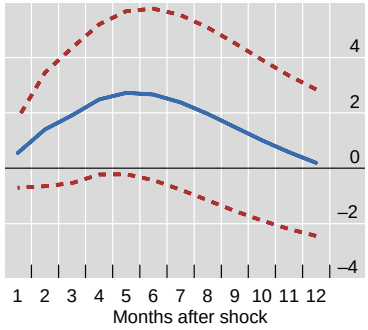
Shock:
Reserve requirement ratio increases by 25 basis points



Shock:
Policy interest rate increases by 25 basis points



Shock:
Expected rate of renminbi appreciation increases by 1 percentage point



Source: Authors' calculations.

Annex 3. Analysis of Hong Kong Syndicated Loans

The finding that spreads on syndicated loans rose after April 2011 could reflect a riskier composition of borrowers arranging syndicated loans. More conclusive evidence requires that deviations between observed pricing and benchmark pricing based on rating, maturity and so on be widened. This Annex presents evidence of such widening, consistent with the interpretation that banks responded to tighter liquidity regulation by raising costs to borrowers of medium-term loans.

Following Gadanecz et al (2012, pp 134–36) and BIS (2007, Chapter VII, p 131), we first estimate a benchmark model of loan spreads over base rates, Libor in the case of the US dollar and Hibor in the case of the Hong Kong dollar. The sample of 782 syndicated loans consists of US dollar loans with Hong Kong-based participants and all Hong Kong dollar loans. The benchmark model finds that collateral and a junk rating for the borrower both tend to raise spreads significantly; while the partial effect of collateral should be a lower spread, the need for collateral indicates a weak credit that may not be fully captured by the rating variable. The amount borrowed and a loan denominated in Hong Kong dollars both tend to lower the spread (Table A3). Overall, about a third of the variation in spreads is explained by this simple model.

Table A3.

Variable	Model A Coefficient [t-statistic]	Model B Coefficient [t-statistic]
Constant	486.6***	471.8***
	[8.3]	[8.4]
Time to maturity	–0.1	0.1
	[–0.9]	[0.5]
Short-term interest rate	–28.5***	–20.1***
	[–14.2]	[–9.2]
Dummy for guarantee	2.9	1.9
	[0.4]	[0.3]
Dummy for collateral	40.2***	36.5***
	[4.3]	[4.1]
Amount of loan facility	–13.6***	–15.5***
	[–4.4]	[–5.3]
Dummy for loans with investment grade rating	0.1	2.4
	[0.0]	[0.2]
Dummy for loans with speculative grade rating	72.8***	72.1***
	[5.9]	[6.1]
Dummy after April 2011		74.8***
		[8.4]
Dummy for Hong Kong dollar loans	–14.7	–2.6
	[–1.6]	[–0.3]
Adjusted R-squared	0.31	0.37
Number of observations	782	782

Only those syndicated loans that use Hibor (for the case of HKD) or Libor (for the case of USD) as interest rate indexes are included. The US dollar sample includes syndicated loans that at least one Hong Kong-incorporated licensed bank or Hong Kong branch (licensed banks) of major foreign banks as participating banks. The Hong Kong dollar sample includes all syndicated loans denominated in HKD regardless of participating banks.

Sources: Bloomberg; authors' calculations.

A key finding is that a dummy that takes the value of zero before April 2011 and one after attracts an economically and statistically significant coefficient. Indeed, taken at face value the rise in spreads was as large as that for junk borrowers.