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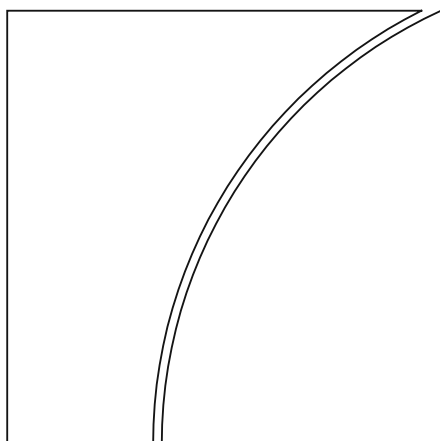
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financial vulnerability in Asia
through the BIS banking and
financial statistics

by Stefan Avdjiev, Bat-el Berger and Hyun Song Shin

Monetary and Economic Department

July 2018



JEL classification: F32, F34, G01

Keywords: Asian Financial Crisis, international bank
lending, procyclicality, financial stability

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Gauging procyclicality and financial vulnerability in Asia through the BIS banking and financial statistics*

Stefan Avdjiev, Bat-el Berger and Hyun Song Shin¹

July 2018

Abstract

We look back at past episodes of financial stress in Asia with a forward-looking perspective. We put ourselves in the shoes of a contemporary observer with the data at hand and ask what evidence was available on the systematic build-up of vulnerabilities. We reconstruct a graphical narrative of banking and financial developments at the time. Our exercise showcases the usefulness of the BIS international banking and financial statistics as a window on the financial system's procyclicality. We conclude with a real-time forward-looking survey of current financial vulnerabilities, focusing on the implications of the shift in the pattern of credit intermediation from banks to bond markets.

Keywords: Asian Financial Crisis, international bank lending, procyclicality, financial stability.

JEL classification: F32, F34, G01

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¹ Bank for International Settlements.

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1. Introduction

This year marks the 10th anniversary of the Great Financial Crisis of 2008, and the 21st anniversary of the beginning of the 1997 Asian Financial Crisis. Given the time that has elapsed and with the benefit of the experience gained since, it is a good moment to reflect on the lessons learned.

One aim of our paper is to look back but with a forward-looking perspective. We put ourselves in the shoes of a contemporary observer with the data at hand and ask what evidence was available to observers on the systematic build-up of vulnerabilities. The spirit of the exercise is to reconstruct a graphical narrative of events through a chart pack of banking and financial developments at the time. Our exercise showcases the BIS international banking statistics that were publicly available at the time. Finding a set of early warning indicators that can signal the vulnerability to financial turmoil has always been important for policymakers. However, there is a virtue in simplicity and in identifying common threads that can tie together episodes that span time periods and geographical distance.

A second goal of our paper is to engage in a “real-time” exercise on the assessment of vulnerabilities, taking into account the shift that has taken place in the pattern of credit intermediation from banks to the capital markets. Increasingly, credit to emerging market economy (EME) borrowers takes the form of debt securities with long maturities. We use the BIS international debt securities statistics to illustrate the pattern of financial intermediation, the lengthening maturities and the prevalence of dollar-denominated debt securities. While long maturities guard against rollover risk, market risk may be more relevant in the propagation of stress. Due to the higher duration of long maturity bonds, prices are more sensitive to changes in yields. Portfolio managers have limited appetite for losses, and longer-duration assets may be subject to the sharpest selling pressure when loss limits are triggered. We return to this issue in the concluding section, and also address the possible repercussions for the real economy.

Our study has two guiding themes. The first is that the build-up of vulnerabilities is reflected in the procyclicality and the slow-moving nature of balance sheet aggregates, especially of the banking sector. The second theme is the importance of the cross-border dimension of the procyclicality of the banking sector (Borio et al (2011), Avdjiev et al (2012), Lane and McQuade (2014)). The fact that banking claims straddle the border is not important in itself. Nevertheless, the border is typically where measurements can be taken most reliably due to the reporting requirements imposed on supervised financial institutions. The external dimension, therefore, takes on great importance in the narrative of events, even if it may not have any special significance of itself.

The cross-border dimension also opens a window on the procyclical risk-taking propensity of financial intermediaries through the composition of liabilities. A bank that grants a loan marks up both sides of its balance sheet. The loan is booked as an asset and the bank grants a deposit to the borrower which the borrower can use to pay another party. In this way, deposit growth, as expressed in the growth of the money stock moves in tandem with the growth of lending, and the money stock tends to be procyclical. However, during periods of rapid growth in lending, the banking sector will avail itself of non-deposit sources of funding to feed its lending activity. Some of this non-deposit funding will be sourced in global capital markets, and hence will show up in the BIS banking and financial statistics.

Thus, the window provided by the BIS statistics proves to be useful for two reasons – first, as a consistent and readily available source of information and second, as a window on the procyclical nature of financial intermediation.

Two countries, two crises: the same, yet different

To motivate our exercise, it is instructive to compare the experience of Spain and Korea during the Great Financial Crisis (GFC). The comparison illustrates both the similarities and the differences between boom-bust episodes. In both cases, the external dimension plays an important role in the narrative of events.

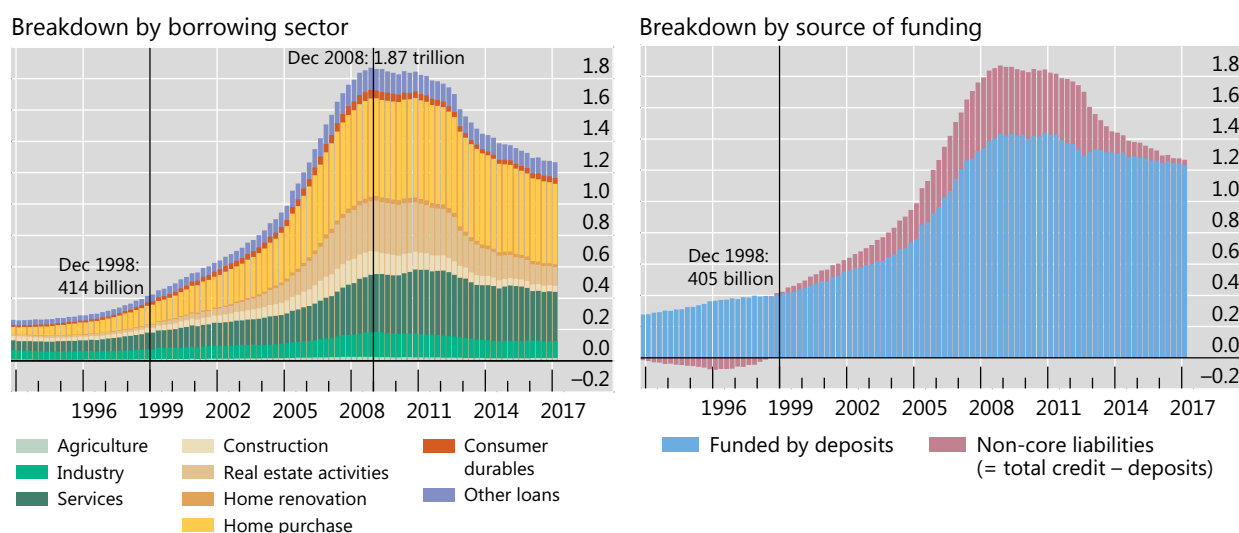
First, consider Spain. On the eve of the 1999 launch of the euro, total bank credit in Spain stood at €414 billion. Over the next 10 years, bank lending in Spain rose almost fivefold to €1.87 trillion. Loans unrelated to the property sector grew modestly, but property-related lending grew very rapidly (Graph 1).

How was the credit financed? Before the euro, domestic bank lending in Spain could be financed entirely from deposits of Spanish residents. Indeed, deposits exceeded lending, as shown by negative non-core funding, defined as lending minus deposits, shown in the right-hand panel of Graph 1. However, as loan growth outpaced the growth of deposits, more funding came from investors outside Spain, for instance, through the issuance of long-term covered bonds that were bought by investors elsewhere in the euro area.

Spain: Banking sector credit composition and funding

Total credit to domestic private non-financial resident sector, in trillions of euros

Graph 1



Source: Bank of Spain.

In the case of Korea, the rapid increase in non-core funding showed up as an increase in the foreign currency liabilities of the banking system. Graph 2 charts the most volatile components of bank liabilities, expressed as a percentage of M2, a proxy for core deposit liabilities. The first peak in non-core liabilities coincides with the Asian financial crisis of 1997. The total is in local currency terms, which explains the sharp spike in 1997 due to currency depreciation. After a lull in the early 2000s, non-core liabilities again rose rapidly in the run-up to the 2008 crisis.

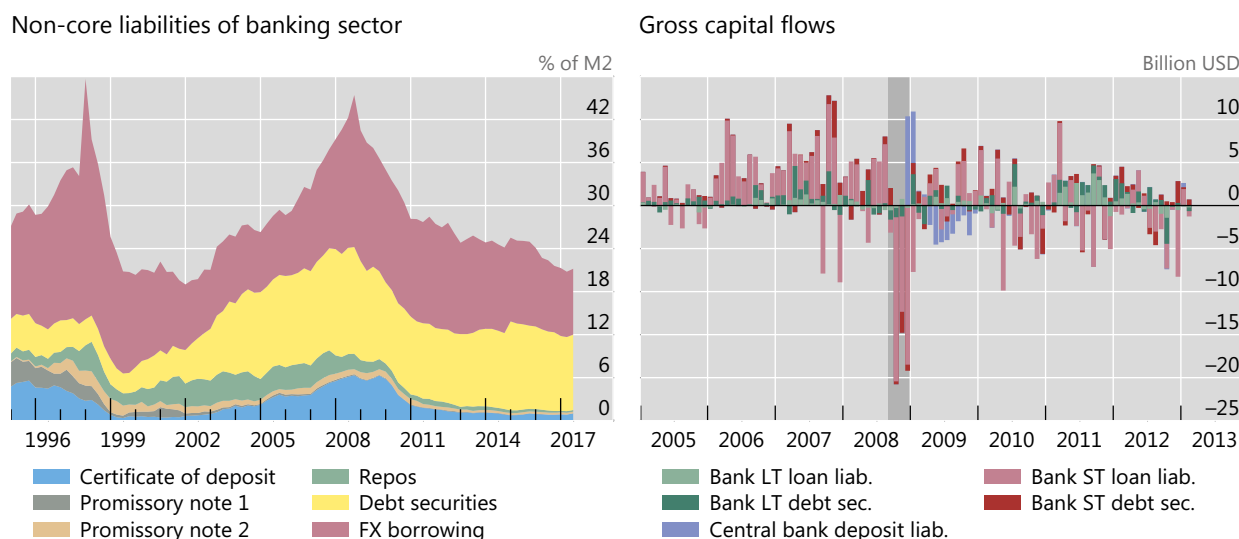
There are, however, two important and instructive differences between Spain and Korea. The first is on currency denomination of bank funding. Spanish banks borrowed in domestic currency (euros) while Korean banks had substantial dollar liabilities. Second, while Spanish banks borrowed long-term, by issuing covered bonds of several years' maturity, Korean banks borrowed short-term.

Korean banks had dollar claims on local corporate borrowers so that currency mismatch was limited, but there was an overall maturity mismatch when banks and corporates were taken together.

Corporates had long-dated dollar claims, such as export receivables, but the currency hedging by Korean banks entailed rolling over short-term dollar liabilities. The overall maturity mismatch left the banking system vulnerable to a run on short-term dollar funding with the onset of the GFC. The right-hand panel of Graph 2 shows the sharp reversal of funding flows in 2008.

Korea: Non-core liabilities and capital flow

Graph 2



Sources: Bank of Korea; authors' calculations.

Comparing the respective experiences of Spain and Korea reveals some common themes – especially the growth of banking sector balance sheet aggregates – but it also shines a light on the differences, such as the currency denomination of bank liabilities and the maturity of those liabilities. We will explore each of these dimensions in our review of the events of the Asian Financial Crisis.

Leverage in the small and large

Before we launch into the details, it is important to establish a few basic principles of balance sheet management by banks. Familiarity with these principles will allow us to more clearly interpret the contemporaneous evidence.

Systemic risk is about the system as a whole. One popular approach to gauging systemic risk is to drill down to detailed micro evidence on how financial institutions are intertwined.² There is much to be learned through this approach, as we delve into the complex web of interconnections.

The other way to go is to “drill up”, to the macro, and indeed, global aggregates. It turns out that drilling up is often more informative, as it delivers the all-important time dimension of systemic risk – how it builds up over time and how it unwinds. We can draw a distinction between leverage in the small (leverage of individual institutions) from leverage in the large (leverage of the financial system as a whole).³

Mitigating complexity is mostly about taming leverage in the small. The motto is: if you take care of leverage in the small, complexity will take care of itself.

² See Brunnermeier et al (2012) and the references therein.

³ See Shin (2017).

However, taming complexity may not be sufficient to ward off vulnerability to a reversal with macro consequences. Vulnerability in this sense has more to do with leverage in the large, and identifying the build-up of risks entails taking a macro and global perspective.

Banks are intermediaries; they borrow from other lenders, combine the borrowed funds with their own funds, and then lend the combined total to ultimate borrowers. Equity is the bank's own funds. The more equity a bank has, the more own funds it has to lend out. As well as lending out its own funds, a bank can borrow and lend out the proceeds. Imagine a bank's total lending as the capacity of a building. Then the bank's equity is like the size of the building's foundations, and its leverage is the height of the building. Increasing leverage expands lending by building a taller building on the same foundations. During boom times, the bank increases lending by adding floors to the building. When the downturn arrives, the bank has to remove some floors, in a painful adjustment.

What about the system as a whole? In principle, leverage in the small (leverage of the individual bank) can vary a lot, even if leverage in the large does not. A deposit-taking bank draws on savers' deposits to finance its lending, but it can also borrow from other banks. The leverage of the banking sector as a whole (leverage in the large) depends on how much lending is being done by the banking sector as a whole compared with its total equity base.

In theory, leverage in the small can diverge from leverage in the large. Indeed, it is a theorem⁴ that any level of leverage for the financial system is consistent with (almost) any leverage profile for individual banks. In practice, however, aggregate leverage is closely tied to the leverage of individual institutions.

Related literature

The causes and consequences of EME financial crises have been extensively studied. Our work is most closely related to the strand of the literature that examines the role of international capital flows in EME financial crises (see Koepke (2015) for a comprehensive review of the literature).

The literature on the importance of international capital flows started to emerge during the early-1990s, after the Latin American crisis. While Latin American countries were going through reforms to strengthen their economies after the crisis, the United States went through a recession, which led to very low interest rates there. International capital flows to Latin America increased and most of the literature at the time focused on whether this was due to domestic (pull) factors such as borrowing countries' economic growth and country risk, or external (push) factors such as advanced economies' economic growth, interest rates and global risk aversion (Ghosh and Ostry (1994), Taylor and Sarno (1997) and Chuhan et al (1998)).

During the 2000s, the empirical literature started to focus on balance of payments components, such as portfolio equity, portfolio debt and FDI, and by looking at different EME regions, such Asia, separately instead of as one EME country group (Filardo et al (2010)). Goldberg (2002) examines the difference in exposure that big and small US banks have vis-à-vis advanced economies, Latin America and emerging Asia. Baek (2006) finds that external (push) factors tend to be more important for portfolio flows to emerging Asia compared with those to Latin America.

The 2008 GFC caused large retrenchments of capital flows directed to EMEs. This shifted the focus of the literature from looking at the impact of net flows to gross flows (eg Lane and Milesi-Ferretti (2001 and 2007)). Net flows had been relatively stable in the run-up to the GFC, whereas gross flows turned out to be more volatile. Moreover, Broner et al (2013) show that gross flows are highly procyclical, specifically in the context of business cycles and crises. Forbes and Warnock (2012) present a systematic

⁴ See Proposition 1 in H S Shin, "Securitisation and financial stability", *Economic Journal*, vol 119, 2009, pp 309–32. The relationship is: $L = 1 + (\sum_{i=1}^n e_i z_i (\lambda_i - 1)) / (\sum_{i=1}^n e_i)$, where L is the leverage of the banking system, e_i is the equity of bank i , λ_i is leverage of i and z_i is i 's funding that comes from outside the banking system.

framework for analysing capital flows, splitting gross inflows into surges (increases) and stops (decreases) and gross outflows into flights (increases) and retrenchments (decreases). This paper shows how the most extreme capital flows episodes are driven by global factors, notably global risk aversion. Looking at the different components of international capital flows, Milesi-Ferretti and Tille (2011) find differences in the behaviour of these components during the GFC, showing that international banking flows are hit hardest while foreign direct investment remains relatively stable. Cetorelli and Goldberg (2011) demonstrate that global banks played a significant role in the transmission of the 2007–09 crisis to EMEs and that the main propagation vehicle was exposure to international funding from source country banking systems that were *ex ante* more likely to suffer from the GFC liquidity shock.

During the post-crisis period, with advanced economies conducting loose monetary policy for extended periods, attention has turned to how monetary policy conditions in those economies have impacted capital flows to EMEs. Many papers identify two main global factors: global risk aversion (often proxied by the VIX) and the US monetary policy stance.

Before the GFC, there used to be a wide consensus in the literature that global risk aversion has a negative effect on capital flows. Nevertheless, there is now growing evidence that the sensitivity of capital flows to global risk aversion has declined considerably after the GFC (Avdjiev et al (2017), Krogstrup and Tille (2017), Shin (2016)). In a recent related paper, Goldberg and Krogstrup (2018) use their newly-proposed Exchange Market Pressure index to construct a Global Risk Response Index, which reflects the country-specific sensitivity of capital flow pressures to measures of global risk aversion.

At the same time, the effect of US monetary policy on capital flows is not so clear-cut. While some studies have concluded that the impact is negative (eg Ghosh et al (2014), Bruno and Shin (2015a)), others have found a positive relationship or mixed results (eg Goldberg (2002), and Cerutti et al (2017a)). Avdjiev and Hale (2018) reconcile those seemingly contradictory findings by presenting evidence that the impact of US monetary policy on cross-border bank lending depends on the prevailing capital flow regime (expansion versus contraction) and on the level of the two main federal funds rate components (macroeconomic fundamentals versus monetary policy stance). Taking a different perspective, Cetorelli and Goldberg (2012) find that global banks use their global network to manage local shocks by using internal cross-border funding, making them less susceptible to changes in monetary policy.

There are also a number of important contributions on the theoretical side of the literature. Calvo et al (1992) and Fernandez-Arias (1996) were the first to distinguish between country-specific “pull” factors and external “push” factors. Their work provided the theoretical framework for the subsequent empirical studies on the topic. In more recent work, Mendoza (2010) and Bianchi (2011), have modelled sudden stops using occasionally binding collateral constraints. In related work, Brunnermeier and Sannikov (2015) propose a unified theoretical framework to analyse the macroeconomic consequences of capital controls. Finally, Bruno and Shin (2015b) formulate a model of the international banking system that highlights the bank leverage cycle as the determinant of the transmission of financial conditions across borders through banking sector capital flows. A key prediction of the model is that local currency appreciation is associated with higher leverage of the banking sector. We discuss this theoretical prediction in more detail and provide empirical evidence to support it in Section 5.

The rest of this paper is organised as follows. In the next section, we take a longer-term perspective and trace the evolution of international banking over the past four decades. In Section 3, we study the Asian Financial Crisis through the lens of the BIS international banking statistics. We then examine the broader global international financial landscape in Section 4. In Section 5, we take stock of the latest developments in the global financial system, with a particular emphasis on the post-crisis shift from bank-based to market-based international financial intermediation. We conclude in Section 6.

2. International bank lending over the past four decades

With the benefit of the experience gained since the Asian Financial Crisis, we can look back at the events at the time through the lenses of procyclicality and financial vulnerability. As part of our exercise, we shine a light both on the borrowers and the lenders. The two-way investigation of the banking balance sheet is made possible by the comprehensiveness of the BIS international banking statistics (IBS). We examine the evolution of international banking over the past four decades and pose the following questions. Who were the most important lenders? Who were the largest borrowers? How has the broad international banking landscape evolved?

The BIS international banking statistics (IBS) consist of two main data sets: the locational banking statistics (LBS) and the consolidated banking statistics (CBS).

The locational banking statistics (LBS), as the name suggests, organise their information according to the *residence* of reporting banks – ie their place of business. Compilation of the LBS is consistent with balance of payments principles. Under this broad heading, this data set offers two main perspectives: positions by *residence* of reporting bank and by *nationality* of reporting bank, meaning the jurisdiction of the bank's headquarters. So, for instance, the locational banking statistics by residence would shed light on the cross-border claims of banks doing business in Japan on borrowers in the rest of the world. An example of the locational banking statistics by nationality is the cross-border claims of *Japanese banks* (ie banks whose headquarters are in Japan), located anywhere in the world, on borrowers in the rest of the world. In both cases, LBS by residence and by nationality, positions are unconsolidated in the sense that the claims between offices of the same banking organisation (intra-bank positions) are not netted out.

By contrast, the intragroup positions in the BIS consolidated banking statistics (CBS) are netted out. This is closer to the principles used by banking supervisors. The CBS also have a breakdown in two main perspectives: claims on an immediate counterparty (IC) basis, or on an ultimate risk (UR) basis. To illustrate the difference between the two (IC and UR) statistical perspectives, consider an example in which a Korean bank extends a loan to a borrower in China, and the loan is guaranteed by a Japanese bank. On an IC basis, the loan will be recorded as a claim of Korean banks on China. On an UR basis, the loans will be reported as a claim of Korean banks on Japan.

In this paper, we will look mainly at cross-border claims from the LBS and international claims from the CBS. Cross-border claims are claims between residents and non-residents in the sense of the balance of payments accounts. For example, a claim booked by a bank in Japan on a counterparty residing outside Japan would be classified as a cross-border claim. International claims are the sum of cross-border claims and local claims in foreign currency. For example, the international claims of Japanese banks on counterparties in Korea include cross-border claims from Japanese banks outside Korea to parties in Korea, plus local lending in Korea by Japanese banks in any currency other than the Korean won.

Together, the LBS and CBS can offer complementary views on banking trends. When they are combined in a judicious manner, the two sets of statistics can be very informative. We will have many opportunities to illustrate this throughout the paper.

Nevertheless, there are also some caveats. Numbers from LBS and CBS cannot be compared one-to-one. This is due mainly to three wedges. Two of those wedges have already been mentioned above: (1) whereas the positions reported in the CBS are consolidated, those reported in the LBS are not, and (2) the cross-border claims available in the LBS are defined differently from the international

claims in the CBS. Finally, more countries report LBS than CBS.⁵ It is important to keep these three distinctions in mind, especially when comparing data from the same lender or on the same borrower.

a. Main lenders

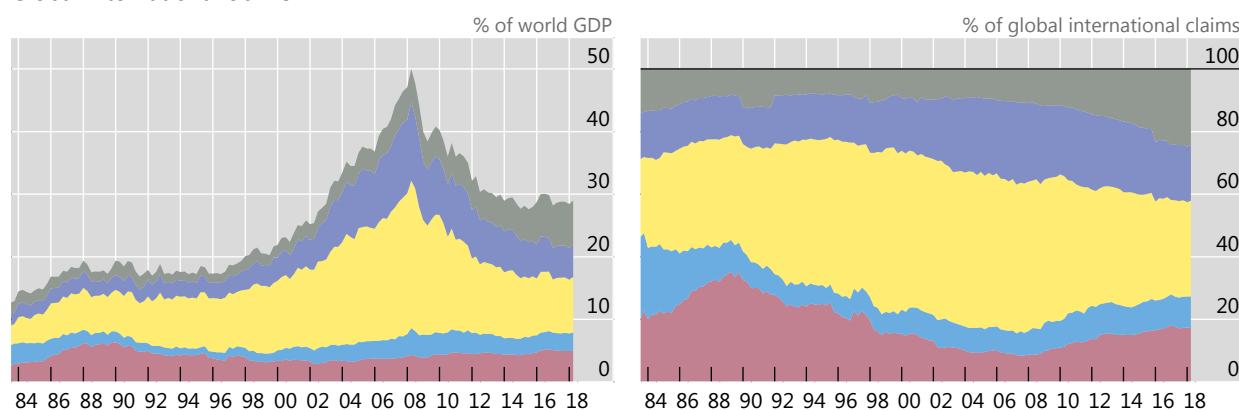
In the early 1980s, US banks were the biggest international lenders. Their international claims stood at \$375 billion, equivalent to 3.3% of world GDP at the time (Graph 3). Nevertheless, the leadership of global banking began to switch almost immediately after the start of the sample. Heavily affected by the Latin American debt crisis, US banks began a long period of relative decline, handing the baton of global banking leaders to European banks. European banks' share stayed relatively stable over the next five years, hovering at just below 50% of aggregate global international claims.

Broad trends in international bank lending, by lender nationality

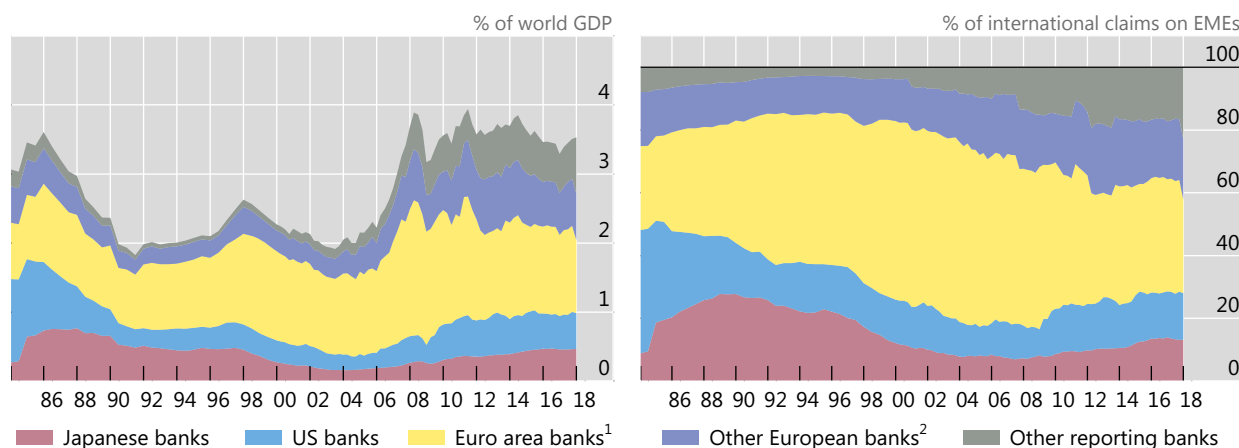
International claims

Graph 3

Global international claims



International claims on EMEs



¹ Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal and Spain. ² Denmark, Sweden, Switzerland, United Kingdom.

Sources: IMF, *World Economic Outlook*; BIS locational banking statistics and consolidated banking statistics on IC basis.

In the meantime, the share of lending by Japanese banks increased from 2.6% of world GDP in Q2 1983 to a peak of 6.4% in Q3 1989. This is notable in two regards. First, this turned out to be the

⁵ The full lists of reporting countries for the BIS LBS and the BIS CBS are available at: https://www.bis.org/statistics/rep_countries.htm

peak of the relative heft of Japanese banks for the whole sample to this day. Second, this peak occurred eight years before the onset of the Asian Financial Crisis.

As lending by Japanese and US banks subsided in the 1990s, lending by European banks picked up. Whereas during the run-up to the 2008 GFC, lending by Japanese, US and other banks stayed below 5% of world GDP, lending by European banks surged, reaching a peak of 36% of world GDP (\$21 trillion) in Q1 2008. The sharp decline that followed took the outstanding lending stock back to its 2004 level (around \$11 trillion) as of end-2017.

b. Main borrowers

Lending to EMEs has grown considerably over the last four decades, growing from less than \$350 billion (3% of world GDP) in Q4 1980 to almost \$4 trillion (5% of world GDP) in Q4 2017. Remarkable as this may sound, it still pales in comparison with lending to advanced economies (AEs), which went from a little under \$800 billion (7% of world GDP) to \$20 trillion (25% of world GDP) over the same period, a 25-fold increase in less than 40 years.

Compared with the overwhelming volume of borrowing by advanced economies, it might appear that borrowing by EMEs is relatively stable. However, when we zoom in and only look at borrowing by EME regions, we see some interesting shifts among EME regions.

In the mid-1980s, when US banks were still the world's largest lenders, the biggest EME borrowers were located in Latin America. Graph 4 clearly illustrates the build-up and the deleveraging of the Latin American debt crisis. In the early 1990s, right around the time that borrowing by Latin America stabilised, bank lending to emerging Asia increased rapidly. This continued until the start of the Asian Financial Crisis in 1997.

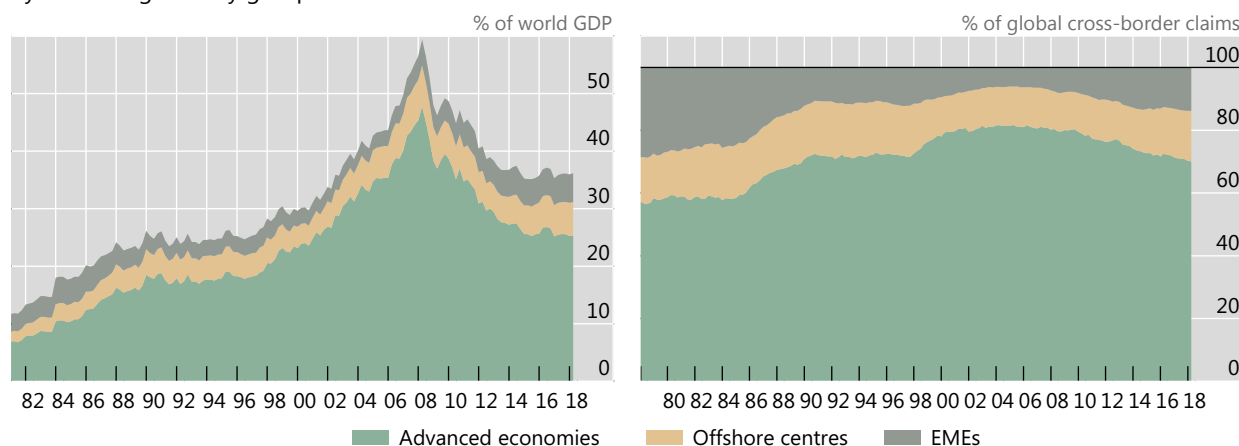
In the run-up to the GFC of 2008, bank lending to emerging Europe and emerging Asia really picked up. Both regions saw a sharp deleveraging after the GFC. Nevertheless, while lending to emerging Europe has not increased again, lending to emerging Asia has surpassed its pre-GFC peak and currently accounts for roughly half of all bank lending to EMEs. China alone accounted for 24% of all EME borrowing as of end-2017.

Broad trends in international bank lending, by borrower location

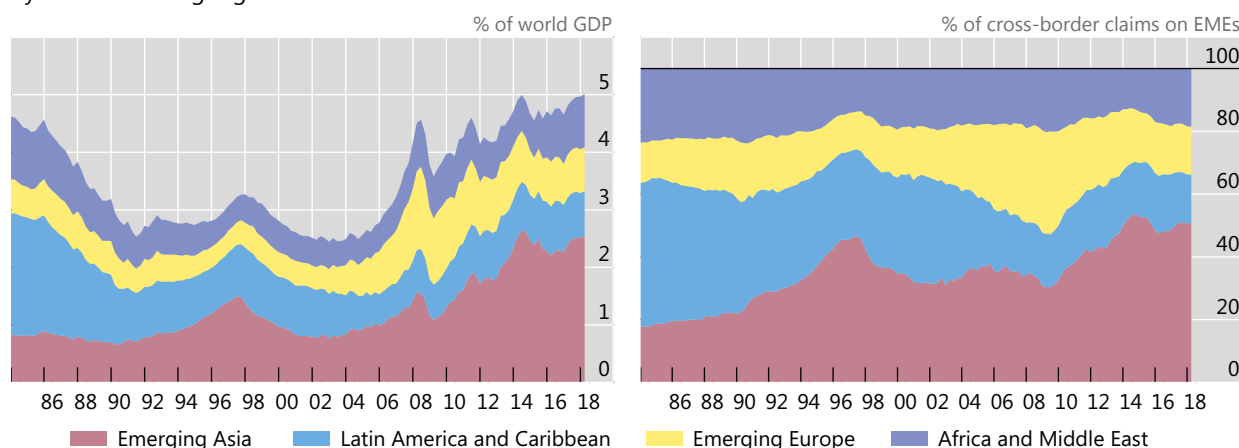
Cross-border claims

Graph 4

By borrowing country group



By EME borrowing region



Sources: IMF, *World Economic Outlook*; BIS locational banking statistics.

3. The Asian Financial Crisis through the lens of the BIS international banking statistics

The previous section provided a broad overview of global banking trends to help put the Asian Financial Crisis (AFC) into perspective. In this section, we take a closer look at what happened to international bank lending during the AFC. More concretely, we focus on bank lending to the hardest-hit countries: Indonesia, Korea, Malaysia, the Philippines and Thailand (the AFC-5 countries). We pay particular attention to the potential (early warning) signals that policymakers in the 1990s could have extracted from the BIS IBS in real time.

a. Aggregate cross-border bank lending

The close link between cross-border credit and domestic credit tends to pose considerable financial stability challenges (Borio (2016), BIS (2017)). Cross-border credit can amplify domestic credit booms, as it typically outgrows its domestic counterpart during financial booms, especially those that precede serious financial strains (Borio et al (2011), Avdjiev et al (2012), Lane and McQuade (2014)). As Aldasoro

et al (2018) have recently shown, the 12-quarter growth rate of the ratio of cross-border claims on a given country to its GDP is a useful early warning indicator for systemic banking crises.

All the AFC-5 countries experienced a rapid expansion of cross-border credit ahead of the AFC (Graph 5). The most notable example is Thailand, whose external bank borrowing reached an unprecedented quarterly growth rate of 42% at end-March 1996. Although not as dramatic as in the case of Thailand, the pre-AFC expansions in cross-border bank claims on all remaining AFC countries were also very sizeable.

When taken in isolation, growth rates can be deceptive since they could be derived from a low base. Therefore, combining information on levels with information on growth rates can often give a more reliable indication of whether cross-border credit growth is broadly within the norm or whether it is exceptional in some way.

The usefulness of combining levels and growth rates is illustrated in Graph 6a, which shows the evolution of the level and the growth rate of the ratio of cross-border claims over GDP (XBC/GDP) for the largest 40 EMEs in the 1990s.⁶ In the early part of the decade, Thailand and Indonesia had slightly higher increases in their XBC/GDP ratios, although not unusually high compared with other EMEs. Nevertheless, by mid-1995, Thailand had separated from the “rest of the pack” along both (the stock and the flows) dimensions of the XBC/GDP ratio. At end-June 1997, on the eve of the AFC, the AFC-5 countries showed clearly higher levels and growth of XBC/GDP than other EMEs.⁷

Doing the same exercise for the GFC shows slightly different results (Graph 6b). Here the shock hitting the system was not region-specific, and hence we do not see Asian countries collectively moving away from the cloud of other EMEs. Instead, by mid-2008, about a quarter of the EMEs in the panel show elevated XBC/GDP growth (higher than 50%), but these EMEs are from different geographical regions.

These statistics were available to policymakers before the AFC and the GFC, which means it would have been possible at the time to have spotted some of these anomalies in real time (BIS (1996)).⁸ Going forward, this external dimension of lending can be a good indicator of where vulnerabilities are building in the system.

⁶ The growth rate of the ratio of cross-border claims over GDP is defined in a similar (but not identical) fashion to the respective early warning indicator of Aldasoro et al (2018). See footnote 1 in Graphs 6a and 6b for the exact definition.

⁷ In addition to the above “growth rate” measure for cross border claims, we have also explored several alternative “flow” metrics – (i) the growth rate of the ratio of unadjusted cross-border claims to GDP; (ii) the adjusted growth rate of cross-border claims; (iii) the unadjusted growth rate of cross-border claims; and (iv) the compounded adjusted growth rate of cross-border claims. The key takeaways that emerge from the scatter plots associated with each of those alternative measures are very similar to the ones revealed by Graph 6a. All of these alternative scatter plots are available upon request.

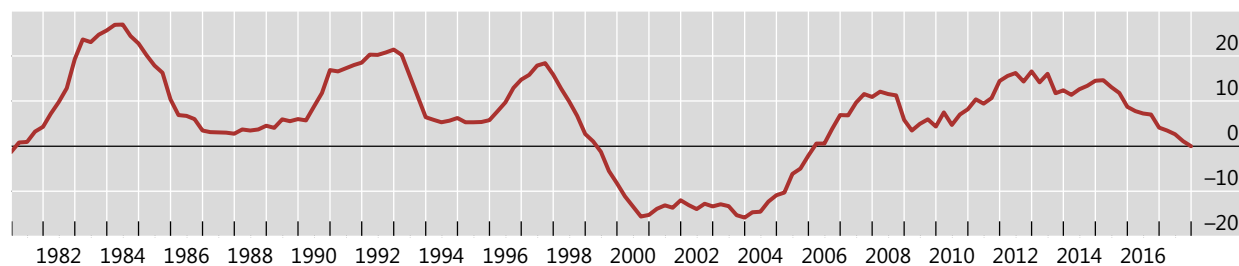
⁸ Strictly speaking, the BIS IBS are published with a lag of four months. Against the backdrop of the typically much longer time horizon over which financial vulnerabilities tend to accumulate, it can be reasonably argued that the BIS IBS data still provide “de facto” real-time information.

Growth of cross-border claims on the AFC-5 countries

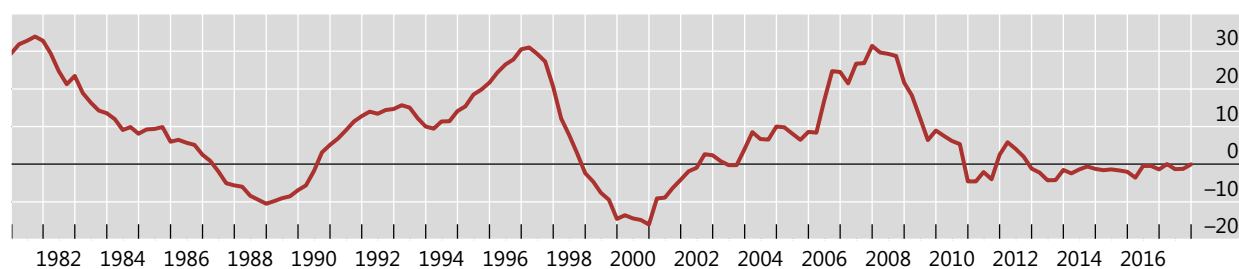
Break- and exchange rate-adjusted quarterly growth, 12Q moving average, in per cent

Graph 5

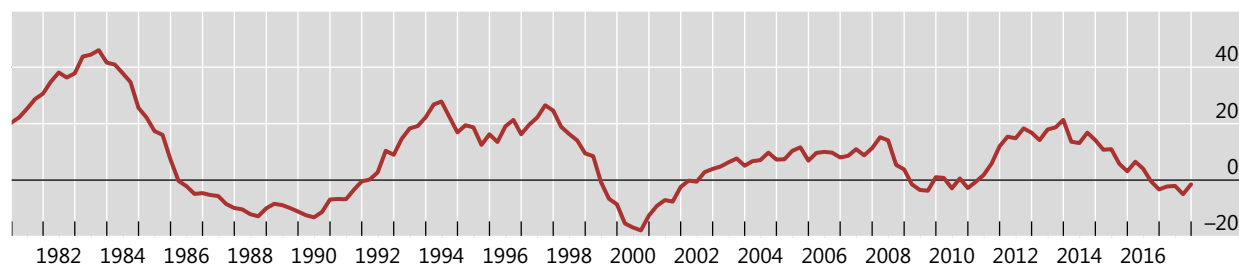
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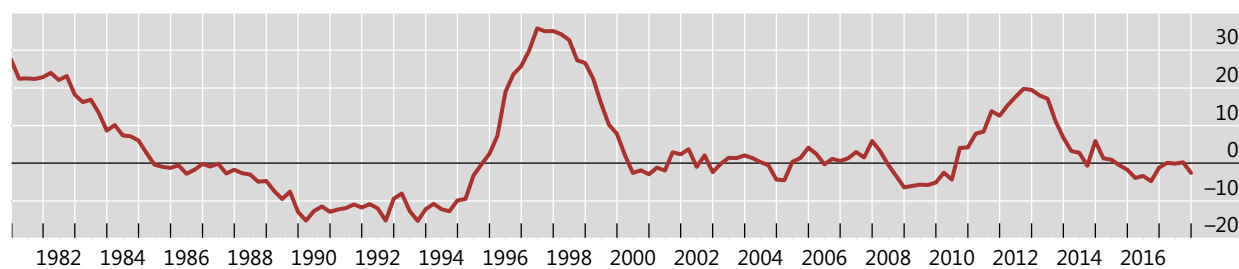
Korea



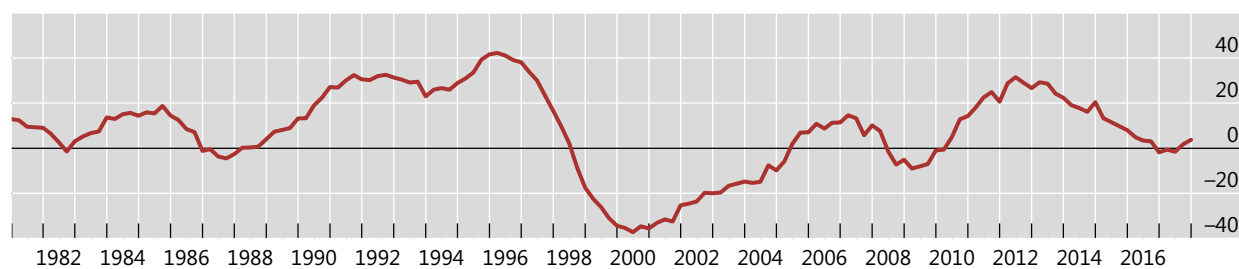
Malaysia



The Philippines



Thailand

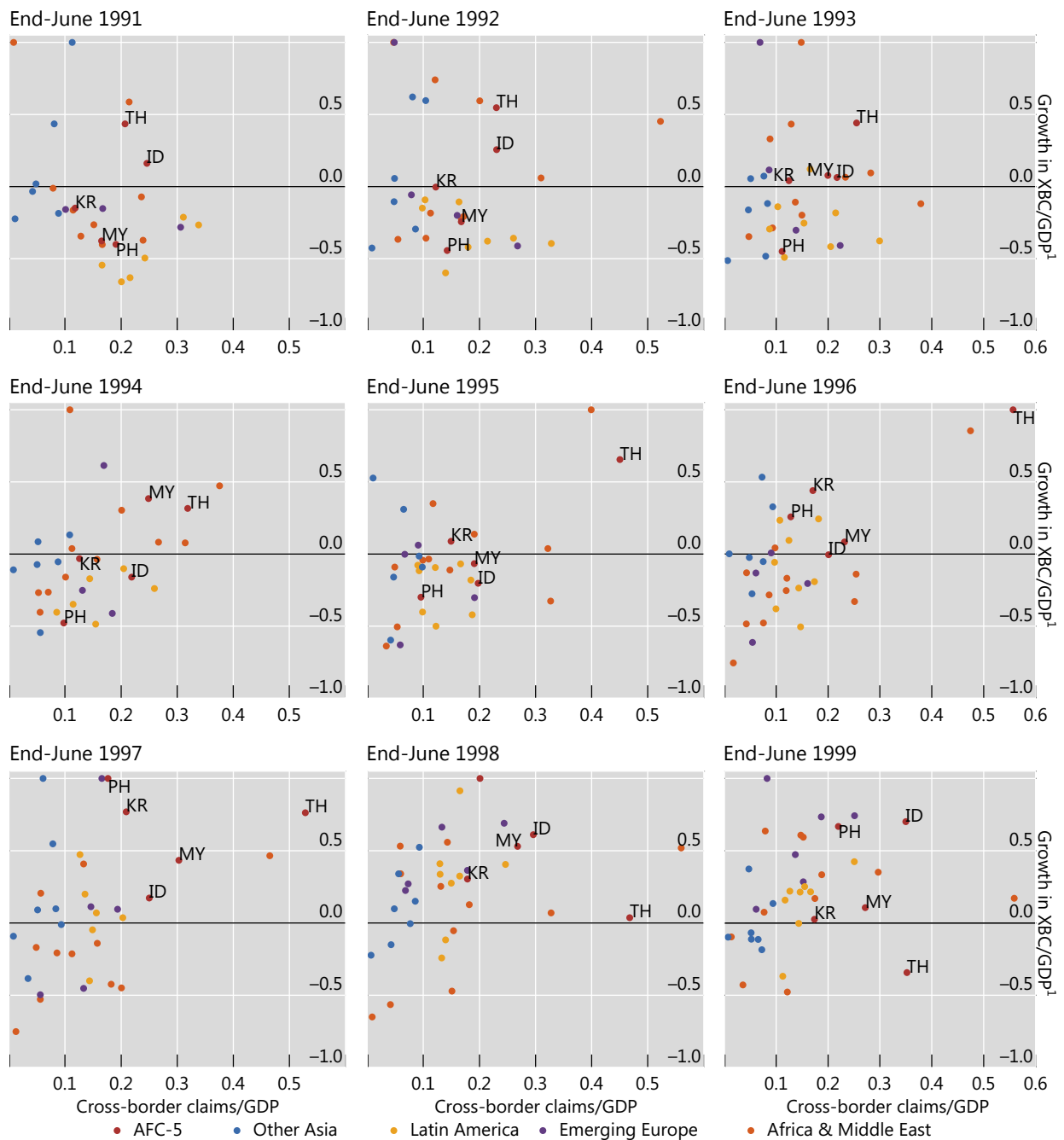


Source: BIS locational banking statistics.

Cross-border bank claims as share of GDP

Stocks and 12-quarter growth rates, at selected points in time

Graph 6a



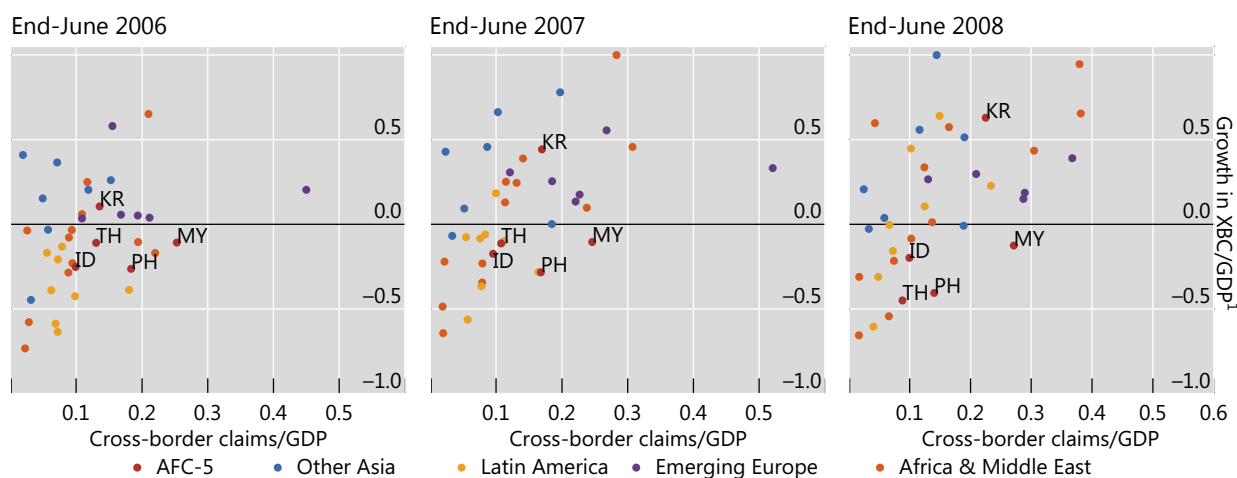
¹ Twelve-quarter growth in cross-border claims over GDP, adjusted for breaks and exchange rate movements as follows: $\frac{XBCS_t}{GDP_t} / \frac{XBCS_t - \sum_{i=0}^{11} XBCF_{t-i}}{GDP_{t-12}}$, where XBCS = cross-border claims amounts outstanding; XBCF = break- and exchange rate-adjusted cross-border flows.

Sources: IMF, *World Economic Outlook*; national data; BIS locational banking statistics.

Cross-border bank claims as share of GDP

Stocks and 12-quarter growth rates, at selected points in time

Graph 1b



¹ Twelve-quarter growth in cross-border claims over GDP, adjusted for breaks and exchange rate movements as follows: $\frac{XBCS_t}{GDP_t} - \frac{XBCS_t - \sum_{i=0}^{11} XBCF_{t-i}}{GDP_{t-12}}$, where XBCS = cross-border claims amounts outstanding; XBCF = break- and exchange rate-adjusted cross-border flows.

Sources: IMF, *World Economic Outlook*; national data; BIS locational banking statistics.

b. Sector breakdowns

The BIS LBS reveal that the rapid build-up in cross-border bank lending to the AFC-5 countries took the form primarily of interbank lending (Graph 7). For the most part, banks located outside the respective countries lent to banks in those countries, which in turn used the funds to extend local loans to residents. The only exception was Indonesia, which had regulations restricting the ability of local banks to make foreign currency loans to residents. Largely as a result, most cross-border lending to the country was directly to non-banks (Radelet and Woo (2000), Grenville (2011), Avdjiev et al (2012)). Nevertheless, even in the case of Indonesia, the pre-AFC increase in cross-border interbank lending was non-negligible.

The BIS CBS, which net out inter-office positions and include locally extended loans in foreign currency, provide an important complementary perspective. The sectoral breakdown available for international claims in the CBS reveals that the majority of foreign banks' lending was directed towards the non-bank private sector (Graph 8).

Thus, the picture that emerges from combining the locational and the consolidated perspectives (depicted in Graphs 7 and 8, respectively) is consistent with a story in which foreign banks located outside the borrowing country lent to their related offices (branches and subsidiaries) inside the country, which in turn extended local loans (denominated in foreign currency) to the non-bank private sector. This largely explains why the share of lending to the non-bank private sector in Graph 8 is substantially higher than the share of lending to non-banks in Graph 7.⁹ It also reflects the importance of the distinction between direct and indirect cross-border credit, highlighted in Avdjiev et al (2012).

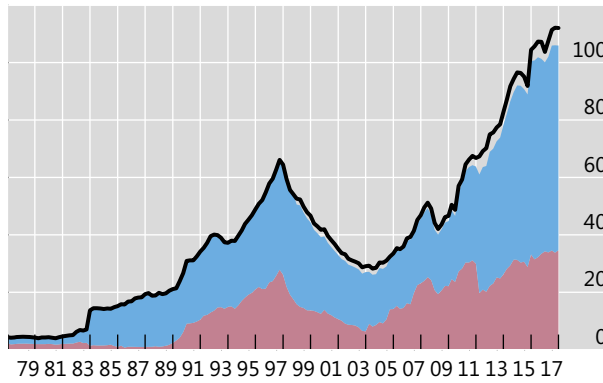
⁹ An additional potential wedge between the amounts reported in the above two data sets is related to the respective reporting populations. The LBS cover the positions of all internationally active banking units *located* in LBS reporting countries (regardless of the nationality of the banking unit). By contrast, the CBS cover the positions of all banking units whose controlling *parents are from* CBS reporting countries (regardless of the residence of the banking unit). The full lists of reporting countries for the BIS LBS and the BIS CBS are available at: https://www.bis.org/statistics/rep_countries.htm.

Cross-border claims by counterparty sector

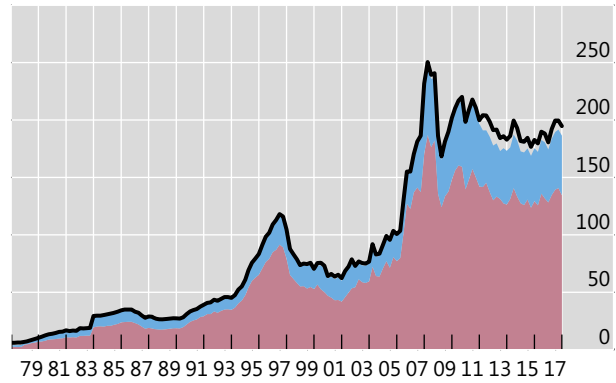
In billions of US dollars

Graph 7

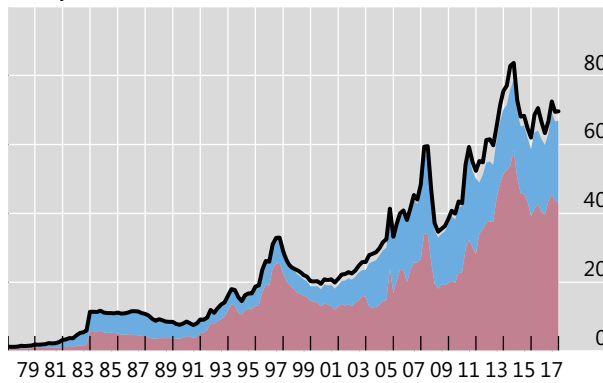
Indonesia



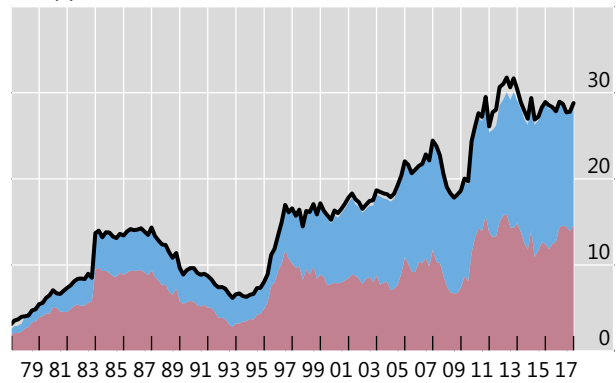
Korea



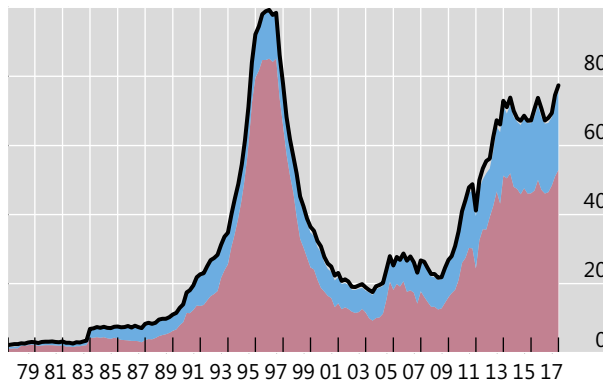
Malaysia



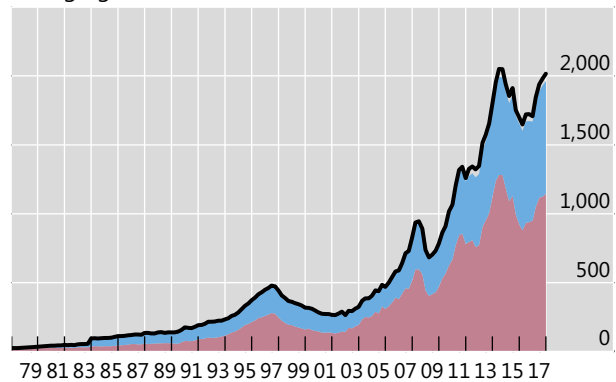
Philippines



Thailand



Emerging Asia



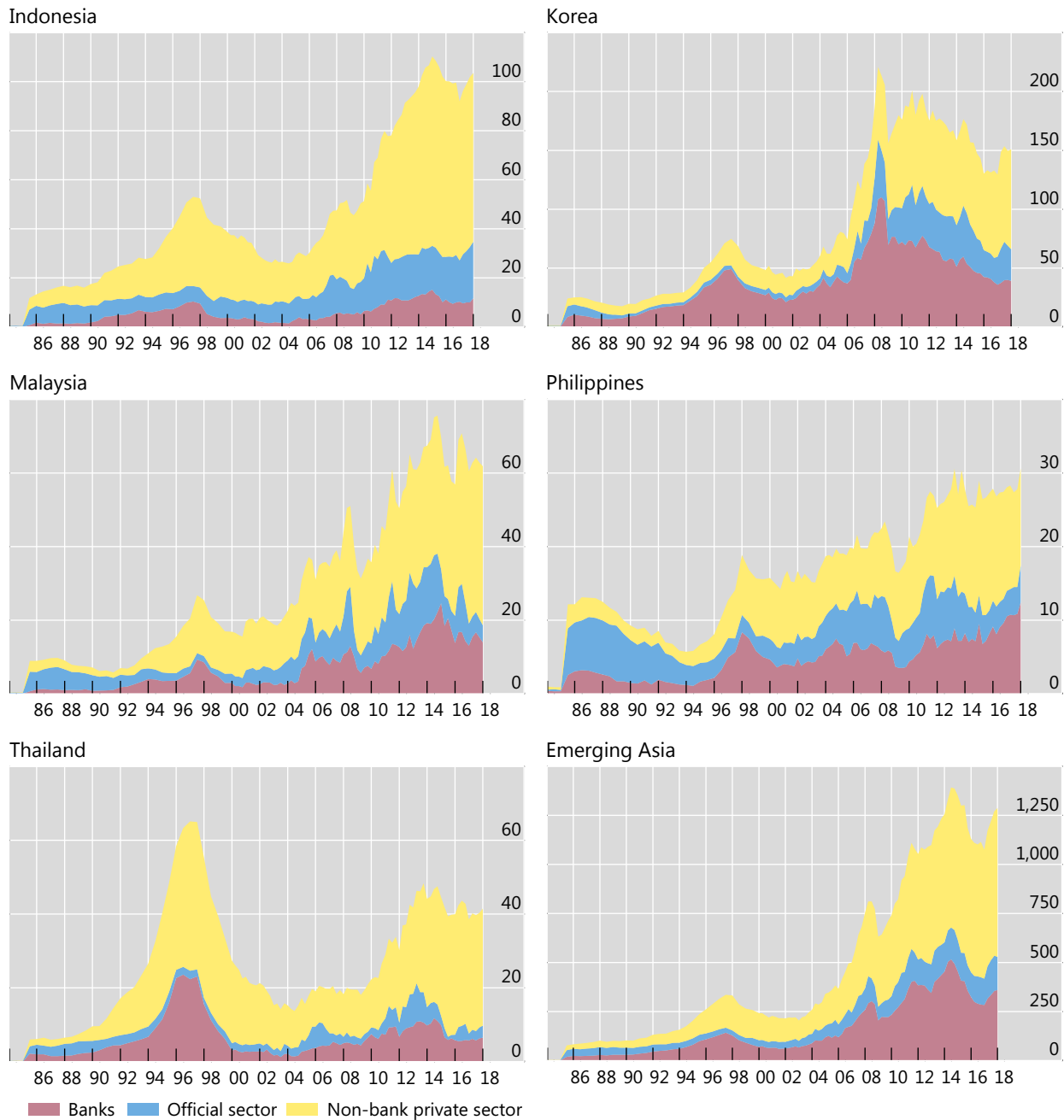
— All sectors ■ Banks ■ Non-banks

Source: BIS locational banking statistics.

International claims by counterparty sector

In billions of US dollars

Graph 8



Source: BIS consolidated banking statistics on IC basis.

c. Maturity breakdowns

The BIS consolidated banking statistics (CBS) provide a breakdown into the short and long maturities of claims. When looking at the maturity composition of international claims in Asia, most of the international bank lending to the AFC-5 countries during the run-up to the AFC represented “hot money” (ie claims with a maturity of less than one year).

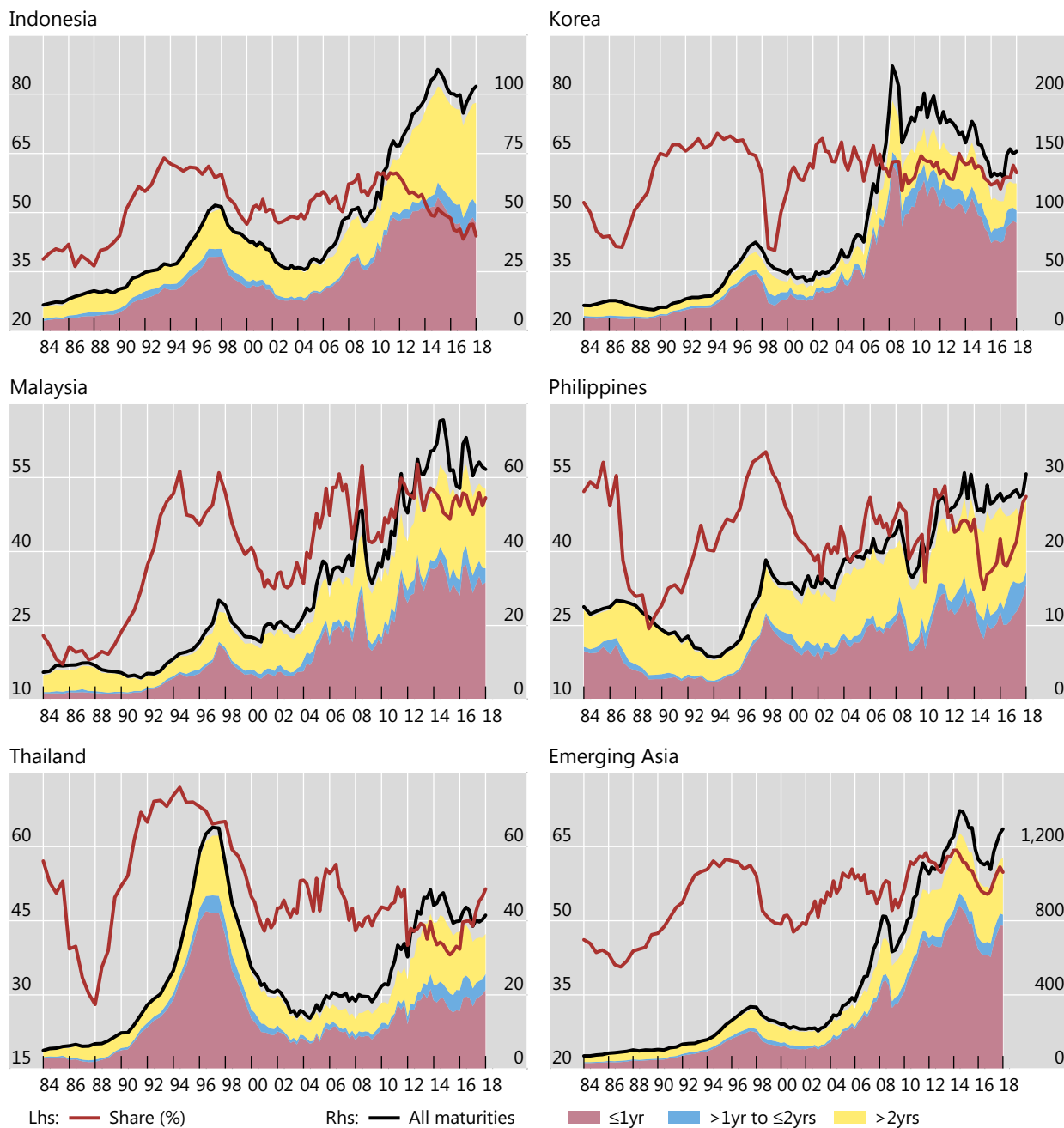
Such short-term claims were the main drivers of the rapid pre-AFC increases not only for the entire region, but also for each of the five individual AFC countries (Graph 9). During the run-up to the

GFC, short-term borrowing also took off in Indonesia, Korea and Malaysia. After the GFC, the proportion of long-term borrowing has increased for some countries in the region, such as Indonesia and Thailand.

International claims by maturity

In billions of US dollars

Graph 9



Source: BIS consolidated banking statistics on an IC basis.

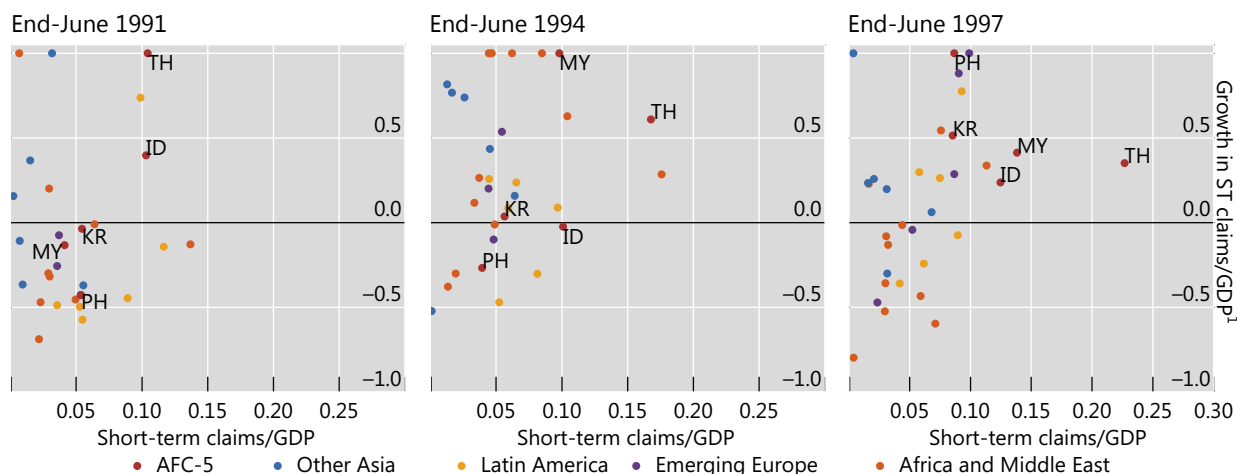
As in Section 3(a), we can plot the ratio of short-term international claims to GDP (STC/GDP) on one axis and compare that with the growth of this ratio, as in Graph 10. Here too we see the AFC-5

countries leaving the other EMEs behind, as both stocks of and growth in STC/GDP increase for the AFC-5 countries, but less so for most other EMEs.

Short-term international bank claims as a share of GDP

Stocks and 12-quarter growth rates, at selected points in time

Graph 10



¹ Twelve-quarter growth in short-term claims over GDP: $\frac{ST\ claims_t}{GDP_t} / \frac{ST\ claims_{t-12}}{GDP_{t-12}}$.

Sources: IMF, *World Economic Outlook*; national data; BIS consolidated banking statistics.

d. Lender breakdowns

Using the consolidated banking statistics, we can get a sense of which banking systems were providing funding to Asian borrowers in the years leading up to the AFC (Koch and Remolona (2018)). Graph 11 shows the origin of international claims on the AFC-5 countries. Thailand and Indonesia clearly show the big increase in Japanese banks' lending to these countries. In Korea, Malaysia and the Philippines, Japanese banks' involvement also increased, although not as much as European banks' lending to these countries. US banks on the other hand were not very active in the region during the AFC, but have increased their lending in the last decade (especially to Korea). Since the GFC, the gap between total lending to emerging Asia (Graph 11, black line) and lending by advanced economies (Graph 11, stacked areas) has been filled largely by banks from within the Asia-Pacific region itself (Remolona and Shim (2015), Ehlers and Wooldridge (2015)).

The BIS IBS also reveal that virtually all major national banking systems were rapidly increasing the shares in their international lending portfolios that were allocated to the AFC-5 countries (Graph 12). The steep increase for Japanese banks is particularly notable, although UK and euro area banks also had fairly sharp increases. By contrast, most banking systems were simultaneously reducing their lending shares in Latin America (in line with the global trends discussed in Section 2).

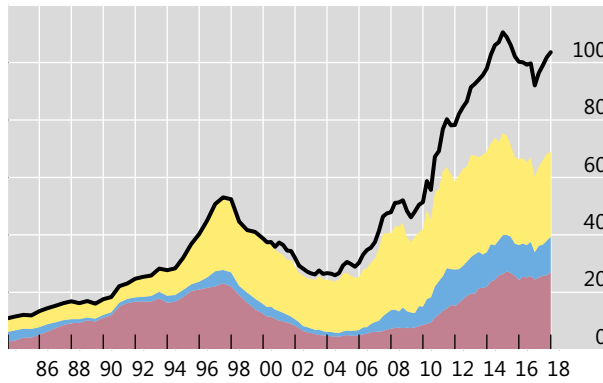
In the years after the GFC, lending to Asian countries other than the AFC-5, such as China and India, has increased significantly for all four major banking systems. For US banks, which for most of the sample lent primarily to Latin America, these other Asian borrowers have become the most important EME borrowing region in the last couple of years.

Origin of international claims, by counterparty country

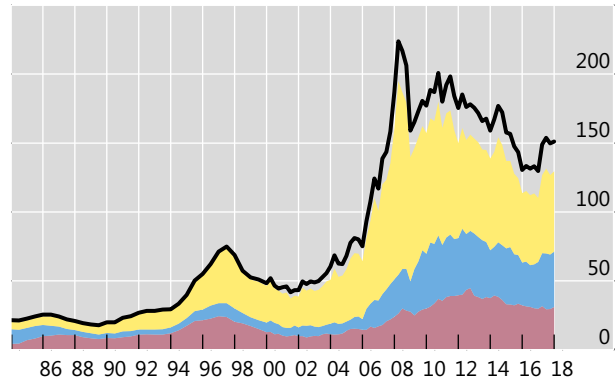
In billions of US dollars

Graph 11

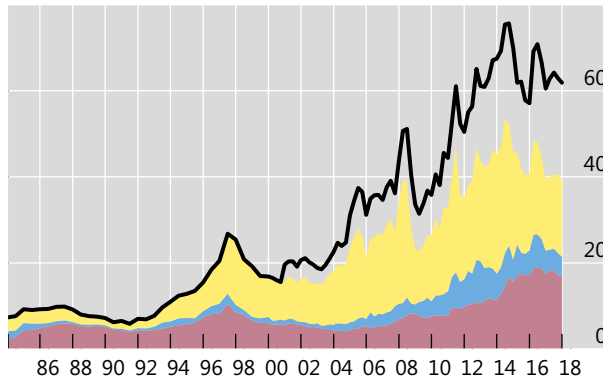
Indonesia



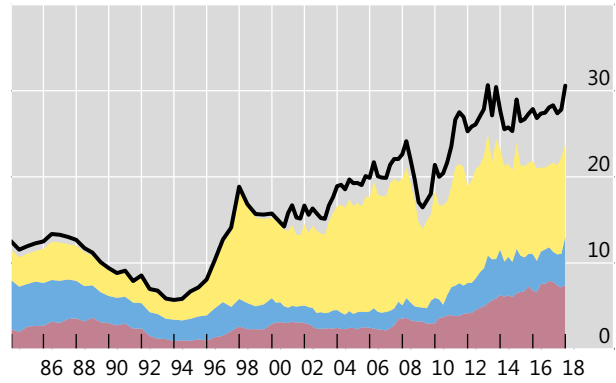
Korea



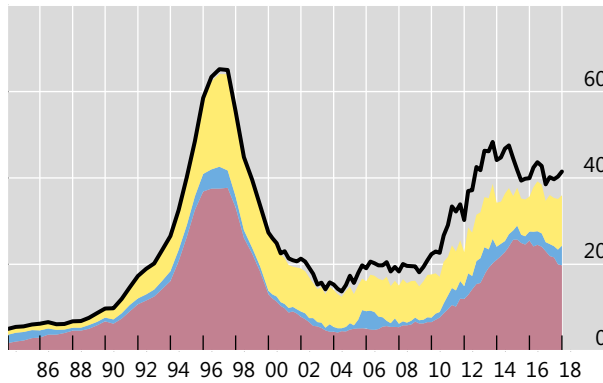
Malaysia



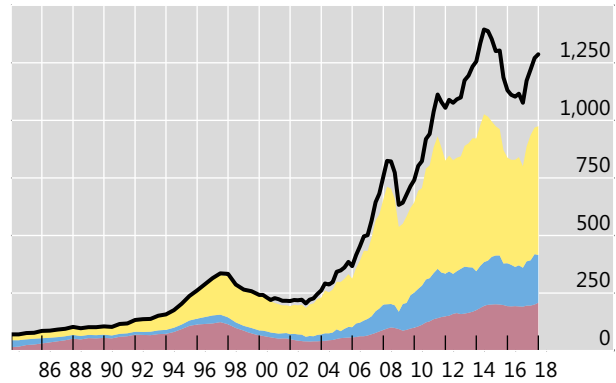
Philippines



Thailand



Emerging Asia



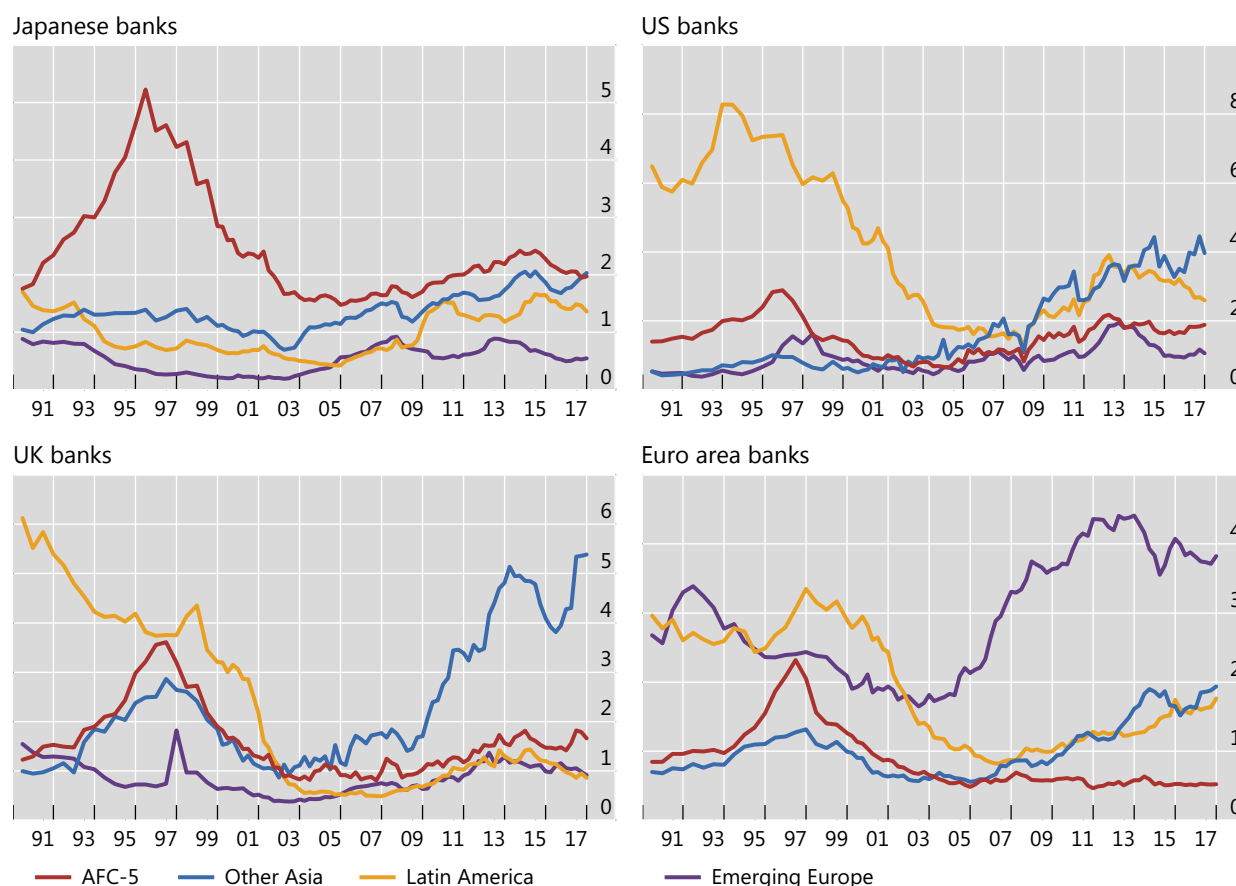
Japanese banks US banks Developed European banks All reporting banks

Source: BIS consolidated banking statistics on an IC basis.

International claims, by lending banking system

As a share of global claims by lending banking system¹

Graph 12



¹ Calculated as the share of (international claims of banking system i to country group j) to (international claims by banks with nationality i to the rest of the world).

Sources: BIS locational and consolidated banking statistics.

e. Currency breakdowns

The locational banking statistics include information on the currency denomination of claims. This allows for a detailed breakdown of foreign currency denominated lending in the region. Graph 13 provides this breakdown for the AFC-5 countries and emerging Asia as a whole.

The US dollar played a prominent role in the AFC. It was the main currency in which most cross-border claims on the AFC-5 countries were denominated. This was another manifestation of the lack of triple coincidence in international finance (Avdjiev et al (2016)): most of the cross-border lending in the run-up to the AFC was denominated in US dollars, despite the fact that neither the lending banks, nor the borrowers were located in the United States.

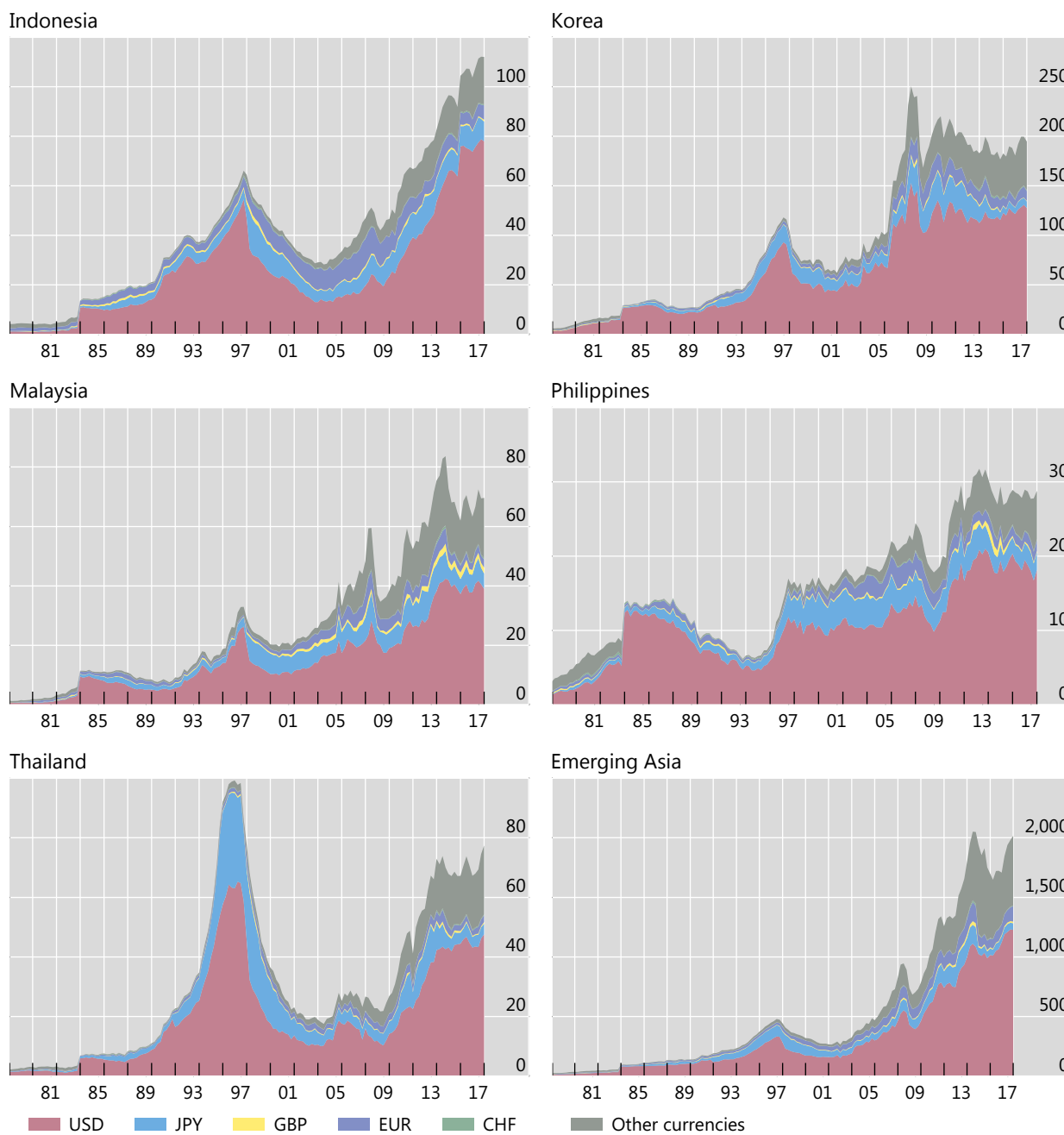
At the height of the AFC, lending in Japanese yen became very significant for Thailand, but less so for the other AFC-5 countries. Even though much of the funding in emerging Asia comes from euro area banks (see Graph 11), borrowing in euro was and still is only a small percentage of total foreign currency borrowing.

The local currency of borrowing countries is included in the category "other currencies". Up until the early 2000s, this category was negligible for most countries in the region, indicating that virtually all cross-border lending was done in currencies other than the borrower's local currency.

Currency breakdown of cross-border claims

In billions of US dollars

Graph 13



Source: BIS locational banking statistics

Cross-border lending in dollars increased even further in the decade following the AFC, reaching remarkable levels on the eve of the GFC (see Graph 15 in the next section). Once again, the majority of US dollar lending was originated by banks located outside the United States and was provided to borrowers outside the United States.

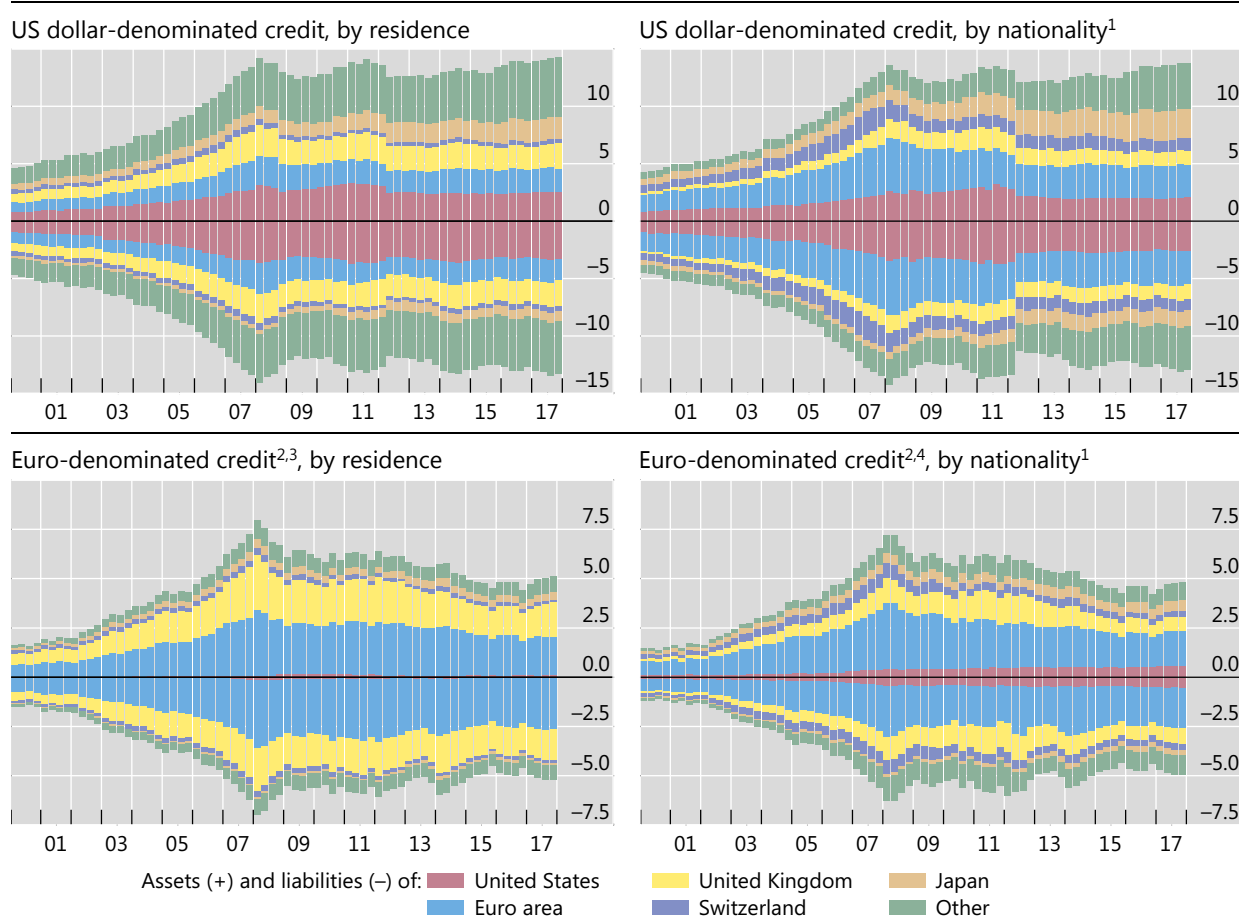
4. The global picture

The greater integration of the global financial system (and the global banking system, in particular) that has taken place over the past several decades has profound implications about the way we study and analyse international finance. The traditional approach has been to assume that the GDP boundary defines both the decision-making unit and the currency area. This “triple coincidence” of GDP area, decision-making unit and currency area is an elegant simplification but misleads when financial flows are important in their own right (Avdjiev et al (2016)).

Graph 14 illustrates a couple of important aspects of the (lack of) triple coincidence in international finance. First, the currency area tends to be much broader than the GDP area, especially in the case of major international funding currencies, such as the US dollar and the euro. More specifically, the majority of US dollar- and euro-denominated cross-border bank claims are booked by banks located outside the respective currency issuing jurisdictions (Graph 14, left-hand panels).

Cross-border credit, all sectors, in USD trillion

Graph 14



¹ The break in series between Q1 2012 and Q2 2012 is due to the Q2 2012 introduction of a more comprehensive reporting of cross-border positions (for more details, see www.bis.org/publ/qtrpdf/r_qt1212v.htm). ² Excludes intra-euro area cross-border assets and liabilities. ³ Euro-denominated assets and liabilities of banks located in the United States are estimated between Q1 2000 and Q1 2012. ⁴ Before Q2 2012: an estimate of intra-euro area cross-border assets and liabilities is obtained by applying the average share between Q2 2012 and Q3 2017 of intra-euro area assets and liabilities to all asset and liabilities of euro area banks.

Source: BIS locational banking statistics, Tables A5 (by residence) and A7 (by nationality).

Second, the overlap between decision-making units and GDP areas is (very) far from perfect. More concretely, the country in which banks book their cross-border claims is very often different than

the country of their headquarters (ie their nationality), which represents a much closer empirical counterpart to the theoretical concept of “decision-making unit”.

Before the GFC, commentators pointed to the large US current account deficit and raised concerns about a depreciation of the US dollar, drawing parallels with the experience of EMEs that suffer a “sudden stop” in capital flows.

Instead of crashing, the dollar actually soared during the crisis. The main reason was that European banks had used short-term dollar funding to invest in long-term dollar assets in the United States (McGuire and von Peter (2012)). As asset prices fell and dollar debts came due, borrowers sought dollars to repay their maturing debts. Dollar appreciation fed on itself, as the stronger dollar piled further pressure onto these banks’ balance sheets.

Graph 15, which displays two snapshots (as of 2002 and 2017) of cross-border bank claims in US dollars, provides an important complementary perspective to the global picture presented in Graph 14. European banks had claims of \$856 billion on US borrowers in 2002, but this grew to over \$2 trillion by 2007. This increase was associated with the rapid growth of the asset-backed securities issuer sector, which grew from modest beginnings in the early 2000s to well over \$2 trillion by 2007. Subprime mortgage securitisation reflected the activity of European banks (Bertaut et al (2011)). Some of the short-term dollar funding came from US money market funds, but a substantial amount came from the currency swap market, where European banks borrowed dollars by pledging other currencies (euros, for instance) as collateral.

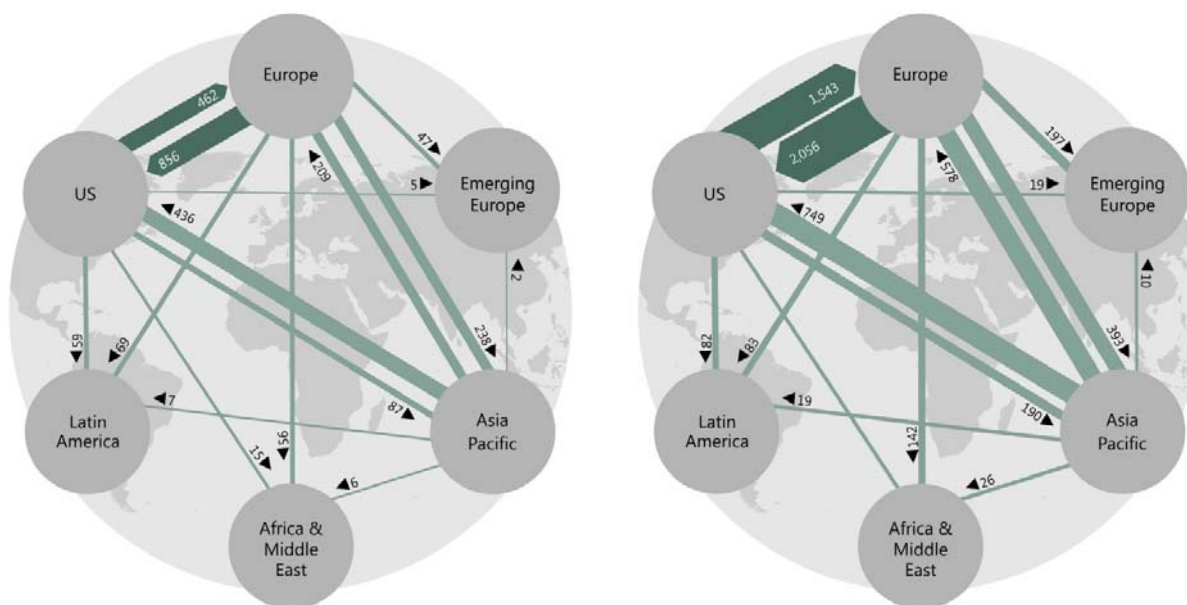
US dollar-denominated cross-border bank claims

In billions of US dollars

Graph 15

2002

2007



Source: BIS locational banking statistics.

5. Where do we stand now?

How far does the history help us to understand current vulnerabilities? The lessons of past crises are extremely important and should undoubtedly be heeded going forward. Nevertheless this does not

automatically imply that future bouts of financial disruption must follow the same mechanism as those of the past.

In order to gauge ease of financing in the world, the BIS calculates global liquidity indicators by combining the BIS LBS with the BIS international debt securities statistics. A popular global liquidity number is the total amount of US dollar-denominated credit to non-banks located outside the United States. This indicator is the sum of all USD-denominated cross-border lending to non-residents, USD-denominated local loans outside the US and USD-denominated debt securities issued by non-residents.

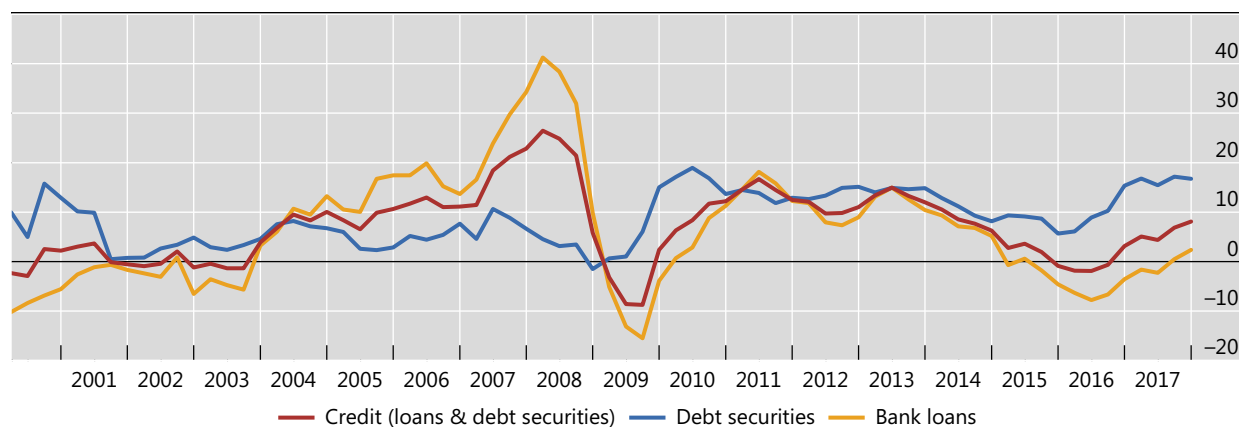
Two developments are important in assessing current risks to financial stability. The first development is the “second phase of global liquidity” – the shift in financial intermediation from banks to capital markets, especially through the issuance of fixed income instruments (Shin (2013)). The second is the fluctuation in risk-taking attitudes over time. As credit intermediation migrates from banks to capital markets, drivers of risk-taking also change.

Regarding the shifts in credit intermediation, banking sector retrenchment after the crisis resulted in a long period of subdued cross-border bank flows. For advanced economies, cross-border banking has been subdued for much of the post-crisis period. The annual growth rate of aggregate cross-border lending to advanced economies turned consistently positive only in early 2016. For EMEs, US dollar bank loans were shrinking at an annual rate of 8% as recently as the middle of 2016, but have now levelled out and are growing again in most regions (Graph 16).

US dollar-denominated credit to EME non-banks

Annual growth in per cent

Graph 16



Source: BIS global liquidity indicators.

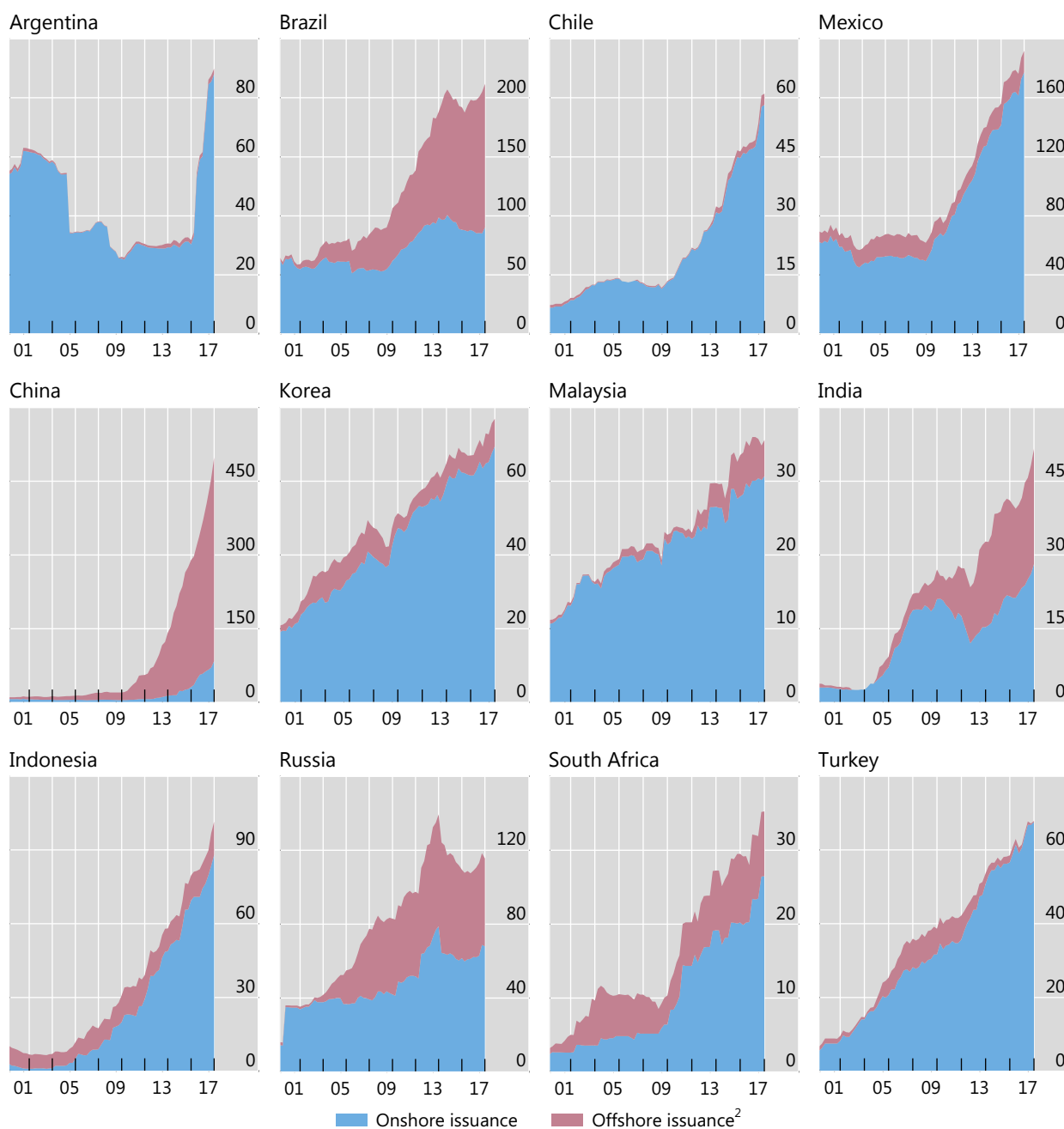
The most notable recent development is the very rapid growth in US dollar-denominated debt securities issued by EME borrowers. The outstanding amount has been growing at an annual rate of 17% since late last year.

The growth in US dollar-denominated international bond issuance by EME borrowers has been very broad-based. The global wave has swept across all major EME regions (Graph 17). The post-GFC surge has been especially notable for several major EMEs – China, Brazil, Chile and Turkey. In the case of the former two countries, a very large portion of the increase has been due to offshore issuance (Graph 17, red areas).

US dollar-denominated debt securities issued by EME non-banks

In billions of US dollars

Graph 17



¹ Offshore bond issuance is defined as outstanding US dollar-denominated bonds issued offshore (ie outside the country listed in the panel title) by non-banks with the nationality listed in the panel title.

Sources: Dealogic; Euroclear; Thomson Reuters; TRAX; BIS calculations.

As intermediation migrates from banks to bond markets, credit conditions are more vulnerable than before to a snapback of long-term interest rates and increased volatilities. A snapback could be accompanied by reversals of cross-border portfolio flows, threatening the sustainability of the high debt levels in many sectors.

A snapback could have several potential triggers, including an inflation surprise, but the key is a sudden shift in risk assessments. Long-term investors are thought to be a stabilising influence in financial markets, absorbing losses without triggering insolvency. However, we are reminded from time

to time that such investors can have limited appetite for losses, and they can join in a selling spree. We saw an example in February 2018, although the disturbance was mainly in the equities market.

In spite of the large stock of dollar-denominated debt securities outstanding issued by EME borrowers, there are some mitigating factors. First, the international debt securities issued by EME corporates have long maturities, and the maturities have been getting longer, as seen in Graph 18. Borrowers with long-maturity debt are less vulnerable to runs and rollover risk. Second, many EMEs hold substantial foreign exchange reserves, in contrast to their situation in past crises. And third, many of the EME issuers are global firms with revenues in foreign currency.

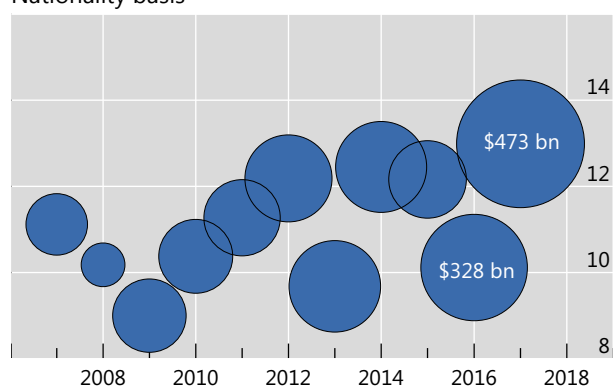
But, even here, we need to bear in mind some important qualifications.

Annual gross issuance and maturity¹ of US dollar international debt securities

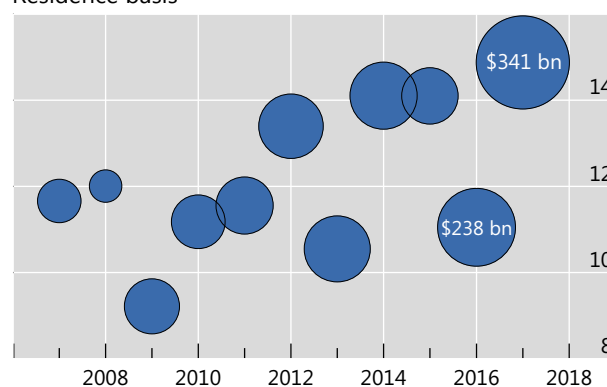
EME non-bank corporations,² in years

Graph 18

Nationality basis³



Residence basis³



¹ Weighted average. ² Non-bank financial institutions, government and non-financial institutions. ³ Nationality basis refers to firms with headquarters in the EME countries. Residence basis refers to firms resident in the EME countries. The size of bubbles reflects relative volume of annual gross issuance of long-term securities.

Sources: Dealogic; Euroclear; Thomson Reuters; Trax (Xtrakter Ltd); BIS calculations.

First, bonds with long maturities protect against runs, but they are vulnerable to market risk. They have longer duration, so that their prices are more sensitive to yield changes. If bond investors have limited appetite for losses and cut their positions in the face of a sharp decline in their values, the selling pressure will exacerbate the snapback in yields.

Second, non-financial firms' financial activities spill over into the rest of the economy. Foreign currency borrowing by EME corporates have taken on the attributes of a "carry trade" where, for every dollar raised through a bond issue, around a quarter ends up as cash on the firm's balance sheet (Bruno and Shin (2017)). Here, cash could mean a domestic currency bank deposit or a claim on the shadow banking system, or indeed a financial instrument issued by another firm. So, dollar borrowing will spill over into the rest of the economy in the form of easier credit conditions. When the dollar borrowing is reversed, these easier domestic financial conditions will be reversed. A broad-based rise in the dollar could usher in a period of tighter global financial conditions.

Third, even if the monetary authorities of a country holds large foreign exchange reserves, there is a sectoral disparity within the country, as it is the corporate sector which has done much of the borrowing. So, even if the country in aggregate has sufficient FX reserves to meet FX liabilities, there is an uneven distribution within the economy. The corporate sector itself may find itself short of financial resources and may cut investment and curtail operations, resulting in a slowdown of growth.

So, even a central bank that holds a large stock of foreign exchange reserves may find it difficult to head off a slowdown in the real economy when global financial conditions tighten.

Central bank FX reserves can cushion the blow by supporting commercial banks so that they can continue lending to domestic firms. FX reserves can also be deployed to support intervention in the swap or forward markets. In both cases, additional resources from the Global Financial Safety Net will prove useful. Nevertheless, the interventions in a bond-dominated setting will be more challenging than in a traditional bank-dominated setting, as seen in the example of Korea that we opened with.

For EMEs, an important aspect is the role of the US dollar as a barometer of risk appetite. When the dollar is weak, there tends to be greater appetite for risk, but a stronger dollar often goes hand in hand with the reversal of risk attitudes. There is accumulating evidence that cross-border bank lending and international portfolio flows tend to increase as the dollar weakens and conversely (Graph 19).

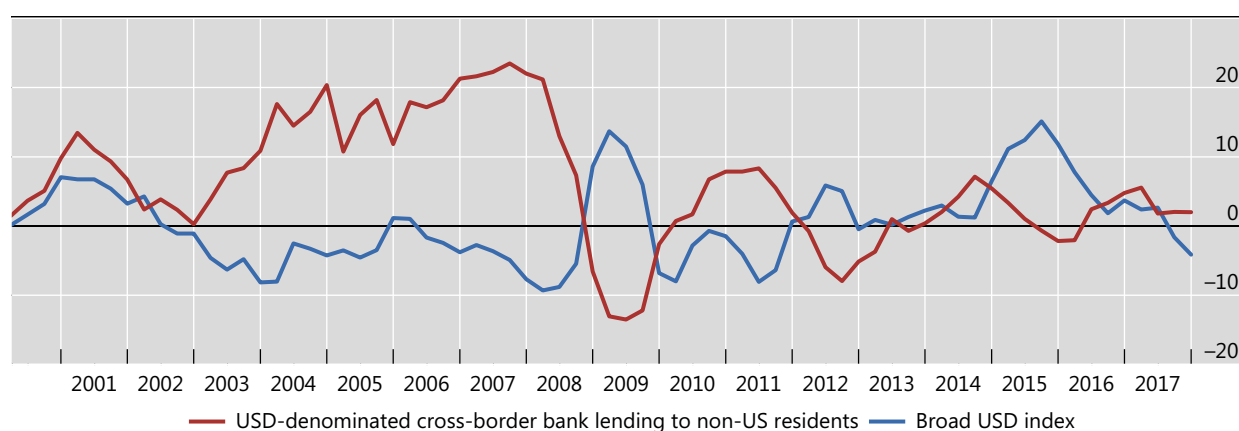
The above empirical relationship appears to be driven by the financial channel of exchange rate fluctuations (Shin (2016), Avdjiev et al (2018)). This channel has several drivers, both on the demand side and on the supply side of dollar credit.

In terms of the demand for dollar credit, a borrower who has dollar-denominated liabilities and domestic currency assets would see a strengthening of its balance sheet as a result of a dollar depreciation. Furthermore, an exporting firm with dollar receivables or an asset manager with dollar denominated assets – but with domestic currency obligations – would hedge currency risk more aggressively when the dollar is expected to depreciate further. Notably, this was the main driver of the large build-up of foreign currency credit in Korea during the period preceding the GFC (Chung et al (2012)). Incurring dollar liabilities, or an equivalent off-balance sheet transaction, would be the way to hedge currency risk in such instances.

Growth of USD-denominated cross-border bank lending and the broad USD index

Annual change, in per cent

Graph 19



Sources: BIS locational banking statistics and nominal effective exchange rate indices.

The link between dollar depreciation and greater borrowing in dollars by non-residents may also operate through the supply of dollar credit, and has been dubbed the risk-taking channel by Bruno and Shin (2015b). When the potential for valuation mismatches on borrowers' balance sheets arises from exchange rate changes, a weaker dollar flatters the balance sheets of dollar borrowers, whose liabilities fall relative to assets. From the standpoint of creditors, the stronger credit position of the borrowers reduces tail risk in the credit portfolio and creates spare capacity for additional credit extension even with a fixed exposure limit through a value-at-risk (VaR) constraint or economic capital (EC) constraint. This is why, for an EME, a depreciation of the local currency against the dollar tends to be associated with an economic contraction rather than an expansion, as the textbook would suggest.

We should be mindful of this channel considering the increased dollar debt in EMEs since the crisis. According to the BIS global liquidity indicators, the outstanding stock of US dollar credit to non-bank EME borrowers has roughly doubled since 2008, to stand at \$3.7 trillion as of end-2017. Most of

the increase has been driven by international bond issuance. And, while governments have issued bonds mainly in domestic currency, a tightening of global conditions still impacts domestic interest rates (Hofmann et al (2016)).

6. Concluding remarks

Our study has been guided by two themes. The first is that the build-up of vulnerabilities is reflected in the procyclicality and the slow-moving nature of balance sheet aggregates, especially of the banking sector. The second theme is the importance of the cross-border dimension of the procyclicality of the financial system.

The bare fact that the lending relationship crosses a border is not important in itself, but the border is where measurements have most often been taken. Cross-border activity therefore provides a window on the trends taking place globally. Often, the window is a narrow one, and as observers we look to alternative measures as necessary. However, the external dimension of banking and financial activity provides an opportunity to piece together a more complete and informative picture. In this endeavour, our study has showcased the usefulness of the BIS international banking and financial statistics.

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