



BANK OF ENGLAND

Financial Stability Paper No. 40 – October 2016

Capital inflows — the good, the bad and the bubbly

Glenn Hoggarth, Carsten Jung and Dennis Reinhardt



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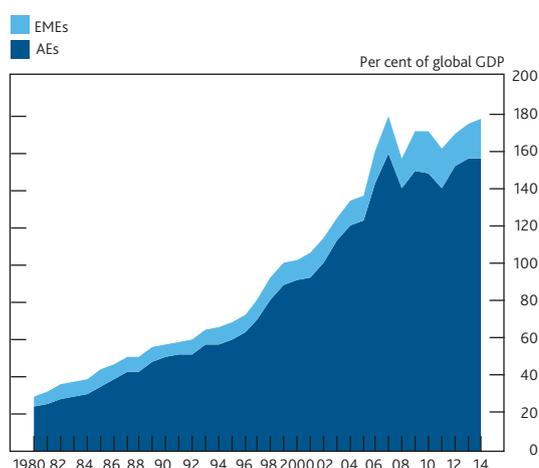
Capital inflows come in all shapes and sizes. This paper highlights that equity flows, especially foreign direct investment, are the most stable forms of capital inflows. In contrast, debt inflows from banks particularly in foreign currency are most prone to booms and busts. These flows also seem most sensitive to external factors, especially changes in global risk, and also to changes in domestic credit growth. Although portfolio debt flows are somewhat more stable particularly to advanced countries, granular data highlight that (open-ended) emerging market mutual funds in foreign currency and aimed at retail investors are also prone to inflow 'surges' and 'stops'. The share of external debt denominated in foreign currency is significantly higher in emerging market economies (EMEs) than in advanced countries. EMEs also usually have shallower and narrower financial markets. This suggests these countries are more prone to risks from capital inflow booms and busts.

Capital account openness is, in principle, beneficial to the economy. It allows investors to diversify their asset portfolios and debtors more alternative sources of borrowing. It should also increase the efficiency of resource allocation, competition in the domestic financial system, and facilitate the transfer of technology knowhow. But it may also act as a source of risk to domestic financial stability. So the policy objective should be to maintain stable capital flows in the context of an open capital account. Financial crises have often been associated with marked changes in global risk. We find evidence that macroprudential policy reduces the sensitivity of capital inflows to global volatility. Therefore, in addition to building up buffers against external shocks such measures may help to reduce systemic risks caused by marked changes in capital flows. The OECD has begun this year to review their Codes of Liberalisation of Capital Movements. We hope this paper can serve as background to that review.

1 Introduction

In the modern era, financial globalisation began in advanced countries (AEs) from the 1980s and, more recently in emerging market economies (EMEs), after the millennium. The early 2000s saw an explosion in the magnitude and volatility of cross-border finance worldwide. The global financial crisis (GFC) temporarily put this process into reverse but total global external liabilities (relative to GDP) have since almost returned to their pre-crisis peak (**Chart 1**), while volatility has remained high.

Chart 1 Gross external liabilities of advanced economies and EMEs, 1980–2014



Sources: IMF International Financial Statistics, IMF World Economic Outlook and authors' calculations.

Capital account openness brings with it a number of potential benefits. It allows investors to diversify their asset portfolios and debtors more alternative sources of borrowing. It should also, in principle, increase the efficiency of resource allocation, competition in the domestic financial system, and facilitate the transfer of technology knowhow.⁽¹⁾ But it may also act as a source of risk to financial stability if flows are not handled effectively. In particular, large swings in capital flows can cause financial instability with inflows contributing to unsustainable domestic credit booms and capital stops causing potentially liquidity and funding crises and associated large falls in output.⁽²⁾ In principle, the varying features of different types of capital flows suggest that they may carry different risks to financial stability (as well as benefits to the broader economy).

This paper looks at *gross* capital inflows and slices the available data through various prisms — instrument, currency, borrowing country, sector and type of creditor — to investigate which types of flows are most prone to booms and busts and the factors which have caused this and what this may imply for the role of policy.

Changes in gross flows are often a better guide than net flows to financial stability risks. For example, the sharp rise in gross

capital inflows ahead of the GFC and the subsequent fall to some major advanced-country banking systems, such as the United Kingdom, was closely mirrored in gross outflows. This meant that changes in net flows neither gave a signal for the rising risk ahead of the crisis nor of the size of adjustment during it as their banks reacted to a loss of external funding partly through running down their assets abroad. In the past, at least, EMEs' non-reserve assets were modest and so the distinction between gross and net flows was smaller than for AEs. However, EMEs' external assets have risen sharply over the past two decades.

2 Some stylised facts — how has the pattern of capital inflows shifted since the global financial crisis?

In the wake of the GFC there was a retrenchment in global capital inflows but these have since resumed, albeit at a slower pace than before.

But this disguises some important changes in the pattern of flows under the surface. The balance of payments data split capital flows into four main types of instrument — foreign direct investment (FDI), portfolio equity, portfolio debt and 'other' — mainly loans and deposits from abroad.⁽³⁾ Equity inflows, especially FDI, were less affected by the crisis. On the other hand, debt flows retrenched and have increased only modestly since. But the decline in debt flows was concentrated in loans and deposits. This is perhaps not surprising given there was a banking crisis, reflecting mainly internationally focussed banks' deleveraging their balance sheets. In contrast, marketable debt flows to EMEs have been stronger than prior to the GFC partially replacing cross border lending by banks (**Charts 2 and 3**).⁽⁴⁾

Some of these global patterns are accentuated at the country and regional level. There has been a shift of capital inflows away from AEs to EMEs: whereas EMEs received less than 10% of global cross-border inflows between end-2000 and end-2007, they received 25% of global flows between end-2009 and end-2015. And the stock of cross border bank loans from international banks, the major component of 'loans

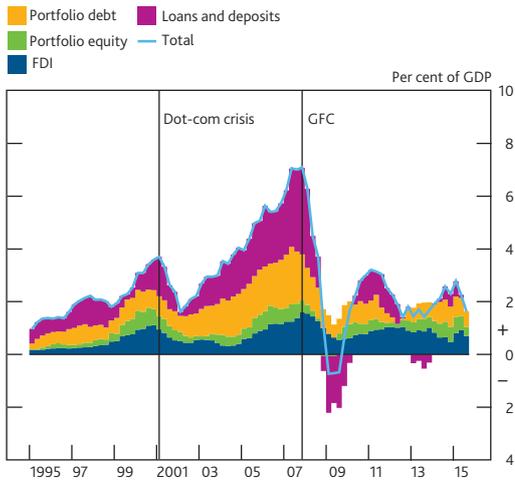
(1) It should be acknowledged though that the evidence on the benefits of capital account openness is mixed (see, for example, Kose *et al* (2009)).

(2) See, for example, Ghosh, Ostry and Qureshi (2016).

(3) The 'other' category is a residual of all positions and transaction not included in direct investment, portfolio investment, financial derivatives, employee stock options, and reserve assets. It also includes, for example, trade credit and advances (see IMF BOP Manual). But for brevity in this paper we will use the term 'loans and deposits'.

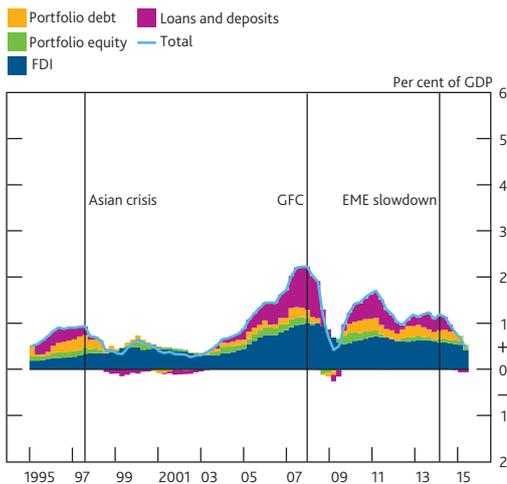
(4) Throughout this paper we classify AEs and EMEs along similar lines to the BIS in their International Banking Statistics which split countries/entities into developed, developing and offshore centres. This implies that most central and eastern European as well as most non-Japan Asian countries are part of the EME sample. We include, however, Hong Kong and Singapore (classified by the BIS as offshore centres) in our AE group of countries.

Chart 2 Gross capital inflows to AEs, by instrument, 1995 Q1–2015 Q3



Notes: Quarterly gross capital inflows are divided by annual GDP and averaged over four quarters.
Sources: IMF International Financial Statistics, IMF *World Economic Outlook* and authors' calculations.

Chart 3 Gross capital inflows to EMEs, by instrument, 1995 Q1–2015 Q3

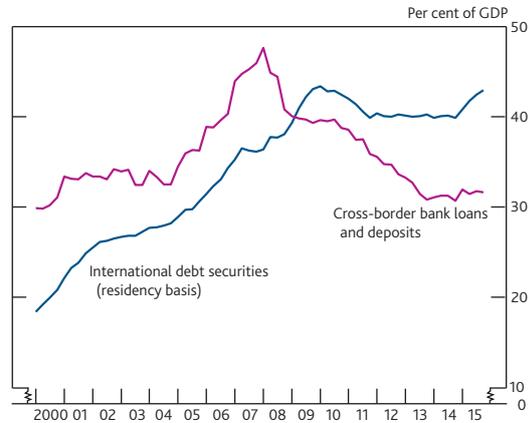


Notes: Quarterly gross capital inflows are divided by annual GDP and averaged over four quarters.
Sources: IMF International Financial Statistics, IMF *World Economic Outlook* and authors' calculations.

and deposits' in the balance of payments,⁽¹⁾ has fallen markedly as a share of GDP in AEs (Chart 4) especially from and to advanced countries which had banking crises.⁽²⁾ In contrast, the stock of cross border bank lending to EMEs has increased broadly in line with GDP (Chart 5), notwithstanding a relatively modest decline from 2014 Q3.

International debt (on a residency basis) in the BIS International Debt Statistics refers to debt securities issued by domestic-headquartered companies and governments on international markets and is a key component of the portfolio debt category in the balance of payments.⁽³⁾ The outstanding stock of international debt securities has moved in line with GDP since the GFC in AEs (Chart 4) and international debt outstanding is now higher than the level of bank loans in EMEs (Chart 5). International debt issuance abroad by affiliates of

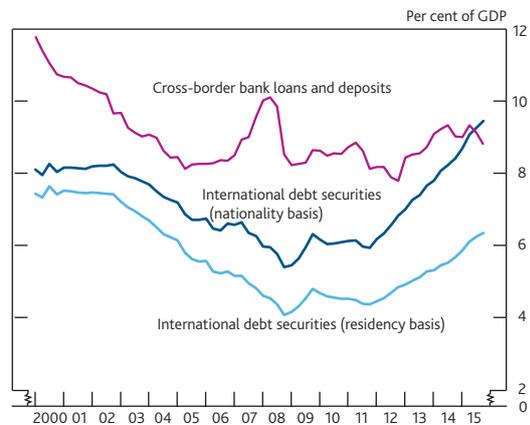
Chart 4 Advanced countries' external debt liabilities — cumulative changes in cross border loans from international banks and international debt securities, 2000 Q1–2015 Q4



Notes: Cross-border loans and deposits from all BIS-reporting banking systems to residents in AEs or EMEs. International debt securities refer to amounts outstanding of international debt securities issued on a nationality or residency basis (see footnote (4) below). To account for exchange rate valuation effects, the chart shows cumulative exchange rate adjusted changes in bank loans and deposits or net issuance of debt securities added (or subtracted) to (from) their respective end period (2015 Q4) stocks.

Sources: IMF *World Economic Outlook*, BIS International Banking and Debt Securities and authors' calculations.

Chart 5 EMEs' external debt liabilities — cumulative changes in cross border loans from international banks and international debt securities, 2000 Q1–2015 Q4



Notes: See Notes to Chart 4.

Sources: IMF *World Economic Outlook*, BIS International Banking and Debt Securities and authors' calculations.

domestically-headquartered companies in recent years has been even bigger than by their parent companies (reflected in the growing gap between the nationality and residency measures of EME international debt shown in Chart 5). This

(1) The stock of cross border lending by BIS reporting banks accounted for almost one-half (49%) and almost two-thirds (62%) of total loans and deposits in the last quarter of 2014 for AEs and EMEs respectively. There is a data quality issue though since for some large EMEs, lending by BIS reporting banks is bigger than the loans and deposits in the balance of payments of which it should, in principle, be a sub component.
(2) See Hills and Hoggarth (2013) and Forbes (2014).
(3) Portfolio debt also includes debt issued on domestic markets held by non-residents.
(4) The difference between international debt on a nationality and residency basis gives an estimate of outstanding international bonds issued by affiliates abroad of a parent entity headquartered locally. This calculation will be an underestimate since international debt on a residency basis includes debt issued by resident affiliates of corporates headquartered in other countries. The bias though is likely small other than in countries that are international financial centres hence we show this only for EMEs.

Table A Share of foreign currency debt, 2002 Q1–2015 Q3

Per cent

Advanced economies

	Cross-border loans and deposits from banks to:			International debt (residency basis) issued by:		
	All sectors	of which: Banks	Non-banks	All sectors	of which: Banks	Non-banks
2002 Q1	50.7	55.4	35.2	41.3	47.1	38.9
2007 Q1	49.2	53.3	36.7	42.9	50.1	39.8
2010 Q1	45.9	48.2	39.2	40.7	47.8	35.8
2015 Q3	46.2	47.3	44.0	46.1	57.7	37.9

EMEs

	Cross-border loans and deposits from banks to:			International debt (nationality basis) issued by:		
	All sectors	of which: Banks	Non-banks	All sectors	of which: Banks	Non-banks
2002 Q1	91.2	94.0	89.1	99.6	99.7	99.1
2007 Q1	87.6	87.8	87.4	98.2	98.9	97.7
2010 Q1	85.2	84.7	85.7	96.6	96.5	96.5
2015 Q3	78.7	73.7	83.7	96.7	99.1	96.8

Notes: Cross-border loans are from all BIS-reporting banking systems. International debt securities are outstanding international bonds issued on a nationality basis in EMEs and a residency basis in AEs. Currency denomination is not available for offshore debt issued by affiliates of domestically owned companies based abroad (included in the nationality but not the residency based measure). We assume — for EMEs — that all offshore securities are denominated in foreign currency. Non-banks refers to issuance by non-bank financial institutions and non-financial corporations.

Sources: BIS International Banking and Debt Statistics and author's estimates.

suggests that the balance of payments data, which is measured on a residency basis, understate the increase in EME corporate borrowing from foreigners and thus the potential risks to the domestic economy.⁽¹⁾

Taking a long view, EMEs are currently less at risk of a currency crisis than was the case in the last quarter of the twentieth century. The strengthening in macroeconomic fundamentals and policy frameworks, including more flexible exchange rates, has allowed EME governments to increasingly borrow in their own currency and many EMEs — especially in Asia — have built up a large war chest of foreign currency reserves (Denbee, Jung and Paternò (2016)).⁽²⁾

On the other hand, the shift *within* cross-border debt finance since the GFC from loans to capital markets and therefore from banks to non-bank financial institutions, may have resulted in new risks that need to be monitored and potentially dealt with. In particular, unlike borrowing from foreign banks nearly all EME international debt is denominated in foreign currency (Table A).⁽³⁾⁽⁴⁾ This suggests that the switching in debt financing to international bond markets by EME companies has likely been associated with an increase in foreign currency exposure.

3 Literature on capital inflows

There are numerous studies that have looked at the risks from different types of capital inflows especially by instrument type. The empirical literature is fairly conclusive that debt flows are more pro-cyclical, volatile and generate greater financial stability risks than equity flows.⁽⁵⁾ Although both debt and equity inflows can contribute to bubbles in domestic asset markets, debt market booms have in the past been

found to be more associated with subsequent macroeconomic instability and financial crises. Igan and Tan (2015) find in a sample of 33 countries over the 1980–2011 period that portfolio and especially inflows of loans and deposits are — and in contrast to FDI — significant contributors to domestic household and corporate sector credit booms.⁽⁶⁾ Eichengreen, Hausmann and Panizza (2003) find that debt inflows in foreign currency are found to increase the likelihood and severity of crises.⁽⁷⁾ Eichengreen and Gupta (2016) highlight that sudden stops of non-FDI flows in EMEs are usually preceded by a boom of inflows and associated with a marked fall in GDP growth of around 4%. More generally, according to Ghosh, Ostry and Qureshi (2016) surges in capital inflows are followed 20% of the time by financial crises and are often associated with large falls in output. This effect is especially strong following surges in 'other' inflows.

Numerous studies have also looked at the determinants of capital flows splitting them into global ('push') and country specific ('pull') factors. They nearly all show that gross capital inflows, especially flows from international banks, are strongly positively related to global factors. Rey (2015) find that the common global factor in determining financial cycles in capital

(1) See, for example, McCauley, McGuire and Sushko (2015).

(2) Chui, Kuruc and Turner (2016) give updated estimates of the reductions in EMEs' aggregate foreign currency mismatches. They argue that the improvement in EME government's net foreign currency assets contributed to making it cheaper for EME corporates since to borrow from abroad.

(3) We do not have the information to split marketable debt issued on the *local* market into foreign and local currencies.

(4) Within AEs there is, however, important heterogeneity. Unsurprisingly, AEs that issue reserve currencies, such as the United States, the euro area, and the United Kingdom, have a much lower foreign currency share than other AEs.

(5) See, for example, Kose *et al* (2009) and Forbes and Warnock (2012).

(6) They find, however, that portfolio inflows have less impact on corporate credit growth where domestic stock markets are more developed and can more easily be absorbed.

(7) See Eichengreen, Hausmann and Panizza (2003).

inflows is driven primarily by US monetary policy. She also finds a strong association of the VIX, a measure of uncertainty and risk aversion in financial markets, with all types of capital inflows other than FDI. Bruno and Shin also highlight the importance of global push factors affecting the supply of cross border lending by international banks, showing that global banks' leverage including their cross border lending is increased through a decline in the VIX (2015a) and a lower targeted Fed funds rate (2015b) through increasing the lending spread on cross border lending. The latter is also associated with real domestic exchange rate appreciation (against the dollar) in the recipient country which magnifies the supply (and demand) of cross border bank lending through improving the net worth of domestic borrowers (see also Shin (2015)).

Eichengreen and Gupta (2016) find that global factors, especially the VIX, have become more important in explaining the probability of a sudden marked decline ('stop') in gross capital inflows to EMEs. Forbes and Warnock (2012) show that periods of marked increases ('surges') as well as stops in total gross capital inflows are driven mainly by the VIX but not affected by changes in US monetary policy. In contrast, more recently Correa *et al* (2016), using bilateral bank lending data, find that higher source country policy rates result in an increase in cross border lending *from* the source country especially to non-banks which they attribute to a rebalancing effect following the increase in credit risk of non-banks in the source country due to the tightening of domestic monetary policy.

Most studies also find that portfolio flows — especially debt — are negatively related to global interest rates and the VIX. In a recent study Avdjiev *et al* (2016) compare the sensitivity of international debt securities and cross border bank lending to changes in global factors. They find that over their whole sample period (2000 Q1–2013 Q4) the growth in international bonds and particularly cross border bank loans are sensitive to the VIX and the US Fed funds rate. But they also highlight that the relationships have changed a lot over time. Prior to the GFC, bank lending was found to be sensitive to changes in both global factors whereas bond finance was not. In the post-GFC period, bond finance was also found to be very sensitive to both global factors — similar to bank lending for changes in the Fed Funds rate but even more so for changes in the VIX. They also find that prudential policies, specifically increases in capital requirements, reduces the sensitivity of a reversal of capital inflows, especially cross border loans to banks, to a rise in the Fed Funds rate or an increase in the VIX. Reinhart and Sowerbutts (2015), Buch and Goldberg (2016) and Hills *et al* (2016) also find that in some cases changes in domestic macroprudential policies can affect banking flows to and from abroad. The IMF (2016) highlight that less capital account openness, higher foreign currency reserves, lower government debt and especially flexible exchange rates

reduces the sensitivity of EME total gross capital inflows to global factors.

IRC Task Force on IMF issues (2016) and Bussière, Schmidt and Valla (2016) are two recent papers, related to ours, which discuss extensively recent trends in international capital flows and implications for international financial stability issues, including policy options for dealing with capital flow volatility. Below we will add to the literature by (i) analysing the volatility of capital flows in detail by type of instrument, creditor and especially by domestic versus foreign currency and (ii) examining empirically which type of policies influence the sensitivity of capital flows to global factors.

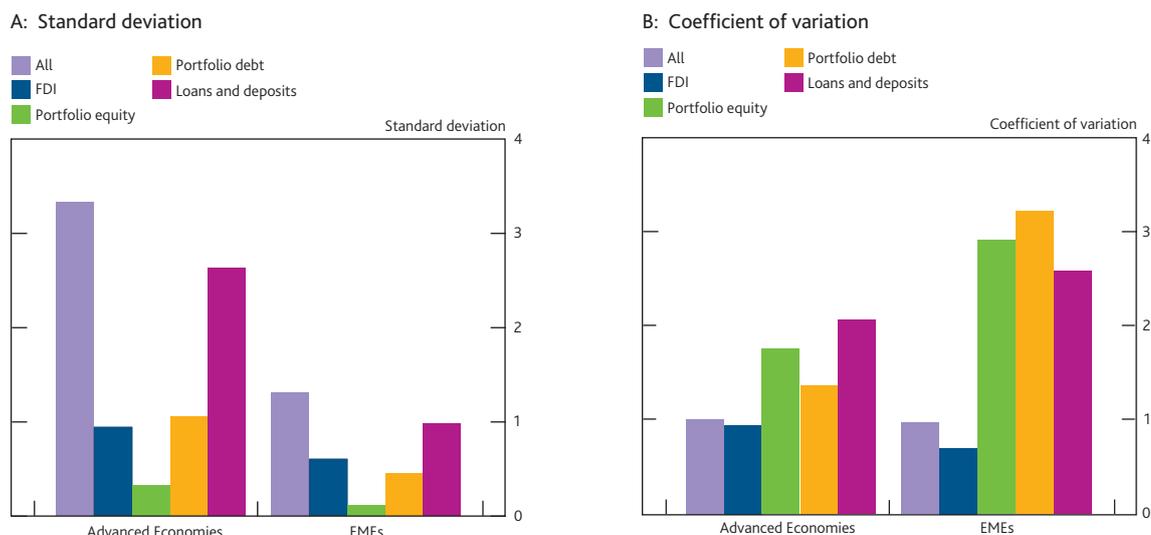
4 Capital inflow volatility and booms and busts

A key concern of policymakers, especially in EMEs is that capital account openness can sometimes result in very large movements in capital inflows. There are various ways to show these patterns, at varying degrees of granularity. We focus on three key metrics. First, as a general indicator for the full sample period, we show the volatility of gross inflows measured by the standard deviation and the coefficient of variation. Second, we focus on recent episodes of known *global* booms and busts in capital inflows. Third, we take a bottom-up country perspective looking at when they experienced gross capital inflow surges and stops (Forbes and Warnock (2012)) and looking in detail at the pattern of flows in these periods by instrument, currency and by type of creditor.

4.1 Volatility in capital inflows

The left-hand side panel of **Chart 6** plots the volatility of quarterly gross capital inflows (measured by the standard deviation relative to own GDP) over the past 20 years in both EMEs and AEs. On this basis the significance of capital inflow volatility for the domestic economy has been particularly high for loans and deposits and low for portfolio equity in both AEs and EMEs.

But this greater volatility may partly reflect the fact that non-marketable debt inflows played a more important role in the past (on average and in relation to GDP) than other debt or equity flows. As discussed above, since the GFC, portfolio flows have become more important in recent years especially to EMEs and are likely to be more prominent going forward. A more intrinsic measure of volatility is the standard deviation of flows relative to their long-term mean of the respective flows. On this measure, volatility has been, as expected, lower for FDI but is similar for other broad categories of flows into both AEs and EMEs (Panel B in **Chart 6**). More granular data on capital inflows shows that cross border lending and deposits by global banks — the most significant part of loans and deposits — has been particularly volatile especially to

Chart 6 Volatility of gross capital inflows (per cent of GDP) 1995 Q1–2015 Q3

Notes: The charts show the cross-country median of the standard deviation of gross capital inflows (in per cent of GDP, Panel A) or the cross-country median of the standard deviation of inflows divided by the average size of capital flows (Panel B).

Sources: IMF International Financial Statistics and IMF *World Economic Outlook* (for GDP data).

EMEs and especially when either denominated in foreign currency and/or at short-term remaining maturity.⁽¹⁾ International bonds issued by residents have been less volatile but those issued by subsidiaries of EME domestically-headquartered companies abroad — the fastest growing component in recent years — have also been volatile.

4.2 Capital inflows during global stress episodes

The above measures show the average past volatility of capital flows. For financial stability risks, however, we are particularly interested in the pattern of capital flows during periods of marked booms and busts since these are likely most associated with financial stress or outright crises.

Charts 2 and 3 earlier highlighted three previous large waves of aggregate gross inflows into AEs and/or EMEs each associated with a global stress or an outright crisis — the 1997–98 East Asian crisis for EMEs, the 2000–01 dot-com bubble burst for AEs and the 2008–09 financial crisis for both AEs and EMEs. They also include the most recent slowdown in gross inflows to EMEs 2014–15 that has not, at least so far, caused widespread distress. Charts 7 and 8 and Appendix Tables A1 and A2 show the composition of the change in gross capital inflows between these boom and bust periods in AEs and EMEs respectively. Loans and deposits inflows (relative to GDP) fell significantly in most of these episodes especially cross-border lending in foreign currency. The turnaround in bond flows seems to have been concentrated in foreign currency flows. For FDI, the turnaround was less pronounced, apart from during the dot-com stock market bubble. The latter highlights the source of the shock matters. It is also noteworthy that given there was a large retrenchment in gross capital outflows, the decline in net inflows in AEs — unlike in EMEs — was much smaller.

4.3 Composition of capital inflows during country specific booms and busts

Another way of assessing periods of surges and stops is from a bottom-up country specific perspective by identifying periods when *individual countries* experienced a rapid increase and then slowdown in their *total* capital inflows (relative to own GDP). Below we slice the data by debtor instrument, currency and type of creditor.

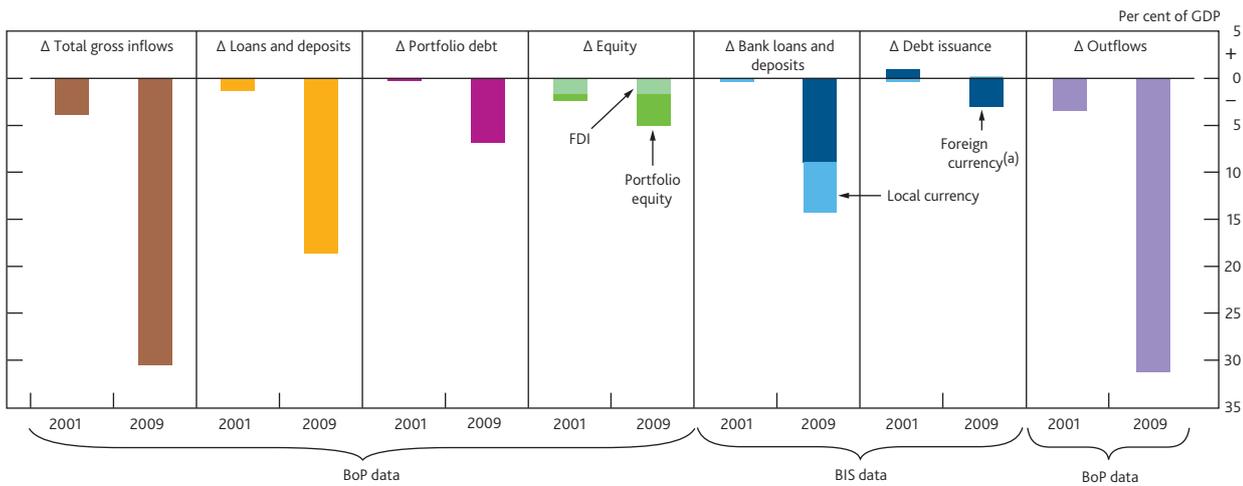
Capital inflows in stress periods, by debtor instrument

Chart 9 shows the composition of capital flows for the median advanced and emerging country during these surge and stop periods broken into main instrument (Panels A and B), debt instrument by currency and maturity (Panels C and D) and debt instrument by type of creditor (Panels E and F). Surges and stops in a country's total capital inflows are identified using the method by Forbes and Warnock (2012).⁽²⁾ They tell a similar story as above. For the median country in the sample, the turnaround in inflows of loans and deposits between surges and stop periods was particularly large, FDI was much more stable while portfolio (debt and equity) flows fell somewhere in between (Panels A and B). More granular data show that within bank loans and deposits from international (BIS reporting) banks the turnaround was biggest in foreign rather than domestic currency and, as expected, short-term rather than long-term flows especially to EMEs (Panel D). And within international debt issuance the biggest turnaround was in those denominated in foreign currency. In fact, in advanced

(1) EMEs' loans and deposits from abroad are increasingly coming from non-banks rather than banks.

(2) A surge (stop) is defined to start when total gross capital inflows relative to GDP rise (fall) to 1 standard deviation above (below) their backward looking mean, then surpass 2 standard deviations, and until they fall back to 1 standard deviation. We exclude surges and stops in capital flows in absolute value smaller than 0.5% of GDP.

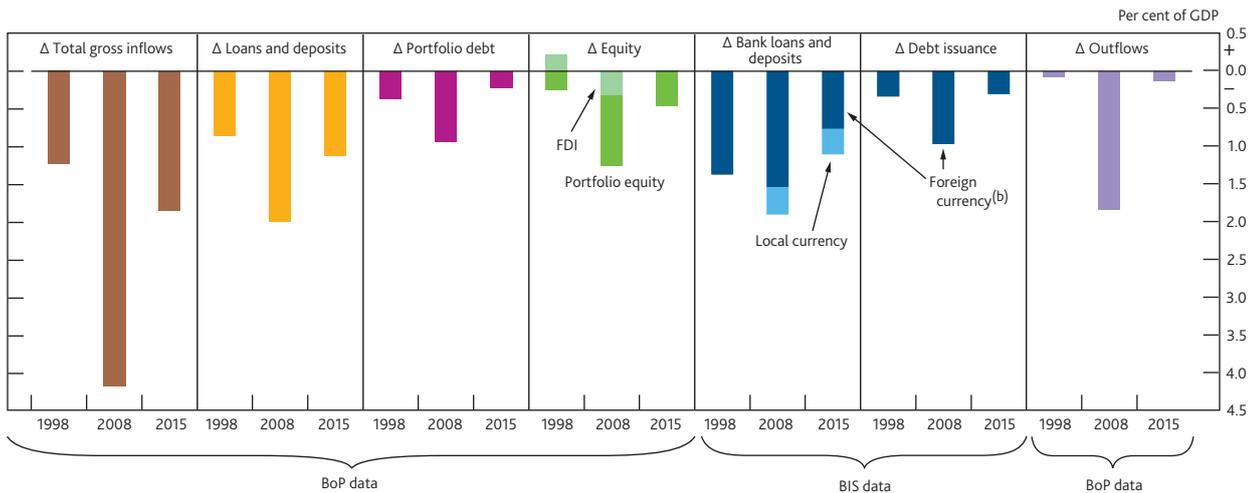
Chart 7 AEs: the turnaround in different types of gross capital inflows in periods of global financial crises



Sources: BIS and IMF.

(a) Capital flows during a turnaround are the sum of the respective type of capital inflow (per cent of GDP) during a bust period minus during a boom. Bust periods are identified based on Chart 2 for AEs and Chart 3 for EMEs from the quarter after a noticeable peak in aggregate gross capital inflows until the subsequent trough in gross capital inflows. Boom periods are defined as the period before the bust and defined to last exactly the same number of quarters as the subsequent bust. Charts 2 and 3 as well as Appendix Tables A1 and A2 show the precise episodes identified.

Chart 8 EMEs: the turnaround in different types of gross capital inflows in periods of global financial crises^(a)



Sources: BIS and IMF.

(a) Note that, as shown in Table A, almost all net international debt flows to EMEs recorded in the BIS international debt statistics are in foreign currency.
 (b) See footnote (a) to Chart 7.

countries local currency net debt issuance were larger in periods of capital stops than surges (Panel C). This may reflect a shift by investors to safe haven advanced country sovereign bonds during these periods.

Capital inflows in stress periods, by creditor

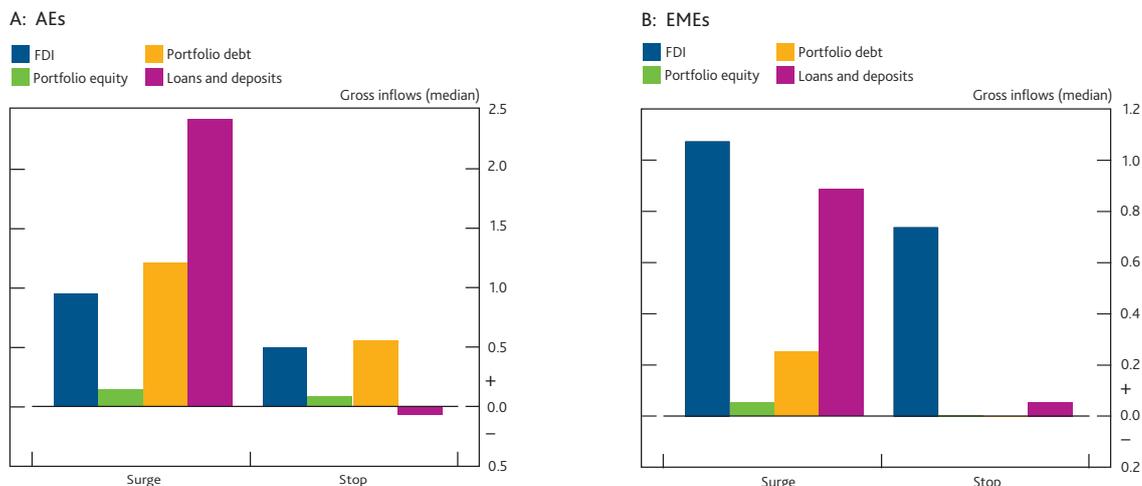
Chart 9, Panels E and F, suggests that *who* extends financing may matter for variations in capital inflows. For example, although cross border loans and deposits to both AEs and EMEs changed a lot during surges and stops — and more so than portfolio debt — this is especially so from foreign banks rather than non-bank creditors.⁽¹⁾ Also, during periods of stops in aggregate capital inflows, portfolio debt flows from non-banks have tended to dry up into EMEs but not into AEs. This may reflect non-bank investors, in particular, switching into advanced country safe haven sovereign bonds during these periods.

Given the growing importance of non-bank financial institutions as creditors in bond markets (IMF (2015); FSB (2016)), we investigate these flows in more detail. We focus on mutual funds since this is the non-bank financial sector for which relatively comprehensive and long-time series data are available. Mutual funds make up a relatively small share of non-bank investment in portfolio debt markets in AEs, but a more sizeable share in EMEs. Since end-2009, mutual funds accounted, on average, for 5% of non-bank portfolio debt flows to AEs but more than one-fifth of those to EMEs (Chart 10). Moreover, the share of mutual fund in portfolio flows to EMEs has risen significantly since the GFC. Other portfolio flows stemming from non-bank financial institutions

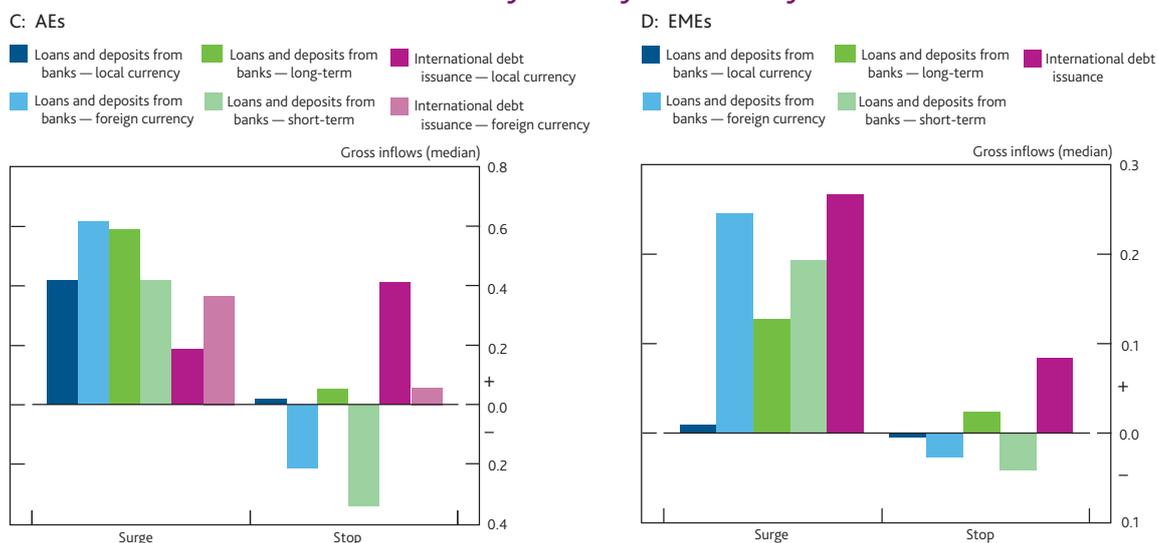
(1) Since the share of total cross border loans and deposits to EMEs provided from non-banks has been increasing over time suggests they may be increasingly financed by steadier loan flows.

Chart 9 Gross capital inflows (per cent of GDP) for the median country during periods of country specific surges and stops in total capital flows — 1995 Q1–2015 Q3

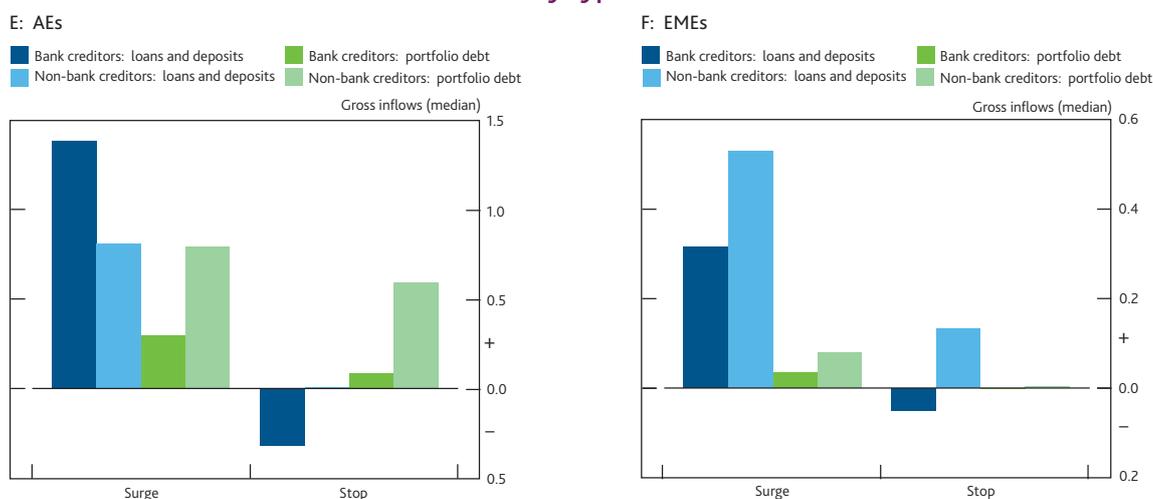
Capital flows by instrument



Debt flows by currency and maturity



Debt flows by type of creditor

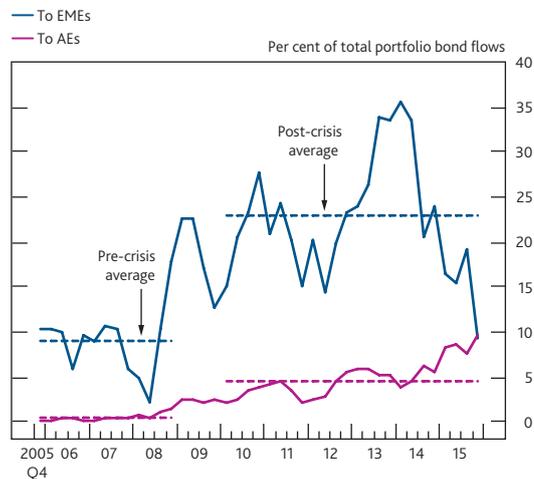


Notes: Panels A and B are based on IMF IFS data. International debt issuance (panels C and D) from the BIS IDS refers to the net issuance of international debt securities issued on a residency (AEs) or nationality basis (EMEs) as a per cent of GDP. Loans from banks (panels C and D) are from the BIS IBS and refer to the estimated exchange rate adjusted change in the stock of loans (in per cent of GDP). In panels E and F, loans and deposits (portfolio debt) from non-bank creditors are calculated as the difference between total inflows of loans and deposits (portfolio debt) from IMF IFS minus loans and deposits (portfolio debt) from international banks using the BIS IBS. Quarterly capital flows are split into two groups, conditional on whether there is a surge or a stop in gross capital inflows identified using the method by Forbes and Warnock (2012). Each bar represents the cross-country median of the respective type of capital inflows (in per cent of GDP) during periods of surges or stops in a country's aggregate gross capital inflows.

Sources: IMF International Financial Statistics, IMF *World Economic Outlook* (for GDP data), BIS International Banking Statistics (IBS), BIS International Debt Statistics (IDS) and authors' estimates.

consist of direct investments from pension funds, insurance companies and those made through asset managers ‘separate accounts’ (see Box 1).⁽¹⁾

Chart 10 Median AE and EME mutual fund share of total non-bank portfolio bond flows^(a)



Sources: IMF International Financial Statistics and EPFR.

(a) Four quarter rolling mean.

Mutual fund flows to individual countries can be influenced by two factors — changes in end-investor redemptions and in allocation decision by portfolio managers. It is well-documented that asymmetric information between end-investor and fund manager creates frictions that can lead to pro-cyclicality (including over-reaction to shocks) of portfolio flows (see, for example, IMF (2015) for a summary). In addition, faced with market stress, if the most liquid assets are sold first and if funds perform liquidity transformation, then there may be a ‘first-mover advantage’ for investors redeeming first. This could lead to run-like behaviour in the fund industry. For similar reasons, the FSB (2016) has recently

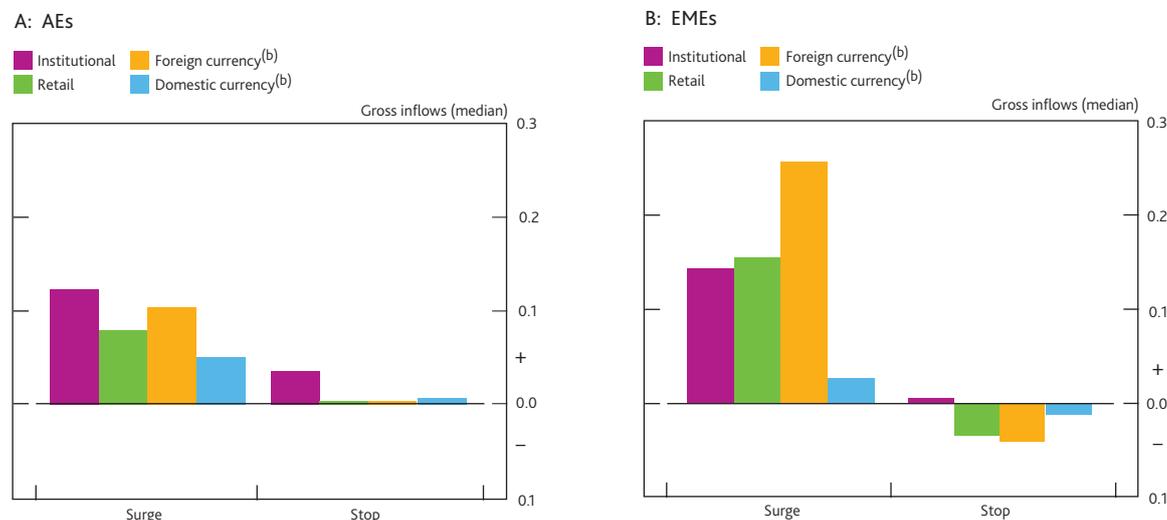
issued reform proposals to address structural vulnerabilities in the asset management industry.

Virtually all cross-border mutual fund flows are open-ended funds. These are funds in which end investors can flexibly add or redeem funds, often at the fund’s end-of-day’s net asset value (NAV). Mutual fund inflows to AEs and EMEs change significantly in periods of capital inflow surges compared with stops (Chart 11). This seems to support some regulators’ concern that open-ended fund flows may be prone to being procyclical, caused by ‘first mover advantage’ or ‘investor herding’. Within the total, although funds catering to both institutional and retail investors have given rise to large inflows during the surge periods, retail fund inflows have dried up more during stop periods. And the stops and surges in foreign currency have been bigger than in domestic currency.⁽²⁾ Such sudden reversals in mutual fund flows have been associated with deterioration of funding conditions in EME bond markets (IMF (2015)).

The above highlights that some types of capital inflows appear more variable than others. To get a better sense of the domestic impact after surges in particular types of capital inflows, Chart 12 shows the cross-country median of annual GDP growth after surges (relative to the average growth in the year before the surge) for the particular type of capital inflows.

- (1) Providers of separate account services manage the money of institutional investors (including pension funds, insurance companies and sovereign wealth funds) and high net worth individuals. Contracts are private and can vary substantially across clients. Data for separate accounts managed by US asset managers are not reported publicly and their activities are less transparent than those of registered funds (which have some reporting requirements). SIFMA (2014) notes that it is mostly large institutional investors that invest via private accounts.
- (2) Foreign currency flows are approximated by flows in US dollars. In 2015, 45% of all mutual fund flows to EMEs and 20% to AEs were in dollars. We use the label ‘domestic currency’ as on average the majority of non-US dollar flows are denominated in the flow-receiving country’s domestic currency.

Chart 11 Creditor side: gross mutual fund flows (per cent of GDP) during stops in capital flows^(a)



Sources: EPFR, IMF World Economic Outlook and authors’ calculations.

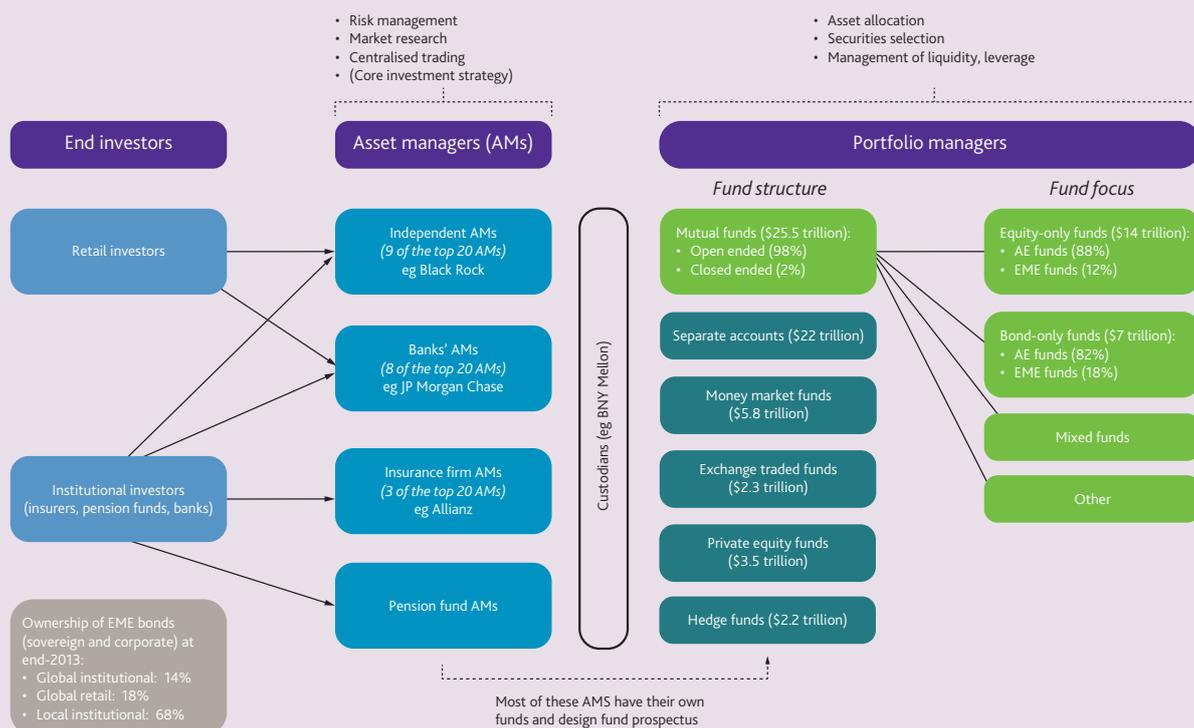
- (a) AE and EME fund flows are investments in AEs and EMEs. Retail and institutional investor flows are defined according to the types of end-investor targeted. EPFR Global defines institutional investor funds as funds targeting institutional investors only or those with the minimum amount of \$100,000 per account. All other funds are labelled ‘retail’.
- (b) Foreign currency flows are approximated by flows in US dollars.

Box 1 The asset management and investment fund industry

Figure A shows a stylised map of the asset management and investment fund industry. It highlights that, besides independent asset managers (AMs) such as BlackRock, asset managers that belong to bank or insurance groups make up

eleven of the world's 20 largest asset managers. But asset managers' balance sheets are relatively small. Instead the assets under management (AUM) are often held in mutual funds and in 'separate accounts' which are the two dominant investment vehicles (\$26 trillion and \$22 trillion respectively). Most mutual funds are open-ended which means funds can be redeemed on demand. AE equity funds are traditionally the largest segment but investment in bond funds, including in EMEs ones, doubled between 2008–14.

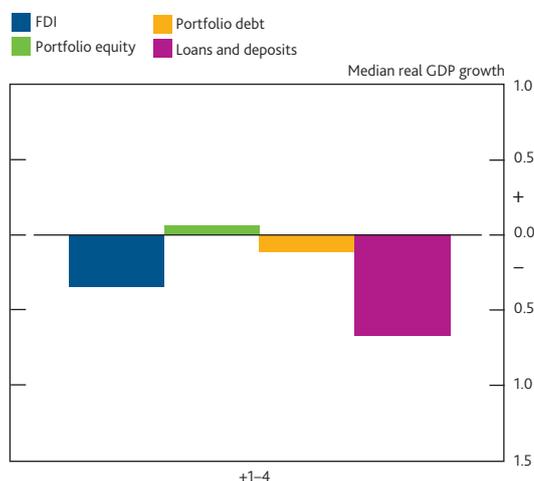
Figure A Stylised map of the asset management and investment fund industry, end-2013



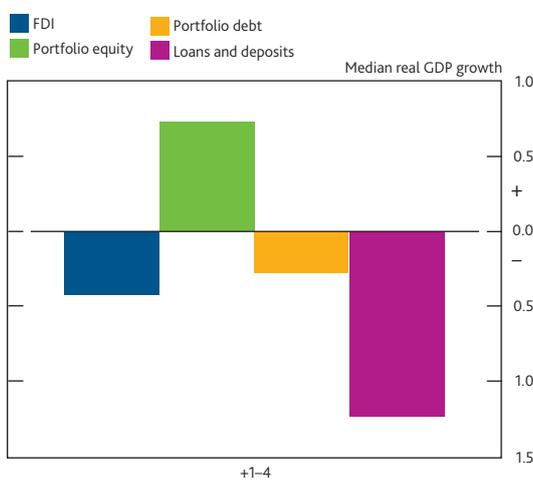
Sources: IMF Global Financial Stability Report, April 2015 (Chapter 3); data on fund focus and for the top 20 asset managers are for end-2014: Shek, Shim and Shin (2015). IMF Global Financial Stability Report, April 2014, and Towers Watson (2015).

Chart 12 Aftermath of capital inflow surges

A: AEs



B: EMEs



Notes: GDP growth after surges in respective capital flows is expressed relative to GDP growth in the 4 quarters before the surge. Surges are identified from 1980 Q1 to 2015 Q3, but we use GDP growth data for up to a year afterwards in order to calculate GDP growth in the aftermath of surges.

Sources: BIS International Banking Statistics, IMF International Financial Statistics and IMF World Economic Outlook.

It highlights that GDP growth falls particularly after surges in loans and deposits while it grows at similar rates around surges in other instrument types of capital flows.⁽¹⁾ For example, annual GDP growth is 0.8 percentage points below its pre-surge average in AEs following a surge in loans and deposits from abroad. Al-Saffar, Ridinger and Whitaker (2013) also showed an association between output losses in AEs and accumulated external debt positions and maturity and currency mismatches, with those factors perhaps explaining half of the loss of output in the UK after the GFC. In EMEs, annual GDP growth is almost 1.5 percentage points below its pre-crisis average following a surge in inflows from loans and deposits.

Overview of results: which capital flows are the most variable?

To sum up, in this section we have used three approaches to determine which gross capital inflows are the most volatile and/or prone to booms and busts: (i) quarterly variation; (ii) changes during episodes of global crises; and (iii) changes

between country specific surges and stops. In the next section we add econometric results that analyse how dependent flows are on global (as opposed to domestic) financial conditions. **Tables B and C** summarise the results for AEs and EMEs respectively. They highlight that, according to all metrics, banking flows are the most volatile and/or variable, especially those in foreign currency, followed by portfolio debt, especially when it is held by banks. Our metrics also show that EMEs face more volatile portfolio debt flows than AEs. The most stable flows appear to be FDI and portfolio equity. Our regressions below suggest that sensitivity to global volatility plays an important role in explaining these different patterns in types of capital inflows. Banking inflows, unlike equity, are also found to be positively related to the domestic credit growth (pro-cyclical).

(1) The fact that GDP growth is below its pre-surge average also for FDI flows might be driven by the role of financial sector FDI. As described in Dell'Erba and Reinhart (2015), surges in this type of FDI are associated with boom and bust cycles in GDP contrary to other types of FDI.

Table B Summary of volatility and surges and stops in gross capital inflows, AEs

Type of instrument	Approach	Quarterly volatility ^(a)		Stress periods		Role of global volatility ^(d)		Procyclical with domestic credit ^(e)
				GFC ^(b)	Surges to stops ^(c)			
Type of instrument	FDI							
	Portfolio equity							
	Portfolio debt	from banks	from non-banks			from banks	from non-banks	
	International debt (BIS)					in FX	in non-FX	
	Loans and deposits							
	Bank loans and deposits, foreign currency (BIS)							
	Bank loans and deposits, local currency (BIS)							

(a) Refers to the coefficient of variation (CV). Categorisation: green if CV < 2; yellow if CV between 2 and 5; red if CV > 5.

(b) The turnaround in capital inflows as a percentage of GDP during the GFC. Categorisation: green if less than 5% of GDP; yellow if 5-7%; red if >7%.

(c) Difference in cumulative capital inflows (percentage of GDP) between surges and stops; green if <0.4%; yellow if 0.4%–0.8% difference; red if > 0.8% difference.

(d) Regressions: grey if capital inflows are not statistically significantly related to global volatility; green if significant and positively related to global volatility; red if significant and negatively related to global volatility (ie inflows fall when global volatility rises).

(e) Regressions: grey if capital inflows are not statistically significantly related to domestic credit growth; red if significant and positively related to domestic credit growth (ie procyclical).

Table C Summary of volatility and surges and stops in gross capital inflows, EMEs

Type of instrument	Approach	Quarterly volatility ^(a)		Stress periods		Role of global volatility ^(d)		Procyclical with domestic credit ^(e)
				GFC ^(b)	Surges to stops ^(c)			
Type of instrument	FDI							
	Portfolio equity							
	Portfolio debt	from banks	from non-banks					
	International debt (BIS)							
	Loans and deposits	from banks	from non-banks					
	Bank loans and deposits, foreign currency (BIS)							
	Bank loans and deposits, local currency (BIS)							

(a) Refers to the coefficient of variation (CV). Categorisation: green if CV < 2; yellow if CV between 2 and 5; red if CV > 5.

(b) Refers to the turnaround in capital flows as percentage of GDP during the GFC. Categorisation: green if less than 1% of GDP; yellow if 1%–1.5%; red if > 2%.

(c) Difference in capital inflows (percentage of GDP) between surges and stops. Green if <0.2%, yellow if 0.2%–0.5% difference; red if > 0.5% difference.

(d) Regressions: grey if capital inflows are not statistically significantly related to global volatility; red if significant and negatively related to global volatility.

(e) Regressions: grey if capital flows are not statistically significantly related to domestic credit growth; red if significant and positively related to the domestic credit growth (ie pro cyclical).

5 Explaining gross capital inflows

5.1 Specification of regressions

In this section, we look more formally at how different components of capital inflows are affected by changes in global factors (usually outside the control of policymakers) and domestic factors (which may be more responsive to domestic policy levers). Specifically, we employ a cross-country panel regression framework with country fixed effects similar in style to Bruno and Shin (2015a), Forbes and Warnock (2012) and Reinhardt and Riddiough (2015):

$$F_{i,t} = \alpha + \beta_1 \text{Global Volatility}_{t-1} + \gamma' X_{i,t-1} + \delta_i + \varepsilon_{i,t}$$

Our main dependent variable is, as in the preceding sections, the different types of gross capital inflows scaled by annual GDP.⁽¹⁾ To capture global volatility, we use the average quarterly realised volatility of returns in the MSCI Global Equity Index, which combines the returns on 23 developed economy stock markets.⁽²⁾ A negative coefficient on β_1 would indicate that capital inflows behave pro-cyclically — falling when global volatility rises and increasing when global volatility declines.

The vector $X_{i,t-1}$ includes several other variables found to be important determinants of capital inflows in the literature. Changes in global GDP growth and global interest rates enter in relative terms, ie as the difference between changes in domestic and global interest rates or growth.⁽³⁾ An increase in domestic growth or interest rates relative to world levels is likely to increase the relative profitability of investing in the domestic economy, including via reducing the likelihood of regional banks defaulting (Bruno and Shin (2015a)). The interest rate differential will also, to some extent, reflect changes in core country monetary policy that are found to have an important impact on capital flows (for example, Rey (2015)). As a measure of how capital flows are related to the domestic credit cycle, we include the annual growth in credit extended by domestic banks to the domestic non-bank private sector. A positive coefficient means that the capital flow under investigation is responsive to the domestic credit cycle. In fact, such capital flows could be seen as providing the marginal financing when domestic credit is already booming. The depreciation of the domestic exchange rate *vis-à-vis* the dollar is relevant in the presence of foreign currency mismatches. If, for some domestic borrowers, foreign currency liabilities exceed assets, a currency depreciation will increase the value of their net foreign currency denominated liabilities, pushing them towards their default boundary and so likely reduce capital inflows. This channel might be especially relevant for banking debt flows given banks are more likely than non-bank creditors to lend to households and smaller corporates which may be unhedged (see, for example, Bruno and Shin (2015a)). All the independent variables are lagged by one quarter to reduce endogeneity concerns. All variables and

their sources are described in greater detail in Table A3. The sample period is, as in the preceding sections, 1995 Q1–2015 Q3.⁽⁴⁾

In the following, we will first discuss our results for the broad split of capital flows by instrument given by the balance of payment statistics (Table D), before moving to a (i) finer disaggregation of banking and marketable debt flows focusing on their currency denomination (Tables E and F) and (ii) capital flows by different types of creditors — bank and non-bank creditors (Table G) and different types of mutual funds (Table G).

5.2 Main determinants of capital inflows, by type of flow

Determinants of aggregate flows

Table D shows that the sensitivity to global and domestic factors for different types of capital inflows varies markedly. While cross-border loans and deposits into both AEs and EMEs fall during periods of high global volatility, FDI and portfolio equity flows do not show a significant response. The evidence is mixed for portfolio debt flows, which appear pro-cyclical only to EMEs but not to AEs. The latter may be driven — as found in the previous section — by the greater relevance of safe haven flows into AE sovereign bond markets. The results imply that when the volatility index is 10 points higher (it rose by 30 points after the collapse of Lehman brothers), quarterly inflows of loans and deposits are 0.55% of GDP lower in AEs and 0.14% of GDP lower in EMEs, which is roughly one-third (AEs) or more than half (EMEs) of their average quarterly inflows over the sample period as a whole (1.35% for AEs versus 0.25% of GDP for EMEs).

The higher pro-cyclicality of debt compared to equity flows also carries over to domestic factors, importantly to domestic credit growth. We find that both portfolio debt and loan and deposit inflows rise to AEs following increases in domestic credit growth; this holds also for EMEs but the effect is statistically significant only for loan and deposit inflows. The results are quantitatively important: when quarterly credit growth is 10 percentage points higher, quarterly loans and deposit inflows rise by 0.75% of GDP in AEs and 0.25% in EMEs. This highlights the risk of a vicious circle whereby increases in domestic credit growth encourage debt inflows from foreign banks abroad which further fuels the domestic boom.

-
- (1) With annual GDP averaged over the current and three preceding quarters to avoid breaks in the series of capital flows to GDP. In the BIS banking statistics capital 'flows' are calculated as estimated exchange rate-adjusted changes in stocks; they are, therefore, not affected by exchange-rate valuation effects.
 - (2) The measure provides a broad proxy for global economic uncertainty and/or risk aversion, providing a more precise measure than the alternative US-centric VIX index of implied US stock market volatility.
 - (3) Global interest rates are calculated as the average money market rates in the United States, United Kingdom, Japan and the euro area.
 - (4) To make sure that large observations are not driving the results all dependent and independent variables (except global factors and indices) are winsorised at the 5% level.

Table D Global and domestic determinants of gross capital inflows: balance of payments (IFS)

	Balance of Payments (IFS)							
	AEs				EMEs			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	FDI	Portfolio equity	Portfolio debt	Loans and deposits	FDI	Portfolio equity	Portfolio debt	Loans and deposits
Global volatility (L)	-0.0034 (0.0033)	-0.0022 (0.0016)	0.0001 (0.0045)	-0.0563*** (0.0113)	-0.0014 (0.0016)	-0.0015 (0.0010)	-0.0071*** (0.0018)	-0.0137*** (0.0031)
Domestic credit growth (L)	0.0040 (0.0047)	0.0012 (0.0015)	0.0387*** (0.0071)	0.0750*** (0.0155)	0.0035 (0.0035)	0.0011 (0.0008)	0.0042 (0.0039)	0.0257*** (0.0058)
Domestic GDP growth (relative to global, L)	0.0295** (0.0125)	0.0135*** (0.0046)	0.0134 (0.0209)	0.0989** (0.0377)	0.0142 (0.0092)	0.0031 (0.0025)	-0.0116 (0.0084)	0.0559*** (0.0173)
FX depreciation (L)	-0.0042 (0.0044)	0.0003 (0.0015)	-0.0239*** (0.0051)	-0.0265** (0.0106)	-0.0097** (0.0043)	-0.0027 (0.0016)	-0.0116** (0.0045)	-0.0326*** (0.0061)
Domestic interest rates (changes relative to global, L)	0.0605* (0.0319)	-0.0121 (0.0167)	0.0227 (0.0269)	0.1844* (0.1068)	0.0039 (0.0048)	-0.0131** (0.0060)	0.0075 (0.0106)	-0.0235 (0.0163)
Constant	1.2770*** (0.0485)	0.2716*** (0.0221)	0.7097*** (0.0683)	1.9584*** (0.1794)	0.8194*** (0.0217)	0.1440*** (0.0130)	0.3680*** (0.0254)	0.3749*** (0.0401)
Observations	2,156	2,034	2,051	2,156	1,525	1,491	1,453	1,503
R-squared	0.0095	0.0133	0.0701	0.0879	0.0142	0.0139	0.0212	0.1192
Countries	31	30	30	31	21	21	21	21

Notes: The table presents the estimated parameter values from fixed-effects panel regressions. The dependent variables are quarterly gross capital inflows in per cent of GDP. In columns (1) to (4) we report results for a sample of advanced economies, while in columns (5) to (8) we do the same for EMEs. 'L' behind a variable name indicates that this variable is based on quarterly data and lagged by one quarter. Data on capital flows are collected from the IMF IFS database. Other data are described in Table A3. The sample period is 1995 Q1–2015 Q3. Robust standard errors, clustered at the country level, are reported in brackets. *** is significant at the 1% level, ** at the 5% level and * at the 10% level.

Among the other variables, the most interesting result is that, as expected, the (lagged) depreciation of the exchange rate enters negatively in most instances. The effect is strongly significant and large especially for debt flows, indicating that such types of flows are most responsive to risks crystallising due to foreign currency mismatches on borrowers' balance sheets. The differential between domestic and global interest rates generally has the expected positive sign but is, at best, only weakly significant. Rather than through this direct channel, global interest rates may instead be one of the underlying factors causing changes in global volatility and thus indirectly capital inflows.

Having explored the broad instrument breakdown using the balance of payment statistics, we next employ two specialised datasets that allow shedding light on the question whether there is heterogeneity within these broad categories, specifically with regard to whether the currency denomination matters for assessing the drivers of capital flows.

Determinants of banking flows

In Table E, we employ BIS International Banking Statistics to distinguish between debt inflows from banks that are denominated in foreign versus local currency. The evidence is supportive that bank debt inflows in foreign currency are more procyclical than in local currency. Bank claims on AEs in the form of debt securities are found to only fall in periods of high global volatility if they are denominated in foreign rather than local currency (columns 2 versus 1) suggesting that foreign currency bank debt flows appear inherently less stable in the face of global shocks than local currency flows. The same holds for EMEs (column 5) where aggregate debt securities are

almost exclusively denominated in foreign currency (see Table A). Also, although both foreign and local currency loans and deposit inflows from banks into AEs and EMEs appear pro-cyclical, the impact is stronger for foreign currency flows. In addition, there is stronger evidence for pro-cyclicality of foreign than local currency bank loans and deposits with respect to the domestic credit growth in both AEs and EMEs (columns 4 versus 3 and 7 versus 6).

Table F extends the exercise of the previous table to the BIS International Debt Statistics which allows splitting the debt *issuance* by all domestic *sectors* to all types of creditors into foreign and local currency. As discussed earlier, this split is only relevant for AEs, since nearly all international debt issuance in EMEs is estimated to be in foreign currency. The results again support the notion that foreign currency inflows appear more pro-cyclical than local currency ones, especially with regard to global factors (column 2 versus 1). In EMEs, (mostly foreign currency denominated) debt issuance is also pro-cyclical with regard to global volatility (column 3). Importantly, including the offshore issuance of affiliates into our measure of debt issuance, reveals that the responsiveness to global volatility increases further (column 4). Such borrowing appears to be used as a marginal type of financing, rising when global uncertainty and risk aversion is at its lowest and falling more sharply than debt issuance by EME parents when it evaporates.

Table E Global and domestic determinants of gross banking inflows: foreign currency (FX) versus domestic currency (non-FX)

	International Banking Statistics						
	AEs				EMEs		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Non-FX bank portfolio debt	FX bank portfolio debt	Non-FX bank loans + deposits	FX bank loans + deposits	Bank portfolio debt (mostly FX)	Non-FX bank loans + deposits	FX bank loan + deposits
Global volatility (L)	-0.0006 (0.0014)	-0.0061*** (0.0013)	-0.0112*** (0.0032)	-0.0313*** (0.0073)	-0.0027** (0.0013)	-0.0027*** (0.0007)	-0.0115*** (0.0022)
Domestic credit growth (L)	0.0083*** (0.0029)	0.0063** (0.0026)	0.0233*** (0.0053)	0.0471*** (0.0136)	0.0027* (0.0014)	0.0011 (0.0008)	0.0162*** (0.0037)
Domestic GDP growth (relative to global, L)	0.0222*** (0.0067)	0.0113*** (0.0038)	0.0440*** (0.0084)	0.0888** (0.0328)	0.0064** (0.0027)	0.0009 (0.0021)	0.0540*** (0.0127)FX
FX depreciation (L)	-0.0062*** (0.0016)	-0.0029 (0.0017)	-0.0195*** (0.0044)	-0.0340*** (0.0096)	-0.0037** (0.0014)	-0.0053** (0.0019)	-0.0202*** (0.0055)
Domestic interest rates (changes relative to global, L)	-0.0157 (0.0175)	0.0005 (0.0130)	-0.0397 (0.0380)	0.0639 (0.0603)	-0.0077 (0.0051)	0.0031 (0.0041)	0.0077 (0.0158)
Constant	0.1332*** (0.0201)	0.1730*** (0.0205)	0.3772*** (0.0496)	0.8718*** (0.1067)	0.0667*** (0.0153)	0.0678*** (0.0088)	0.1776*** (0.0342)
Observations	2,191	2,202	2,203	2,203	1,560	1,561	1,560
R-squared	0.0410	0.0492	0.0677	0.0633	0.0203	0.0183	0.0898
Countries	31	31	31	31	21	21	21

Notes: The table presents the estimated parameter values from fixed-effects panel regressions. The dependent variables are estimated exchange rate adjusted changes in the stock of bank liabilities denominated in all, foreign and local currencies in per cent of GDP. In columns (1) to (4) we report results for a sample of advanced economies, while in columns (5) to (7) we do the same for EMEs. 'L' behind a variable name indicates that this variable is based on quarterly data and lagged by one quarter. Data on banking flows are collected from the BIS International Banking Statistics. Portfolio debt refers to the position 'Debt Securities' in the BIS locational banking statistics. The split in FX and non-FX components is based on authors' estimates. Other data are described in Table A3. The sample period is 1995 Q1–2015 Q3. Robust standard errors, clustered at the country level, are reported in brackets. *** is significant at the 1% level, ** at the 5% level and * at the 10% level.

Table F Global and domestic determinants of debt issuance: foreign currency (FX) versus local currency (non-FX)

	International Debt Statistics			
	AEs		EMEs	
	(1)	(2)	(3)	(4)
	Non-FX debt issuance	FX debt issuance	Debt issuance (mostly FX)	Debt issuance (mostly FX, nationality basis)
Global volatility (L)	0.0072*** (0.0022)	-0.0055** (0.0020)	-0.0038* (0.0019)	-0.0046** (0.0017)
Domestic credit growth (L)	0.0128*** (0.0038)	0.0204*** (0.0060)	0.0013 (0.0027)	0.0024 (0.0027)
Domestic GDP growth (relative to global, L)	0.0084 (0.0075)	-0.0137 (0.0106)	-0.0069 (0.0064)	-0.0073 (0.0075)
FX depreciation (L)	-0.0043** (0.0019)	-0.0104*** (0.0024)	-0.0071** (0.0028)	-0.0081** (0.0031)
Domestic interest rates (changes relative to global, L)	-0.0012 (0.0160)	0.0209 (0.0195)	0.0040 (0.0096)	0.0073 (0.0095)
Constant	0.1787***	0.3804***	0.2794***	0.3244***
Observations	2,183	2,283	1,613	1,613
R-squared	0.0621	0.0495	0.0090	0.0129
Countries	29	31	21	21

Notes: The table presents the estimated parameter values from fixed-effects panel regressions. The dependent variables are quarterly debt issuance in foreign or local currencies in per cent of GDP. In columns (1) to (2) we report results for a sample of advanced economies, while in columns (3) to (4) we do the same for EMEs. 'L' behind a variable name indicates that this variable is based on quarterly data and lagged by one quarter. Data on debt issuance are collected from the BIS International Debt Statistics. Other data are described in Table A3. The sample period is 1995 Q1–2015 Q3. Robust standard errors, clustered at the country level, are reported in brackets. *** is significant at the 1% level, ** at the 5% level and * at the 10% level.

5.3 Main determinants of capital inflows, by type of creditor

Banks versus non-bank investors

The second heterogeneity issue we focus on relates to the identity of the creditor. Does it matter whether a loan or debt security is extended by an international bank or an asset manager or other non-bank financial institutions? Before diving into the detail, **Table G** presents our first pass at the question using the estimates of loans and deposits and debt securities extended by bank vs all non-bank creditors.⁽¹⁾ Two results stand out. Firstly, loans and deposits from bank creditors to both AEs and EMEs (columns 1 and 5) appear to be more pro-cyclical for both global volatility and domestic credit growth than lending from non-bank creditors (columns 2 and 6). Secondly, for debt securities the picture is more mixed and differs markedly between AEs and EMEs. In particular, debt securities purchased by non-banks in AEs are not found to be sensitive to global volatility (column 4) but their purchases in EMEs is significantly so (column 8). The latter is consistent with the focus in the literature using EPFR data on the volatility of asset manager lending to EMEs (eg Fratzscher (2012)). The former may reflect that during stress periods non-bank investors switch within AEs from riskier bonds to safe haven government bonds.

Mutual fund investors

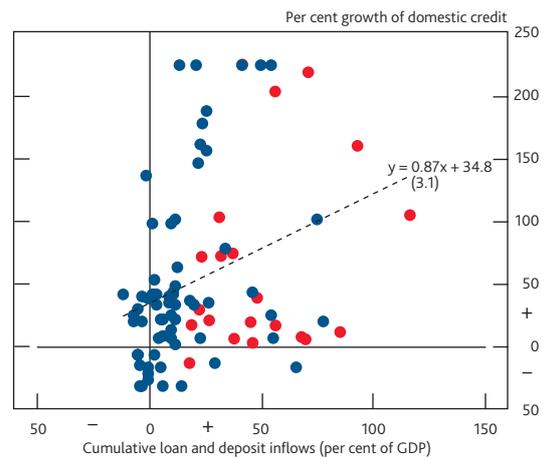
We now disaggregate columns 4 and 8 of **Table G** (non-bank portfolio debt flows to AEs and EMEs respectively) using more granular data from EPFR to look at a key sub-category of non-bank creditors — mutual funds investing in bonds (**Table H**). Nearly all these funds are open-ended. We find that mutual fund flows to both AEs and EMEs are sensitive to global volatility (columns 1 and 6). The economic significance — reflected in the size of the coefficient — is much bigger for retail and foreign currency funds. Another interesting finding is that mutual fund flows seem, unlike inflows from banks, to be *counter*-cyclical to the domestic credit cycle, especially flows to EMEs. This is in line with related findings in the literature, such as Lim, Mohapatra and Stocker (2014) and Brandao Marques *et al* (2014). It suggests that cross-border lending from non-bank creditors is less volatile than that by bank creditors. So, if first-mover advantage and liquidity mismatches can be addressed, market-based finance may be a stabilising type of cross border flow. It may also reflect the finding of Fratzscher (2012) that mutual fund flows are counter-cyclical during 'normal' times although pro-cyclical in crisis periods.

5.4 Discussion of results

The econometric results highlighted that the sensitivity of capital inflows to changes in global factors varies markedly across different types of capital flows, especially with regard to global risk and uncertainty proxied by realised volatility of global equity returns (a measure similar but broader than the popular VIX index). The results also highlight the strong

interaction between domestic credit growth and cross border inflows especially of loans and deposits. **Chart 13** highlights that prior to the GFC countries which experienced a large increase in the growth of domestic credit also often experienced a large increase in cross border inflows of loans and deposits (percent of GDP). And these countries were, in turn, more likely to experience a banking crisis post Lehman's failure (as shown by the red dots in the chart).

Chart 13 Growth of domestic credit and cumulative cross-border loan and deposit inflows (end-2002-end 2007) and crisis incidence in the subsequent two years^(a)



Sources: IFS and BIS.

(a) A red bubble indicates that the country experienced a banking crisis in 2008–10. A blue bubble indicates no crisis. Banking crisis are taken from Laeven and Valencia (2013).

6 How do policy and other factors influence capital inflows?

The econometric results presented so far highlighted that — among the basic categories of capital inflows by instrument contained in the IMF's IFS statistics — cross border loans and deposits — especially in foreign currency — have been the most sensitive to global volatility in both AEs and EMEs. In this section, we therefore focus on which policies — fully or partly under control of the domestic authorities — affect the sensitivity of such flows to global volatility.

In order to do so, we add into our regression framework an interaction term between our measure of global volatility and the respective factors (in addition to the factor on its own to complete the interacted framework):

$$F_{i,t} = \alpha + \beta_1 \text{Global Volatility}_{t-1} + \beta_2 \text{Factor}_{t-1} + \beta_3 \text{Global Volatility}_{t-1} * \text{Factor}_{t-1} + \gamma' X_{i,t-1} + \delta_i + \varepsilon_{i,t}$$

(1) Specifically, loans and deposits from non-bank creditors are calculated as other investment flows from the IMF IFS minus loans from BIS reporting banks to the respective economy from the BIS. Similarly, portfolio debt purchased by non-bank creditors is calculated as portfolio debt investment from the IMF IFS minus debt securities of BIS reporting banks *vis-à-vis* the respective economy taken from the BIS.

Table G Global and domestic determinants of gross debt inflows by type of creditor

	AEs				EMEs			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Bank creditors: loans + deposits	Non-bank creditors: loans + deposits	Bank creditors: portfolio debt	Non-Bank creditors: portfolio debt	Bank creditors: loans + deposits	Non-bank creditors: loans + deposits	Bank creditors: portfolio debt	Non-bank creditors: portfolio debt
Global volatility (L)	-0.0471*** (0.0083)	-0.0256** (0.0109)	-0.0066** (0.0027)	0.0051 (0.0047)	-0.0130*** (0.0022)	0.0013 (0.0034)	-0.0030** (0.0014)	-0.0059*** (0.0019)
Domestic credit growth (L)	0.0819*** (0.0139)	0.0106 (0.0119)	0.0171*** (0.0039)	0.0364*** (0.0095)	0.0176*** (0.0045)	0.0082*** (0.0029)	0.0027* (0.0015)	0.0020 (0.0037)
Domestic GDP growth (relative to global, L)	0.1532*** (0.0352)	0.0005 (0.0316)	0.0393*** (0.0128)	-0.0256 (0.0160)	0.0542*** (0.0151)	-0.0054 (0.0139)	0.0049 (0.0029)	-0.0233** (0.0093)
FX depreciation (L)	-0.0581*** (0.0110)	0.0111 (0.0152)	-0.0111*** (0.0021)	-0.0248*** (0.0067)	-0.0234*** (0.0059)	-0.0121* (0.0060)	-0.0045*** (0.0013)	-0.0079 (0.0056)
Domestic interest rates (changes relative to global, L)	0.0192 (0.0809)	0.1462* (0.0812)	-0.0242 (0.0370)	0.0466 (0.0390)	0.0036 (0.0135)	-0.0358 (0.0222)	-0.0070 (0.0052)	0.0286** (0.0118)
Constant	1.3560***	1.0189***	0.3134***	0.4385***	0.2310***	0.1125**	0.0737***	0.3164***
Observations	2,088	2,088	1,991	1,991	1,470	1,470	1,418	1,418
R-squared	0.1050	0.0075	0.0796	0.0439	0.0894	0.0138	0.0230	0.0194
Countries	31	31	30	30	21	21	21	21

Notes: The table presents the estimated parameter values from fixed-effects panel regressions. The dependent variables are quarterly capital inflows in per cent of GDP. In columns (1) to (4) we report results for a sample of advanced economies, while in columns (5) to (8) we do the same for EMEs. Loans and deposits from non-bank creditors are calculated as other investment flows from IFS minus loans from BIS reporting banks to the respective economy from the BIS. Debt liabilities extended by non-bank creditors is calculated as portfolio debt investment from IFS minus debt securities of BIS reporting banks vis-à-vis the respective economy taken from the BIS. 'L' behind a variable name indicates that this variable is based on quarterly data and lagged by one quarter. Data on control variables are described in Table A3. The sample period is 1995 Q1–2015 Q3. Robust standard errors, clustered at the country level, are reported in brackets. *** is significant at the 1% level, ** at the 5% level and * at the 10% level.

Table H Global and domestic determinants of mutual fund flows by type of creditor

	AEs					EMEs				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Total	Institutional	Retail	FX	Non-FX	Total	Institutional	Retail	FX	Non-FX
Global volatility (L)	-0.0022*** (0.0002)	-0.0006*** (0.0001)	-0.0014*** (0.0002)	-0.0014*** (0.0001)	-0.0005*** (0.0001)	-0.0019*** (0.0004)	-0.0008*** (0.0002)	-0.0010*** (0.0002)	-0.0016*** (0.0003)	-0.0002** (0.0001)
Domestic credit growth (L)	-0.0008 (0.0005)	-0.0003 (0.0003)	-0.0004 (0.0002)	-0.0005* (0.0003)	-0.0001 (0.0001)	-0.0011** (0.0004)	-0.0006** (0.0002)	-0.0005* (0.0003)	-0.0009** (0.0003)	-0.0002 (0.0001)
Domestic GDP growth (relative to global, L)	0.0003 (0.0013)	0.0010* (0.0006)	-0.0007 (0.0008)	-0.0004 (0.0012)	0.0000 (0.0003)	0.0011 (0.0014)	0.0008 (0.0007)	0.0001 (0.0008)	-0.0001 (0.0013)	0.0005** (0.0002)
FX depreciation (L)	0.0008* (0.0004)	0.0000 (0.0001)	0.0008** (0.0003)	-0.0001 (0.0002)	0.0003** (0.0001)	-0.0023*** (0.0005)	-0.0010*** (0.0003)	-0.0012*** (0.0002)	-0.0023*** (0.0004)	-0.0001 (0.0001)
Domestic interest rates (changes relative to global, L)	0.0031 (0.0046)	0.0017 (0.0014)	0.0005 (0.0031)	0.0025 (0.0035)	-0.0011 (0.0014)	-0.0014 (0.0022)	0.0002 (0.0007)	-0.0009 (0.0014)	0.0004 (0.0014)	-0.0007 (0.0008)
Constant	0.0373*** (0.0065)	0.0159*** (0.0042)	0.0200*** (0.0041)	0.0336*** (0.0056)	-0.0002 (0.0034)	0.0443*** (0.0073)	0.0228*** (0.0031)	0.0219*** (0.0047)	0.0367*** (0.0060)	0.0080** (0.0033)
Observations	942	937	942	929	929	896	896	896	887	887
R-squared	0.2696	0.2902	0.3183	0.3104	0.3408	0.3765	0.3478	0.4091	0.4026	0.2510
Countries	28	28	28	28	28	21	21	21	21	21

Notes: The table presents the estimated parameter values from fixed-effects panel regressions with cluster robust standard errors. The dependent variables are quarterly mutual fund inflows in per cent of GDP. Compared to the above regressions year fixed effects are added. This is to bring the estimates in line with the literature (eg Lim, Mohapatra and Stocker (2014); Fratzscher (2012)) and to account for the fact that EPFR flows seem to be significantly more trend-driven than BoP figures. The sample period is 2004 Q4–2015 Q4. Robust standard errors, clustered at the country level, are reported in brackets. *** is significant at the 1% level, ** at the 5% level and * at the 10% level.

Table 1a Determinants of the sensitivity of loans and deposit inflows to global volatility

Factor	(1)	(2)	(3)	(4)	(5)
	None	Prudential policy actions (during preceding year)	Capital actions	Lending standards actions	Reserve requirement actions
Global volatility (L)	-0.0413*** (0.0075)	-0.0528*** (0.0097)	-0.0447*** (0.0084)	-0.0402*** (0.0078)	-0.0419*** (0.0077)
Factor		-0.3261 (0.1980)	-0.3014 (0.2820)	0.6128 (0.3699)	-0.0909 (0.2802)
Global volatility (L) * Factor		0.0334*** (0.0122)	0.0272** (0.0119)	-0.0148 (0.0181)	0.0116 (0.0185)
Domestic credit growth (L)	0.0465*** (0.0093)	0.0458*** (0.0092)	0.0460*** (0.0092)	0.0458*** (0.0092)	0.0465*** (0.0093)
Domestic GDP growth (relative to global, L)	0.0846*** (0.0222)	0.0818*** (0.0216)	0.0845*** (0.0221)	0.0853*** (0.0221)	0.0837*** (0.0220)
FX depreciation (L)	-0.0288*** (0.0065)	-0.0301*** (0.0068)	-0.0286*** (0.0065)	-0.0280*** (0.0067)	-0.0289*** (0.0066)
Domestic interest rates (changes relative to global, L)	0.0136 (0.0308)	0.0075 (0.0310)	0.0111 (0.0307)	0.0111 (0.0306)	0.0134 (0.0307)
Constant	1.3804*** (0.1048)	1.4980*** (0.1404)	1.4219*** (0.1230)	1.3292*** (0.1110)	1.3819*** (0.1078)
Observations	3,558	3,558	3,558	3,558	3,558
Countries	52	52	52	52	52
R-squared	0.0750	0.0787	0.0760	0.0780	0.0752

Notes: The table presents the estimated parameter values from fixed-effects panel regressions. The dependent variables are quarterly loan and deposit inflows in per cent of GDP. 'L' behind a variable name indicates that this variable is based on quarterly data and lagged by one quarter. Data on capital inflows are collected from the IMF IFS database. Other data are described in Table A3. The sample period is 1995 Q1–2015 Q3. Robust standard errors, clustered at the country level, are reported in brackets. *** is significant at the 1% level, ** at the 5% level and * at the 10% level.

A positive coefficient on β_3 would imply that the respective factor reduces the (negative) impact of global volatility on banking inflows.

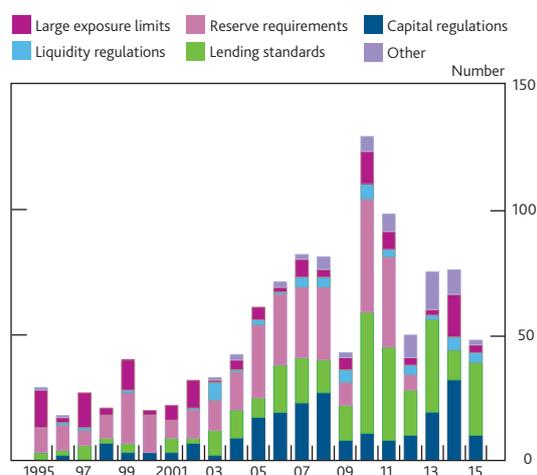
6.1 Prudential policies

To start with, we focus on whether a tightening in prudential policies during the previous year reduces the responsiveness of banking inflows to global volatility. Data on macroprudential policies are taken from Reinhart and Sowerbutts (2016) who provide a novel dataset on the use of macroprudential policies over time for a wide variety of actions. Specifically, we focus first (in Table 1a) on a dummy variable which takes the value of 1 when any type of prudential policy actions has been tightened within the past year.

Ideally we would like to have information on the strength of the macroprudential actions. However, there is to date no comprehensive dataset on measuring macroprudential policy intensity in a cross-country, cross-time consistent way. The difficulty of deriving quantitative indices of macroprudential intensity stem largely from the fact that the use of macroprudential policies is country specific where even policies that sound similar such as loan-to-value limits vary in their implementation. Similarly, risk weights often differ across countries, which make comparing the intensity of capital regulation across countries difficult.

Next, in the remaining columns of Table 1a, we disaggregate prudential policies into three main components — a tightening in capital requirements, reserve requirements and lending

standards. While the dataset also includes liquidity regulations and large exposure regulations, we focus on these three sets of policies given they have been applied in a wide range of countries. Chart 14 shows that there has been a variety of macroprudential policy actions for each of the policies we consider and that measures have been taken both before and after the GFC. The number of actions is higher in more recent years, which reflects the growing recognition of the importance of macroprudential policy.

Chart 14 Macroprudential policy tightening

Source: Reinhart and Sowerbutts (2016).

We group similar actions together, so for example all risk weights on exposures to specific sectors and capital requirement actions are combined to create the variable

'capital regulations'. Similarly, actions such as limits on loan-to-value ratios, debt service ratios and repayment periods are grouped as 'lending standards', given that these all apply to borrowers, are introduced via the same framework of regulations and are frequently taken at the same time. We also consider changes in reserve requirements. These are traditionally thought of as a monetary policy instrument, but have been used in a number of countries for macroprudential purposes to protect against liquidity risks and/or rapid domestic credit growth.

Turning to the results contained in **Table Ia**, in column 1, we first confirm that global volatility has a negative impact on banking inflows in a sample for which data on prudential policies are available. In column 2, we show our key result, namely that prudential policy tightening in the past has reduced the sensitivity of banking flows to global volatility. In fact, the point estimates imply that prudential policy tightening in the run-up to a high volatility period has reduced the responsiveness of banking flows by more than half. The results lend support to the notion, discussed further in the policy section, that domestic prudential policies could act as a defence against volatility in capital flows.

Columns 3 to 5 show that this result appears to be driven by a tightening in capital requirements rather than in lending standards or reserve requirements. This might reflect that more resilient banks — or at least a signal of policy action to ensure such resilience — could have a more significant impact on banking inflows than on other prudential policies (although those can of course have indirect effects on bank resilience). Again, the point estimates imply that capital policy tightening in the run-up to a high volatility period has significantly reduced the responsiveness of banking flows to these shocks.

Table Ib, summarises our full set of results on the interaction terms β_3 , including a range of other policy measures. This lends further support to the notion that bank resilience matters for the responsiveness of banking inflows to global volatility. Specifically, we also find that banking inflows into better capitalised banking systems (ie lower leverage) were less responsive to global volatility (reflected in a positive interaction term). This evidence is in line with a recent paper mentioned earlier by Avdjiev, McCaulry and Shin (2016) who also find that tighter capital requirements act as a shield against global shocks to cross-border bank loans.

6.2 Capital account liberalisation

Do more open capital accounts increase the sensitivity of banking flows to global factors? To examine this question, we employ both an aggregate index of restrictions on the capital account taken from Chinn and Ito (2008) and also a measure specific to banking flows taken from Fernandez *et al* (2015). These indices measure, contrary to the prudential actions

Table Ib Determinants of the sensitivity of loans and deposit flows to global volatility

	Coefficient on the interaction term		Coefficient on the interaction term
Regulatory Factors		Foreign Bank Shares	
Prudential policy actions	Positive	Number of foreign banks as a share of total resident banks (per cent)	Negative
Capital actions	Positive	Foreign bank assets as a share of total resident bank assets (per cent)	Insignificant
Lending standards actions	Insignificant	External Balance	
Reserve requirement actions	Insignificant	Current account balance (per cent of GDP)	Insignificant
Bank capital to assets	Positive	International investment position (per cent of GDP)	Insignificant
		Reserves (per cent of GDP)	Insignificant
Capital Account Openness			
Capital account openness	Negative		
Openness to banking inflows	Negative		

Notes: The table presents results on β_3 from the fixed-effects panel regressions and results regarding regulatory factors which are presented more fully in **Table Ia**. The dependent variables are quarterly loans and deposit flows in per cent of GDP. Data on capital inflows are collected from the IMF IFS database. Other data are described in **Table A3**. The sample period is 1995 Q1-2015 Q3. Standard errors, clustered at the country level, are reported in brackets.

database, the intensity of restrictions on the capital account and are a measure of how widespread such restrictions are.

We find that, unsurprisingly, capital inflows in financially open countries are indeed more sensitive to global factors (**Table Ib**). The flipside of this result is of course that restrictions to capital account openness — ie capital controls/measures that discriminate on the basis of residency — can help to reduce the sensitivity of capital flows to global factors.

The IMF has recently suggested that, under certain circumstances, capital flow management measures (CFMs), which includes residency-based (capital controls) and currency-based measures, can form part of the macroeconomic and prudential toolkit to appropriately manage the risks around surges in capital inflows (IMF (2012)). For example, some macroprudential measures are aimed at reducing financial stability risks through acting directly to reduce the risks from capital inflows. Measures that discriminate on the basis of currency fall into this category.⁽¹⁾ Bruno and Shin (2013) find that such measures have — in the

(1) Such measures are at times put into the group of CFMs, although arguably their intention is usually to improve domestic financial stability rather than target capital flows directly. The IMF sees CFMs and MPMs as overlapping in situations when capital flows are the source of systemic financial sector risks.

case of the Korean Republic — served to reduce the sensitivity of capital inflows to global financial conditions.

However, some forms of capital controls may have distortionary effects (see, for example, Forbes (2005)) with potential adverse knock-on effects on GDP growth. The results on macroprudential policies above point to one alternative policy avenue countries can take to alleviate the higher responsiveness to global factors resulting from capital account openness. Moreover, the Basel Committee assessed that increasing minimum capital and liquidity requirements will likely have long-term net economic benefits through reducing the probability of a financial crisis and the output losses associated with such crises. These benefits substantially exceed the projected output costs for a range of higher capital and liquidity requirements (BIS (2010)) suggesting that such an alternative avenue might be more beneficial in net terms.

6.3 Other factors

The relative importance of the affiliates of foreign-owned banks in the domestic economy might be another important factor driving the sensitivity of loans and deposit flows to changes in global volatility. Due to information asymmetries foreign banks may be more prone to run in the face of global shocks than domestic banks. Domestic-owned banks might also rely on additional funding via their internal capital markets whereas the evidence on whether affiliates of foreign banks benefit from the same type of support is more mixed (De Haas and van Lelyveld (2010), (2014); Hoggarth, Hooley and Korniyenko (2013); Reinhardt and Riddiough (2015)).⁽¹⁾ To shed light on the role of foreign banks, we employ data from the World Bank's Global Financial Development database on the share of foreign banks in total resident banks measured by number and asset value. Our results provide tentative support that a higher relative importance of affiliates of foreign-owned banks makes cross border banking inflows more sensitive to global volatility especially when measured by number of banks.

Finally, we consider factors related to the external balance of a country. The presence of a current account surplus, a strong net international investment position or large foreign currency reserve holdings should all serve to make a country less prone to global risk. However, empirically we cannot establish that this is the case, potentially reflecting bank investors focusing on more specific factors such as bank resilience or capital regulation when deciding from which countries to withdraw when the global risk cycle turns.

7 Conclusions and policy implications

The stylised facts and empirical evidence presented in this paper points to some gross capital inflows potentially posing more financial stability risks than others in being driven by global risk factors and contributing to booms in capital inflows

and domestic credit — debt rather than equity, especially lending from bank creditors, and in foreign rather than local currency. Although these results hold for both EMEs and AEs, the risks from capital inflows may be higher in EMEs given they often have shallower and narrower financial markets as well as much larger shares of external debt liabilities denominated in foreign currency (see **Table A**). The econometric evidence is suggestive that global factors, particularly changes in global risk have played an important role in affecting debt inflows especially of loans and other debt instruments in foreign currency. Cross-border bank lending in foreign currency also seem to have been positively associated with the growth in credit from domestic banks suggesting the potential for a mutually reinforcing cycle of credit to the real economy from domestic and foreign firms. Cross-border bond flows in local currency and/or from non-banks to AEs, if anything, rises in periods of global volatility. This may reflect safe haven purchases of AE sovereign bonds.

Such findings do not mean that countries should jump immediately to look for policies to limit capital inflows. On the contrary, capital flows potentially provide a range of benefits to the economy so the goal should be to make an open global financial system safer. In fact, an open capital account allows countries to build up gross external assets. And as we have seen in many AEs, these could be retrenched in times of reversals in capital inflows to cushion the impact on the domestic economy.

7.1 Sound macro policies and structural measures

Macroeconomic policies should play a key role in managing the risks from marked changes in capital inflows. A combination of a looser monetary and tighter fiscal policy and exchange rate appreciation may limit the surge in inflows. If foreign currency reserves are inadequate building them up would both limit exchange rate overshooting and provide a cushion against any future capital flow reversal.⁽²⁾

Structural measures are also important. A deepening and broadening of domestic capital markets should mean that surges and stops in capital inflows can be better accommodated. A deepening of domestic local capital markets (eg through standardised bonds) make it easier for an economy to absorb a surge in capital inflows without causing a credit or asset price bubble. It is especially important to

(1) De Haas and van Lelyveld (2010) find that intragroup funding is 'supportive' and flows to affiliates most in need of liquidity support. But De Haas and van Lelyveld (2014) find that parent banks provided less support to their foreign affiliates during the GFC implying that intra-group funding may also contribute to the international propagation of financial shocks. Reinhardt and Riddiough (2015) provide evidence that intragroup funding remains more stable than wholesale interbank funding during high-volatility periods for both domestic parent banks and foreign affiliates (and even during the GFC). The results by Hoggarth, Hooley and Korniyenko (2013) suggest that it is important to distinguish between the funding of foreign *branches* and *subsidiaries* in this regard, because, at least in the United Kingdom, lending by branches was more cyclical than by subsidiaries before and in the wake of the GFC partly due the greater reliance of foreign branches on what turned out to be fickle forms of funding from their parents.

(2) See IMF (2012).

develop local capital markets in local currency given that borrowers will avoid balance sheet losses from domestic exchange rate depreciation. A more diversified domestic investor and instrument base, including institutional investors and simple and transparent securitisation markets, would also reduce the risk of a drying up in any particular form of financing. More broadly, some EMEs especially need to improve their institutional and policy frameworks. This will encourage foreign investors to broaden their EME asset portfolios to — from the borrower’s perspective — safer types of flows such as longer-term, local currency and equity instruments. In addition, domestic microprudential policies should be strong so that the financial system can withstand such marked shocks in its own funding or that of its domestic borrowers. Furthermore, assessing the strength of domestic banks’ balance sheets should include regular stress tests of their reliance to external shocks.

7.2 Macroprudential policies

There may be circumstances, however, when structures are broadly appropriate and macroeconomic measures are exhausted. For example, high inflation may limit the ability to cut policy rates while if the exchange rate is already clearly overvalued it will limit the willingness of the domestic authorities to allow further exchange rate appreciation. Structural measures may also have a long gestation period. There may in any case be a question whether these macroeconomic and structural measures will be sufficient to fully limit the risks caused by marked changes in capital inflows. For many EMEs, fundamentals are a lot better now than during the wave of crises through to the turn of the millennium. Also, as discussed earlier, periods of gross inflows and reversals tend to come in waves and seem — other than for FDI — to be highly correlated across country and very susceptible to changes in the global investment environment irrespective of country specific factors and policies.⁽¹⁾

Therefore, countries may also need macroprudential tools that address systemic risk arising from marked changes in capital inflows.⁽²⁾ In principle, some of these tools can help build up capital and liquidity buffers to cushion the financial system against adverse financial shocks from abroad. Other macroprudential tools may indirectly reduce the risk of marked changes in capital inflows. On the latter, we have found some evidence that macroprudential policy actions have mitigated the sensitivity of banking inflows to global volatility — often a cause of or, at least, contributory factor to financial instability in the past. Therefore, our results lend some support to the notion that prudential policies could be used against the systemic risk from marked changes in capital inflows rather than more discriminatory measures such as capital controls which often carry greater distortions to the domestic and global financial system.

Against this background it is welcome that a range of international prudential measures have been agreed to reduce domestic bank leverage and credit risk (eg the countercyclical capital buffer (CCyB) and leverage ratio) and funding risk (Liquidity Coverage Ratio (LCR) and the Net Stable Funding Requirement (NSFR)). If fully implemented globally these policies could indirectly smooth capital inflows, for example, through reducing the incentive for domestically regulated banks to borrow in boom periods and reduce their ability to borrow short-term including from abroad. Our econometric evidence points to cross border inflows from foreign to domestic banks especially in foreign currency being positively associated with the growth in domestic credit from local banks. And reciprocity of other countries’ use of CCyB — which has been agreed at the global level — would also, if fully and consistently implemented, directly reduce lending to the domestic non-bank private sector from foreign banks.

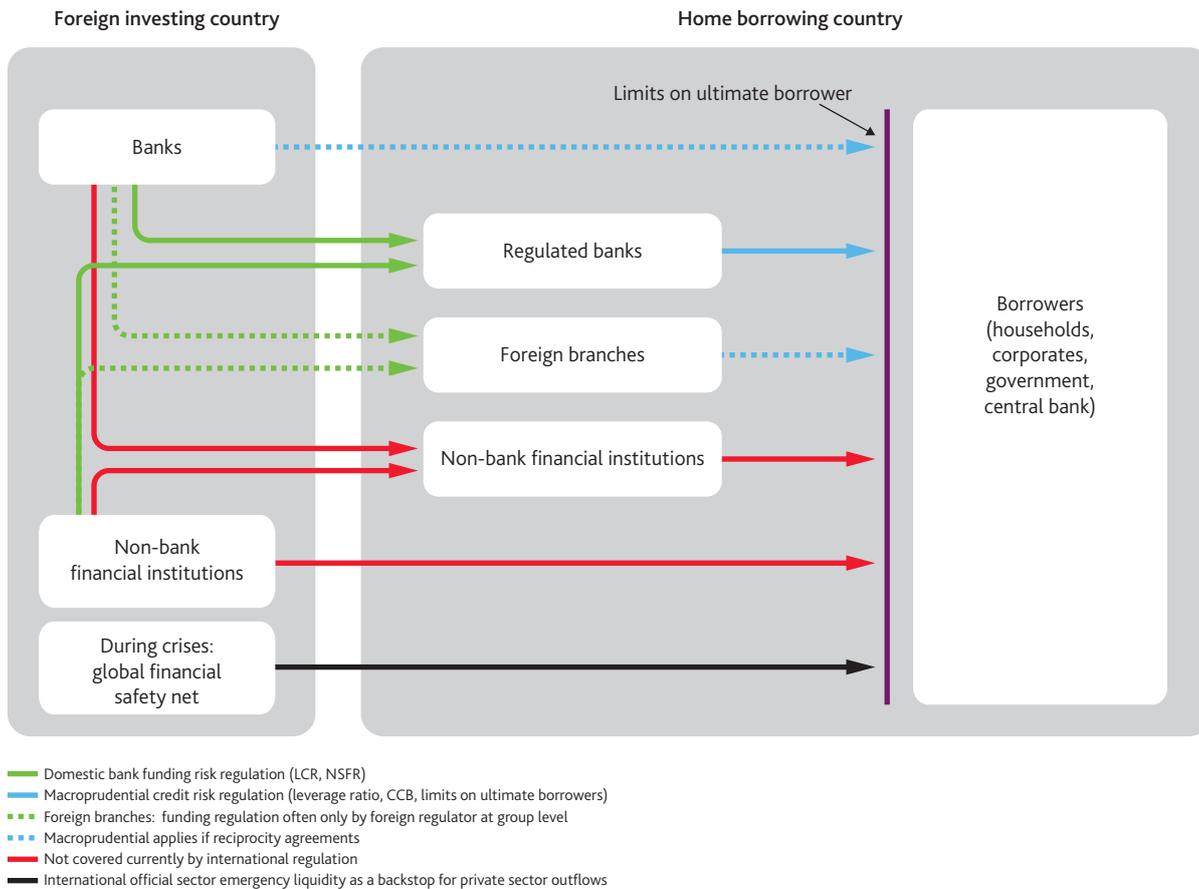
Such macroprudential policies agreed internationally are preferable to country specific prudential CFMs since they are transparent and consistent across country. There is question over whether Basel style macroprudential policies can be tailored to address risks from foreign currency mismatches. Our analysis above highlights the volatility of cross-border debt flows in foreign currency and their susceptibility to changes in global factors outside the control of national authorities. One option to shield domestic banks’ from foreign currency funding risks would be for banking systems that have significant foreign currency borrowing, particularly where the central bank does not have access to foreign currency swap lines, to implement the LCR and NSFR on a more granular basis. For key currencies, for example, it could be required that banks hold assets that cover potential outflows in these currencies. It is welcome that the OECD is considering the treatment of such prudential measures in foreign currency in the current review of their Codes of Liberalisation of Capital Movements.⁽³⁾

National prudential measures can shield against the risk of volatility in cross border foreign currency inflows into domestic banks but will not usually cover direct foreign currency borrowing from abroad by domestic companies and households. In fact, tighter foreign currency policies applied to domestic banks’ lending to domestic non-banks may encourage an increase in lending from banks abroad — so-called policy leakages (Reinhardt and Sowerbutts (2015)). So there is a question whether reciprocity agreements may need to be extended beyond the CCyB to explicitly capture cross border foreign currency risks to non-banks. For example, the European Systemic Risk Board (ESRB) recommended that other EU authorities reciprocated national measures to stem

(1) See Rey (2015) and Forbes (2016).

(2) See the IMF/FSB/BIS (2016) which takes a stocktake of recent experiences of using macroprudential policies including the cross border effects.

(3) Under Basel 3, banks and supervisors are encouraged to monitor liquidity and funding risks in significant currencies.

Figure 1 Impact of macroprudential management measures on capital inflows^(a)

(a) Legend indicates which regulations apply.

the risks of a boom in foreign currency borrowing by households and companies in some CEE countries.⁽¹⁾ Extending reciprocity to other instruments could be on a voluntary basis and requested where leakages from cross border borrowing (and from local branches) are large such as for the corporate sector.

There may also be a need to consider tools to mitigate financial stability risks that were contributed by capital inflows from and to non-banks (see Figure 1). As discussed above, there has been a marked rise in cross border portfolio debt finance from non-bank financial institutions to some EMEs since the GFC. And looking forward, a combination of a growing relative importance of EMEs in the world economy and a reduction in investor home bias could lead to much larger portfolio flows to EMEs (see Haldane (2011)). One possible option to reduce the volatility of cross-border debt finance from and to non-banks is to extend regulation at the creditor end to some global non-bank investors such as investment funds. Our analysis above finds that mutual fund flows to both AEs and EMEs are volatile especially those that are ultimately on the behalf of retail investors and those that are invested in portfolio debt in foreign currency. The FSB has recently published a consultative document with policy recommendations to address such structural vulnerabilities

from asset management activities and investment funds (FSB (2016)). These include addressing liquidity mismatches and redemption terms in open-end funds, highlighted as risk factors in our analysis. Our paper further suggest that, especially for EMEs, mutual fund investments in foreign currency are a potential risk that could be considered, for example, in foreign currency liquidity stress testing scenarios.

7.3 Global co-ordination and data gaps

More generally, given that most evidence — including our own analysis — highlights that global 'push' factors have a significant impact on capital inflows raises the question whether more emphasis needs to be put on the policies and behaviour that affect the capital outflows from creditor countries. This is something that policy makers in EMEs have been asking for.⁽²⁾ One fundamental constraint in doing this is that source countries have national rather than global mandates for their macroeconomic and macroprudential policies and so need to tailor their policies to domestic objectives. Nonetheless, given the potential vulnerable of countries to global shocks emphasises the importance of ensuring that the overall global safety net is adequate.⁽³⁾

(1) ESRB (2011).

(2) For example, see Rajan (2014).

(3) See Denbee, Young and Paternò (2016).

On information sharing, the FSB is currently a useful forum for national authorities to discuss risks to the global financial system and their macroprudential policies. Looking ahead, as the global system becomes more financially integrated, for example with the ongoing growth in market-based finance, there may be a need to increase information sharing across countries.⁽¹⁾ This could be supported by a datahub of national macroprudential actions including whether cross border flows are covered or not.

This paper also highlights a number of data gaps on — or affecting — capital flows.⁽²⁾ Data on the banking system including cross-border activities is in reasonably good shape although there is always room for improvement.⁽³⁾ Cross-border data on non-banks both for creditors and debtors is a lot more patchy. On the creditor side, it would be useful to have more granular data by type of non-bank creditor cross-border loans and deposits and portfolio flows (including non-bank non-mutual-fund flows). On the debtor

side, it would be useful to have more information on cross-border financing of corporates and households including by currency and the extent they hedge their foreign currency risk. Also, although traditional measures of capital flows — between residents and non-residents — are important for the balance of payments and the macroeconomy they do not capture all the potential financial stability risks facing a country. In particular, the latter depends also on the *consolidated* balance sheet positions of banks and non-banks. For firms that operate globally across national borders their balance sheets cut across traditional resident-based balance of payments data and include the liability and asset positions of affiliates abroad. This is clearly important for banks with a significant global presence. It may also be important for large companies, for example, some EME corporates have in recent years been raising a lot of debt offshore via their affiliates abroad which does not show up in the balance of payments residence based data.

(1) See Cecchetti and Tucker (2016).

(2) The G20 International Financial Architecture Working Group (2016) also makes a number of recommendations for improving capital flow data some of which will be taken up by the second phase of the IMF/FSB data gaps initiative, see IMF/FSB (2016).

(3) Although national reporting of banking data to the BIS has been made more granular some countries have yet to report on this basis while some that have did not report the encouraged options.

Appendix

Table A1 The behaviour of gross capital inflows around boom and bust periods in AEs

Period	Gross inflows as per cent of GDP (sum)	Contributions of:				Bank loan and deposit inflows (to all sectors)		Debt Issuance (residency-based)		Gross outflows as per cent of annual GDP (sum)	Net flows as per cent of GDP (sum)
		Loans and deposits	Portfolio equity	Portfolio debt	FDI	Foreign currency	Local currency	Foreign currency	Local currency		
Dot-Com											
Boom: 2000 Q2–2001 Q1	13.8	4.32	2.46	2.91	4.12	1.28	1.21	1.15	2.06	12.16	1.64
Share (per cent)		31.30	17.80	21.00	29.90	51.40	48.60	8.30	14.90	88.10	11.90
Bust: 2001 Q2–2002 Q1	9.97	3.07	1.71	2.69	2.49	1.1	0.99	0.86	2.96	8.75	1.21
Difference bust-boom	-3.84	-1.25	-0.75	-0.22	-1.64	-0.17	-0.21	-0.29	0.9	-3.41	-0.43
Share in difference bust-boom of gross inflows (per cent)		32.60	19.50	5.60	42.60	4.50	5.60	7.60	-23.50	88.80	11.20
GFC											
Boom: 2006 Q2–2007 Q4	43.97	17.83	4.07	13.06	8.94	6.69	6.02	4.78	4.46	41.3	2.67
Share (per cent)		40.50	9.30	29.70	20.30	52.70	47.30	10.90	10.10	93.90	6.10
Bust: 2008 Q1–2009 Q3	13.45	-0.79	0.73	6.3	7.23	-2.21	0.59	1.72	4.64	10.06	3.39
Difference bust-boom	-30.52	-18.62	-3.34	-6.76	-1.7	-8.9	-5.42	-3.06	0.18	-31.24	0.72
Share in difference bust-boom of gross inflows (per cent)		61.00	11.00	22.20	5.60	29.20	17.80	10.00	-0.60	102.30	-2.30

Table A2 The behaviour of gross capital inflows around boom and bust periods in EMEs

Period	Gross inflows as per cent of GDP (sum)	Contributions of:				Bank loans and deposit inflows (to all sectors)		Debt issuance (nationality based)	Gross outflows as per cent of annual GDP (sum)	Net flows as per cent of annual GDP (sum)
		Loans and deposits	Portfolio equity	Portfolio debt	FDI	Foreign currency	Local currency			
Asian crisis										
Boom: 1997 Q3–1998 Q2	3.68	0.93	0.51	1.06	1.17	1.44	0.09	1.3	1.26	2.42
Share (per cent)		25.40	13.80	28.80	31.90	39.20	2.50	35.30	34.30	65.70
Bust: 1998 Q3–1999 Q2	2.45	0.08	0.26	0.7	1.41	0.06	0.1	0.97	1.2	1.25
Difference bust-boom	-1.23	-0.86	-0.24	-0.36	0.24	-1.38	0.01	-0.33	-0.06	-1.16
Share in difference bust-boom of gross inflows (per cent)		69.70	19.80	29.70	-19.20	112.40	-0.90	27.00	5.10	94.90
GFC										
Boom: 2007 Q1–2008 Q1	10.45	4	0.73	1	4.71	2.44	0.5	1.24	6.32	4.13
Share (per cent)		38.30	7.00	9.50	45.10	23.30	4.70	11.90	60.50	39.50
Bust: 2008 Q2–2009 Q2	6.27	2.01	-0.2	0.06	4.4	0.9	0.13	0.27	4.49	1.78
Difference bust-boom	-4.17	-2	-0.94	-0.94	-0.31	-1.54	-0.37	-0.97	-1.83	-2.35
Share in difference bust-boom of gross inflows (per cent)		47.90	22.50	22.50	7.40	-0.23	8.80	23.20	43.80	56.20
Latest episode										
2013 Q2–2014 Q2	5.93	1.42	0.35	0.99	3.12	0.92	0.43	1.48	4.03	1.9
Share (per cent)		23.90	5.90	16.70	52.70	15.50	7.30	24.90	68.00	32.00
Bust: 2014 Q3–2015 Q3	4.05	0.29	0.36	0.77	2.65	0.14	0.09	1.17	3.89	0.16
Difference bust-boom	-1.88	-1.13	0.01	-0.22	-0.47	-0.78	-0.34	-0.31	-0.14	-1.73
Share in difference bust-boom of gross inflows (per cent)		60.30	-0.70	11.90	25.20	41.30	18.10	16.60	7.70	92.30

Table A3 Variable sources and definitions

Variable	Description	Source
Capital inflows	The dependent variables are the various breakdowns of capital inflows, introduced in Charts 9 and 11, as a share of annual GDP (4-quarterly rolling mean). EPFR mutual fund flow data are based on cumulative monthly flows per quarter	IMF IFS, BIS locational Banking Statistics, EPFR
Global volatility	Volatility of the MSCI World Index. Realised volatility is calculated as the square root of the average of the sum of squared log daily returns. To convert to an annualised value this measure is then multiplied by the square root of 252 divided by the number of trading days in a given month	Data Stream
Global growth	Per cent	IMF IFS
Domestic GDP growth	Per cent	IMF WEO
Change in global interest rate	Quarterly change in the money market rate averaged across the United States, the United Kingdom, Germany and Japan (per cent)	IMF IFS
Change in domestic interest rate	Quarterly change in the domestic money market rate. Treasury bill or policy rates if money market rates were not available (per cent)	IMF IFS
Domestic credit growth	Quarterly credit growth by domestic banks extended to domestic non-bank private sectors (year-on-year, per cent). If BIS data were not available, data from the IMF IFS database on claims of other depository institutions on the private sector are used (Position 22D)	BIS long time series on domestic credit and IMF IFS.
FX depreciation	Quarterly change in log end-of period nominal exchange rate. US dollar numeraire (per cent)	IMF IFS
Prudential policy actions	Dummy variables that take the value 1 if a country has tightened its prudential policies during the preceding year	Reinhardt and Sowerbutts (2016)
Bank capital to assets (per cent)	Ratio of bank capital and reserves to total (unweighted) assets	World Bank Global Financial Development database.
Capital account openness	To measure financial openness, we employ the index of capital account openness from Chinn and Ito (2008). The index runs from 0 to 1, where higher values imply fewer restrictions on the capital account or fewer financial restrictions on the current account	Chinn and Ito (2008, extended to 2013)
Bank inflow controls	Data on specific capital controls are taken from Fernandez <i>et al</i> (2015). Specifically, we use direct investment inflow restrictions and measure money market inflow controls using restrictions on the purchase of money market instruments locally by non-residents. All variables are 0/1 dummies that indicate whether restrictions are in place	Fernandez <i>et al</i> (2015).
Number of foreign affiliates share of total resident banks (per cent)	Per cent of the number of affiliates of foreign-owned as a share of the number of total resident banks in an economy. A foreign bank is a bank where 50% or more of its shares are owned by foreigners	World Bank Global Financial Development database.
Foreign affiliates share of total resident bank assets (per cent)	Per cent of the total resident banking assets that are held by affiliates of foreign-owned banks. A foreign bank is a bank where 50 percent or more of its shares are owned by foreigners	World Bank Global Financial Development database.
Current account balance (ratio to GDP)	Balance of payments	IMF IFS
International investment position (ratio to GDP)	Gross external assets minus liabilities from the international investment positions	IMF IFS
Foreign currency reserves (ratio to GDP)	Balance of payments	IMF IFS

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