

# Committee on the Global Financial System

## CGFS Papers

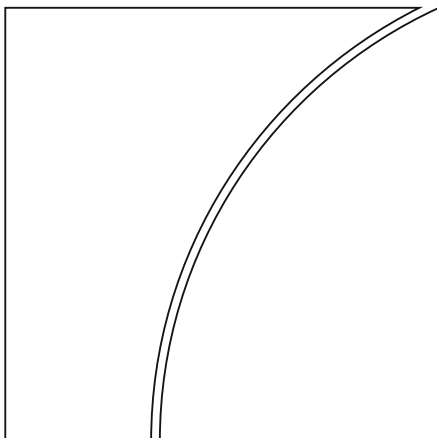
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## Changing patterns of capital flows

Report prepared by a Working Group co-chaired by Gerardo García López (Bank of Mexico) and Livio Stracca (European Central Bank)

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## Preface

Extreme swings in capital flows have long been a cause of concern for policymakers because of the risks that they can pose to macroeconomic and financial stability. The decade following the Great Financial Crisis (GFC) of 2007–09 saw significant changes in the volume and composition of capital flows, including in the pipes that channel them. In particular, an increasing share of foreign capital has been channelled through portfolio investors and other non-bank financial intermediaries. These changes may have shifted the risks associated with capital flows.

The Committee on the Global Financial System (CGFS) formed a Working Group, chaired by Gerardo García López (Bank of Mexico) and Livio Stracca (European Central Bank), to analyse changing patterns in the composition and dynamics of capital flows and to discuss the macroeconomic and, in particular, financial stability implications of these changes. The Group was formed prior to the outbreak of the Covid-19 pandemic, and the sudden stop in capital flows in March 2020 brought many of the Group's findings into sharp focus.

Whereas the CGFS's previous report on capital flows to emerging market economies (EMEs), published in 2009, did not come to a definitive conclusion regarding the net benefits of capital account liberalisation, this report finds that the richer data and empirical methods available today highlight these benefits more clearly. The risks are also clearer, especially the adverse effects of sudden stops in capital inflows and the challenges faced by economies with weaker institutions and less developed financial markets. Moreover, these risks have evolved over the past decade due to the rising importance of portfolio investors and other changes in the institutions and infrastructure through which capital flows are channelled.

The report finds that global factors have played a significant role in driving capital inflows to EMEs in particular. There has been an abundance of global liquidity since the GFC, fuelling international investors' pursuit of yield. Shifts in risk appetite have also had an important effect. That said, with improvements in EMEs' macroeconomic fundamentals and institutional frameworks, investors are becoming more selective. Due to EMEs' structural achievements, cyclical factors have become more significant drivers of capital flows and the distinctions between advanced economies and some EMEs are blurring.

The report assesses the effectiveness of policy tools for managing the risks associated with extreme shifts in capital flows, drawing on central banks' views and previous studies. It concludes that, even for countries with strong structural policies and sound fundamentals, there are circumstances in which additional policy tools, particularly macroprudential measures, occasional foreign exchange intervention and liquidity provision mechanisms, can help mitigate capital flow-related risks. However, these tools are no substitute for reforms aimed at strengthening the resilience of the economy and financial system. In addition, the Covid-19 crisis highlighted the critical role played by the global financial safety net, as well as the importance of developing a better understanding of the joint impact that policy tools have on capital flows.

I hope that this report provides policymakers, researchers and market participants with useful insights on changing patterns of capital flows and their policy implications.

Philip Lowe

Chair, Committee on the Global Financial System  
Governor, Reserve Bank of Australia

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## Executive summary

The decade following the Great Financial Crisis (GFC) of 2007–09 saw significant changes in the patterns of capital flows, especially in their composition. These changes reoriented rather than reduced concerns about the potentially adverse impacts of exceptionally large or volatile capital flows. In particular, extreme swings in non-resident inflows still pose a significant risk to macroeconomic and financial stability. This risk is particularly high for emerging market economies (EMEs), which tend to be more dependent on foreign capital and whose local financial systems are less resilient to shocks.

The challenges posed by large swings in capital flows were highlighted again in the early stages of the Covid-19 crisis, when portfolio flows to EMEs reversed with unprecedented speed and magnitude. The crisis demonstrated the effectiveness of policy tools in managing the risks associated with extreme shifts in capital flows, but it also served as a reminder that both the toolkit and the framework for its application are still works in progress.

Whereas the Committee on the Global Financial System's (CGFS) previous report on capital flows to EMEs, published in 2009, did not come to a definitive conclusion regarding the net benefits of capital account liberalisation, empirical evidence based on the richer data available today highlights these benefits more clearly. Capital inflows can have significant positive effects on real economic outcomes and financial development. However, the risks are also clearer, especially the adverse effects of sudden stops in capital inflows.

These risks can be significant, and they are shaped by three sets of factors. First, they depend on the characteristics that "pull" capital flows towards recipient countries. Second, they depend on exogenous conditions that "push" capital flows to foreign markets. Third, they depend on the "pipes" through which capital is channelled, such as different types of financial intermediaries and the rules and practices they follow. Overall, there is a higher risk that resources will be misallocated when capital flows are driven by global financial conditions or channelled through a domestic financial system beset with financial frictions.

The CGFS's 2009 report concluded that, at that time, a large number of EMEs already met the macroeconomic and financial system preconditions for fully realising the benefits of international capital mobility. This has since proved to be true. Improvements in EMEs' macroeconomic fundamentals and institutional frameworks have made investors more selective when assessing opportunities in EMEs. These improvements addressed structural weaknesses, leading investors to shift their focus towards cyclical factors such as economic growth.

Supported by improved fundamentals, capital flows to EMEs have, on average, held up better than those to advanced economies (AEs) in the years since the GFC. Inflows to EMEs fluctuated around their pre-GFC levels, whereas flows to AEs remained far below their pre-GFC levels. That said, inflows to EMEs remained low in comparison with the size of their economies. China stood out as one of the few EMEs to see a substantial increase in inflows after the GFC.

Even though EMEs have continued to catch up to AEs in terms of the development of their financial systems and policy frameworks, these structural improvements have not insulated them from sudden stops. The frequency of sudden stops in capital inflows to EMEs has not significantly declined since the GFC. Importantly, however, the improved resilience of EMEs has reduced the severity of the disruptions these sudden stops cause. For example, during the Covid-19 crisis, in contrast to previous periods of global stress, many EMEs had enough policy leeway to implement countercyclical policies to smooth the adjustment to the shock.

Sudden stops are typically triggered by exogenous global shocks. Tightened monetary policy in major AEs stands out as a potential trigger, as seen during the 2013 "taper tantrum". Commodity price fluctuations played a role in the sudden stop episodes of 2015. Shifts in international investors' risk appetite are another possible trigger, as seen during the Covid-19 crisis.

In general, global factors have played a significant role in driving capital inflows to EMEs. Against the backdrop of a prolonged period of low interest rates, there has been abundant global liquidity since the GFC, fuelling international investors' pursuit of yield. Shifts in risk appetite have also had an important influence on the ebb and flow of capital. Furthermore, due to China's growing weight in global activity, economic and policy developments in that country have increasingly shaped capital flow patterns, as demonstrated by the financial market fluctuations that followed the devaluation of the renminbi in 2015.

Since the GFC, the pipes that channel capital flows to EMEs have changed significantly. An increasing share of foreign capital has been channelled through investment funds and other portfolio investors. Indeed, in many countries, portfolio investors have surpassed banks as the largest source of foreign credit. Other changes in these pipes include the international expansion of EME-based banks and investors, which has also broadened the role of public sector investors in international capital markets. Foreign direct investment (FDI), which has historically been the most stable and beneficial type of capital inflow, has also been more affected by financial and tax-related strategies than it had been in the past.

These changes have altered the risks associated with capital inflows to EMEs. On the one hand, they helped diversify the investor base and develop local financial markets. This in turn enabled governments to borrow in their own currency rather than in foreign ones, thus reducing the currency mismatches that had exacerbated earlier crises in EMEs. On the other hand, the rising importance of portfolio investors exposed EMEs to new risks, or rather, "old risks in new clothes". Passive investment strategies and other practices in the asset management industry can give rise to herd behaviour and contagion, such as when changes to a bond or equity index trigger a rebalancing by the portfolio investors tracking the index. Also, unhedged investments can amplify feedback loops between exchange rates and asset prices, potentially resulting in destabilising dynamics. Other players, like rating agencies, have become an integral part of the global financial infrastructure, presenting their own new risks and benefits. More generally, the Covid-19 crisis increased attention on the potential systemic risks associated with non-bank financial intermediation and how to enhance its resilience.

The CGFS's 2009 report concluded that the optimal response to large and volatile capital flows is a combination of macroeconomic and structural policies. It also concluded that there is no "one size fits all" regarding precisely how these policies are best combined – the best combination depends on the country and the context. This report reaffirms these conclusions and expands upon them to highlight that, even for EMEs with strong structural policies and sound fundamentals, there are circumstances in which additional policy tools, particularly macroprudential measures, occasional foreign exchange intervention and liquidity provision mechanisms, can help mitigate capital flow-related risks.

Furthermore, the Covid-19 crisis underscored the critical role of international cooperation. The pipes that channel capital are interconnected and operate on a global scale. Therefore, policy actions that affect these pipes and the flows they channel have global implications. This highlights the importance of international dialogue about potential spillovers. It also confirms the need for a strong global financial safety net composed of a mix of tools suited to different shocks, including tools for alleviating short-term liquidity pressure as well as others designed to ease medium-term adjustment. It also highlights the need for clear international guidance on the appropriate use of various policy tools in managing extreme shifts in capital flows, taking into account their spillovers and other multilateral consequences.

The first chapter of this report outlines trends in capital flows since the GFC, especially their composition and volatility. The second chapter examines the drivers of capital flows, distinguishing between what drives capital flows in normal times and what drives them during periods of extreme volatility. The third chapter analyses the benefits and risks of capital flows. The final chapter examines policy tools and lessons for managing risks, drawing on central banks' views of the effectiveness and potential side effects of various tools.

# 1. Trends and dynamics in capital flows

The decade following the Great Financial Crisis (GFC) of 2007–09 saw significant changes in the volume and composition of global capital flows. The volume of flows declined globally, with the notable exception of flows to China, which rose significantly. The composition of creditors shifted away from banks and towards market-based sources of funding, with increased foreign participation in the local markets of emerging market economies (EMEs) in particular. The composition of borrowers similarly shifted away from banks and towards corporates and public sector entities. The currency composition of flows grew more diversified, though the US dollar remained the dominant currency for borrowing and investing internationally.

This chapter provides an overview of these changes. It first presents stylised facts about general, persistent trends in capital flows over the 2009–19 period. It then turns to the question of whether volatility and the frequency of sudden stops declined after the GFC, followed by a higher-frequency review of developments during the Covid-19 crisis of 2020. Throughout this chapter and the rest of the report, the focus is mainly on inflows to EMEs because fluctuations in gross flows have generally had larger economic and financial effects, and thus posed greater challenges, for these economies than for AEs.

## 1.1 Trends in aggregate flows

### Net versus gross flows

Since the GFC, analysis of capital flows and their economic consequences has changed focus from net flows to gross flows.<sup>1</sup> Emphasis used to be placed on net flows because they make up the financial counterpart to the current account balance. As such, they provide a convenient gauge of the impact of capital flows on a country's real economy, asset prices and exchange rates. Net flows are also a proxy for net borrowing from the rest of the world.

Policymakers and researchers turned their focus to gross capital flows for several reasons. First was the recognition that a country's net position may not be a reliable indicator of its financial vulnerabilities. Financial vulnerabilities are better identified according to gross balance sheet positions. If gross inflows contract sharply, the economic consequences may be severe, even if the economy starts from a balanced or even surplus net position (Tarashev et al (2016)). Net positions might also mask maturity mismatches. A second, related reason for focussing on gross flows is that inflows by foreigners and outflows by domestic residents can be large and volatile, both in absolute and relative terms (Davis et al (2021)). Gross flows are a key channel through which spillovers and contagion are transmitted and amplified across countries. Third, analysis of net flows does not take into account differences in the behaviour of domestic and foreign investors. For instance, a surge in net inflows due to increased investments by non-residents could have very different policy implications than would a repatriation of funds by residents (Forbes and Warnock (2012)).

### Global flows remain below their pre-GFC trend

The GFC marked a turning point in the global trend of gross capital flows. Inflows and outflows rose rapidly between 2002 and 2007, reaching a high of \$12 trillion or about 22% of global GDP (Graph 1.1, left-hand panel). They declined precipitously during the GFC and subsequently trended sideways, never regaining their pre-GFC upward momentum. The post-GFC drop-off in flows was especially pronounced for bank

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<sup>1</sup> Gross capital inflows refer to non-residents' purchases of domestic assets minus their sales of such assets. Gross outflows measure residents' purchases of foreign assets minus their sales of such assets. Net flows are defined as gross inflows minus gross outflows.

loans, which are considered “other” investment flows. Portfolio debt and equity flows were also lower over the 2009–19 period. Foreign direct investment (FDI) held up better.

The global trend reflects mainly flows to advanced economies (AEs). Whereas inflows to AEs accounted for 18% of world GDP in 2007, they never exceeded 7% after the GFC (Graph 1.1, centre panel). Flows to financial centres contributed to the trend increase before 2007, but over the 2009–19 period they were volatile. The share of assets held in financial centres has continued to increase over the past decade, even though their share in world GDP has fallen over the same period (Lane and Milesi-Ferretti (2017)).

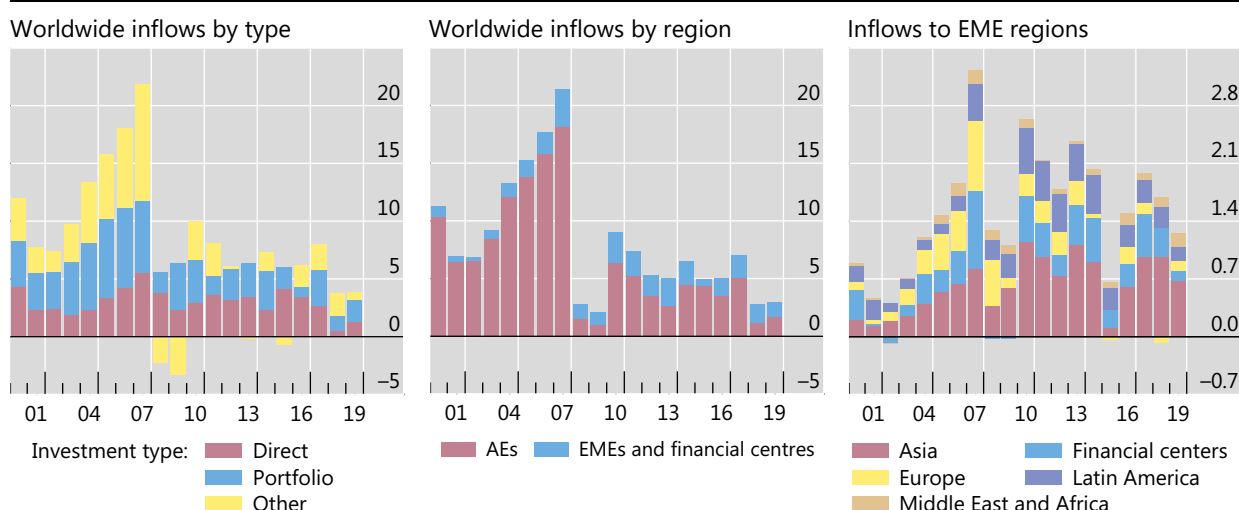
Inflows to EMEs held up reasonably well after the GFC (Graph 1.1, right-hand panel). They slowed sharply in some years; for instance, in 2015 when commodity prices fell and the economic outlook for China deteriorated. However, such slowdowns tended to be short lived.

Emerging Asia stands out as the one region that saw a sustained increase in capital flows after the GFC. Boosted by China, inflows to emerging Asia doubled between the 2000–07 period and the 2009–19 period, from around 0.4% of global GDP to an average of 0.8%.

## Capital flows by type and region

As a percentage of world GDP

Graph 1.1



AEs = advanced economies; EMEs = emerging markets; Financial centres = Hong Kong SAR and Singapore; Emerging Asia = CN, IN, ID, MY, PK, PH, TH; Emerging Europe = CZ, HU, PL, RO, RU, TR; Latin America = AR, BR, CL, CO, MX, PE; Middle East and Africa = EG, SA, KW, QA, ZA.

Sources: IMF, *Balance of Payment Statistics*; CGFS Working Group calculations.

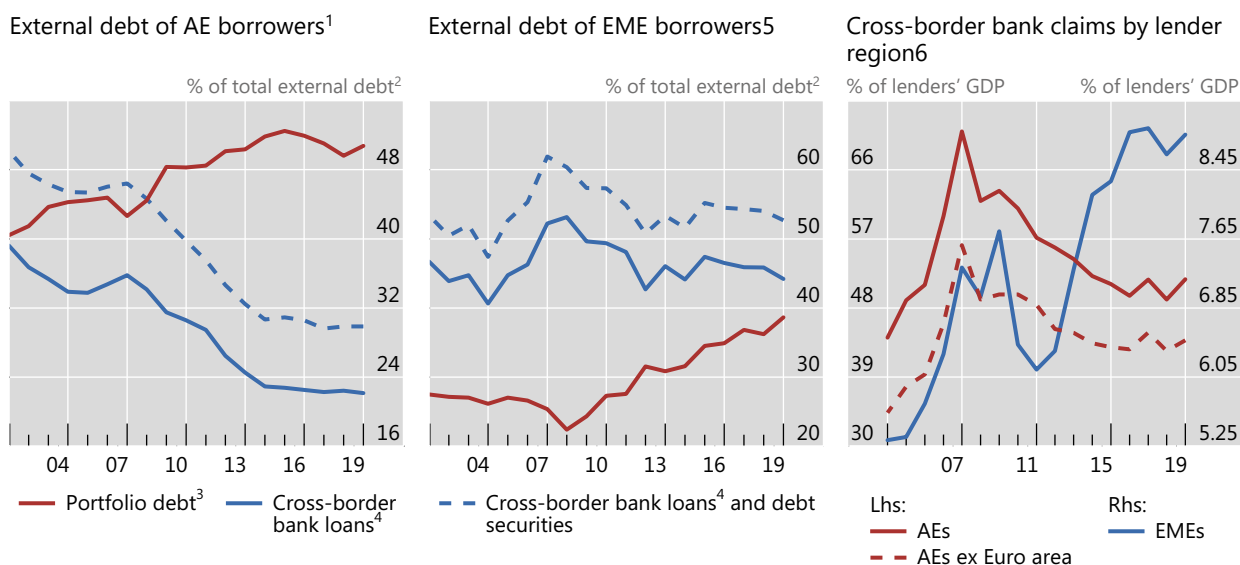
## 1.2 Salient changes in patterns of capital flows

### Shift from bank to non-bank funding

One of the most salient changes that took place during the post-GFC period was a retrenchment of cross-border bank lending and a rise in portfolio investment. The post-GFC withdrawal of AE banks from international lending has been offset by the growing importance of market-based flows, particularly for capital inflows to EMEs (BIS (2019), Lane and Milesi-Ferretti (2017)). In their replies to the survey conducted for the purpose of this report (Box 1A), central banks singled out the declining role of banks as the most important structural change in global patterns of capital flows. The growing role of asset managers, investment funds and other non-bank financial intermediaries was the second structural shift most frequently cited by survey respondents.

## Declining role of banks since the Great Financial Crisis

Graph 1.2



<sup>1</sup> Outstanding amounts for AT, AU, BE, CA, CY, CH, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, JP, LV, LT, LU, MT, NL, NZ, NO, PT, SE, SK, SI, VA, and US. <sup>2</sup> Defined as the stock of debt securities portfolio investment liabilities plus the stock of other debt instrument liabilities across all sectors for both components. <sup>3</sup> Stock of portfolio investment liabilities for all sectors. <sup>4</sup> Cross-border loans include interbank deposits and deposits with own affiliates. <sup>5</sup> Outstanding amounts for AL, BR, CL, CN, CO, CZ, EG, HR, HU, ID, IL, IN, KE, KR, KZ, MA, MY, MZ, MX, PE, PH, PK, PL, RO, RU, SA, TH, TN, TR, UA, and ZA. <sup>6</sup> The GDP of LBS-reporting countries (lenders' GDP) enters the denominator as a scaling factor in the year when the country started to report to the LBS.

Sources: IMF *International Investment Position Statistics*; IMF, *World Economic Outlook*; BIS locational banking statistics (LBS); CGFS Working Group calculations.

For borrowers in many AEs, debt funding from abroad had mainly taken the form of portfolio investment even before the GFC. The share of total external debt represented by portfolio debt climbed higher after the GFC, to more than 50% in 2019 (Graph 1.2, left-hand panel). The share represented by cross-border bank loans correspondingly fell, from 34% in 2009 to 20% in 2019.

The share of EMEs' liabilities represented by portfolio debt has risen steadily since 2008, to almost 40% in 2019. Nevertheless, banks remain the dominant source of funding. Cross-border bank loans declined as a share of external debt between 2008 and 2012 and have fluctuated around 45% since then (Graph 1.2, centre panel).

The relative decline in bank lending was driven in large part by the deleveraging of AE banks, particularly those headquartered in the euro area. Banks built up their capital buffers in part by reducing their cross-border lending. AE banks' cross-border claims fell from 70% of their home countries' GDP in 2008 to about 50% in 2019 (Graph 1.2, right-hand panel). As discussed further below, banks from EMEs expanded even as those from AEs retrenched. EME banks' cross-border claims increased from about 7% of their home countries' GDP to almost 9% between 2008 and 2019 (Graph 1.2, right-hand panel).

Notably, even while reducing their cross-border lending, banks continued to invest in portfolio debt. Their holdings of debt securities issued by both AE and EME borrowers remained more or less constant as a share of borrowers' external debt over time (Graph 1.2, left-hand and centre panels, distance between dashed and solid blue lines).

### Rising importance of public sector borrowers and investors

Another post-GFC change was the increasing presence of the public sector in international financial markets in both borrower and investor roles. In terms of borrowers, the most important public sector entities are central governments. Depending on the country, sub-national governments, the central bank,

and state-owned banks and enterprises are also active borrowers. In terms of investors, central bank reserve managers have been joined in international markets by sovereign wealth funds and public sector pension funds.

Since the GFC, public sector borrowers have accounted for a growing share of total debt securities issuance in many countries and at the global level (Lane and Milesi-Ferretti (2017)). This trend is also occurring in capital flows, especially to EMEs. On average, over the 2009–19 period, 38% of total capital inflows to EMEs and more than half of portfolio inflows could be attributed to the public sector (Graph 1.3, left-hand panel). In international debt securities markets, public sector entities strengthened their position as the dominant borrowers from EMEs (Graph 1.3, right-hand panel). Excluding China, the share of EMEs' outstanding debt securities held by the public sector rose from 52% at end-2011 to 57% at end-2019.

The public sector is less dominant among borrowers from AEs. Public entities' share of AEs' issuance in international debt securities markets fell from 11% in 2011 to 8% in 2019. Private non-financial corporations have substantially increased their share of outstanding international debt securities, but private banks are still the largest borrowers from AEs.

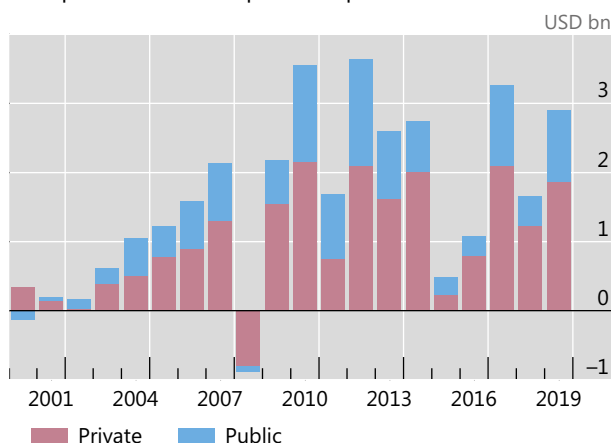
Public sector investors are also increasingly important. Sovereign wealth funds (SWFs), public sector pension funds and central banks have increased their holdings of domestic and foreign securities. For instance, the assets under management at SWFs increased from \$3.2 trillion in 2009 to \$7.5 trillion in 2018 (Preqin (2018)).

The rise of public sector borrowers and investors is creating ever closer links between public sector entities within countries and across borders. For example, at end-2019, more than half of US Treasury securities were held by public sector entities located abroad, like foreign central banks (Alfaro et al (2020)).

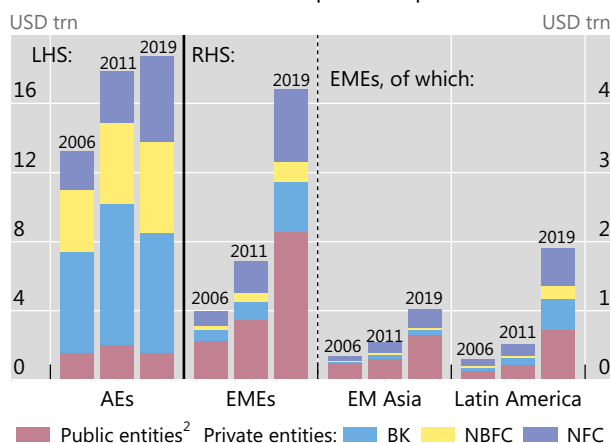
Portfolio inflows to EMEs by sector of borrower

Graph 1.3

EME portfolio inflows: public vs private



International debt securities: public vs private issuers<sup>1</sup>



<sup>1</sup> Amounts outstanding, at year end. All securities types; all currencies. Ultimate sector of the parent. <sup>2</sup> Public banks, public non-bank financial institutions, public non-financial corporations, central banks, general government.

Sources: ECB calculations; IMF, *Balance of Payments Statistics*; Dealogic; Euroclear; Thomson Reuters; Xtrakter Ltd; CGFS Working Group calculations.

## Multinational companies increase the complexity of flows

A third notable change in the pattern of capital flows is the “financialisation” of FDI. This is related to the increasing complexity of corporate structures and consequent rise in intra-company transactions. Multinational companies pursue various financial and tax strategies in order to reduce costs. Some of these

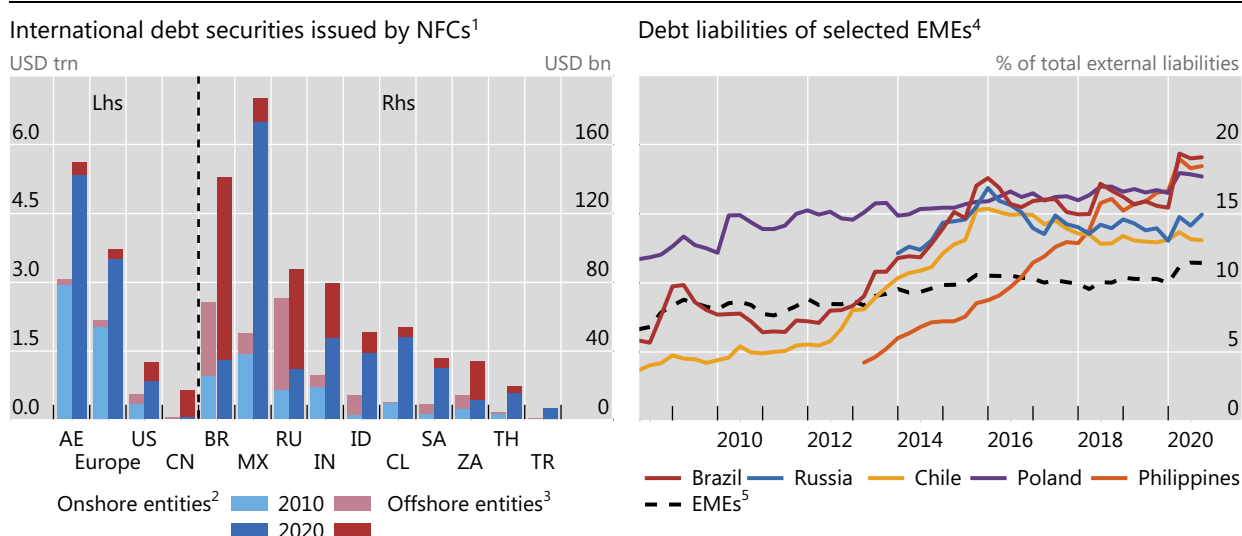
strategies channel money across borders, often through a complex web of related entities and sometimes involving a shift in intellectual property rights or the relocation of corporate headquarters. These strategies in turn affect balance of payment aggregates, especially FDI, which is less and less a reflection of real investment or the expansion of production technologies (Angulo and Hierro (2017)). Going forward, statistical definitions and concepts need to take these developments into account.

Corporates use their offshore affiliates partly as a vehicle to attract a broader investor base and diversify their funding sources. The shift away from bank-intermediated financing to market financing over the past few years has coincided with a sharp increase in international bond issuance by non-financial corporations (Graph 1.4, left-hand panel). This strategy has become popular among corporates from AEs and EMEs alike. To repatriate their funds, they can either extend a cross-border intra-company loan or make a deposit with a bank located in their home country. Such transactions have increased the stock of debt liabilities as a share of total external liabilities. This increase is particularly pronounced for some EMEs, raising their average share from 8% to 11% over the past decade (Graph 1.4, right-hand panel).

Another strategy concerns pass-through funds. In some countries, especially financial centres, a large fraction of FDI is redirected to another final destination. Multinational corporates contribute significantly to this phenomenon of “phantom” FDI. On the one hand, funds passing through certain subsidiaries, such as regional headquarters, on their way to their final destination might simply reflect the hierarchical organisation of production networks and interactions between affiliates. On the other hand, tax optimisation strategies seem to drive a substantial share of these pass-through funds. Damgaard et al (2019) find that phantom FDI passing through these funds accounts for almost 40% of global FDI.

## Measurement issues in a world of multinational entities

Graph 1.4



<sup>1</sup> All securities types; all currencies. Amounts outstanding, end-December of the indicated year. <sup>2</sup> NFCs (by sector of ultimate parent) with their nationality and residence as listed on the horizontal axis. <sup>3</sup> NFCs (by sector of ultimate parent) with their nationality as listed on the horizontal axis and residing elsewhere. <sup>4</sup> Debt liabilities refer to direct investment debt instruments liabilities stock. Total external liabilities refer to the stock of direct investment, portfolio and other investment. <sup>5</sup> Simple average of BR, CL, CN, CZ, HU, ID, IN, KR, MX, PH, PL, RU, TH, and ZA.

Source: IMF, *International Investment Position Statistics*; Dealogic; Euroclear; Thomson Reuters; Xtrackr Ltd; CGFS Working Group calculations.

## Increased regional integration among EMEs

A fourth change in the pattern of capital flows is growing interlinkages among EMEs. Against the backdrop of EMEs' growing share of global economic activity, international investors have increased their holdings of EME assets. Over the past decade, the net assets of international equity funds investing in EMEs more

than doubled, while those of bond funds investing in EMEs more than quadrupled. Moreover, investors from EMEs have become an integral part of global financial markets (Broner et al (2020)). While China was the main driver, cross-border investments by other actors from emerging Asia and Latin America also increased.

Emerging Asia stands out for the financial integration that has occurred in the region, reflecting its relatively broad financial development (Didier et al (2016)). The domestic investor base has expanded in many countries in the region. For example, insurance corporations' assets rose to about 40% of GDP. Regional pension funds also saw a substantial increase in their holdings. This contributed to higher intra-regional cross-border holdings of debt securities.

Regional financial integration generally increased for debt security holdings, while equity investments point in the opposite direction. The share of EME-issued debt securities held by other EMEs rose from 4% in 2006 to 14% in 2019 (Graph 1.5, left-hand panel). Conversely, in 2019, EME investors accounted for 6% of all equity holdings issued by other EMEs, down from 9% in 2006 after seeing a slight increase over the post-GFC period (Graph 1.5, right-hand panel).

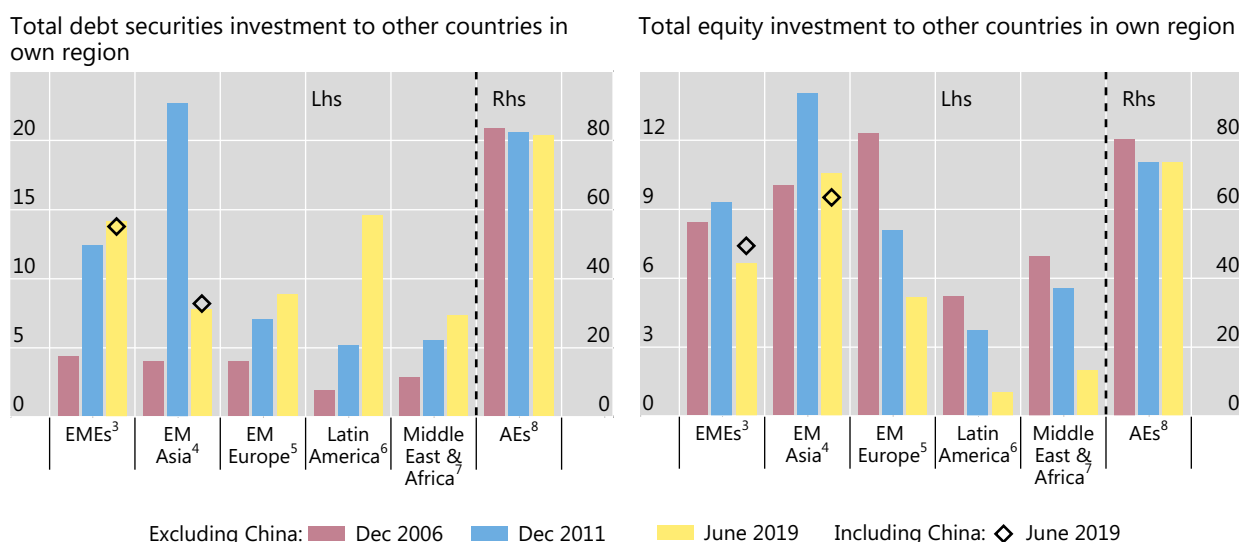
EME banks have made inroads into cross-border lending. Chinese banks accounted for 26% of all cross-border claims on EMEs and 38% of all cross-border claims on emerging Asia. They rapidly expanded to other continents as well, with their share of cross-border claims on Africa and the Middle East growing from about 13% in 2016 to 19% as of mid-2020.

The survey of central banks conducted for the purpose of this report suggests that AEs are still the most important funding sources in EMEs across all types of investment; this is consistent with the data presented here. Central banks report that the footprint of EME investors in other EMEs is largest for FDI and portfolio flows.

## Regional financial integration: evidence from portfolio investment assets<sup>1</sup>

As a percentage of total investments<sup>2</sup>

Graph 1.5



<sup>1</sup> Excluding investments to offshore centres within own region. <sup>2</sup> As a share of total bond or equity investment, respectively. <sup>3</sup> For bars, same country coverage as in EM Asia, EM Europe, Latin America and Middle East & Africa. Bars do not include China, diamond represents regional aggregates including China for the year 2019. <sup>4</sup> IN, ID, KR, MY, PK, PH, and TH. <sup>5</sup> BG, CZ, EE, HU, KZ, LB, PL, RO, RU, SK, TR, and UA. <sup>6</sup> AR, BR, CL, CO, CR, and MX. <sup>7</sup> EG, IL, KW, and ZA. <sup>8</sup> AU, AT, BE, CA, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, JP, LU, MT, NL, NO, NZ, SE, and US.

Sources: IMF, *Coordinated Portfolio Investment Survey*; CGFS Working Group calculations.

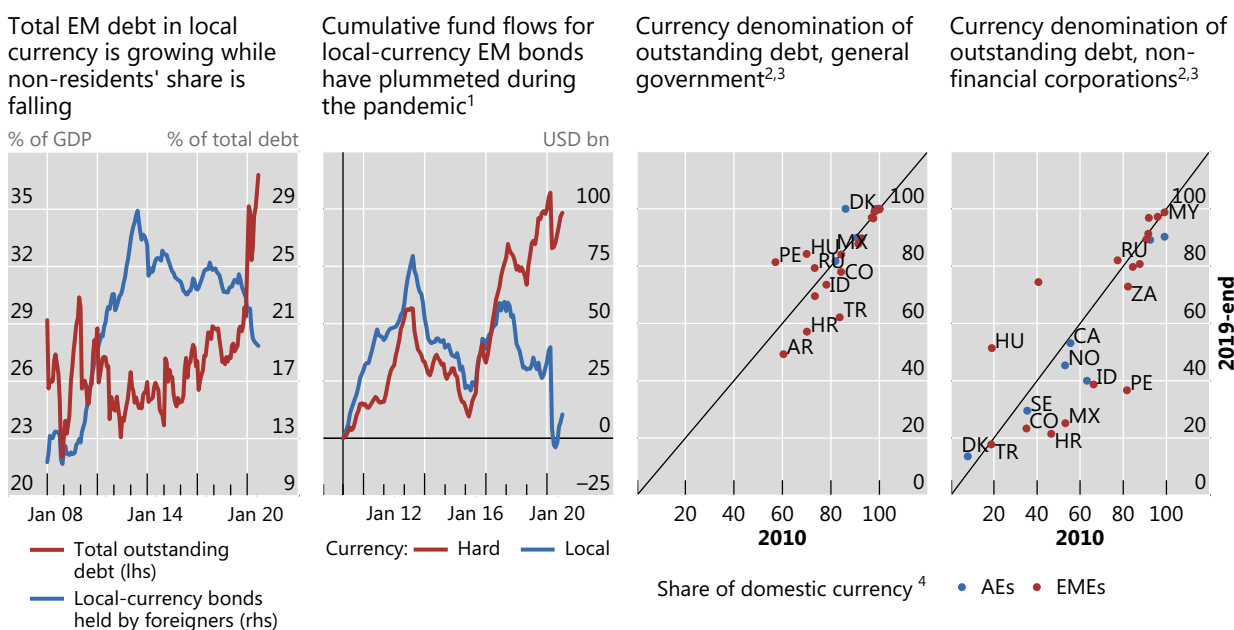
## Despite increased issuance in EME currencies, the US dollar still dominates

A final notable trend is that, despite significant changes in the volume and composition of creditors and debtors since the GFC and a decline in the US's share of global economic activity, the US dollar still dominates international finance as a funding and investment currency (CGFS (2020b)). To be sure, currency composition varies by type of flow, region and sector. For example, the euro is important in some regions, Europe in particular, and foreign investment in instruments denominated in EME currencies is rising. Even so, the US dollar remains pre-eminent overall.

Policymakers in many EMEs made efforts to develop local currency government bond markets while improvements in macroeconomic policies and the resilience of the domestic financial system made local currency debt more attractive to foreign investors (CGFS (2019)). The development of foreign exchange (FX) spot and derivatives markets has been an integral part of these efforts (Box 1B). The outstanding amount of EME local currency debt relative to GDP grew from 25% to 35% over the past decade, although there is substantial heterogeneity across countries (Graph 1.6, first panel). Foreign investor participation initially climbed from 14% to 29% between 2010 and 2014 for a sample of 12 EMEs. However, the share subsequently fell to 19% in early 2020. Indeed, international funds investing in EME bonds denominated in local currencies saw considerably fewer inflows than their foreign currency counterparts over the 2016–20 period (Graph 1.6, second panel).

### Debt securities: local vs hard currency denominations

Graph 1.6



AEs = advanced economies; AR = Argentina; AU = Australia; BR = Brazil; CA = Canada; CH = Switzerland; CN = China; CO = Colombia; DK = Denmark; EMEs = emerging markets and developing economies; HR = Croatia; HU = Hungary; ID = Indonesia; IL = Israel; IS = Iceland; JP = Japan; KR = Korea; MX = Mexico; MY = Malaysia; NO = Norway; PE = Peru; RU = Russia; SE = Sweden; TH = Thailand; TR = Turkey; TW = Chinese Taipei; ZA = South Africa.

<sup>1</sup> The vertical line represents December 2009. <sup>2</sup> Estimated values using domestic debt securities and international debt securities statistics. Domestic debt securities are assumed to be issued in domestic currencies only. <sup>3</sup> Immediate issuer basis. Private and public. <sup>4</sup> Domestic/(domestic+foreign) ratio.

Sources: Bank of Mexico; IMF; Dealogic; Euroclear; EPFR; Thomson Reuters; Xtrakter Ltd; national sources; CGFS Working Group calculations.

The share of local currency debt in the total debt of EME corporates is much lower than that of EME sovereigns, and in some countries it has decreased since the GFC (Graph 1.6, third and fourth panel). In inflation-targeting EMEs, corporates' foreign currency debt has almost tripled since 2005 to more than \$2 trillion, or more than 16% of GDP. Corporates apparently consider the potential currency risks of foreign

currency debt to be outweighed by the benefits of tapping a larger and more liquid market, accessing a broader investor base and incurring potentially lower borrowing costs (CGFS (2020b)). Borrowing in the US dollar is particularly attractive when policymakers intervene to smooth exchange rate fluctuations against the US dollar so that currency risk is shared with central banks. As discussed in Chapter 4, FX intervention is one of the policy tools commonly used by EME central banks to minimise extreme shifts in exchange rates and capital flows, as experienced during episodes of sudden stops and surges.

### 1.3 Volatility and sudden stops

Turning to the volatility of capital flows, evidence is mixed about whether or not volatility has increased since the GFC. Some argue that the post-GFC period saw a “great moderation” in volatility (eg McQuade and Schmitz (2017)). Yet, in their responses to the Working Group’s survey, central banks from a number of AEs and EMEs identified higher capital flow volatility as a key post-GFC trend. In order to reconcile these divergent views, it is important to distinguish between cyclical swings and extreme shifts, which may have different drivers (see Chapter 2) with different consequences for volatility. Also, central banks may have minimised this observed volatility through policy interventions, using the tools discussed in Chapter 4 of this report.

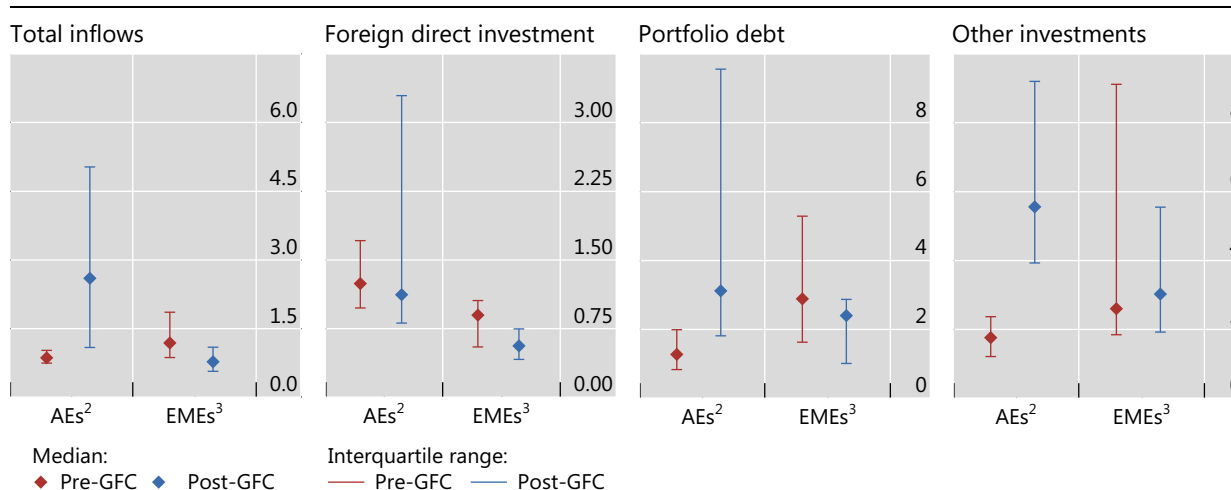
Trends in cyclical swings differ by region and type of flow. On average, gross inflows to AEs are more volatile than gross inflows to EMEs when measured as coefficients of variations based on quarter-on-quarter changes (Graph 1.7). Pagliari and Hannan (2017) confirm this finding using more sophisticated measures of gross capital inflows at the individual country level. The dispersion of capital flow volatility is also greater across AEs and increased across almost all types of flows after the GFC.

Other investment, which mainly comprises bank lending, has historically been the most volatile type of flow, and thus its declining share in total inflows might be expected to reduce flow volatility overall. While bank lending to most AEs became even more volatile after the GFC, it became less volatile for most EMEs. Portfolio debt flows tend to replicate this pattern at the individual country level.

#### Capital inflow volatility by region and type

Coefficient of variation: quarterly inflows between 2000-07 and 2010-19<sup>1</sup>

Graph 1.7



<sup>1</sup> The coefficient of variation is obtained by dividing the standard deviation of capital inflows to country  $i$  throughout the time-period  $t$  (pre or post-GFC) by the absolute value of mean capital inflows to this country during the same period. <sup>2</sup> AEs: AT, AU, BE, CA, CH, DE, DK, ES, FI, FR, GB, GR, IL, IT, JP, NL, NO, PT, SE, and US. <sup>3</sup> EMEs: AR, BR, CL, CN, CO, CZ, HU, ID, IN, KR, MX, MY, PE, PH, PL, RO, RU, SA, TH, TR, and ZA.

Sources: IMF, *Balance of Payment Statistics*; BIS; CGFS Working Group calculations.

FDI, which has historically been the least volatile type of flow to EMEs, has recently seen a marked increase in volatility for some individual economies, mainly AEs. This appears to be consistent with the “financialisation” of FDI. Even though the volume of FDI is substantial, central banks are less concerned about the volatility of FDI than that of other types of flows.

### Frequency of surges and sudden stops did not increase post-GFC

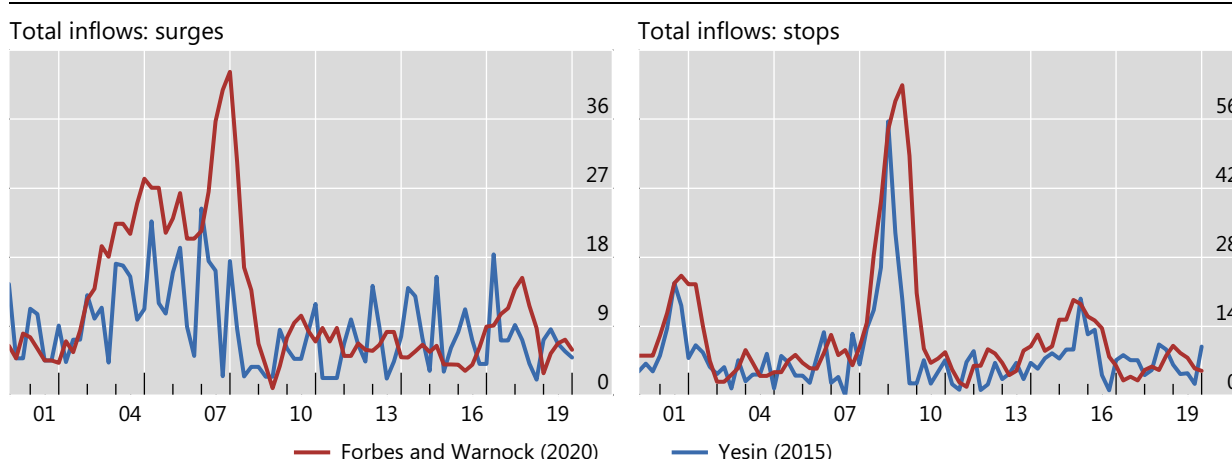
Surges occur when gross capital inflows are very high relative to a reference level, whereas sudden stops occur when gross capital inflows are very low. As a general pattern, stops tend to follow surges.

The incidence of sudden stops and surges varies over time. In the years prior to the GFC, there was an increase in surges (Graph 1.8, left-hand panel). Consistent with the financial stress observed during the GFC, the number of stops rose significantly higher during that period than the number of surges that had occurred before it (Graph 1.8, right-hand panel). While surges became less frequent after the GFC, the frequency of stops was little changed. These findings are confirmed by two different methodologies applied by the Working Group, based on Forbes and Warnock (2012, 2020) and Yeşin (2015).

### Incidence of extreme movements in capital flows to AEs and EMEs<sup>1</sup>

In per cent

Graph 1.8



<sup>1</sup> Both panels show the number of countries with an extreme value of capital flows divided by the total number of countries in the sample. The parameters of the Forbes and Warnock (2012, 2020) methodology were the following: The variable is the moving sum of annual nominal capital flows. Year-on-year changes are calculated and compared over time. Normal range is defined as 2 times the standard deviation of the variable during the previous 12 quarters. The duration of an extreme period of capital flows is minimum of two consecutive quarters. The parameters of Yesin (2015) methodology were the following: The variable is capital flows to GDP ratio. A Hodrick Prescott filter with a recursive window is used to calculate the smoothed levels of the variable. Normal range is defined as 1.5 times the standard deviation of the variable during the previous 12 quarters.

Sources: Forbes and Warnock (2020); Yesin (2015); CGFS Working Group calculations.

Not all subcomponents of portfolio inflows showed a decline in surges after the GFC. Portfolio debt inflows to EMEs have seen more frequent surges since 2016, according to the Forbes and Warnock methodology. By contrast, bank-related surges seem to have become less frequent over the post-GFC period.

Sudden stops are not unique to EMEs. For example, the experience of the first two decades of the euro shows that countries sharing the single currency are not immune to boom and bust episodes connected to sudden shifts in international financial flows (Lane and McQuade (2013)). Analysis by Fidora et al (2020) suggests that sudden stops in euro area countries tend to be more frequent and more severe than in other AEs. Similarly, David and Gonçalves (2019) find that countries with fixed exchange rates and members of a currency union tend to experience longer and more disruptive sudden stops. As illustrated

by the euro area sovereign debt crisis of 2011–12, AEs are more likely to experience sudden stops if they have large net external debt, a high structural unemployment rate, a positive output gap and a high degree of financial openness (Fidora et al (2020)).

That said, EMEs tend to experience more extreme swings than AEs, such as during the “taper tantrum” of 2013 and the financial market stress that followed the devaluation of the Chinese renminbi in 2015 (Ahmed et al (2017)). As discussed in later chapters of this report, these more extreme swings are potentially harmful for financial stability in EMEs and pose challenges for policy makers.

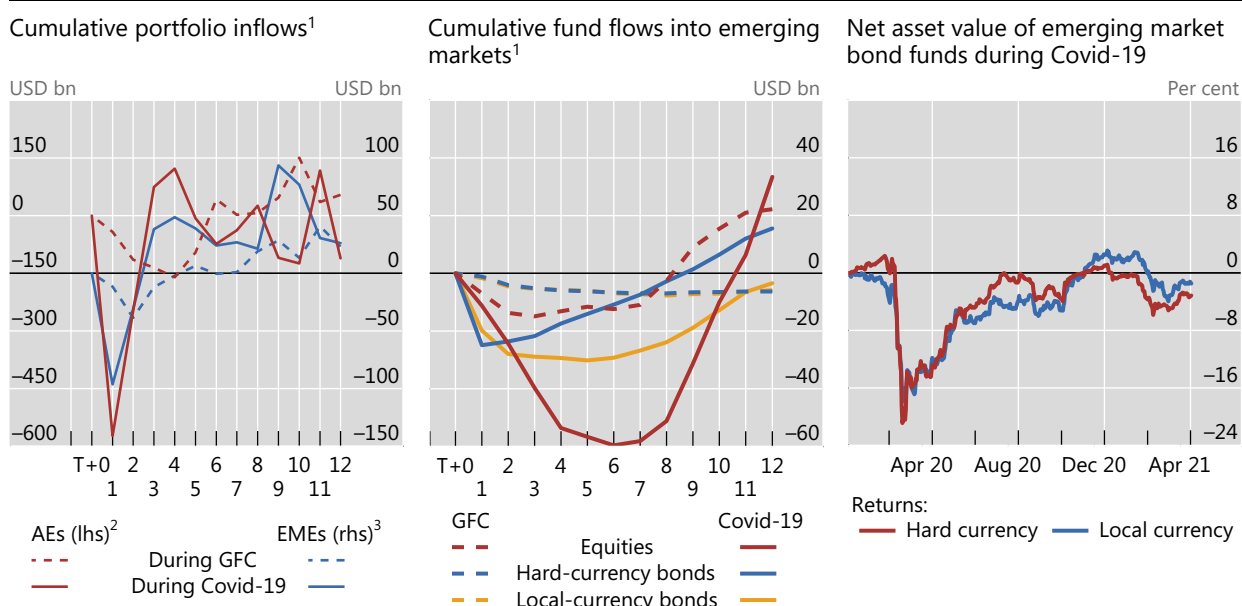
## 1.4 Covid-19 crisis

The outbreak of the Covid-19 pandemic triggered a sharp reversal of capital flows to EMEs and some AEs in March 2020. Results from a capital-flows-at-risk analysis indicate how exceptional the crisis was. Even when taking into account the global deterioration in financial market conditions, the ex ante likelihood of such huge capital outflows from EMEs was quite low, only reaching about 12% at the outset of the Covid-19 crisis (Eguren-Martín et al (2020b); also Section 2.2). An analogous analysis for the GFC indicates that the likelihood was 30% at that time. Also, in contrast to earlier crises, the Covid-19 crisis was triggered by an exogenous global shock that affected AEs and EMEs almost simultaneously.

Portfolio investment flows at the peak of the Covid-19 crisis indicate how US dollar funding needs have evolved since the GFC. They have shifted away from banks located in the United States and Europe, which were at the centre of the GFC, towards a more diverse set of market participants and regions. In March 2020, some EME central banks sold sizeable amounts of US Treasuries in order to meet local demand for dollar funding, as well as to cushion the impact of a decline in commodity prices and intervene in FX markets. The “dash for cash” by investors and borrowers contributed to strains in the US Treasury market, but these strains did not spill over to other AE markets in any significant way. The euro area and Japan saw only modest outflows.

Inflows to EMEs recovered starting in April 2020, boosted by monetary policy easing in major AEs (Graph 1.9, left-hand panel). The initial rebound in portfolio flows was heterogeneous along several dimensions. First, investors were more selective about which markets they returned to than they had been during the sell-off. They differentiated between EMEs based on economic vulnerabilities, policy frameworks and the extent to which the pandemic had been brought under control. For instance, portfolio inflows to China in particular and parts of emerging Asia and eastern Europe recovered faster than those to other regions. Second, the pace of recovery in debt inflows was initially faster than that in equity inflows (Graph 1.9, centre panel) Third, the pace of recovery differed considerably between flows into local currency instruments and those into hard currency. Flows into local currency bond funds were initially subdued, owing to concerns about weak EME currencies, future fiscal space and central banks’ accommodative policy stance (IMF (2020a)). Carry trades also became less attractive in the intermediate aftermath of the Covid-19 shock.

Heterogeneity decreased in late 2020, when flows into equities and local currency funds picked up substantially across many EMEs, and then in early 2021 inflows exhibited divergent patterns. The net asset values of EME bond funds in both hard and local currency reached their pre-crisis levels in the last quarter of 2020 and subsequently lost momentum (Graph 1.9, right-hand panel). When asked in the survey about near-term prospects for capital flows, central banks’ unanimous response was that foreign investors’ decisions would be significantly influenced by monetary and fiscal policy. A rise in US long-term yields preceded capital outflows from many EMEs in March 2021, although shifts were more moderate than during the 2013 “taper tantrum” and recovered in April.



<sup>1</sup> Each period is a month. Period 1 corresponds to March 2020 for Covid-19 and September 2008 for the Great Financial Crisis. <sup>2</sup> US, Euro area, and Japan. <sup>3</sup> BG, BR, CL, CN, CO, CZ, EE, HU, IN, ID, KE, KR, LB, LK, LT, LV, MK, MN, MX, MY, PH, PK, PL, QA, RO, RS, RU, SA, SI, TH, VN, TR, TW, UA, and ZA.

Sources: ECB; Ministry of Finance of Japan; US Department of the Treasury; International Institute of Finance; EPFR; JP Morgan; CGFS Working Group calculations.

Going forward, it is unclear how long the scars from the Covid-19 crisis will take to heal. In the survey, some central banks considered the effects to be temporary, as market conditions had improved and, in most cases, market functioning had returned to pre-crisis levels. Others noted that the long-run effects were not clear and the longevity changes would depend on how the pandemic evolved. A third group acknowledged that, as global uncertainty remained high, they paid more attention to capital flows than they had before the outbreak. Finally, some respondents pointed to the catalytic effects of the pandemic: for instance, it resulted in a more stable investor base.

## 1.5 Conclusions

The decade following the GFC saw significant changes in the volume and composition of capital flows, the consequences of which will be analysed in the remainder of this report. The shift from bank to non-bank financing, the rise of EME investors and the growth of local currency bond markets have helped to diversify EMEs' investor base. However, this has not necessarily reduced the frequency of extreme shifts. Indeed, the Covid-19 crisis is a reminder that the actions of portfolio investors and other non-bank financial intermediaries can give rise to destabilising dynamics.

The rise of public sector investors has increased the links between different countries' public sectors. This heightens the risk that adverse developments in one country might spill over to others, for example when a sovereign wealth fund sells its government bond holdings.

The "financialisation" of FDI makes it difficult for authorities to monitor capital flow developments because data might reflect phantom FDI pass-through funds instead of actual investment. Also, the greater complexity of multinationals' international operations increases countries' exposure to developments abroad and potentially masks risks. Balance of payments and international investment position statistics

need to be complemented with other data sources in order to understand underlying changes in different types of capital flows.

According to the survey conducted by the Working Group, central banks from EMEs give greater consideration to capital flow dynamics in their decision-making processes than do their AE peers. EME central banks place equal importance on gross and net flows. But they tend to pay closer attention to inflows than to outflows, viewing an extended period of gradual inflows as a possible symptom of growing financial vulnerabilities.

Box 1A

### Input from central banks and market participants

The Working Group drew on four sources of information for its analysis and findings. First, it reviewed the academic literature and recent reports from international groups, including the BIS, CGFS, IMF and the Asian Consultative Council (ACC). Second, it undertook its own analysis of selected issues. Third, it held roundtable discussions with academics and market participants to validate its analysis (Annex A summarises these discussions).

Finally, it surveyed central banks about their views on recent developments and their experience with tools for managing volatile capital flows (Annex B illustrates the replies). The survey followed the structure of the report. It asked central banks for their views about the most important trends in capital flows, the main drivers and how they changed after the GFC, benefits and risks, and the tools for responding to capital flow volatility. The survey was undertaken in Q3 2020 and completed by 34 central banks: 16 from AEs and 18 from EMEs.

## Capital flows and market development: Mexico's experience

Since the financial crises of the 1990s, EMEs have encouraged the development of local capital markets as a way to reduce their vulnerability to swings in capital flows. The transformation of Mexico's financial markets over the last two decades has been very significant, and its markets are now among the deepest and most liquid among EMEs.

The development of Mexico's financial markets started with the FX market. Following the "Tequila" crisis of 1994-1995, the Banco de México moved quickly to develop a deep and liquid FX market to support the new flexible exchange rate regime for the Mexican peso (MXN). Laws were enacted to prevent the dollarisation of the economy; a MXN futures contract was established offshore on the Chicago Mercantile Exchange to facilitate hedging and positioning; capital flows were liberalised and the currency was made fully convertible; macroprudential measures were introduced to limit the FX exposures of local banks; and settlement risk was mitigated by adding the MXN to the Continuous Linked Settlement (CLS) system. Together these reforms helped make the MXN one of the most traded EME currencies, with spot and derivatives turnover of over \$100 billion a day.

Starting in the year 2000, the Mexican authorities turned their attention to the development of money and bond markets. The government implemented a market makers programme and increased its local financing relative to its external financing, using fixed rate securities as the main financing tool. Also, the government improved the predictability, transparency and organisation of its debt securities issuance.

These initiatives, coupled with a more sustainable fiscal balance and the adoption of inflation targeting, helped to boost foreign participation in Mexico's markets, which in turn contributed to market development together with some of its accompanying benefits, as is further elaborated in Chapter 3. Foreign investors' holdings of Mexican government securities increased sharply in the years after the GFC, rising from 11% of outstanding securities at end-2007 to a peak of 39% in January 2015 (Graph 1B). Mexico registered a more pronounced increase in foreign participation than most other EMEs. After 2014, non-residents' share of holdings trended slowly downward across many EMEs. In Mexico, the depreciation of the MXN and a fall in oil prices contributed to the decline.

## Capital flows and market development: Mexico's experience

Percentage of total amount outstanding

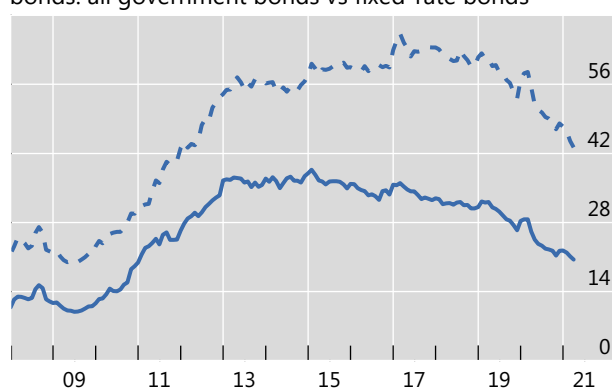
Graph 1B

Foreign holdings of governmental debt in local currency



Foreign holdings: — In selected EMEs excluding Mexico<sup>1</sup>  
— In Mexico

Net-non-resident holdings of Mexican government bonds: all government bonds vs fixed-rate bonds



— All government bonds — Fixed-rate bonds

<sup>1</sup> All foreign holdings in EM countries are expressed as a percentage of the total outstanding bonds in Brazil, Hungary, Indonesia, Israel, Peru, Poland, Thailand, and Turkey.

Source: Bank of Mexico; CGFS Working Group calculations.

## 2. Drivers of capital flow dynamics

Have the changes in the trends and dynamics of capital flows discussed in Chapter 1 been accompanied by changes in the factors that drive capital flows? Focussing on gross capital inflows to EMEs, this chapter analyses how the drivers of capital flow patterns and sudden stops have changed since the GFC. One of the most significant developments following the GFC was the implementation of unconventional monetary policy measures in AEs, which contributed to an environment of abundant global liquidity. In this context, marginal changes in global liquidity have not had a large impact on the overall pattern of capital flows. At the same time, a significant tightening in AE monetary policy increased the likelihood of sudden stops.

Drivers of capital flows can be classified into push factors, pull factors and pipes. Push factors motivate investors to seek opportunities away from their home economy. They are thus exogenous to the recipient country and relate to global economic and financial conditions that affect the availability of funds. The most prominent push factors include global liquidity, international investors' risk appetite, global economic growth, commodity prices, the strength of the US dollar and, since the GFC, China's global economic footprint. These global push factors interact, so separately identifying the effects of each is an analytical challenge.

Pull factors reflect country characteristics that can attract international capital to the recipient economy. They determine the risk-return profile that the economy presents to foreign investors. Pull factors include cyclical factors (eg economic growth, fiscal deficits, foreign debt ratios, yields on domestic assets) and structural factors (eg institutional quality, local financial market development, outstanding sovereign debt, trade openness, the exchange rate regime, foreign reserves). In practice, investors often pay attention to key composite measures of these factors, such as credit ratings.

Pipes represent the institutional infrastructure of the global financial system through which capital flows ultimately move. While the origin of the push-pull framework dates back to Calvo et al (1993), incorporating the pipes of the international financial system is a more recent phenomenon (Carney (2019)). The pipes include not only the various financial intermediaries themselves (eg banks, institutional investors, investment funds), but also the rules by which they play, such as their mandates, investment purposes and regulatory standards. Rating agencies that assess borrowers' creditworthiness can also be considered an integral part of the pipes. In the context of capital flow-related risks, pipes can contribute to spillovers and contagion, for example through the synchronised behaviour of different investors, or if a common lender withdraws from a set of countries all at once.

This framework for classifying drivers is intuitively appealing, but it has its limitations. Different drivers interact and mutually reinforce or counteract each other; therefore, it can be difficult to identify their individual effects. Also, while this framework has been applied extensively in the analysis of portfolio and banking flows, it is less applicable for FDI flows. For this reason, FDI is not discussed separately in this chapter and is considered only as part of total capital inflows.

### 2.1 Drivers differ across types of capital flows

This section describes the core drivers of capital flows to EMEs based on the survey of central banks and the roundtable discussions, as well as empirical analyses that the Working Group conducted. Two types of empirical analyses, panel regression and machine learning, were conducted for a sample of 33 EMEs representing all geographical regions. These analyses used gross capital inflows scaled by GDP<sup>2</sup> as the relevant outcome variable, looking at total inflows as well as portfolio debt and other investment. The

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<sup>2</sup> The scaling by local GDP helps to account for different sizes and dynamics of local economic growth. However, it also implies that potential drivers have a significant impact only if capital inflows grow much faster or slower than GDP. Despite these shortcomings, the procedure is standard in the literature (see Koepke (2019) for an overview).

choice of these outcome variables was motivated by the shift from bank-intermediated to more market-intermediated flows highlighted in Chapter 1. This shift impacted the pipes, which in turn had repercussions for the importance of various push and pull factors in capital flows to EMEs. While the panel regression analysis captures some broad correlation patterns between capital flows and their drivers, it cannot explicitly address the shifting pipes. Machine learning analysis<sup>3</sup> is better suited to showing the repercussions of changing pipes. It shows that the pipes may have strengthened the interlinkages between classic push and pull drivers (Annex C3). Both analyses show that, after the GFC, global economic growth was the most significant push factor, while slower-moving (and more difficult to measure) local pull factors, such as those related to institutional quality, became less significant.

## Pipes

One of the most noticeable changes seen in the global financial system after the GFC was the declining share of bank-intermediated credit, which was mirrored by the growing importance of market-based flows as a portion of total capital inflows. This change in the pipes reflects the composition of capital flows and substantially shapes their dynamics, whereas push and pull factors are more important determinants of the volumes that they channel. The pipes primarily affect the volatility of capital flows and their sensitivity to other drivers, thereby only indirectly impacting their volumes. For instance, investment fund-intermediated flows are more volatile than portfolio flows channelled through other types of investors (Arslanalp et al (2020)) and potentially more pro-cyclical. While the development of derivatives markets is one of the pull factors that help attract foreign investment, it also makes up part of the pipes, because derivatives expand the diversity of ways that investors can hedge positions, gain exposure and employ leverage. If these changes in the pipes modify the volatility of overall flows to a country, then they can impact the risk-return characteristics that pull investors towards investing in local assets (Annex C5).

Inclusion in an international bond or equity index is perhaps the clearest illustration of how a change in pipes alters the sensitivity of capital flows to different drivers. When an index provider increases a country's weight in the index, the country typically experiences a surge in capital inflows. For instance, Annex C1 describes the impact of the inclusion of Chinese A-shares in the MSCI Emerging Markets index. In EMEs, the magnitude of this effect has increased in line with the rapidly growing pool of assets linked to major indexes (Arslanalp et al (2020)). This has many positive effects, such as the deepening of local financial markets, but it can also change the dynamics of flows. For instance, index inclusion might reduce flows' sensitivity to domestic factors in the recipient country while increasing their sensitivity to global trends. Index inclusion can hence bring about risks in the form of pro-cyclicality of flows and potential price distortions. Also, the passive, index-tracking investment strategies followed by many funds can generate momentum based on the past composition of outstanding stocks (Cerutti et al (2019)). Similarly, exchange-traded funds exhibit an increased sensitivity to global risk factors (Converse et al (2020)).

Changing pipes are also linked to potential spillovers. International investors in EME assets typically follow standardised metrics, such as credit ratings, to assess the riskiness of their investments. A change in an individual recipient country's sovereign rating can lead to herding behaviour among investors. This was a notable concern voiced by central banks in the survey. Flows to specific EMEs exhibit common dynamics, especially during periods of financial stress, in part because of the growing role of international mutual funds, as explored in Puy (2016). Also, an increase in a country's index weighting can trigger spillovers to other countries due to rebalancing effects (Annex C1). When investors see specific economies as belonging to the same distinct group, trouble in one economy can give rise to contagion because of perceptions about their shared characteristics.

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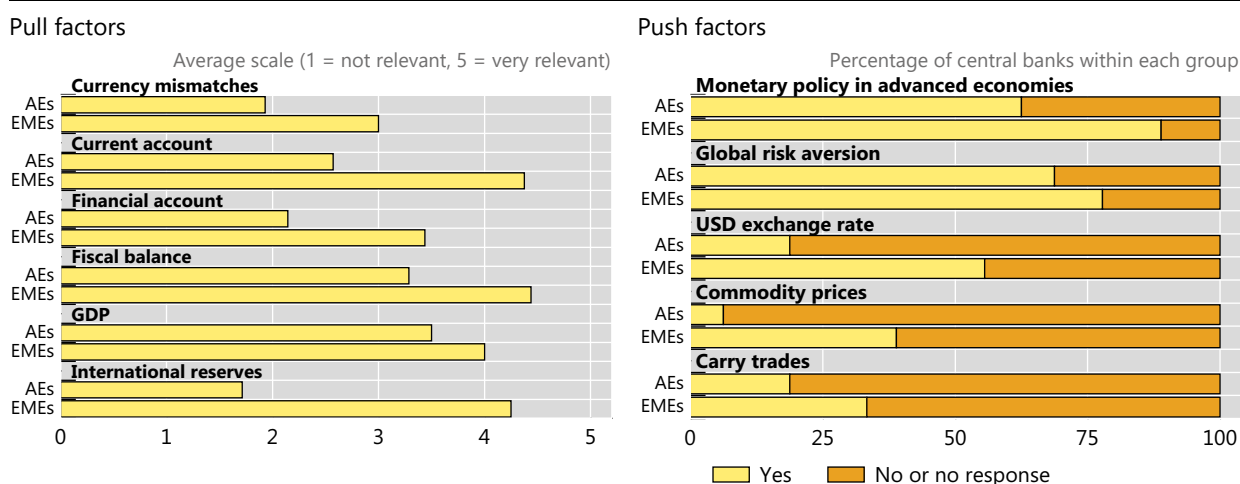
<sup>3</sup> Machine learning analysis is one way to model non-linear relationships, allowing for a variable's importance to be estimated while taking interaction effects into account. The analysis conducted for this report uses a random forest approach to assess the extent to which each driver contributes to minimising the mean squared errors of capital flows as the dependent variable. The random forest model is based on bootstrapping and aggregating multiple decision trees.

## Push factors

Considering its abundance in the decade following the GFC, the majority of central banks identified global liquidity as the most important push factor. Respondents from EMEs stated this even more firmly than those from AEs (Graph 2.1, right-hand panel). Market participants at the roundtable also supported this view (Annex A2 summarises the discussion). Global liquidity refers to the ease of financing and is best evaluated using a combination of price and quantity measures (CGFS (2011)). In the Working Group's empirical analysis, major AEs' monetary policy stances were used as a proxy for global liquidity, particularly that of US monetary policy due to the pre-eminence of the US dollar in the international financial system.

Core drivers of capital flows as indicated in the survey<sup>1,2</sup>

Graph 2.1



<sup>1</sup> AEs: AU, BE, CA, CH, DE, EA, ES, FR, GB, IT, JP, LU, NL, NZ, SE, and US. <sup>2</sup> EMEs: AR, BR, CN, CL, CO, HK, IN, KR, MX, MY, PE, PH, RU, SA, SG, TH, TR, and ZA.

Source: CGFS Working Group, Survey on changing patterns of capital flows, August 2020, questions 6a and 7.

The impact of AE's monetary policies on capital flows to EMEs is not a new concern. For many years, monetary policy has been a channel through which developments in AEs spill over to financial conditions in EMEs. There is plenty of literature showing that tighter monetary policy conditions have a negative impact on portfolio and bank-related capital flows to EMEs (Koepeke (2019)).

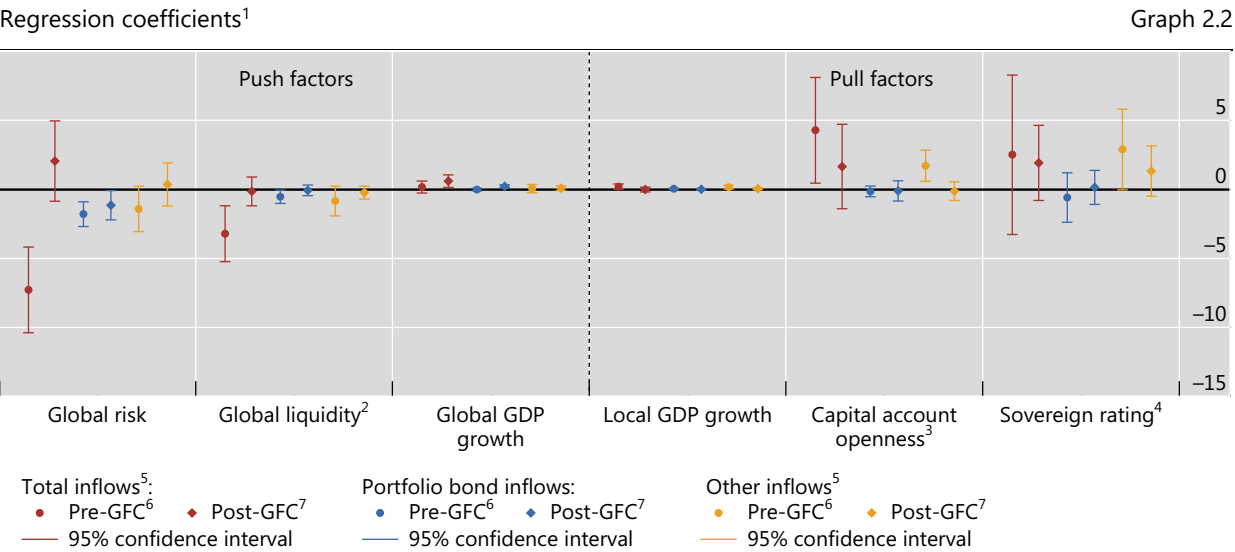
While central banks and market participants perceive global liquidity as one of the most important drivers, the results of the panel regression analysis provide a more nuanced picture. Although AE monetary policy remains the key determinant of global liquidity, marginal changes in an environment of general abundance seemingly became less relevant to the patterns of flows to EMEs in the post-GFC period. The Working Group's panel analysis shows that total capital inflows to EMEs scaled by GDP showed a significant sensitivity to changes in US policy rate over the 2000–07 period (Graph 2.2). After the GFC, they became less sensitive, particularly as the crisis receded.<sup>4</sup> With respect to the components of capital flows, neither portfolio debt nor bank-related inflows exhibit a significant response to monetary conditions during post-GFC periods of normal market functioning. Even though changes in monetary policy have had

<sup>4</sup> Measurement problems and the synchronicity of monetary policies may have contributed to capital flow patterns' declining sensitivity to marginal changes in global liquidity. After the GFC, measuring monetary conditions became more complicated because the federal funds rate remained very low while unconventional monetary policy became more important. Also, monetary conditions and risk aversion often interact. The Working Group's regression analysis uses the shadow short rate to proxy global liquidity and thus can take the different tools of monetary policy into account. Furthermore, the degree of convergence among several AE monetary policies, instead of US monetary policy alone, might explain shifts in capital flows' sensitivities to global liquidity conditions (Avdjiev et al (2020)).

little influence on the shape of post-GFC flow patterns, they can still trigger sudden stops, as discussed later in this chapter and highlighted by Forbes and Warnock (2020).

The role of *global risk aversion* in driving international capital flows also changed significantly after the GFC. Central banks from both AEs and EMEs identified global risk aversion as a very relevant push factor, and some central banks from EMEs added that frequent changes in risk aversion were a core driver of volatility. In general, a higher level of the VIX, which is a widely used gauge of global risk aversion, is associated with lower capital flows to EMEs. The Working Group’s analyses suggest that the impact of the VIX has generally declined.<sup>5</sup> But results differ by type of capital flow, which again highlights the changing role of different financial intermediaries serving as the pipes of the global financial system (Graph 2.2). The VIX became insignificant for total capital inflows to EMEs over the 2010–18 period when scaled by GDP, its significance declined for portfolio debt inflows, and it was never significant for bank-related flows.

### Panel analysis of EME inflow patterns



<sup>1</sup> The analysis aims at disentangling the key push and pull drivers of capital flow patterns. It highlights basic correlations (not causal relationships) through a linear specification that draws on panel regression approach, while letting fixed effects absorb time-invariant country specific factors. The dependent variable is gross capital inflows to country *i* in quarter *t* scaled by GDP and the main explanatory variables are those portrayed in the graph. See Annex C2 for more details. <sup>2</sup> US monetary policy; measured by the federal funds rate, switching to the shadow rate when reaching 0. <sup>3</sup> Chinn-Ito Index, in levels. <sup>4</sup> As changes when switching between four discrete categories. <sup>5</sup> Excluding official loans provided by the IMF. <sup>6</sup> Pre-GFC period covers between 2000Q1 and 2007Q4. <sup>7</sup> Post-GFC period covers between 2010Q1 and 2018Q4.

Sources: IMF, *Balance of Payment Statistics*; CGFS Working Group calculations.

Commodity prices are also an important determinant of capital flows, especially for exporters in emerging markets (Clark et al (2020), Davis et al (2021)). Central bankers from EMEs identified them as a push factor (Graph 2.2) when triggered by supply shocks. Again, China’s growth has had a strong influence on the demand for commodities and thus their prices in the past decade.

The relative strength of the US dollar is another example of a global push factor whose separate contribution is hard to isolate. While the US dollar exchange rate has been highlighted in both the survey and the literature as a driver of portfolio flows (eg Molina and Viani (2019), Avdjiev et al (2020), Boermans

<sup>5</sup> Econometric challenges are an important caveat when interpreting results. Empirical work on global push factors usually distinguishes at least between global liquidity, global investors’ risk attitudes and global economic growth prospects. Yet, these factors interact. For instance, monetary policy affects global risk attitudes and vice versa, which makes it difficult to disentangle separate contributions (Bekaert et al (2013)).

and Burger (2020)), changes in the US dollar exchange rate are inherently linked to the stance of US monetary policy and global risk attitudes.

## Pull factors

Historically, *structural* factors in recipient economies have been a key determinant of long-term patterns in capital flows (Byrne and Fiess (2016)). In the survey, EME central banks confirmed that, in the past, achievements in areas like macroeconomic stability, financial openness, the soundness of institutions and the development of local financial markets have successfully attracted foreign investors.

Thanks to earlier improvements, the marginal effects on capital flows of implementing long-term *structural* policies weakened over the last decade. The Working Group's panel analysis suggests that the significance of these structural factors as drivers of gross capital flows has declined since the GFC. For example, financial openness, as a slow-moving pull factor measured by the Chinn-Ito index, does not turn out to be a significant driver of total or bank-related flows scaled by the recipient country's GDP in the post-GFC period (Graph 2.2, also Annex C2). This finding is consistent with the substantial improvements made in structural factors across EMEs around the world since the financial crises of the 1990s. Indeed, improvements in structural factors were a pre-condition for EMEs to be included in international bond and equity indexes and to attract a broader pool of portfolio investors. EMEs' structural achievements are blurring the distinction between AEs and some large EMEs as separate asset classes.

Against this backdrop, *cyclical* pull factors are perceived as having become more important in driving capital flows to EMEs since the GFC. Recent literature provides some evidence of an increase in international investors' selectiveness when assessing investment opportunities (Ahmed et al (2017), Boermans and Burger (2020), Eller et al (2020)). Roundtable participants highlighted that, against the backdrop of advances in institutional frameworks and macroeconomic fundamentals, investors' decision-making process moved away from the joint assessment of groups of EMEs towards a more nuanced approach (Annex A). They identified local GDP growth as the most important country-specific factor driving investment decisions.<sup>6</sup> In their replies to the survey, central banks listed GDP growth, the fiscal balance and the current account balance as the most important pull factors (Graph 2.1, left-hand panel). Central banks from EMEs also highlighted the role of carry trades as a driver (Graph 2.1, right-hand panel).

## 2.2 Sudden stops: changing pipes interact with global, local and regional triggers

Sudden stops deserve special attention because they can destabilise the economy, as discussed in Chapter 3. The triggers of sudden stops can differ from the drivers of capital flow patterns during normal times. Push factors often play a "gatekeeper" role in that they determine the timing of capital flow waves. Pull factors and pipes can not only trigger sudden stops, but also impact their amplitude or severity (Eguren-Martín et al (2020a)). Understanding the mechanisms that trigger and amplify sudden stops is hence key to designing appropriate policies for mitigating their effects, as discussed in Chapter 4.

The empirical analysis below focuses on EMEs even though, as discussed in Chapter 1, sudden stops also occur in AEs. The analysis below covers the period through end-2018 and so does not consider the Covid-19 crisis, which is discussed separately at the end of this section.

### Global liquidity and regional spillovers are important triggers

Push factors can be important triggers of sudden stops. While the post-GFC roles of risk aversion and global GDP as triggers of sudden stops vary depending on the specification, the Working Group's panel analysis points to a tightening of US monetary policy as something that significantly increases the

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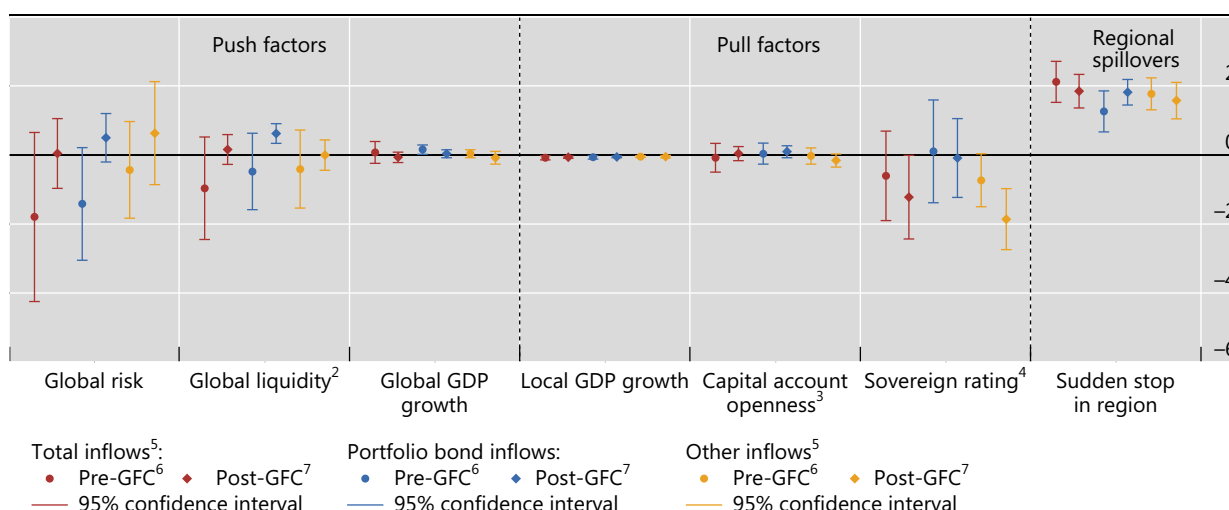
<sup>6</sup> The Working Group's empirical analysis does not attribute a significant role to local GDP growth after the GFC. Even so, the analysis scales capital inflows by local GDP, which makes it difficult to identify the effect of cyclical factors.

likelihood of sudden stops in portfolio debt flows to EMEs (Graph 2.3, also Annex C4). This contrasts with the analysis of quarterly flow patterns in Section 2.1, where changes in US monetary policy were not found to be a significant driver. The rising incidence of sudden stops in 2014–15, as the US Federal Reserve gradually withdrew the ultra-accommodative policies put in place during the GFC, nicely illustrates the relationship between US monetary policy and the likelihood of sudden stops and investors' renewed sensitivity to global push factors (Buono et al (2020)).

## Sudden stop analysis of EME capital inflows

Estimates based on a cloglog analysis<sup>1</sup>

Graph 2.3



<sup>1</sup> The analysis aims at disentangling the key push and pull drivers of sudden stops. The dependent variable indicates a sudden stop in gross capital inflow to country  $i$  in quarter  $t$ . The main explanatory variables are those portrayed in the graph. A positive and significant estimate indicates that this factor raises the likelihood of a sudden stop. See Annex C for more details. <sup>2</sup> US monetary policy; measured by federal funds rate, switching to the shadow rate when reaching 0. <sup>3</sup> Chinn-Ito Index, in level. <sup>4</sup> In level. <sup>5</sup> Excluding official loans from the IMF. <sup>6</sup> Pre-GFC period covers between 2000Q1 and 2007Q4. <sup>7</sup> Post-GFC period covers between 2010Q1 and 2018Q4.

Sources: IMF, *Balance of Payment Statistics*; CGFS Working Group calculations.

The impact of US monetary policy on the likelihood of sudden stops varies by type of capital flow, hinting at the different pipes that channel them. Bank-related flows do not exhibit a significant response in the post-GFC period, as confirmed by Eguren-Martín et al (2020a). Advances in global regulation might rationalise this finding, as stricter rules on banks may have moderated their reactions during periods of extreme swings (Forbes (2020)). While banks have become safer, the simultaneous increase in bond issuance has apparently made portfolio flows a more important source of sudden stops (Graph 2.3).

Regional spillovers are an important trigger of sudden stops. The Working Group's analysis suggests that the likelihood of a sudden stop in one particular country increases significantly when a sudden stop has recently occurred in the same region (Graph 2.3). If investors experience stress in one particular recipient country, they withdraw not only from this country, but also from other countries within the region. The Asian financial crisis in the late 1990s serves as an example of a common lender effect, with banks taking the role of withdrawing investors. In more recent stress episodes, like the "taper tantrum" in 2013 or China's currency devaluation in 2015, non-bank financial intermediaries played a significant role in the withdrawal of funds.

## Pull factors amplify the impact of sudden stops

Local economic growth stands out as a factor that reduces the likelihood of a sudden stop. Its importance changed very little between the pre- and post-GFC periods and is evident across all types of capital flows (Graph 2.3). Empirical results also suggest that if a country's sovereign rating improves, the occurrence of

sudden stops declines significantly. Rating upgrades had a pronounced effect on bank-related flows and gained significance for total flows in the post-GFC period.

Apart from reducing the likelihood of a sudden stop, pull factors appear to be an important amplification mechanism. In fact, research beyond the scope of the Working Group's analysis suggests that local vulnerabilities can amplify the damage caused by sudden stops. Higher fiscal deficits, larger current account deficits and higher levels of foreign currency debt increase the economic damage that EMEs suffer after foreign funds are suddenly withdrawn (Cavallo (2019)). This amplification mechanism arises as local vulnerabilities interact with exogenous shocks like those proxied by the global financial cycle (Scheubel et al (2019)).

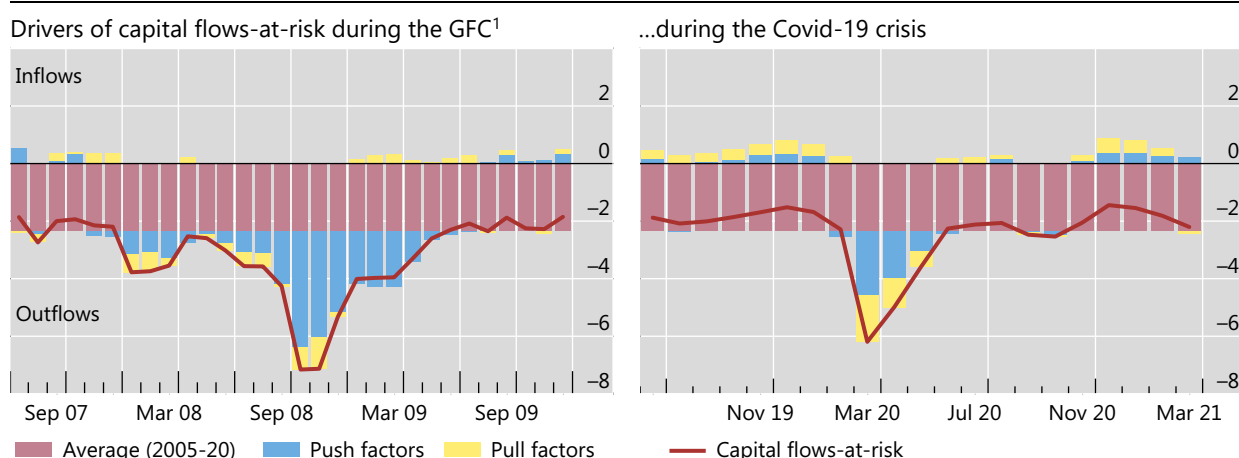
### Push factors and outflows during the Covid-19 crisis

The Covid-19 crisis illustrated the dynamics at work during sudden stops. Push factors were the main triggers of the sharp reversal in capital flows to EMEs, as they had been during the GFC (Graph 2.4). In particular, the reversal in March 2020 was triggered by a sudden shift in investors' risk appetite. Some EMEs were hit by a second, parallel exogenous shock when commodity prices fell sharply. Later in 2020, when capital flows picked up substantially across many EMEs, pull factors played an important role (Graph 2.4, right-hand panel).

#### A sudden stop driven by push factors

As a percentage of GDP

Graph 2.4



<sup>1</sup> The methodology is based on Eguren-Martín et al 2020. Both panels show the fluctuations of a "capital flows-at-risk" measure, which corresponds to the lower tail of a predicted distribution based on quantile regressions. For reasons of data availability, considered economies are Brazil, Colombia, India, Indonesia, South Africa, and Turkey.

Sources: Eguren-Martín et al (2020); CGFS Working Group calculations.

The pipes spread the Covid-19 shock globally and rapidly. In their survey replies, many EME central banks highlighted the pro-cyclical behaviour of some non-bank financial intermediaries and rating agencies. Pressure on asset prices, interest rates and exchange rates was amplified by intermediaries that relied mechanistically on risk management models. When asked about differences between this and previous crisis episodes, some central banks pointed out that global risk aversion increased more quickly during the Covid-19 crisis, but then also reversed more quickly due in part to aggressive policy responses (discussed in Chapter 4).

Pull factors also played a non-negligible role during the initial Covid-19 shock. In contrast to 2007–08, when most EMEs were in an expansionary phase of their cycle and inflation gaps were positive, many EMEs had more policy leeway to be able to respond to the shock in early 2020. In many EMEs,

structural changes had improved the anchoring of inflation expectations, while the output gap was negative. Thus, the amount of room that countries had for policy easing differed not only from previous crisis episodes, but also substantially across countries. The Covid-19 crisis exposed vulnerabilities in those countries with less room for policy manoeuvre.

Feedback loops between capital flows, exchange rates and asset prices during the early part of the crisis demonstrated that financial market development has changed, but not eliminated, EMEs' vulnerability to large swings in capital flows. Markets characterised by low liquidity, high foreign participation, high exchange rate volatility or high sovereign spreads saw the sharpest increases in yields for a given bond portfolio outflow during the early stages of the pandemic (Hördahl and Shim (2020)). The survey of central banks suggests that markets with a broad domestic institutional investor base were better able to absorb the shock.

In the survey, central banks indicated that they expected macro-financial fundamentals to reassert themselves as pull factors going forward. Indeed, soon after market conditions stabilised, EMEs with investment-grade credit ratings were able to raise substantial amounts in international bond markets. Yet, as discussed in Chapter 1, foreign investors were slower to return to local currency bond markets than to foreign currency markets.

## 2.3 Conclusions

The changing pipes of the global financial system add to the challenges faced by EMEs. Changes in the pipes have become the most important drivers of capital flow patterns since the GFC. More specifically, the shift from bank-based to market-based finance, while expanding and diversifying funding sources, also played a key role in driving flows by shaping the triggers of sudden stops. A small number of non-bank financial intermediaries dominate the global asset management industry, managing portfolios that are often large relative to EME markets. This goes hand in hand with the importance of index inclusion and the fact that changes in sovereign ratings might trigger both sizeable changes in capital flows and potential spillover effects.

In the context of unconventional monetary policy and unprecedented levels of global liquidity, *marginal* changes in AE monetary policy have become less important as drivers of capital flow patterns in the post-GFC period. Measurement problems and the synchronicity of monetary policies may have contributed to declining sensitivity to marginal changes in global liquidity. That said, sudden changes in global liquidity caused by AE monetary policy have become a key trigger of sudden stops.

Pull factors have increased in importance, as demonstrated by investors' increased focus on differences across EMEs. In principle, pull factors can insulate EMEs with good fundamentals from the effects of sudden stops. In practice, push factors dominate during sudden stops, as seen during the Covid-19 crisis. Nevertheless, good fundamentals give the authorities space to respond to shocks and pull factors enable these countries to benefit from a quicker turnaround in capital flows.

Going forward, as a result of policy actions taken to combat the economic effects of the Covid-19 crisis, in particular fiscal and monetary easing, several EME central banks stated in the survey that they see their financial vulnerabilities increasing on the back of higher debts and deficits. Pull factors may thus become even more important drivers of capital flow patterns going forward.

### 3. Benefits and risks

This chapter examines the benefits and risks associated with openness to international capital flows. There is a large theoretical and empirical literature studying the relationship between capital flows and two categories of outcomes: first, real variables such as growth, investment and consumption; and second, financial stability considerations, including credit bubbles and asset price overvaluation.

Capital inflows have been shown to boost investment, productivity and growth. However, these benefits can be offset by misallocation generated by flows and by the damage inflicted when the effects of sudden stops are amplified by financial frictions and externalities. Openness to international capital flows can enhance financial stability by diversifying funding sources and accelerating financial development, but it also poses challenges to financial stability due to the potential for overheating and exposure to foreign shocks, especially in economies with weaker institutions, less developed financial markets or large foreign liabilities.

On balance, the accrued evidence shows that capital flows offer clear benefits for most countries and that the risks posed, while significant in some cases and depending on country characteristics, can be managed using the policy tools discussed in the next chapter. This marks a significant shift since the publication of the previous CGFS report on capital flows in 2009. While that report concluded that evidence on the net benefits of liberalisation was limited, the rich data that has become available over the last decade, as well as advances in theoretical and empirical methodology, have meant that those benefits are now much clearer, as are the risks. Moreover, recent work has more carefully considered what could be called the “term structure” of benefits and risks by testing for specific mechanisms at the appropriate horizon.

This chapter starts with a conceptual framework regarding benefits and risks, followed by an overview of the empirical evidence for real outcomes such as growth, investment and productivity. The chapter then discusses implications for financial stability such as credit growth and asset prices.

#### Benefits from improved resource allocation and risk sharing

Theory identifies substantial benefits from openness to international capital flows. Two main mechanisms drive the potential *benefits*. First, when capital can move freely across borders, it can flow to countries where it can be used most productively. This in turn generates benefits in terms of real economic outcomes, including higher aggregate investment, output and consumption. Second, when agents can invest internationally, they are able to share risk more efficiently by benefitting from portfolio diversification. Annex C5 provides an illustration and some quantitative evidence regarding foreign portfolio investment in EMEs. This should bring benefits not only to the real economy, such as lower consumption volatility, but also improve financial stability. When financial institutions are able to access more diverse sources of funding, financial conditions are less responsive to negative domestic shocks, mitigating their effects.

Beyond these direct benefits, openness to capital flows can have *indirect* benefits. Participation by foreigners can increase the depth and liquidity of local financial markets, improving their function and long-term allocative efficiency in the country. Additionally, some researchers have noted that borrowing internationally can subject governments to external discipline and thus strengthen their commitment to pursuing sound policies. These benefits featured prominently in central banks’ responses to the Working Group’s survey (Annex B).

#### Risks arising from financial frictions and externalities

Notwithstanding the benefits, financial openness can also expose countries to important *risks*. Risks have two main sources: financial frictions and externalities. These risks are closely tied to financial stability, while

also being damaging to the real side of the economy, as seen in many of the sudden stop episodes discussed in Chapter 1.

Broadly speaking, *financial frictions* arise when asymmetric information or moral hazard prevents lenders or investors from allocating capital to firms based purely on their productive potential. One important strategy that lenders use to deal with such issues is requiring borrowers to post collateral, which they can seize if the firm fails to repay its debts. But this means that firms with more (or more attractive) collateral can more easily access financing even if they are less productive than some firms with less collateral. Just as in the domestic context, this alone can result in the misallocation of capital flowing in from abroad, since funding will go to firms with a higher net worth rather than to firms with higher productivity (Gopinath et al (2017)). The potential for misallocation is most concerning when flows are driven by push factors – particularly those related to global financial conditions, such as risk sentiment or AE monetary policy – rather than, for example, improved domestic productivity or global growth.

*Externalities* can amplify and propagate shocks, especially in the context of currency and maturity mismatches. Externalities occur when the actions of some agents produce costs or benefits that affect others. Where domestic financial development is weak, issuing debt in foreign currency becomes relatively more attractive to firms. But this borrowing gives rise to a variety of externalities, generally due to the fact that individual firms and households do not take into account the effect their actions will have on exchange rates. As a result, they take on more foreign currency debt when times are good than would be optimal if they considered effects on the economy as a whole. The inflows associated with borrowing from abroad then spark appreciation of the real exchange rate, pushing up its value, which harms competitiveness in the short term as well as long-term growth prospects (Benigno and Fornaro (2014)).

And when times are bad, the externalities associated with foreign currency borrowing significantly amplify and propagate negative shocks, particularly when combined with the financial frictions discussed above (Jeanne and Korinek (2010), Mendoza (2010)). When foreign lenders retrench, domestic residents must repay their foreign currency debts, cutting savings and investment in order to do so. These repayments cause the depreciation of the exchange rate, making the debt burden more onerous and increasing the effects of financial frictions, which in turn necessitates further repayments, thus depressing consumption and savings even more. Individual borrowers do not factor in this amplification mechanism when deciding on the size of their liabilities because the effects that generate it work via externalities. A similar mechanism can be set in motion through maturity mismatches, regardless of the currency in which debt is denominated (Caballero and Krishnamurthy (2001)).

Importantly, some types of capital flows involve currency and maturity mismatches, while others do not. Thus, the type of *pipe* that channels capital across borders crucially affects the benefits and risks associated with flows. For instance, FDI and equity portfolio inflows are usually denominated in local currency while offering state-contingent payoffs, and thus do not incur the risks associated with debt flows (Korinek (2018)). By contrast, portfolio debt flows and flows associated with banks that rely on wholesale funding from abroad can involve both currency and maturity mismatches. As a result, any assessment of the benefits and risks associated with capital flows must take into account this heterogeneity by type of capital flow.

Understanding the existence of financial frictions and externalities, which interact with each other, is crucial to understanding an important risk associated with openness to international capital flows: the exposure to sudden stops, which are often accompanied by sharp drops in output. As discussed in Chapter 2, global *push* factors are important drivers of capital flows in general and of sudden stops specifically. However, the *pipes* that channel capital inflows into the domestic real economy can amplify the severity of the economic damage inflicted by these episodes. The shift from bank-intermediated to more market-intermediated funding presented in Chapter 1 might thus suggest that risks have shifted as well. For instance, when inflows take the form of debt issuance in foreign currency, the real effects of sudden stops in capital inflows are likely to be greater.

### 3.1 Real effects of capital flows

During the 2000s, surveys of the academic literature (eg Obstfeld (2009)), and indeed an earlier CGFS report on the topic (CGFS (2009)), described evidence on the real economic benefits of openness to international capital flows as limited, at best. However, a large body of research over the last decade has brought the benefits associated with capital flows, as well as the risks, into much sharper focus and delivered a more nuanced picture. This section provides an overview of this work and presents an overall snapshot of the major benefits for most countries, with clearly identified risks that policymakers can manage using the tools discussed in Chapter 4 of this report.

#### Evidence of clear benefits

Over the last decade, research has found clear evidence of the benefits of capital inflows of all types. This research improved upon the earlier literature by using careful identification strategies, which were made possible by the increased availability of firm-level microdata, as well as natural experiments.

A large body of older work had found clear, unambiguous benefits of FDI inflows, but little, if any, evidence on the benefits of other types of capital flows (Kose et al (2009)). Subsequent work using microdata has confirmed the finding that FDI is beneficial, carefully documenting the productivity gains that result from the transfer of knowledge from foreign parent companies to their local subsidiaries (Kalemli-Özcan et al (2014)). Perhaps more importantly, research over the last decade found clear evidence of the benefits arising from other, more volatile types of capital flows. For example, while bank-related flows tend to be more volatile than other types of flows (as discussed in Chapter 1), bank inflows nonetheless increase lending to domestic firms, thereby generating higher investment and productivity and thus growth (Cingano and Hassan (2020)). Gains arising from openness to bank flows are closely linked to the benefits of foreign banks' operations (surveyed in Claessens (2017)). In addition to easing funding, foreign bank entry or links via local correspondent banks can also bring about benefits for local firms and households in terms of payment services.

Recent work also finds substantial benefits brought by often volatile portfolio flows, which older research had found to be less beneficial or even detrimental. Portfolio equity inflows are associated with increased equity issuance, which firms use to fund investment (Calomiris et al (2019), Kacperczyk et al (2021)). And portfolio debt flows have been shown to not only improve domestic financial conditions, but also boost investment (Williams (2018)), productivity (Larrazin and Stumpner (2017)) and growth (Igan et al (2020)). Whereas older research had raised concerns about whether portfolio flows yielded any actual benefit, more recent evidence suggests that the increasing importance of portfolio flows relative to bank flows, as discussed in Chapter 1, is not a cause for concern.

Importantly, the benefits of liberalising controls on capital inflows are clear from the accumulated documentation that examines episodes in which governments have made such policy changes.<sup>7</sup> Such work is notable for both methodological and practical reasons. The methodological appeal is that liberalisation episodes arguably constitute natural experiments, allowing for the effects of financial liberalisation to be more clearly identified. This type of evidence has practical appeal too because whether or not to liberalise is a decision which many policymakers face. It is thus notable that robust evidence of the benefits of liberalisation emerges from studies of overall liberalisation (for example, Bekaert et al (2011)) as well as those focusing on lifting controls on specific types of capital flows. A host of studies show that opening equity markets to foreigner participation boosts output growth (Gupta and Yuan (2009)), investment (Alfaro and Hammel (2007)), exports (Manova (2008)) and wages (Chari et al (2012)). Though debt flows have generally been viewed as less beneficial than equity flows, there is evidence that

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<sup>7</sup> When examining the evidence from research exploiting policy changes, two caveats are in order. First, there is almost invariably some disagreement about whether any specific policy change is truly exogenous. Second, it could be the case that the benefits arising immediately after liberalisation are one-off effects, or are greater in the short run than in the long run. Nonetheless, research exploiting policy changes provides strong support for the benefits of capital flows.

the liberalisation of rules governing foreign borrowing by firms boosts investment and productivity (Varela (2017)). Conversely, the imposition of capital controls has been found to curb investment and productivity (Forbes (2007), Alfaro et al (2017)).

### Awareness of specific risks can help inform policy-making

Many of the risks associated with openness to international capital flows fall into three categories: misallocation, exchange rate effects and sudden stops. After examining these risks in detail, this section briefly discusses how new challenges in measuring capital flows require additional caution when considering the risks they pose.

Capital inflows can affect the allocation of resources across both sectors and firms such that the economy's aggregate productivity falls. This reallocation can occur at the sectoral level or the firm level. Episodes of large or sudden capital inflows have been shown to shift labour and capital from tradeable to non-tradeable sectors (Benigno et al (2015)). This poses a risk to real economic performance, because such reallocation can act as a drag on aggregate productivity growth, shifting resources away from tradeable sectors, such as manufacturing, which have much higher productivity growth than non-tradeables like services.

Another type of misallocation can occur when the pipes channelling capital inflows are not of high quality. In countries where domestic financial frictions are relatively more acute – as is the case in some AEs and many EMEs – there is an additional risk that capital inflows will not be allocated optimally across firms. Rather than being channelled to the most productive firms, inflows will instead go to firms with higher net worth or more tangible collateral, slowing aggregate productivity growth (Cette et al (2016), Gopinath et al (2017)). Importantly, this type of misallocation can occur even if inflows do not lead to real exchange rate appreciation.

In some cases, capital inflows may also contribute to misallocation by pushing down interest rates and thereby facilitating the survival of so-called “zombie firms”, or relatively unproductive firms whose profits fail to cover their debt service costs. Borrowing by these firms constitutes misallocation because it crowds out borrowing by more productive firms (Banerjee and Hofmann (2018)). Given that the economic fallout from the Covid-19 pandemic saw firms' profits collapse as interest rates fell to near zero, this channel for misallocation may currently be of particular concern, as focus shifts from providing all firms with short-term support to identifying firms that are viable in the medium term.

In the survey carried out by the Working Group, only a few central banks identified misallocation as a concern. Available evidence also shows that this misallocation effect is not universal. On the contrary, greater openness to capital inflows has been shown to improve the allocation of capital across firms in a significant set of emerging markets (Larrain and Stumpner (2017)). Thus, while policymakers might do well to assess whether or not capital from abroad is being allocated efficiently, more research is needed to determine how widespread this phenomenon is and which policies can most effectively address it.

Closely related to the issue of misallocation are the potentially negative effects arising from the relationship between capital flows and exchange rates. Capital inflows result in both nominal and real exchange rate appreciation, while outflows cause depreciation; these effects are quantitatively significant (Aizenman and Binici (2016)). Moreover, evidence that openness to capital flows is associated with greater exchange rate volatility suggests that the risks of both appreciation and depreciation are amplified (Calderon and Kubota (2018)).

What are those risks? First, exchange rate movements are an important determinant of inflation in small open economies. Accordingly, exchange rate pass-through was an important concern for the central banks surveyed by the Working Group. In turn, the conduct of monetary policy is complicated when inflation moves with capital flows, particularly those driven by push factors (Adrian et al (2020)).

A second risk related to exchange rates arises because appreciation generated by sharp or constant inflows can reduce export competitiveness, with negative effects on the real economy.

Conversely, the exchange rate depreciation triggered by a fall in capital inflows can bolster export competitiveness. This can help offset negative real effects that occur when declining inflows translate into tighter domestic financial conditions.

On balance, the survey conducted by the Working Group showed that an overwhelming majority of AE central banks saw exchange rate depreciation as expansionary. In contrast, only a minority of EME central banks agreed (Annex B). What accounts for this disparity? When capital outflows cause exchange rate depreciations in countries where firms have substantial unhedged foreign currency liabilities, as is the case in many EMEs, the resulting negative balance sheet effects can depress investment, output and productivity. Policymakers and researchers have long been aware of this issue, which recent work further illuminates (Avdjiev et al (2019), Kohn et al (2020)). Newer work highlights that the widespread practice of invoicing exports in US dollars (Boz et al (2020)) also minimises the expansionary effects of depreciation for many economies (Adler et al (2020)). This so-called “dominant currency invoicing” is closely linked to the US dollar’s central role in cross-border capital flows (Gopinath and Stein (2018), also documented in Chapter 1).

The relatively limited benefits of depreciation have led many small open economies to engage in some degree of intervention in FX markets, one of the policy tools discussed in detail in Chapter 4. It also highlights the importance of structural policies that reduce incentives for unhedged foreign currency borrowing and promote the development of hedging markets. For many years, FX trading in EME currencies has outpaced that in AE currencies, led by offshore trading and derivatives (Patel and Xia (2019)).

The possibility of a sudden stop in capital inflows sparking a sharp drop in output remains an important risk for countries open to international capital flows. And indeed, the risk of sudden stops was mentioned in the survey by both EME and AE central banks. Chapter 2 presented evidence on the conditions that make sudden stops more likely. Box 3A assesses the damage that sudden stops typically inflict on the real economy, finding that this damage has historically been substantial but has lessened since the GFC, particularly for EMEs.

It remains crucial that policymakers understand why sudden stops can cause such damage to the real economy. As noted in the introduction to this chapter, theoretical research over the last decade has focused on frictions and externalities as central to this connection. The empirical evidence on sudden stops is consistent with this theoretical work in two ways. First, sudden stops in capital flows cause significant damage when they coincide with banking (Joyce and Nabor (2009)) or currency crises (Hutchison and Noy (2006)). Second, quantitative models that incorporate the relevant frictions can trigger responses of output, investment, asset prices and numerous other variables closely resembling those observed during sudden stop episodes (Korinek and Mendoza (2014)). As a result, policymakers can derive concrete guidance from the theoretical and empirical literature on sudden stops. In the medium term, efforts to foster financial deepening can reduce incentives to engage in unhedged foreign currency borrowing. This in turn reduces the risks associated with sudden stops by shutting down a key amplification mechanism. And in the short-term, macroprudential policies and capital flow measures targeting foreign currency borrowing can mitigate the build-up of risk, as discussed in Chapter 4.

### Cross-country contagion poses a continuing challenge

As noted in Chapter 1, sudden stops often occur in waves, affecting multiple countries at the same time. This points to an additional risk that arises when countries become more open to international capital flows: cross-country contagion. The empirical analysis of the drivers of sudden stop episodes featured in Chapter 2 of this report as well as in recent academic research (Forbes and Warnock (2020)) confirms that when one country in a geographic region is hit by a sudden stop, the probability that other countries in the same region will also see a sudden stop increases significantly. Vulnerability to contagion is a particular concern where banking system leverage is high (Forbes (2013)) and where political risk is elevated (Puy (2016)).

The shift from bank flows to portfolio flows documented in Chapter 1 might change the risk of contagion. When capital flows are mediated by a relatively small number of global banks or investors, a negative shock to one of those can lead to outflows from many countries. When flows are mediated by financial markets, emerging market equities and bonds may be held by a larger and more diverse array of foreign investors. However, herding behaviour may still be a concern if fund managers follow similar investment strategies or the investor base is concentrated.

### Applying lessons from microdata requires looking beyond aggregates

While the widespread availability of microdata has been crucial for improving understanding of the benefits and risks associated with international capital flows, some caution is warranted in generalising the results of research using this data. For example, as previously noted, studies using microdata have produced robust evidence on the benefits of FDI. This work uses detailed data on cross-border mergers and acquisition, as well as firms' ownership structures, inputs and outputs. But, as discussed in Chapter 1, aggregate statistics on FDI include substantial intra-company flows, which often reflect phenomena such as profit shifting (Tørsløv et al (2020)) and offshore issuance (Bertaut et al (2019), Coppola et al (2020)). Such flows are unlikely to generate the types of benefits uncovered in the FDI literature and indeed might entail additional risks and distortions. This example highlights the importance of looking beyond aggregate data when formulating policy and applying research findings obtained using microdata.

## 3.2 Capital flows and financial stability

Apart from its real effects, openness to capital flows also has implications for financial stability. The benefits of openness for financial stability tend to be realised in the long term. By contrast, the financial stability risks associated with openness to capital inflows are often more immediate, although they can certainly build up over time. Moreover, the risks to financial stability follow naturally from the potential benefits of openness. Inflows boost access to finance, allowing firms to invest and grow. However, large inflows, particularly those driven by push factors rather than local economic conditions, can take this too far, driving asset prices to unsustainable levels and putting financial stability at risk. Likewise, overreliance on foreign funds can expose the financial system to foreign shocks to a destabilising degree. The extent to which flows translate into financial instability is highly dependent on the pipes through which those flows enter the economy and on the policies used to manage these risks.

### Diversified financing and accelerated financial development strengthen financial stability

Openness to capital inflows yields two important benefits for financial stability. First, when financial institutions and firms can obtain financing from abroad, they are able to better diversify their access to funding. When this happens, the effects of domestic financial shocks are reduced and there is less amplification and propagation of real shocks. Bank flows have been and remain a very important channel for this diversification of financing (Cetorelli and Goldberg (2012)). However, the rise of market-intermediated financing discussed in Chapter 1 has boosted the role of bond and equity markets, with the latter allowing for risk sharing, which is particularly beneficial. FDI also fosters both risk sharing and diversification, as foreign-owned firms operating in a country can access foreign funding via the firm's internal capital markets. This insulates not just them from local financial shocks but also the other firms with which they do business, via increased provision of trade credit (Lin and Ye (2018)).

Second, openness to international capital improves financial development in its broadest definition. This benefit was discussed in detail in the CGFS's 2009 report on capital flows, and subsequent research has confirmed its significance. A large body of research shows that openness boosts financial market depth and liquidity (de la Torre et al (2007)) as well as pricing efficiency (Kacperczyk et al (2021)). In addition, FDI inflows in the form of mergers and acquisitions can improve corporate governance, not only at the targeted firms, but also at other domestically owned firms (Albuquerque et al (2019)). Aside

from improving the functioning of financial markets, openness can improve the quality of financial intermediation by banks, either by introducing innovation to the local market or by spurring competition (Bruno and Hauswald (2013)). While some of these positive impacts on financial development and thus financial stability take immediate effect, others accrue over the medium or long term (Kaminsky and Schmukler (2008)).

### Stability risks when there is "too much of a good thing"

Capital inflows can pose risks to financial stability, which is made clear by work showing that capital inflows are associated with a higher probability of banking crises (Caballero (2016)) and financial crises more generally (Li and Su (2020)). These negative effects can be broadly characterised as "too much of a good thing" in two respects. First, capital inflows can expand credit and unsustainably boost asset valuations. And second, when firms and financial institutions' use of foreign funding goes beyond what is merited by diversification, the financial system becomes exposed to foreign shocks to such an extent that it poses risks to domestic financial stability.

As previously discussed, capital flows affect real variables primarily by expanding firms' access to credit. This has macro-level implications, as inflows are associated with faster overall credit growth via increased bank lending or market-based financing channels (Igan and Tan (2017)). Strong credit growth and ample credit availability can in turn contribute to a build-up of debt vulnerabilities and related financial stability risks. The extent to which flows pose such risks depends both on the drivers of the flows and the pipes through which they are channelled. Flows driven by pull factors are meeting a demand for funding originating in the recipient economy. By contrast, flows driven by push factors are more likely to push up asset prices unsustainably if the domestic economy is not positioned to absorb them efficiently.

Regarding the pipes through which flows move, credit growth tends to be more responsive to banking and portfolio debt flows and significantly less so to FDI and portfolio equity flows (Lane and McQuade (2013)). Beyond the general concern that capital flows may drive excessively rapid credit growth, portfolio debt and bank flows also pose risks because of the externalities associated with maturity and currency mismatches. As described at the beginning of this chapter, those externalities can amplify shocks and trigger harmful sudden stops.

Capital inflows can lower the funding constraints of domestic banks in EMEs, translating into higher domestic credit growth. Also, if productive firms have had difficulty accessing credit or faced prohibitive borrowing costs, capital inflows may lead to a more efficient allocation of financial resources. The transmission mechanism that links foreign capital inflows and domestic bank lending is presented in Annex C6, which builds on the analysis of credit registry data from five Latin American economies. The results point to an easing of financing conditions when capital flows into the country, particularly through cross-border interbank flows and for lower credit quality borrowers. Banks that rely the most on volatile funding sources (ie banks in the top decile of wholesale funding) and have the weakest loan portfolios (ie in the top decile of non-performing loans) contribute to this easing of financing conditions, although the results are nuanced at the country level. In this particular context, one concern could be that capital inflows increase risk-taking because these banks increase their loan supply to firms with low credit scores. Whether or not this leads to a build-up of system-wide risks depends on two factors: the share of this segment in the domestic market, and whether or not these banks make sufficient provisions to protect against potential defaults. In fact, there is also evidence that these banks charge higher risk premiums to raise their cushions, which points to an overall benefit from capital inflows for EMEs' domestic economies.

Available evidence also indicates that capital flows can put upward pressure on the prices of other assets, including equities (Tillmann (2013)) and real estate. To the extent that valuation pressures in the equity market push share prices beyond what fundamentals merit, this effect by capital flows can be detrimental to financial stability. The results of the Working Group's survey of central banks suggest that policymakers are particularly attuned to this risk, with this being the most widely voiced concern about portfolio equity inflows. International capital flows may also affect a country's domestic financial stability

through their impact on house prices. These effects have been documented in the CGFS's 2020 report on property price dynamics.

Dealing with these financial stability challenges is further complicated by the fact that when a country is more open to capital flows, its policymakers may find it more difficult to control domestic financial conditions. The "impossible trinity" highlights this challenge and is described in Chapter 4. Recent research shows that, since the GFC, domestic interest rates in emerging markets primarily reflect risk premia that are in turn driven by AE monetary policy (Kalemli-Özcan (2019)). This strong relationship diminishes the effect of domestic monetary policy on local interest rates. While the resulting disconnect has implications for the conduct of monetary policy generally, it poses particular challenges in terms of financial stability because it erodes domestic policymakers' control over financial conditions. This highlights the importance of considering the full range of policy tools discussed in Chapter 4 of this report.

### Managing the effects of foreign financial shocks poses challenges

As discussed in Section 3.1, access to foreign funding can produce real economic benefits, but it can also result in exposure to foreign shocks to such a degree that it complicates policymakers' efforts to maintain domestic financial stability (Cesa-Bianchi et al (2019)). Box 3B explores in detail how this can occur in local currency debt markets. Foreign demand for bonds denominated in local currency is a positive development for EMEs, which were long unable to issue in their own currencies, a situation described as "original sin" (Eichengreen et al (2002)). However, when currency risk is shifted from borrowers to creditors, EMEs are, under certain circumstances, still vulnerable to feedback loops between capital flows, exchange rates and asset prices, a situation which some have deemed "original sin redux" (Carstens and Shin (2019)).

Exposure to foreign shocks can also occur via bank flows. Banks' reliance on cross-border flows can present challenges for financial stability, as it increases the co-movement of domestic credit to global push factors (di Giovanni et al (2019)), notably foreign monetary policy (Takáts and Temesváry (2020)). Once again, the pipes through which capital flows are channelled have implications for the potential risks to financial stability. Recent evidence based on a cross-country study using supervisory microdata suggests that the transmission of global shocks is more pronounced in interbank lending than in other forms of capital flows intermediated by banks or non-banks (Buch et al (2019)). At the same time, when the lending most responsive to foreign liquidity conditions is that of better capitalised banks relying primarily on stable funding sources, as has been found to be the case in several Latin American countries (Cantú et al (2020)), the implications for financial stability are relatively benign.

Fluctuations in cross-border bank flows have so far been relatively moderate during the Covid-19 crisis, particularly in comparison with the GFC. Does this indicate that the financial stability risks associated with this type of flow have decreased? Certainly, the extensive regulatory reforms meant to induce banks to hold larger capital and liquidity buffers following the 2008 crisis may have helped keep cross-border bank flows from becoming a major amplification mechanism in 2020. This is a positive spillover from AEs' strengthening of their own financial institutions and risk management (Avdjiev et al (2020)). At the same time, other factors were at play. Unlike in 2008, the shocks hitting the global economy did not originate in the banking sector. Moreover, the US Federal Reserve's provision of dollar swap lines did much to ease stresses in the banking sector (Cetorelli et al (2020)). More work is needed to understand the relative importance of these different factors in the current dynamics of bank flows.

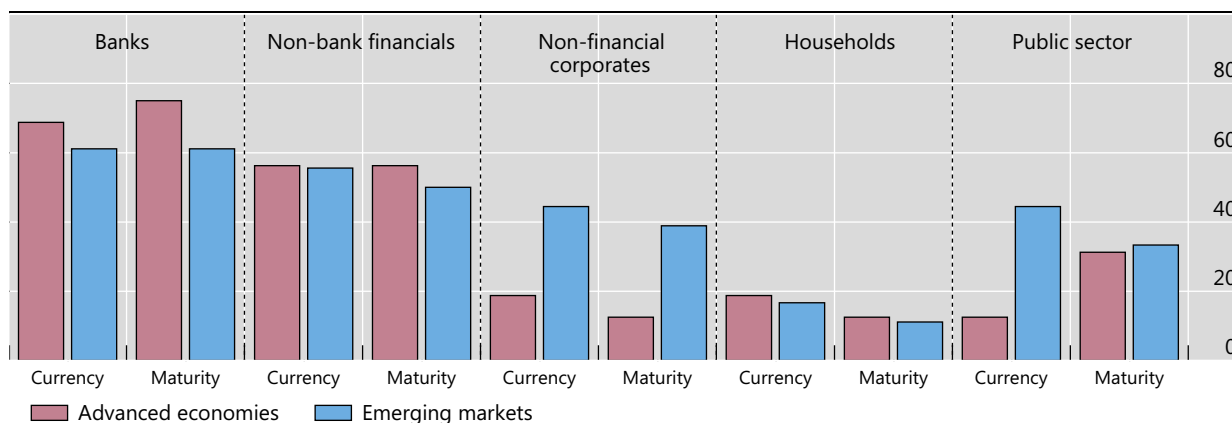
Considering the potential risks posed by foreign financial shocks, it is important that policymakers understand the degree of exposure to these risks. Central banks are attentive to the risks posed by short-term foreign currency borrowing, with the Working Group's survey indicating that monitoring of currency and maturity mismatches in the financial sector is near universal, as shown in Graph 3.1. However, notably fewer central banks report that they track such mismatches on the balance sheets of non-financial firms. This is an area where improved monitoring may be warranted. The behaviour of debt inflows can vary significantly depending on the sector of the domestic entity borrowing from abroad; for example, whether it is the public sector, a bank or a non-financial firm (Avdjiev et al (2018)). In addition, theoretical research

on the mechanisms behind sudden stops identifies foreign currency borrowing by non-financial firms as a key source of amplification and propagation.

### Which mismatches do central banks monitor?

Percentage of central banks that answered “yes”

Graph 3.1



Source: CGFS Working Group, Survey on changing patterns of capital flows, August 2020, question 16..

Furthermore, the risk of sudden stops, and of capital flow volatility more generally, may also vary by type of foreign investor. As highlighted in Chapter 1, asset managers play a growing role in mediating flows to emerging markets. While this increases the investor base for securities issued by firms and governments, the trend may also carry additional risks. For example, capital flows channelled via investment funds may be more sensitive to shocks than those mediated by banks or other types of financial institutions (Arslanalp et al (2020)). And within the universe of investment funds, flows via exchange-traded funds are more volatile than those via traditional mutual funds (Converse et al (2020)). Relatedly, the use of passive investment strategies within the broader asset management industry can exacerbate volatility.

## 3.3 Conclusions

Thanks to better data and identification techniques, policy studies and the academic literature provide convincing evidence of the benefits of capital flows, while at the same time highlighting specific risks. Yet, the type of *pipe* that channels capital flows affects the trade-off between benefits and risks associated with capital flows. Flows have generally been found to have significant positive effects on real economic outcomes, albeit with important heterogeneity depending on the pipes through which these flows are channelled and the characteristics of the recipient country. Recent work highlights the risk that flows will be misallocated, a risk that is amplified when flows are driven by push factors or channelled through a domestic financial system plagued by financial frictions. Likewise, sudden stops remain a major risk associated with openness to international capital flows. However, research now provides clearer guidance than in the past about the institutions and policy actions that can mitigate such risks. In particular, the shift from bank-based to more market-based intermediated funding can have broad implications for financial stability risks, as the players differ in terms of leverage and strength of regulation and thus exhibit different sensitivities to shocks.

While capital inflows can enhance financial stability by fostering financial development and risk sharing, the medium- or long-term effects are offset by the very notable risk that, in the short run, capital flows can be “too much of a good thing”. Again, though, the literature sheds light on when policymakers must be particularly attuned to these risks and manage them using the tools discussed in Chapter 4.

## Output effects of sudden stops

This box provides new evidence on the damage inflicted by sudden stops in capital inflows. Numerous studies documented negative effects of such events in the decades prior to the GFC (Hutchinson and Noy (2006), Joyce and Nabar (2009), Mendoza (2010)). By including sudden stops that occurred in the years since the GFC, this box offers a preliminary assessment of how those effects have changed over time and varied across countries.

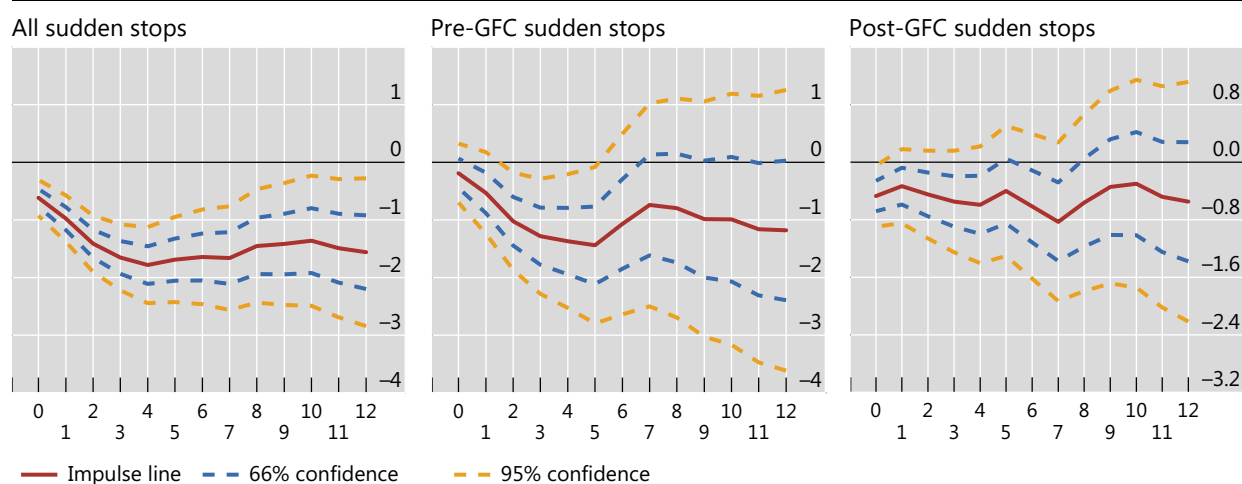
When analysing how the effects of sudden stops on the level or growth of output has changed over time, it is important to control for initial conditions in the economies affected. For example, a one percentage point drop in growth may mean little to a relatively fast-growing economy, but have much more substantial implications in a country where growth is only one percent per year to begin with. For this reason, this analysis employs the local projection method developed by Jordà (2005) to estimate the effect of sudden stops on real GDP, conditional on GDP in the two quarters prior to the event. The analysis includes sudden stop events using the Yesin (2015) methodology employed in Chapters 1 and 2, which identifies sudden stops in both AEs and EMEs from 2000 to 2019. Because of the challenge in identifying the output effects of sudden stops occurring during the Covid-19 pandemic, separately from the damage inflicted by the pandemic itself, these events are not included in this analysis.

As shown in the left-hand panel of Graph 3A, the resulting estimates confirm that sudden stops do inflict significant damage. One year after a sudden stop, real GDP in EMEs is 1.8 percent below its initial level and, rather than subsequently recovering, remains 1.6 percent lower three years later. Importantly, however, the sudden stops that occurred during the GFC itself did more harm than those either before or since. As with sudden stops occurring during 2020, separately identifying the effects of sudden stops in capital flows during the GFC is challenging. Therefore, the centre and right-hand panels of Graph 3A compare the output effects of sudden stops before and after the GFC, setting aside those that occurred in 2008 and 2009. The results suggest that sudden stops have been less harmful during the most recent decade than was the case previously.

### Output effects of sudden stops in EMEs<sup>1</sup>

Percent deviation of real GDP from pre-sudden stop value

Graph 3A



<sup>1</sup> Local projections of log quarterly real GDP on an indicator variable for the onset of a sudden stop, as well as two lags of log GDP and sudden stop variable. Because of the timing convention with the shock hitting at  $t=0$ , the impulse line starts at negative values and would cross the horizontal axis in  $t-1$ .

Sources: Haver Analytics; CGFS Working Group calculations.

This finding reflects changes in the effects of sudden stops in EMEs. By contrast, the sudden stops that occurred in AEs since the GFC have on average left real GDP three percent below its initial level after three years. This effect is three times as large as the effect of sudden stops in AEs prior to the GFC. However, because the absolute

number of sudden stops in EMEs is larger, and their effects in EMEs have been milder post-GFC, the average EME effects plotted in Graph 3A are smaller post-GFC. This reflects the heavy toll on output of the sudden stops that hit the peripheral European economies during the Eurozone crisis.

This analysis thus yields a fairly positive message for EMEs regarding the output effects of sudden stops during the decade from 2010 to 2019, which were relatively mild. Over that period, most EME governments deployed one or more of the policy tools discussed in Chapter 4 of this report in order to maximise the benefits associated with capital flows and manage the associated risks. This box finds some evidence suggesting this effort was successful.

## Box 3B

### Foreign holdings of local currency sovereign bonds

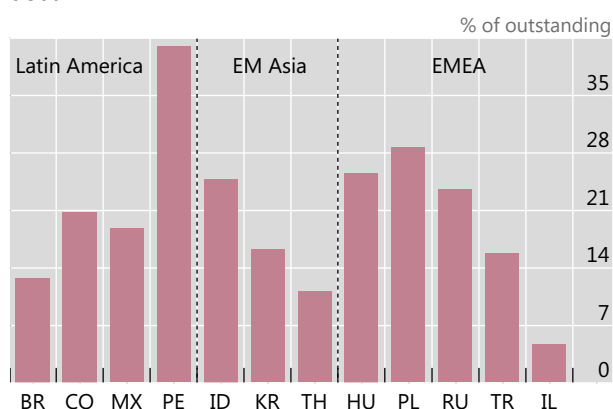
As discussed in Chapter 1 and Box 1B, policymakers in many EMEs have sought to attract foreign investors to local currency bond markets in order to develop capital markets and reduce currency and maturity mismatches. This box examines the relationship between foreign participation in local currency sovereign bond markets and the sensitivity of local interest rates to foreign financial shocks. Such sensitivity can pose a challenge for policymakers in EMEs (Kalemli-Özcan (2019), CCA (2021)), though this challenge must be considered in the broader context of the benefits that the development of local currency markets brings.

As shown in the left-hand panel of Graph 3B, the role of foreign investors in local currency bond markets varies significantly across countries. Indeed, the share of local currency sovereign bonds held by foreigners varies notably even within geographic regions, with Indonesia's share more than twice that of Thailand for example. As discussed in Box 1B, foreign participation in many EME local currency bond markets has on average followed a hump shape in the post-GFC period, peaking in mid-2013. As a result, the cross-country differences have been fairly persistent. For this reason, this box focuses on the cross-country heterogeneity in foreign participation.

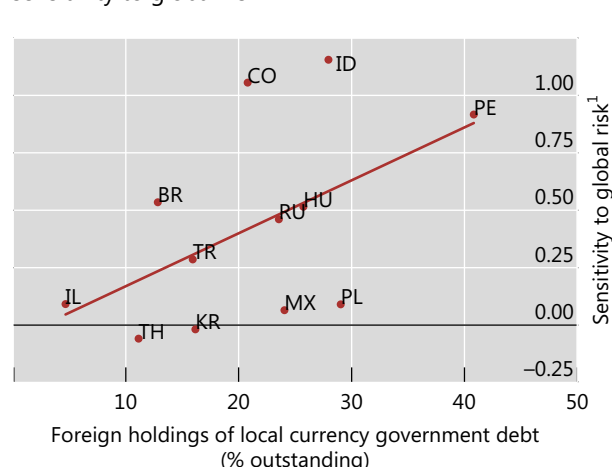
### Foreign holdings of local currency sovereign bonds

## Graph 3B

Average foreign holdings of local currency government debt



Foreign participation in local bond markets and sensitivity to global risk



EMEA = Europe, Middle East and Africa; BR = Brazil; CO = Colombia; HU = Hungary; ID = Indonesia; IL = Israel; KR = Korea; MX = Mexico; PE = Peru; PL = Poland; RU = Russia; TH = Thailand; TR = Turkey. The sample period is January 2005 and June 2020.

<sup>1</sup> Sensitivity is measured by the slope coefficient from a linear regression of month-on-month changes in 10-year local currency sovereign yields on the log of monthly changes in the VIX index.

Sources: Federal Reserve Economic Data (FRED); Bloomberg; national data; CGFS Working Group calculations.

The sensitivity of local interest rates to foreign shocks is measured by the relationship between changes in the yield on local currency government bonds with a maturity of 10 years and moves in the VIX index, a widely used measure of risk aversion in global financial markets. Importantly, however, the results of this analysis are not dependent on the way foreign financial shocks are measured. The relationship between local currency yields and variables such as the trade-weighted US dollar exchange rate or indexes of financial conditions is very similar.

When the VIX rises, indicating greater risk aversion, local currency yields tend to rise, so a larger coefficient indicates greater sensitivity of local rates. The right-hand panel of Graph 3B shows that sensitivity is greater in countries where foreigners own a larger share of local currency sovereign bonds. This provides a concrete example of one of the drawbacks of openness discussed in Section 3.2: exposure to foreign shocks. Having foreigners buy domestic currency debt rather than foreign currency-denominated securities has clear benefits both in terms of reducing the potential for the real effects of sudden stops in capital inflows to be amplified (a risk highlighted in Section 3.1) and bolstering market development (as discussed in Section 3.2). However, it does appear to increase the sensitivity of local financial conditions to shocks originating abroad.

One explanation for the greater sensitivity of markets with greater foreign participation is so-called "original sin redux" (Carstens and Shin (2019)). While issuing in local currency reduces EME borrowers' currency mismatch, it results in foreign holders of the local currency debt carrying such mismatches, which can amplify their reaction to shocks that affect exchange rates. As a result, the reduced vulnerability for domestic issuers comes at the cost of greater transmission of foreign shocks via the balance sheets of foreign creditors. This trade-off can be managed using some of the tools discussed in Chapter 4 of this report.

## 4. Policy tools and lessons

How can policymakers maximise the benefits of openness to capital inflows while limiting the associated risks? As discussed in Chapter 3, periods of extreme swings in capital flows, as seen during episodes of sudden stops and surges, remain a source of concern in terms of macroeconomic and financial stability. The trade-offs that policymakers have to navigate are complex, especially in EMEs. Ideally, policy should aim to achieve three objectives: (a) fostering productivity-enhancing and stable capital flows, (b) mitigating booms and busts in credit and asset prices that may be associated with volatile flows, and (c) in times of crisis, managing the fall-out from a tightening of local financial conditions, currency depreciation and recession.

Policymakers have access to various tools to address these trade-offs. While an individual tool's effectiveness depends on a country's circumstances and the nature of the shock, the optimal response typically requires policymakers to think in different time horizons and work with a combination of policies.

This chapter describes these policy tools while summarising views about their effectiveness and potential side effects, with a particular focus on inflows to EMEs. It discusses interactions between tools and possible international spillovers. The policy tools implemented by central banks during the Covid-19 crisis are then described before some general conclusions are drawn.

### 4.1 Taxonomy of tools

Among the various policies that address the risks associated with extreme swings in capital flows, foremost are structural policies that strengthen the resilience of the economy and financial system while promoting the efficient allocation of resources. Structural policies aim for a sound macroeconomic framework, prudent public debt management, a robust financial system, liquid and diverse financial markets, a fair and effective legal system, and efficient labour and product markets. In other words, they support high-quality economic institutions that create an environment where capital is directed to its most productive

use and shocks are less likely to result in destabilising dynamics. In the push-pull-pipes framework of Chapter 2, structural policies and institutional quality are key pull factors driving capital inflows, as well as some of the pipes that channel capital from abroad.

As discussed in Chapter 3, research shows that the economic benefits of openness to capital flows vary substantially, depending on structural policies and institutional quality. These benefits are considerable for economies in which institutional quality and financial development are high, or at least above a certain threshold (Kose et al (2011)). In other words, capital flows have been found to be more beneficial in places where the pipes through which they are channelled into the domestic economy are high quality, with deep equity and bond markets and an efficient banking sector. By contrast, where foreign debt is already high, additional foreign borrowing may have a negative effect on growth (Eberhart and Presbitero (2015)).

It often takes a long time for the full effects of structural policies to be felt and these policies can be difficult to implement, including for political economy reasons such as the resistance of local lobbies. As a result, the risks arising from financial frictions and externalities still exist in many EMEs, notwithstanding significant improvements in their structural policies and outcomes since the financial crises of the 1990s. Such risks are also present in some smaller AEs with weaker institutions, less developed financial markets or large foreign liabilities.

In economies where structural policies and institutional quality leave room for improvement, additional policy tools may be needed in order to mitigate the risks associated with capital flow volatility. Tools under the control of national authorities can be grouped into five categories: monetary policy, microprudential measures, macroprudential measures (MPMs), capital flow management measures (CFMs) and FX intervention. A sixth category not under the full control of national authorities covers tools requiring bilateral or multilateral agreement: the global financial safety net (GFSN).

The purpose of these tools should be to address temporary market dysfunction, not to delay or replace economic reforms. Some of these tools are most effective when used pre-emptively to mitigate potential vulnerabilities during normal or tranquil periods, while others are more effective when used reactively in order to mitigate the consequences of shocks during stress periods (Table 4.1). Each tool aimed at addressing risks associated with capital flows has limitations and side effects. These can be minimised but not eliminated. In their replies to the Working Group's survey, central banks highlighted the importance of considering side effects when implementing such policies. Those from EMEs pointed out that the side effects of policies meant to mitigate the impact of external shocks are more evident during recessions and periods of high currency volatility and low global risk appetite.

While not explicitly discussed below as one of the tools for influencing capital flows, fiscal policy is extremely relevant because of its many interactions with other policies. Tax policies and other elements of the fiscal framework are part of the structural policies that influence the investment environment (Göndör and Nistor (2012)). Fiscal policy is also an important pre-emptive tool for mitigating the build-up of risks. Countries with strong fiscal positions and prudent debt management policies are less vulnerable to swings in capital flows. For example, they might be less reliant on foreign borrowing, especially the more volatile forms such as short-term, foreign currency borrowing. Furthermore, fiscal policy can be used as a reactive tool that provides countercyclical support for economic activity.

## Monetary policy

While monetary policy can influence capital flows through many channels, its most direct influence has historically been through interest rate differentials. By taking major economies' interest rates into account when setting policy rates, central banks in small, open economies can affect the exchange rate by attracting or repelling capital inflows. However, the cost of doing so is a loss of monetary autonomy.

Policy tools to manage extreme movements in capital flows

Table 4.1

Tools	Pre-emptive uses	Reactive uses	Selected side effects and spillovers	Significant interactions with other policy tools
Monetary policy	Reduce inflationary pressures Reduce the build-up of domestic financial vulnerabilities	Support exchange rate stability Manage domestic liquidity	Apply at an aggregate level (cannot target specific sectors)	Depends on FX policy
Microprudential measures	Reduce the vulnerability of institutions to shocks		Shift the provision of domestic credit to untargeted intermediaries Incentivise targeted intermediaries to expand abroad Remain in place for long periods even when intended to be temporary ("sticky")	Strengthens other structural policies
Macroprudential measures (MPMs)	Moderate credit growth Reduce the build-up of domestic financial vulnerabilities	Ease selling pressure on asset prices	Shift the provision of domestic credit to untargeted intermediaries Incentivise targeted intermediaries to expand abroad	Complements most other tools Substitutes in some circumstances (e.g. lower appreciation pressure by moderating credit growth)
Capital flow management measures (CFMs)	Reduce the build-up of domestic financial vulnerabilities Manage the size or composition of flows	Manage the size or composition of flows	Deflect inflows to other economies Remain in place for long periods even when intended to be temporary ("sticky")	Complements FX policy Complements MPM leakages
FX intervention	Self-insure by accumulating FX reserves	Restore FX market functioning Reduce extreme exchange rate volatility	Stabilise inflation Encourage FX borrowing Discourage FX hedging Exchange rate misalignment Sterilisation costs	Complements monetary policy
GFSN		Manage foreign currency liquidity Meet temporary shortfalls in external financing Facilitate structural adjustment	Increase the risk of moral hazard	Complements FX, monetary and fiscal policies Strengthens structural policies

Source: Working Group's assessment of the central bank survey and academic literature.

The shift from bank funding to portfolio flows discussed in Chapter 1 has increased the importance of unconventional monetary policy tools in EMEs, including asset purchase programs (APPs), government debt swap operations and longer-term repo facilities with greater quantity of eligible collateral. Whereas several AEs implemented APPs in order to provide additional monetary stimulus after the GFC, a few EMEs responded to the Covid-19 crisis by intervening in their fixed income markets to

provide temporary liquidity and address the feedback loop between exchange rates and asset prices that can arise when foreign investors liquidate their positions in domestic debt. By doing so, they prevented an abrupt tightening of financial conditions and further negative consequences for the broader economy.

The majority of central banks that responded to the Working Group's survey preferred not to use monetary policy to manage exchange rate fluctuations and capital flows. Allowing the exchange rate to adjust provides for greater monetary policy autonomy to respond to cyclical developments, providing that sound economic fundamentals prevail and inflation expectations are well anchored. However, when exchange rate fluctuations threaten to destabilise inflation expectations, central banks typically respond by tightening monetary policy, usually by raising policy rates (ACC (2020)).

## Microprudential measures

Microprudential policies, such as capital and liquidity requirements for banks, aim to strengthen the resilience of individual institutions. They can impact the volume and composition of outflows from creditor countries or of inflows to recipient countries. For example, currency limits embedded in liquidity or capital requirements can affect the composition of banks' external assets and liabilities. Also, creditor countries' policies aimed at strengthening financial institutions and their risk management can minimise the adverse effects of shocks on the recipient country (Avdjiev et al (2020)).

Repurposing microprudential policies in order to mitigate risks associated with capital flows is not without its costs. Microprudential policies might undermine their own impact by motivating targeted intermediaries to expand abroad. Also, limits can divert activity to less regulated sectors. For these reasons, microprudential measures tend not to be used to influence capital flows.

## Macroprudential measures

Macroprudential policy refers to the use of prudential tools to limit systemic risk. Examples of MPMs include countercyclical capital buffers, restrictions on FX borrowing and limits on the maturity of debt. MPMs are primarily designed to strengthen the resilience of the financial system and limit the build-up of risks. As such, they are a pre-emptive measure.

MPMs typically do not directly target capital flows and instead focus on domestic vulnerabilities. Such measures indirectly influence capital flows through their impact on credit.<sup>8</sup> Some MPMs have a more direct impact on capital flows by targeting foreign currency exposures. An advantage of MPMs is that, in contrast to monetary policy or some fiscal tools, which have a broad-based impact on the financial sector and economy, MPMs can target specific sectors or forms of credit (Lim et al (2011)). In this way, they are well suited to address the vulnerabilities that arise from the shift in patterns of capital flows from bank to non-bank intermediated funding.

MPMs are generally considered effective tools for mitigating extreme volatility stemming from rapid credit growth and short-term inflows, especially in EMEs (Forbes et al (2015)). A growing literature finds that, by moderating credit developments, MPMs dampen capital inflows and limit the build-up of financial vulnerabilities during booms (Igan and Tan (2017)). Recently, some AEs have used MPMs to target extreme foreign currency lending and to mitigate externalities related to the provision of real estate services (CGFS (2020a)).

Despite these perceived benefits, MPMs also have costs that should be considered. Similarly to tighter monetary policy, macroprudential policies may lead to lower growth in the short term (Richter et al (2019)). Their application can result in a suboptimal allocation of resources and can stunt market development. Also, since they tend to target banks, they can promote a shift to non-bank credit (Cizel et al (2019)). Additionally, some macroprudential instruments – particularly those directed at real estate

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<sup>8</sup> In recognition of the potential impact of MPMs on capital flows, the OECD revised its Code of Liberalisation of Capital Movements in 2019 to provide signatories with increased flexibility to address financial stability risks.

markets – may have distributional implications and disparate effects on different income groups (Tzur-Ilan (2019), Frost and van Stralen (2018), CGFS (2020a)). Furthermore, MPMs face a communication challenge that stems from the difficulty of encapsulating their principal objective of financial stability in a simple metric, as well as from the absence of an established analytical paradigm to guide their conduct (CGFS (2016)).

There are some examples of the successful use of MPMs. For example, in 2007, Peru increased reserve requirements on banks' short-term FX liabilities. This resulted in a lengthening of the maturity of FX liabilities, which reduced the country's vulnerability to swings in capital flows (Armas et al (2014)). In 2010, Korea introduced a cap on financial institutions' FX derivatives positions in order to discourage short-term borrowing overseas. As a consequence, currency forward trades and short-term external debt declined sharply, and currency mismatches also decreased (Kang (2012)).

### Capital flow management measures

Whereas MPMs do not directly target capital flows, CFMs are explicitly designed to limit capital flows and reduce systemic financial risks arising from these flows. CFMs are often defined as restrictions and regulations on FX-denominated instruments or capital account transactions (Erten et al (2019), Rebucci and Ma (2019), Beck et al (2015), IMF (2012)). CFMs can be categorised as either residency-based or not (IMF (2019a)). Residency-based measures, also sometimes defined as capital controls, affect capital flows between residents and non-residents. CFMs can also be categorised based on flow direction (measures applied to inflows, outflows or both) or on the type of restriction applied (eg tax, limit, approval requirement) (IMF (2019a)).

CFMs have the advantage of being useable as either pre-emptive or reactive measures. They can influence flows regardless of whether they are driven by push or pull factors. For example, taxes on capital inflows can be used to contain surges and can be adjusted by authorities according to the economic cycle. Quantity-based restrictions on outflows could be used temporarily to manage the impact of sudden stops. Also, CFMs can plug gaps in MPMs' coverage. Ostry et al (2011) find that when foreign borrowing bypasses the regulated financial sector, CFMs may be a better alternative than MPMs for addressing specific financial stability risks.

That said, CFMs may deter inflows and thus reduce the potential benefits of capital flow mobility. Moreover, they can have unintended consequences, such as incentivising mis-invoicing or deflecting flows to other economies. Also, they may be difficult to remove once introduced, especially if used to postpone adjustments to structural policies or to maintain an undervalued exchange rate (Acosta-Henao et al (2020), IEO-IMF (2020)).

A particularly important challenge when using CFMs is communicating the right message to market participants (Forbes et al (2016)). Clear communication reduces the likelihood that investors will interpret the use of CFMs as a signal of authorities' reluctance to commit to appropriate fiscal and monetary policies. This signalling concern was highlighted by some private sector participants in the roundtables organised by the Working Group.

Evidence on CFMs' effectiveness in reducing systemic risks by stemming capital inflows is mixed.<sup>9</sup> Erten et al (2019) find that their countercyclical use helps reduce boom-bust cycles in real output growth. Habermeier et al (2011) conclude that CFMs extend the maturity of FX inflows, making them more stable and longer lasting. Other studies find that while CFMs have non-negligible effects on the volume of capital flows, these effects depend on country-specific characteristics, do not necessarily last long, and

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<sup>9</sup> Assessing the effectiveness of CFM tools is a complicated task because: 1) there is no widely accepted framework for analysing the effectiveness of CFM policy tools; 2) changes to CFMs do not occur frequently and they may remain in place for a long time, so these instruments display very high serial autocorrelation; 3) policy tools exhibit considerable heterogeneity across economies in terms of the intensity with which they have been used; and 4) the intensity of CFMs is measured in different ways depending on the study (Acosta-Henao et al (2020)).

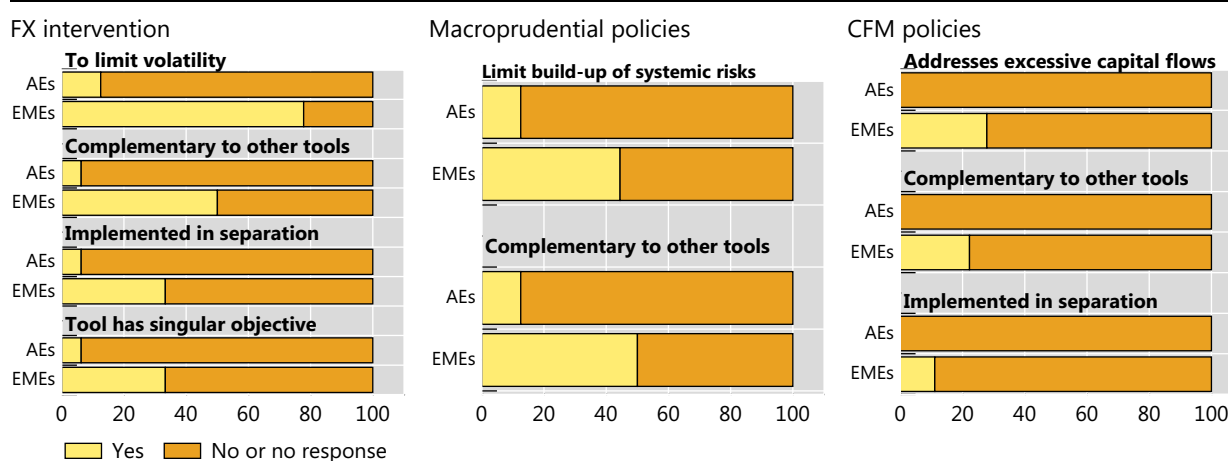
vary across types of assets and flows (Frost et al (2020), Magud et al (2011)). Using a gravity model, Bricongne et al (2020) find that CFMs have a negative impact on capital flows which can be limited and heterogeneous depending on flow type (with FDI being particularly sensitive) and restriction type (restrictions on inflows in destination countries being more effective). Frost et al (2020) concludes that FX-based MPMs can be more effective in reducing capital inflows than capital flow restrictions.

Among the central banks that completed the Working Group's survey, around half use MPMs and consider them to be at least moderately effective (Graph 4.1, centre panel). Several EME central banks deem CFMs useful for addressing extreme capital flows that are not warranted by economic fundamentals (Graph 4.1, right-hand panel). While many central banks pointed out that CFMs can complement other tools, only a small subset mentioned that they implement CFMs separately in order to manage exchange rate fluctuations and capital flows.

## Central banks' views about the effectiveness of policy tools

As a percentage of central banks within each group

Graph 4.1



Source: CGFS Working Group, Survey on changing patterns of capital flows, August 2020, question 22b, 22c, and 22d.

## FX intervention

A commonly used tool for responding to volatile capital flows is intervention by the central bank in the FX market. Economies with fixed exchange rates need to stand ready to buy or sell at any time in order to maintain the exchange rate. Economies with flexible exchange rates might occasionally intervene during periods of extreme volatility to keep extreme changes in the exchange rate from feeding into inflation dynamics.

By building up international reserves, countries can self-insure against a shortage of funding liquidity. To the extent that reserves increase investors' confidence in a country's capacity to meet its external obligations in the event of a shock, they reduce country risk and thus spreads. They also have a potential signalling effect, in that larger stocks of international reserves are linked to higher gross inflows and lower gross outflows (Alberola et al (2016)). At the same time, the fiscal cost of FX reserve accumulation can be high when the return on reserve assets is substantially lower than the cost of borrowing (Aizenman et al (2010)), which is the case for most EMEs.

The effectiveness of using reserves to intervene in FX markets depends on adequate execution, appropriate communication of the intervention's objectives and consistency with other macroeconomic policies (BIS (2013), Carstens (2019)). Many central banks, in particular those from EMEs with a flexible

exchange rate, consider FX intervention to be a very effective tool (Graph 4.1, left-hand panel).<sup>10</sup> It is seen as a way to address extreme volatility in order to support market functioning and restore efficient price discovery (CCA (2021) and Box 4A).

FX intervention comes with costs. These include the distortion of incentives to take risks, which consequently impairs the development of the FX market; potential misalignment of the exchange rate; depletion of reserves and sterilisation costs (carry costs). If not properly communicated, FX intervention could hamper central bank credibility as it could make policy practices less transparent. Also, the impact of FX intervention tends to be short-lived (IMF (2020b)).

### Global financial safety net

The final set of tools available to policymakers for responding to capital flows is the GFSN. The GFSN is a set of institutions and mechanisms that provide the financial support to both prevent a crisis and mitigate the effects of a crisis, facilitating adjustment at the country level and keeping the crisis from spreading further (ECB (2016)). Contrary to international reserves, other tools in the GFSN, notably central bank swap lines, regional financing arrangements (RFAs) and IMF programmes, require a bilateral or multilateral agreement (IMF (2016 and 2017)).

Tools in the GFSN have different benefits and costs depending on the shock. The pooling of resources in RFAs is an alternative to self-insurance. RFAs spread the cost of insurance over a group of countries. Examples include the Chiang Mai Initiative in Asia, the European Stability Mechanism and the Latin American Reserve Fund. However, RFAs' usefulness is limited when shocks to members are correlated. The usefulness of some RFAs is further constrained by their modest size and the fact that they have yet to be tapped.

Swap lines from major central banks are designed to address short-term FX liquidity shortages that might affect monetary policy transmission by disrupting domestic markets; they are not appropriate for alleviating balance of payments pressures. IMF lending facilities are primarily designed to address actual or potential balance of payments pressures as well as provide space for medium-term structural adjustment. Furthermore, they are available to almost all economies, in contrast to swap lines from reserve currency-issuing central banks, which are restricted to a small set of economies.

After the GFC, IMF lending arrangements increased in size and number. In particular, the IMF complemented its traditional financing programmes with precautionary facilities with few or no conditions attached to their use. For example, the Flexible Credit Line (FCL) offers large, up-front access to IMF resources, with no ex post conditions, to economies with very strong economic fundamentals and policy track records. The FCL can be used to reduce the carry costs of building up foreign reserves. In the past, the conditionality attached to IMF programmes and, in some cases, a perception of stigma associated with them, discouraged their use (Scheubel et al (2019)).

There is ongoing debate about whether the GFSN has expanded enough to keep pace with financial globalisation (IMF (2017)). Many consider adequate funding for the IMF to be key to a strong GFSN (IMF (2016), G20 (2020)). Others still worry that unconditional financing gives rise to moral hazard, although evidence of moral hazard from market reactions to various IMF policy announcements is mixed (Dell'Ariccia et al (2002)). The debate would benefit from more empirical evidence about the GFSN's effectiveness.

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<sup>10</sup> There is evidence that FX interventions are more effective in EMEs whose exports are mainly invoiced in US dollars (Chuaprapaisilp et al (2018)).

## 4.2 Interactions and implementation challenges

The effectiveness of the policy tools outlined in Section 4.1 depends critically on the interactions between them. Some tools are most effective when accompanied by complementary measures, while others may be effective in isolation. Such considerations led central banks in many EMEs to adopt inflation targeting and a floating exchange rate as their monetary policy framework, combined with FX interventions and macroprudential tools to mitigate the impact of capital flow swings and exchange rate volatility on inflation, export competitiveness and financial stability (BIS (2019)).

In general, each individual tool is considered most effective when it pursues a distinct policy goal. The use of a tool in order to achieve one target precludes its use in achieving other targets (Tinbergen (1952)). In practice, some tools interact, and tools implemented in pursuit of one goal have implications for the achievement of other goals. With respect to capital flows, the most important interaction is between capital mobility, the exchange rate regime and monetary policy autonomy – the “impossible trinity”. In the presence of dominant global push factors that give rise to co-moving capital flows, individual countries find it hard to protect their open economies from exogenous shocks. In this context, the trilemma has been reduced to a dilemma, as countries with flexible exchange rate regimes may have to choose between monetary policy autonomy and open capital accounts (Rey (2015)).

Theoretical models suggest that a mix of policy tools allows for complementarities to be exploited. For instance, in the context of a flexible exchange rate regime, models show that monetary autonomy can be strengthened through occasional FX interventions and CFMs (Klein and Shambaugh (2015), Basu et al (2020), IMF (2020a)). When extremely volatile capital flows cause exchange rate fluctuations and generate boom-bust cycles in the domestic economy, the optimal policy response may be to use both FX intervention and monetary policy to partially stabilise the exchange rate (Cavallino (2019)). In the case of large portfolio inflows, building international reserves and tightening the fiscal policy stance could prevent FX appreciation and the buildup of financial vulnerabilities (IRC Taskforce on IMF Issues (2018)). Finally, CFM tools used on either inflows or outflows can be an effective way to make monetary policy more independent (Magud et al (2018)).

In the survey, many central banks responded that MPMs are the most effective tool for strengthening other policies and addressing financial vulnerabilities. A strong macroprudential policy framework can provide more flexibility for monetary policy to pursue price stability (Nier and Osiński (2013)). In the presence of constraints to monetary policy, such as an effective lower bound (eg among AEs) or a crawling peg (eg among EMEs), MPMs help curb nominal rigidities as well as aggregate demand or pecuniary externalities (Farhi and Werning (2016)).

In a recent report by central banks in emerging Asia, FX intervention and CFMs were recognised as the most suitable tools for reducing risks to financial stability from extreme exchange rate and capital flow volatility, and MPMs were recognised as suitable for addressing specific risks to domestic financial stability (ACC (2020)). At the same time, the report recognised that the distinctions between different policies are not completely clear because they could operate through the same channels and affect multiple objectives. Indeed, in some circumstances tools may act as substitutes rather than complements. When the use of MPMs increases, the effectiveness of CFMs may decrease (Acosta-Henao et al (2020)). Macroprudential taxes on domestic consumer debt are perfect substitutes for CFMs when they cover the entire economy without leakages (Basu et al (2020)). However, if residents can borrow directly from abroad and are outside the macroprudential perimeter, the tools are imperfect substitutes.

Furthermore, macroprudential policies can reduce the connection between monetary policy and capital inflows, weakening the case for CFMs (Rey (2015), Frost et al (2020)). By preventing extreme credit growth during booms, financial authorities may reduce the incentive for banks to borrow externally when domestic monetary policy tightens.

An especially important interaction to consider is that with fiscal policy. Economies with strong fiscal positions and prudent debt management policies are more likely to have the space to engage in countercyclical fiscal policy in order to mitigate the negative effects of capital flows (Capistrán et al (2011)). Conversely, economies lacking fiscal discipline will be both more vulnerable to swings in capital flows and more reliant on other policy tools to respond to adverse external shocks.

Beyond considerations of effectiveness, policymakers face important practical challenges to the implementation of policy tools. First, authorities need to consider that policy implementation may be conducted by different agencies, and coordination among them may be imperfect (Acosta-Henao et al (2020)). Second, while each policy tool could have its merits in certain circumstances, in practice central banks will need to consider how to carefully incorporate multiple objectives and tools into their policy and communication strategy. Current models poorly capture some tools' interactions, which adds to the difficulty of calibrating them. And third, it may be difficult to identify shocks in real time, so having a transparent policy guidance based on observable real-time metrics could facilitate the application of tools, complemented by expert judgment.

To guide policymakers' understanding of the interactions, complementarities, substitutability and frictions between several policies, the IMF has developed an integrated policy framework (IPF) that jointly considers the role of monetary policy, FX intervention, MPMs and CFMs (IMF (2020a)). However, the IPF does not yet directly incorporate either the implications of the fiscal stance for the efficacy of other policy tools or spillovers to other economies. The IPF concludes that the trade-offs faced by policymakers, especially those stemming from extremely volatile capital flows, warrant the use of multiple tools under certain conditions. It does not recommend a pre-determined hierarchy in which the tools should be used, finding instead that the optimal combination depends on country conditions and shocks. Central banks and the BIS similarly conclude that employing a combination of tools in a complementary manner can strengthen policies' effectiveness and also help mitigate some of their unwanted side effects (BIS (2019), ACC (2020)).

### 4.3 International spillovers

Policies aimed at a target in one country can have unintended consequences for other economies by triggering shifts in capital flows. AE monetary policy is perhaps the most prominent example. While not used by AEs as a tool for managing capital flows, it acts as a key exogenous push factor, as discussed in Chapter 2. Yet, there is cross-country evidence that prudential measures implemented in both recipient countries and countries of origin can potentially offset spillovers that arise as a result of AEs' monetary policy (Bussière et al (2021), Coman and Lloyd (2019)).

Some MPMs that aim to reduce domestic financial vulnerabilities overall might not explicitly target capital flows, but they do have important implications for them. In response to tighter MPMs, banks reduce their lending at home and abroad (Aiyar et al (2014)), but the decline abroad is greater when these measures interact with other policies that render domestic lending more attractive (Forbes et al (2017)). In fact, foreign affiliates might actually play an important role in transmitting these shocks across economies (Cerutti and Zhou (2018)). There is also evidence that macroprudential tools targeting domestic liquidity or specific sectors generate greater international spillovers, while those related to bank capital requirements have weaker effects (Buch et al (2019)). US monetary policy seems to intensify the effects on cross-border US-dollar denominated lending of MPMs implemented by authorities in creditor countries and could thus be considered a positive spillover effect from AEs (Avdjiev et al (2020)).

Policy tools such as capital controls that explicitly target capital inflows can also have implications for other economies. For instance, after Brazil introduced capital controls, mutual fund managers reduced their portfolio allocations to Brazil, but they increased their investments to other economies over the 2008-13 period (Forbes et al (2016)). In particular, there is evidence that capital flows to economies with similar characteristics increase (Pasricha et al (2018)). Private sector representatives confirmed this finding

during the Working Group's roundtable discussion (Annex A2). They acknowledged that economies with liquid markets often bear the brunt of adjustments when other economies implement CFM measures, particularly during periods of high volatility.

The accumulation of international reserves can also generate spillovers. Central banks invest FX reserves almost entirely in assets denominated in a few currencies, with the majority in US dollar assets. The resulting demand for reserve currency assets can affect financial and real outcomes in the countries issuing reserve currencies (Benigno et al (2020)).

#### 4.4 Lessons from the Covid-19 crisis

The Covid-19 crisis tested the policy tools available to central banks. Central banks around the world responded quickly and aggressively to stimulate economic activity and restore stability in financial markets. Notably, EME central banks joined AE central banks in aggressively cutting policy rates and easing monetary policy. This was very different from the usual playbook used by EME central banks (Aguilar and Cantú (2020)). In the past, EME central banks facing a financial crisis tightened monetary policy to stem capital outflows and stabilise the currency. Monetary policy consequently tended to be pro-cyclical. In contrast, during the Covid-19 stress period of March and April 2020, monetary policy was countercyclical. Similarly, past fiscal policy in EMEs was highly pro-cyclical and generally not used to respond to swings in capital flows (Ghosh et al (2017)). In 2020, many EMEs eased fiscal policy, although the fiscal stimulus was much smaller than that in AEs.<sup>11</sup>

Three factors explain why EMEs were able to respond countercyclically to the Covid-induced capital outflows and turmoil in financial markets. First, economies with relatively better economic fundamentals were more resilient to the effects of this crisis. Second, EMEs' cyclical position at the time of the Covid-19 shock left room for policy easing. Inflation was contained and economies did not overheat (Aguilar and Cantú (2020)). Third, AEs' synchronous easing of monetary policy generated tailwinds that rendered the measures implemented in EMEs more effective.

In addition to easing policy, central banks introduced new monetary policy tools to address market dysfunction triggered by the sudden stop in portfolio flows. As discussed above, some EME central banks launched APPs, debt swaps or special liquidity facilities, which played a significant role in stabilising financial conditions. While central banks' actions were motivated by their mandate to maintain price and financial stability and the APPs in EMEs were smaller than those in AEs, these programmes nevertheless raise questions about the line between fiscal and monetary policy. That line is clearer for central banks with a high degree of credibility built on a long track record of stability-oriented policies (Carstens (2020)).

The sudden reallocation of portfolios and the associated market disruptions seen in March also raise questions about the resilience of market-based intermediation and the tools used to address consequent systemic risks. The Financial Stability Board is leading work to enhance the resilience of non-bank financial intermediation (FSB (2020a)). This work includes examining the channels through which shocks are propagated, which may have implications for the risks posed by capital flows.

In response to the sudden stop, EMEs also relaxed MPMs and CFMs in order to encourage capital inflows and ease liquidity (OECD (2020)). For example, Peru reduced its reserve requirements for short-term FX liabilities to non-residents from 50% to 9%, and Korea raised its cap on FX forward positions.

Furthermore, in their response to the Working Group's survey, several central banks noted that they intervened in the FX market, mainly to smooth extreme FX volatility or to provide US dollar liquidity to the market. These interventions were carried out through both spot and derivatives transactions. In general, FX interventions were effective in reducing depreciation trends, alleviating pressure on the private

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<sup>11</sup> In EMEs the fiscal stimulus represented about 2% of GDP (1% if China is excluded), compared to more than 8% in AEs (IMF (2020b)).

sector (CCA (2021)). Yet, some central banks acknowledged that the effectiveness of FX interventions depended on how sound the underlying economic fundamentals were. Most respondents noted that the use and effectiveness of FX intervention did not change during the Covid-19 crisis, but some reported that effectiveness was weaker compared to the pre-Covid period.

FX interventions by central banks in March 2020 exposed the links between public sectors discussed in Chapter 1. More than half of the \$400 billion liquidation of US Treasury securities by foreign investors that month was attributed to foreign public sector institutions seeking US dollar cash (Board of Governors of the Federal Reserve System (2020)). These came on top of sales by a wide range of investors, which caused liquidity conditions in the US Treasury market to deteriorate significantly (Infante and Saravay (2020)). While reserve sales by central banks were not the primary driver of the stress, the episode highlighted the international spillovers caused by FX intervention. In response, the US Federal Reserve and ECB introduced repo facilities specifically for foreign central banks.

The GFSN played an important part in the response to the crisis. Major central banks set up swap lines with a number of EME central banks, which were later complemented with new or expanded repo facilities. Some countries strengthened their access to foreign funding by arranging an FCL with the IMF and at least one drew on their FCL. In addition, the IMF established a new precautionary instrument that mirrored the characteristics of a swap line, the Short-term Liquidity Line (SLL), for members with very strong policies and fundamentals in need of potential short-term support related to capital account pressures.

## 4.5 Conclusions

The 2009 CGFS report on capital flows warned that economies with open capital accounts needed to be prepared for spillovers because flexible exchange rates could absorb only part of any shock (CGFS (2009)). The Covid-19 crisis, like the GFC, once again illustrated that global shocks can have severe economic and financial consequences even for economies with strong structural policies and sound fundamentals. That said, the Covid-19 crisis also demonstrated that additional policy tools can help safeguard financial stability in the presence of extreme shifts in capital flows.

Three policy conclusions emerge from the Working Group's analysis of recent trends, underlying drivers and the trade-offs that policymakers face in the context of capital flows and the policy tools used to address related risks.

**First, policies that address short-term vulnerabilities or market dysfunction are no substitute for reforms that strengthen the resilience of the economy and financial system.** While they might mitigate the risk of abrupt adjustments, they are not a mechanism for preventing warranted but sometimes costly adjustments when policies are unsustainable or institutions are weak. As the CGFS concluded in its 2009 report, the optimal policy strategy for dealing with capital-flow related risks and benefits must focus on stability-oriented policy frameworks, strengthened institutions, promotion of healthy balance sheets and development of deep markets, while enhancing monetary policy autonomy. Research and policy experience since the GFC show that stronger institutions have an impact not only on the quantity but also on the quality of flows. This conclusion is also supported by EMEs' responses to the Covid-19 shock, which showed that improved fundamentals buy important policy space in a crisis.

**Second, there is no-one-size-fits-all prescription.** Countries have to weigh the potential benefits and risks of openness to capital flows, considering the quality of their economic institutions, and this trade-off will be different for each country. Advances in understanding benefits and risks, which were discussed in Chapter 3, and the circumstances in which different tools are effective, discussed in this chapter, provide nuanced guidance for policymakers looking to formulate a package of measures appropriate to their country's specific circumstances. The infrastructure of the global financial system – the pipes – has changed, and measures to address short-term vulnerabilities must take these changes into

account as well. The optimal policy combination will depend on the nature of the shock, the initial circumstances and the specific trade-off that each country faces.

**Third, international cooperation is still key.** Experience since the GFC has made clear that the pipes channelling capital are interconnected and operate on a global scale. Recently, the growing footprint of non-bank financial intermediaries has contributed to these geographical and institutional interlinkages. Therefore, the policy actions in source and recipient countries that affect these pipes and the flows they channel have global implications. This consideration points to the need for a continuous monitoring of the risks to financial stability and an international dialogue about potential spillovers. The need to strengthen such monitoring and dialogue was highlighted in previous reports by the CGFS, IMF, G20 and other international bodies, as was the different responsibilities of source and recipient countries in addressing the risks arising from volatile capital flows.

The Covid-19 crisis highlighted the critical role of liquidity provision during crises, inter alia in the form of the GFSN, and the importance of building a common understanding of the joint impact of policy tools on capital movements and the international financial system. While central bank swap and repo lines, alongside other targeted liquidity actions, helped stabilise financial markets during the Covid-19 crisis, the IMF provides a durable, consistent and global layer of protection against sudden financial shocks within the GFSN. Furthermore, the IMF is well placed to take a central role in providing international policy guidance while also supporting capacity development across a broad membership. In that regard, the IMF's development of the IPF is a welcome step forward, along with work by the BIS and central banks to understand the circumstances in which MPMs and CFMs are best applied, the interaction between fiscal policy and other policy tools, and the potential international spillovers of policy actions.

More generally, the Covid-19 crisis underscored the vulnerabilities posed by the shift from bank to non-bank financial intermediation and the need to strengthen the resilience of the latter. The changes required to strengthen this resilience are beyond the scope of this report. The Financial Stability Board (FSB) is coordinating international efforts to examine and address specific risk factors and markets that amplified the Covid-19 shock; to enhance understanding of systemic risks in non-bank financial intermediaries and the financial system as a whole, including interactions between banks and non-banks and cross-border spill-overs; and to assess policies to address systemic risks in non-bank financial intermediation (FSB (2020a), FSB (2020b)). The outcome of these efforts will constitute an important contribution to lowering the risks associated with extreme shifts in capital flows.

## FX intervention in inflation targeting EMEs: Mexico's experience

In the years since Mexico moved from a crawling peg to a flexible exchange rate, the Bank of Mexico has intervened occasionally in FX markets to foster its adequate functioning. In combination with the central bank's inflation targeting framework, these interventions have contributed to the maintenance of financial, macroeconomic, and price stability.<sup>①</sup>

The Mexican peso (MXN) is the second most traded emerging market currency.<sup>②</sup> Spot and derivatives markets for MXN are well developed, trading 24/7 around the world, and the MXN is a fully deliverable currency that clears under payment versus payment schemes (CLS). Notwithstanding its liquidity, the MXN is prone to abrupt movements during stressful circumstances.

According to the Bank of Mexico, it supports the development of the MXN market and limits its interventions to ensuring an orderly functioning of the market. Its interventions are not intended to prevent the exchange rate from reaching any particular level because the central bank considers that such interventions are likely to prove ineffective and costly.<sup>③</sup> As such, the stated objectives of the Bank of Mexico's FX interventions are twofold: 1) manage the level of international reserves and 2) promote an orderly functioning of the FX market.

As the FX market developed and new technologies emerged, including high frequency trading and algorithms (pipes described in Chapter 2), the central bank has adapted its intervention toolkit to these evolving market conditions, including the use of new mechanisms and even less frequent and discretionary FX interventions. For instance, FX intervention mechanisms have been modified to take account of the fact that most MXN trading takes place offshore, among foreign financial intermediaries.

In regards to its effectiveness, FX interventions to achieve a specific stock of international reserves have been very effective. Assessing the effectiveness of interventions when the objective is to temper extreme exchange rate volatility is more difficult, as there is no counterfactual to compare the outcome without intervention. That said, the available evidence suggests that the Bank of Mexico's interventions to temper extreme volatility have been effective.<sup>④</sup> Finally, the central bank aims to be transparent about its policy objectives. All FX interventions are communicated to the public after they take place with an accompanying statement explaining the motives of such intervention.

① Mexico moved to a flexible exchange rate regime in 1994 and adopted inflation targeting in 2002. ② Based on the BIS Triennial Central Bank Survey of Foreign Exchange and Over-the-counter Derivatives Markets in 2019. ③ Chamon et al (2019). ④ García-Verdú and Ramos-Francia (2014) evaluate the intervention effects for Mexico on the expected exchange rate using derivatives market data through a linear regression model. They find little evidence of an effect on the expected exchange rates' distribution in general. But, in some cases, they find statistical evidence of a certain effect which tends to be short-lived or not economically significant.

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## Annex A Summaries of roundtables

### A1 Roundtable with academics

The virtual roundtable with academics took place on 29 September 2020 and was organised around the four chapters of the report. At the beginning of each session, one or more of the invited academics gave a short presentation: Francis E Warnock (University of Virginia) and Brad Setser (Council on Foreign Relations) discussed trends; Kristin J Forbes (MIT) discussed drivers; Şebnem Kalemli-Özcan (University of Maryland and IMF) discussed benefits and risks; and Gian Maria Milesi-Ferretti (IMF) and Alessandro Rebucci (John Hopkins University) discussed policy. Following their presentations, academics and members of the Working Group engaged in an open discussion.

#### Trends

Against the backdrop of global savings patterns and optimal portfolio allocation decisions, participants mentioned that it was important to calibrate a ‘natural’ level of flows when assessing fluctuations in capital flows. Deviations from this ‘natural’ level could help predict ‘sudden stops’.<sup>1</sup> In contrast to the pre-GFC period, capital flows prior the Covid-19 shock had been below their ‘natural’ levels, which could indicate that the sharp outflows seen in spring 2020 may prove temporary.

In addition to the standard drivers, participants emphasised that tax codes could act as important drivers of gross capital flow movements, particularly for FDI flows. This sort of firm behaviour made nationality-based balance of payments data important (eg to pick up Brazilian corporate bond issuance in the Netherlands).

Overall, participants agreed that the post-GFC period had seen fewer extreme episodes of capital flow movements. However, it was stressed that, when analysing sudden shifts in capital flows, one should be aware that borrower actions could be as important as lender actions, as “it takes two to tango”. For example, sudden banking outflows from China in 2015 were driven by Chinese corporates deciding to voluntarily repay external debt rather than by foreign banks pulling credit lines.

#### Drivers

Recent research found not only that the occurrence of extreme capital flow episodes declined after the GFC, but also that the role of global push factors such as general risk attitudes and global growth had diminished in this period as well. This phenomenon could be attributed to the shift away from bank flows, the observation that banks had become better capitalised, and the post-GFC implementation of stronger macroprudential frameworks. Participants also noted that EMEs had improved fundamentals and adopted reforms, which was reflected in smaller current account deficits, higher reserves and greater FX flexibility to absorb shocks.

Participants mentioned that it was striking to see how few EMEs were flashing red on standard risk indicators pre-Covid. Furthermore, EMEs had now started using QE, which could affect capital flows going forward. It was pointed out that future research would be necessary in order to provide answers to the following questions.

- How does the shifting composition of capital flows from bank to portfolio debt and, within that, local currency debt affect the behaviour of aggregate flows?
- How does the shape of the distribution of capital flows change at different stages of the economic cycle?

<sup>1</sup> Generally speaking, the analysis of flow patterns builds on a different set of models than the analysis of extreme periods. The difference between these two types of analysis is also reflected in Chapter 2 of this report.

- How has the change in 'pipes' (the shift from bank- to market-based finance) impacted the effectiveness of macroprudential policies?

## Benefits and risks

In order to assess the risks and benefits associated with capital flows, participants pointed out that the following aspects should be considered:

- the composition of capital flows by flow type and asset class;
- who the borrowers and lenders are;
- the financial frictions prevalent in recipient countries, especially EMEs; and
- the stance of US monetary policy.

Participants stressed that FDI was found to be beneficial and that debt-related flows posed the most risk according to the literature. Yet, debt still accounted for most external finance in EMEs. A critical aspect to recognise was that, because most EME corporates were SMEs, they borrowed from domestic banks that, in turn, borrowed on capital markets, including external markets. In this regard, financial frictions meant that SMEs might not gain from capital flows in the ways that standard textbook models suggested.

While the availability of market-based finance could, in principle, bring risk-sharing benefits, participants pointed out that it was still better for EMEs to lean towards FDI by implementing policy and institutional frameworks that attracted foreign investors. Often, knowledge transfer could occur as an additional FDI-related benefit, rather than just representing a "sticky" source of finance. An important caveat was stressed, namely that not all FDI was "sticky" and featured "greenfield" investment in new plants. For instance, FDI inflows could derive from retained profits and might then leave the country as portfolio outflows to tax havens. In this context it was also mentioned that future research was needed to explore the development of equity markets in EMEs and how their inherent volatility could be addressed.

## Policy

Participants pointed to the IMF's new Integrated Policy Framework as a provider of new insights into when it might be optimal to put sand in the wheels of capital flows. They recognised that capital controls were more powerful in models than in reality and that the relative lack of proactive use of capital controls as "gates" could reveal the stigma they have as a sign of bad future policies. It was mentioned that macroprudential policies, capital flow management measures (CFMs) and foreign exchange intervention (FXI) could internalise externalities and lead economies to borrow a bit less while mitigating the risks of potential crises. With QE, EMEs now also had a new policy tool to explore.

There was a consensus that, while these tools could suppress amplification mechanisms arising from frictions, policymakers also need structural policies in order to address the frictions themselves. The view was that, while macroprudential policies could present greater benefits than CFMs or FXI, they might not be able to reduce aggregate volatility in capital flows. Indeed, participants wondered whether macroprudential tools could actually foster the shift from banking flows to more volatile market-based flows.

A safer and sounder domestic financial system is important for reducing the amplification of capital flow volatility. Participants also hinted at encouraging evidence suggesting that macroprudential policies had helped lessen the Covid shock. Finally, a consensus emerged that there was a role for policy coordination among countries with regard to capital controls. This mattered for small players in particular, because national central banks could have difficulty justifying the implementation of measures aimed at mitigating externalities.

## A2 Roundtables with market participants

Two virtual roundtables with market participants were organised, one on 30 September 2020 with participants from Asia and another on 2 October 2020 with participants from the Western Hemisphere. Representatives from nine institutions participated, representing banks, asset management firms, hedge funds and rating agencies. The representatives worked in the emerging markets area.

The purpose of the roundtables was to shed light on recent trends and to learn more about how market participants assess the relative importance of different drivers affecting investment decisions. They were asked to address two main questions:

- Which are the main considerations that determine your decision to increase or decrease your investment in a foreign country?
- Do you see persistent trends in investor behaviour, and how do you think that the ongoing Covid-19 pandemic may affect those trends?

Participants shared the view that push factors acted as dominant drivers of capital flows post-GFC, pointing to loose monetary policy in AEs as a major factor. Low rates compressed spreads and risk premiums while pushing investors to pursue yield and diversification in EME assets. A dissenting voice argued that QE acted as a subsidy to AE assets (ie boosted valuations) and caused flows to either return to or stay in AEs. Several market participants noted that, since the outbreak of the Covid-19 pandemic, investors have become more selective and flows to EMEs have seen increasing differentiation at the individual country level.

In terms of pull factors, participants agreed that EMEs' fundamentals had increasingly shaped investors' decisions. EMEs had implemented sound policies and fiscal consolidation that had also made them more resilient to the Covid-19 shock. Among these, floating exchange rates, inflation-targeting frameworks and the development of local currency bond markets were highlighted. Participants also pointed out that capital flow management measures could be problematic if they were used as a cover for bad policies over an extended period of time.

In response to the Covid-19 shock, EMEs had emulated AEs in terms of accommodative monetary policies and fiscal support packages. As a result of parallel policies and thus blurring distinctions between AEs and EMEs, the diversification benefits of EME investments may have declined. Market participants noted that carry-driven investors had not returned to EME local currency markets and were instead favouring hard currency assets.

With respect to global pipes, participants pointed to the role of index inclusion and rating agencies as key drivers in the post-GFC period. Regarding local pipes, several indicated that domestic pension funds and insurers in EMEs had grown substantially, and their ability to absorb shocks in local currency bond markets helped curb the negative effects of foreign flow volatility. One participant noted that these local backstops were important considerations when allocating capital across different EMEs. Another participant suggested that, in the past, global regulations had mainly been shaped by developed markets in order to facilitate their access to financing and that changes occurred very slowly.

Participants agreed that risks in global financial markets had changed. They worried that while the decisive use of fiscal and monetary tools had been very effective at dealing with shocks, such policies were "maxed out" and not fully sustainable. New, big risks would arise from the limitations of current tools. Participants agreed that bank finance had become less important since the GFC and assets under management had shifted to less leveraged investors. Even so, one participant mentioned that substantial bond holdings were currently moving to investors with the highest liquidity needs and that these holders might not be the most stable investors going forward. Another market participant suggested that local risks in EMEs (eg weakened fiscal positions) might have been overlooked due to the dominance of push factors. Domestic inflation and a situation in which external funding needs became binding could be potential tipping points.

## Annex B Survey results

The survey was completed by 34 central banks in August 2020: 16 central banks from AEs and 18 central banks from EMEs. Participating central banks are listed below, grouped by exchange rate regime according to the IMF's classification.

Exchange rate regimes as of 2018<sup>1</sup>

Table B1

	Advanced economies	Emerging market economies
Floating	NZ, CH	AR, BR, CO, IN, KR, MY, PE, PH, ZA, TH, TR
Free-floating <sup>2</sup>	AU, BE, CA, FR, DE, IT, JP, LU, NL, ES, SE, GB, US	CL, MX, RU
Other managed arrangement		CN
Conventional peg		SA
Crawl-like arrangement		SG
Currency board		HK

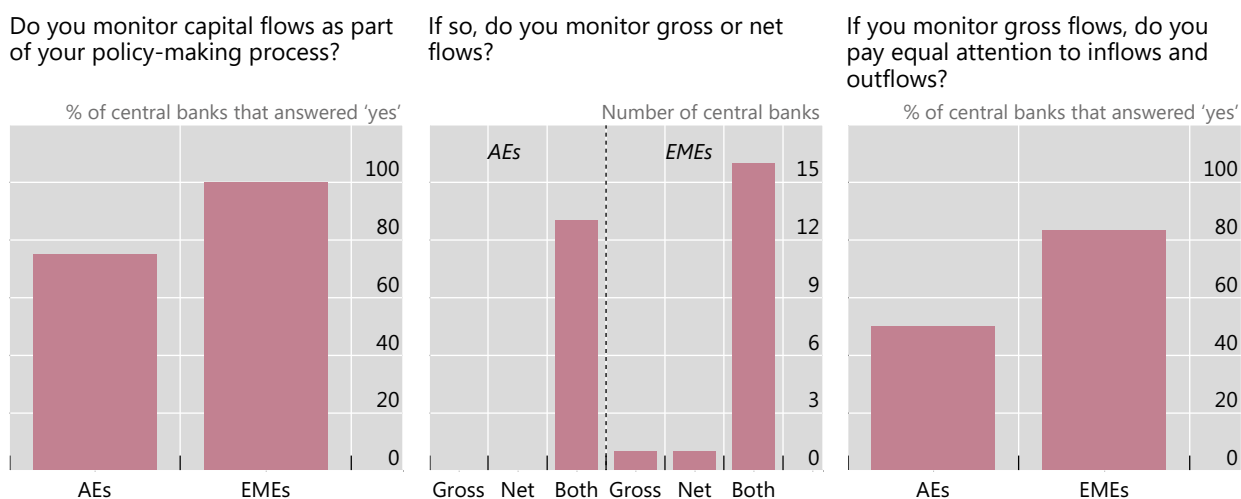
<sup>1</sup> Categories are based on the IMF's AREAER classifications. <sup>2</sup> A floating exchange rate is classified as free-floating if intervention occurs only exceptionally and aims to address disorderly market conditions and if the authorities have provided information or data confirming that intervention has been limited to at most three instances in the previous six months, each lasting no more than three business days.

Sources: IMF, *The Annual Report on Exchange Arrangements and Exchange Restrictions* 2019 edition.

## B1 Trends

Monitoring of capital flows by central banks

Graph B1

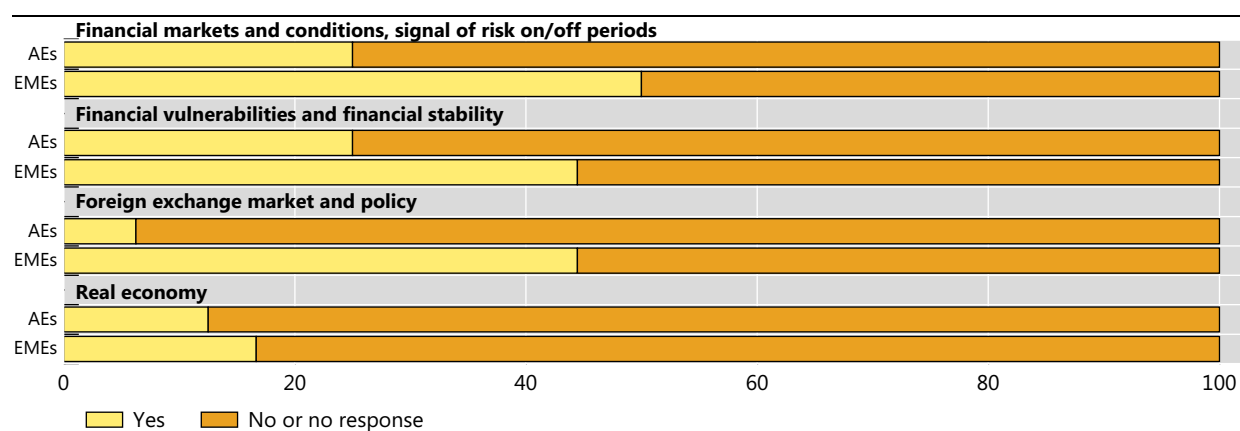


Source: CGFS Working Group, Survey on changing patterns of capital flows, question 1.

## Why do you monitor capital flows?

Percentage of central banks within each group that gave the following reasons

Graph B2

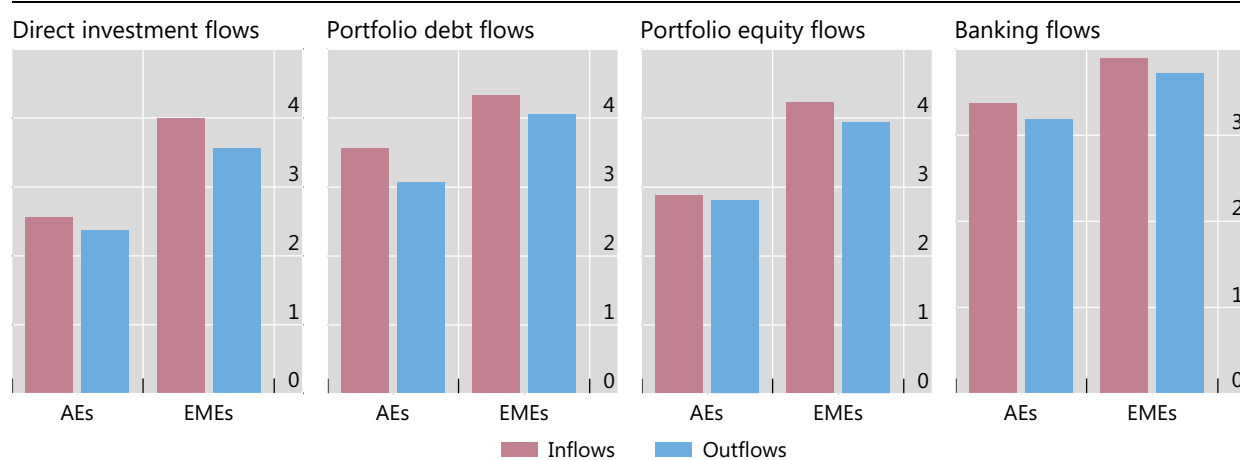


Source: CGFS Working Group, Survey on changing patterns of capital flows, August 2020, question 1.

## What types of gross capital flows are important for central bank policy making?

Average scale (1=not relevant, 5=very relevant)

Graph B3

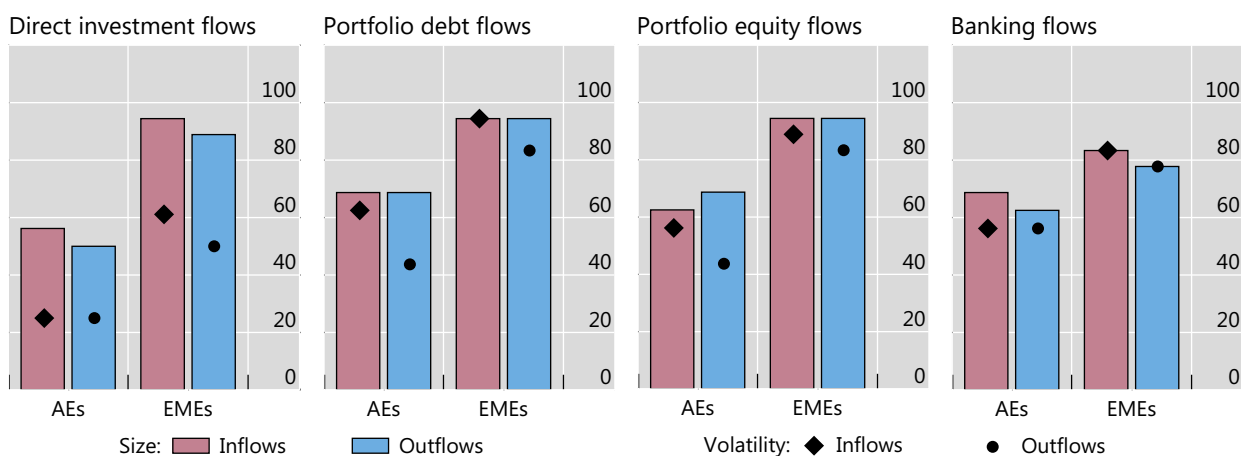


Source: CGFS Working Group, Survey on changing patterns of capital flows, August 2020, question 2.

## Do you pay attention to the size and volatility of inflows and outflows?

Percentage of central banks within each group that answered “yes”

Graph B4

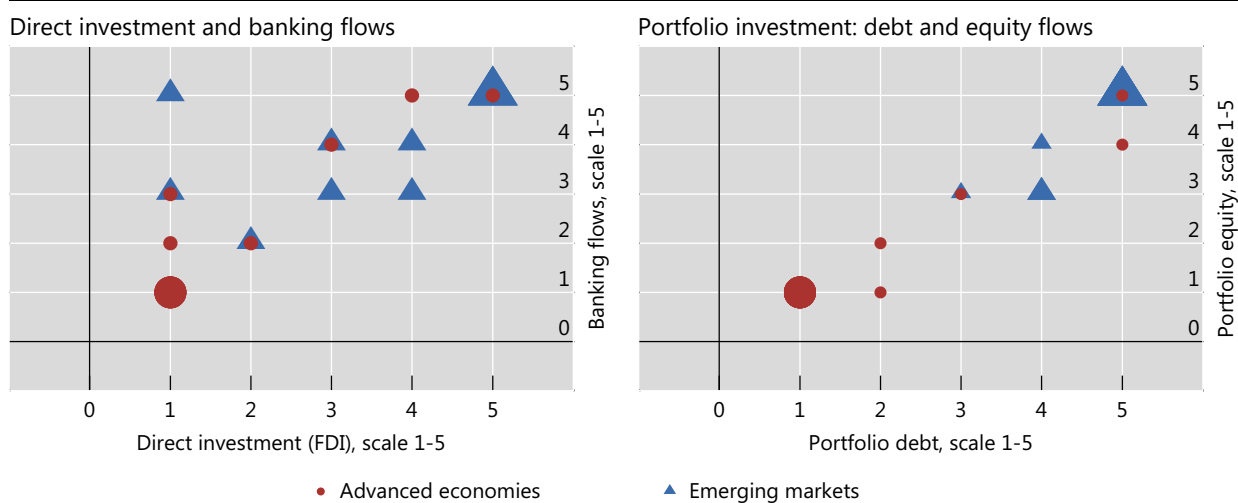


Source: CGFS Working Group, Survey on changing patterns of capital flows, August 2020, question 2.

## Does the type of investor matter for central bank policy making?<sup>1</sup>

Scale (1=not relevant, 5=very relevant)

Graph B5



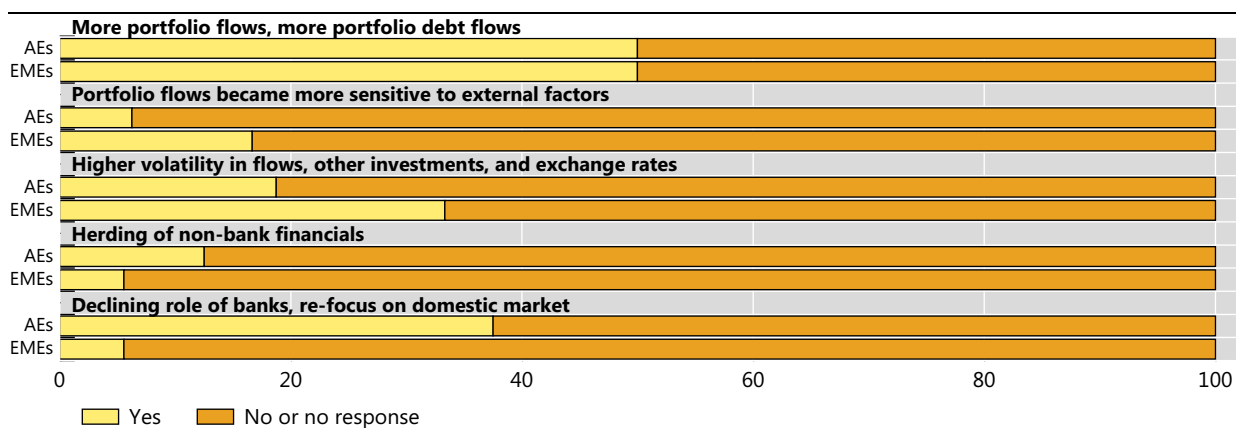
<sup>1</sup> Marker size indicates the number of central banks within groups of AEs and EMEs that correspond to each coordinate.

Source: CGFS Working Group, Survey on changing patterns of capital flows, August 2020, question 3.

## Key trends over the post-GFC period

Percentage of central banks within each group

Graph B6



Source: CGFS Working Group, Survey on changing patterns of capital flows, August 2020, question 4.

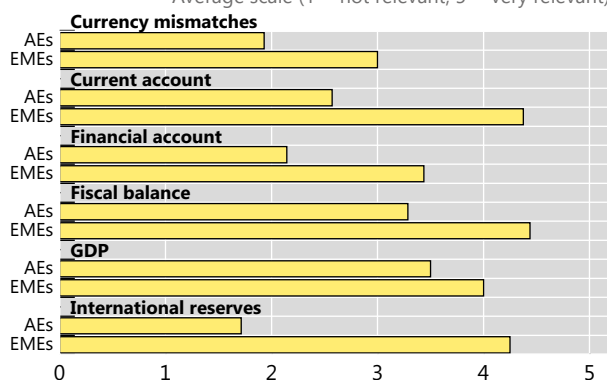
## B2 Drivers

### Main drivers of capital flows

Graph B7

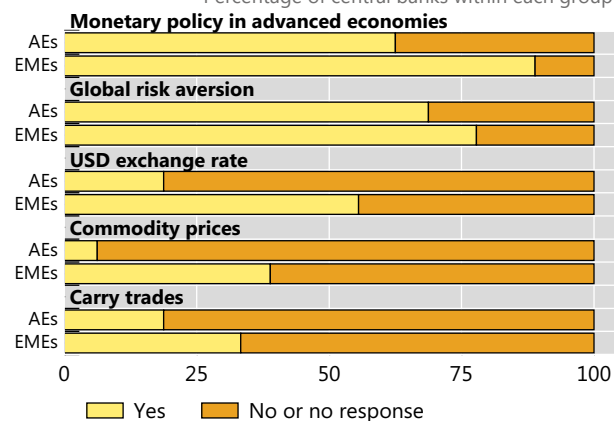
Pull factors

Average scale (1 = not relevant, 5 = very relevant)



Push factors

Percentage of central banks within each group

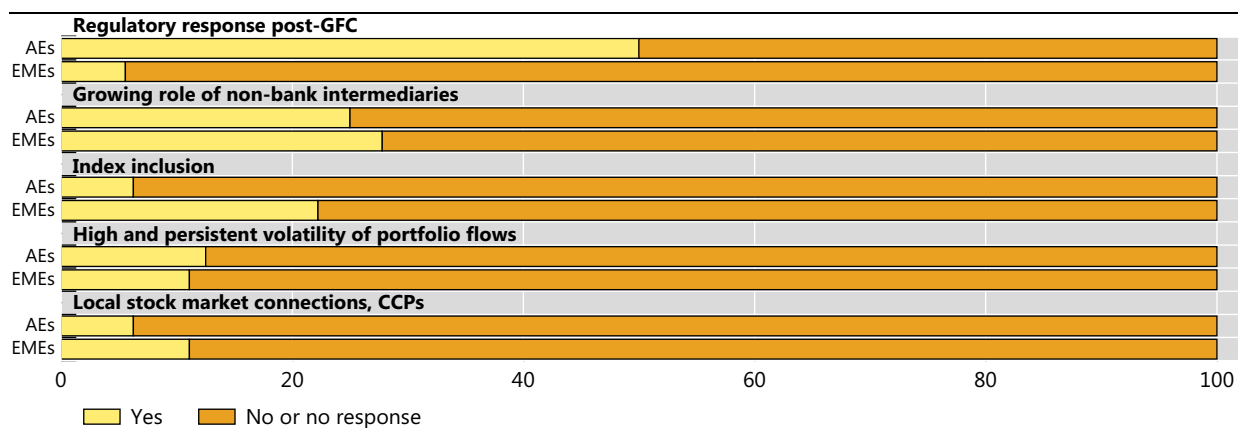


Source: CGFS Working Group, Survey on changing patterns of capital flows, August 2020, questions 6a and 7.

## What amplifies or dampens capital flow dynamics?

Percentage of central banks within each group

Graph B8

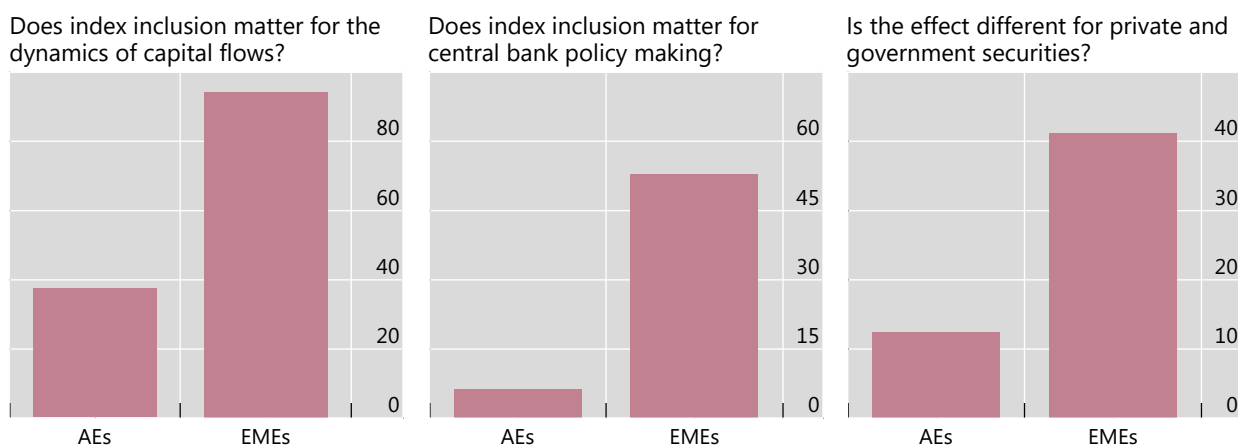


Source: CGFS Working Group, Survey on changing patterns of capital flows, August 2020, question 8a.

## Index inclusion and capital flows

Percentage of central banks that answered "yes"

Graph B9

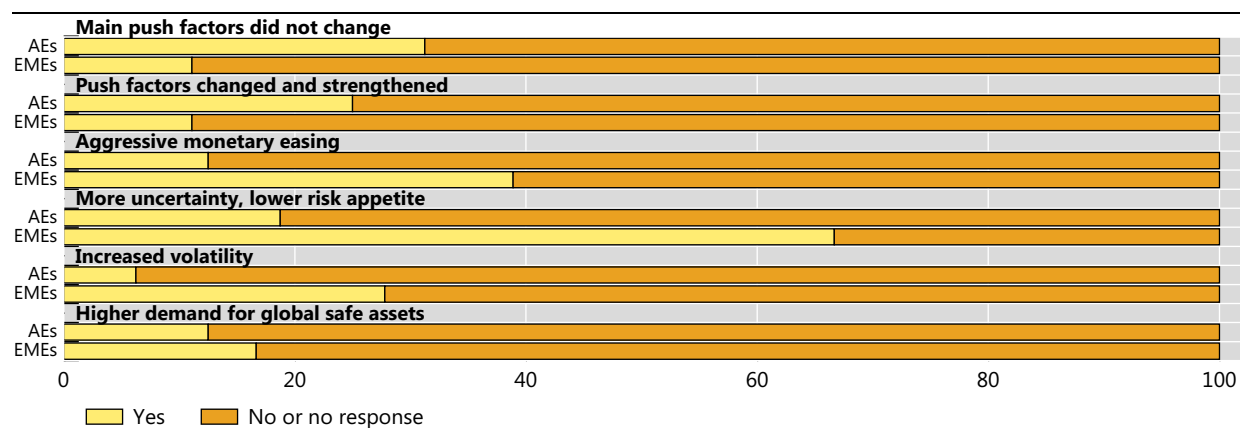


Source: CGFS Working Group, Survey on changing patterns of capital flows, August 2020, question 8b, 8d, and 8f.

## Which push factors changed after the GFC?

Percentage of central banks within each group

Graph B10

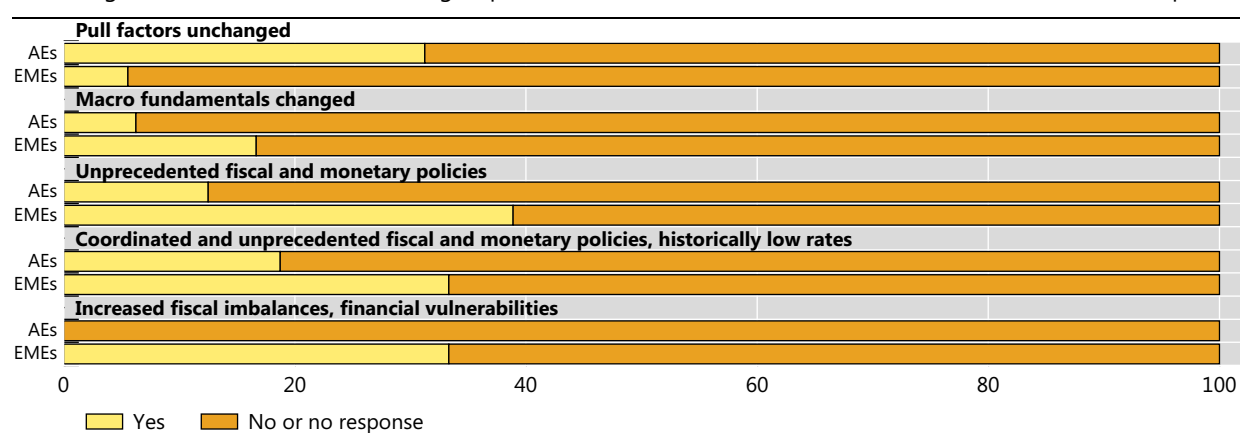


Source: CGFS Working Group, Survey on changing patterns of capital flows, August 2020, question 9a.

## Which pull factors changed after the GFC?

Percentage of central banks within each group

Graph B11

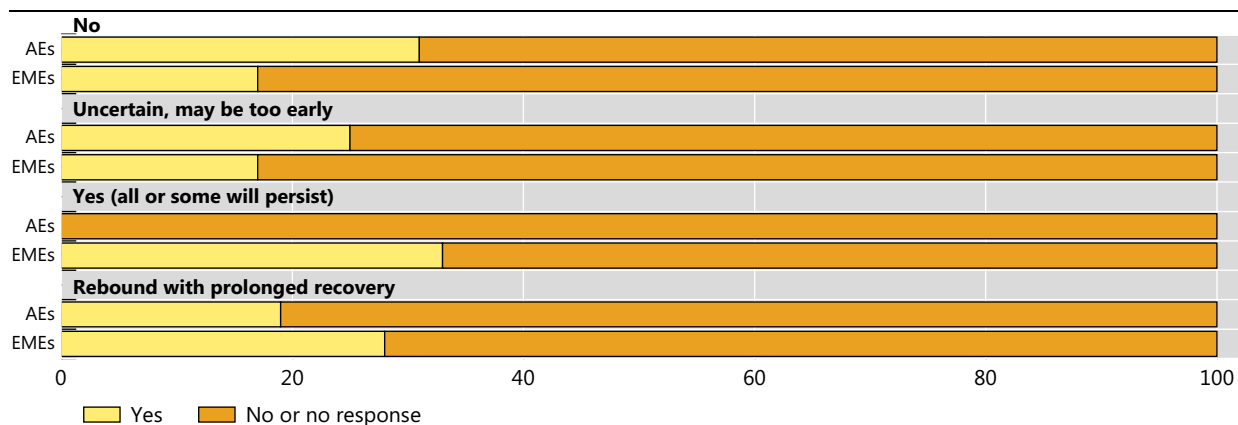


Source: CGFS Working Group, Survey on changing patterns of capital flows, August 2020, question 9b.

Do you expect the Covid-19 crisis to result in persistent changes in capital flow dynamics?

Percentage of central banks within each group

Graph B12



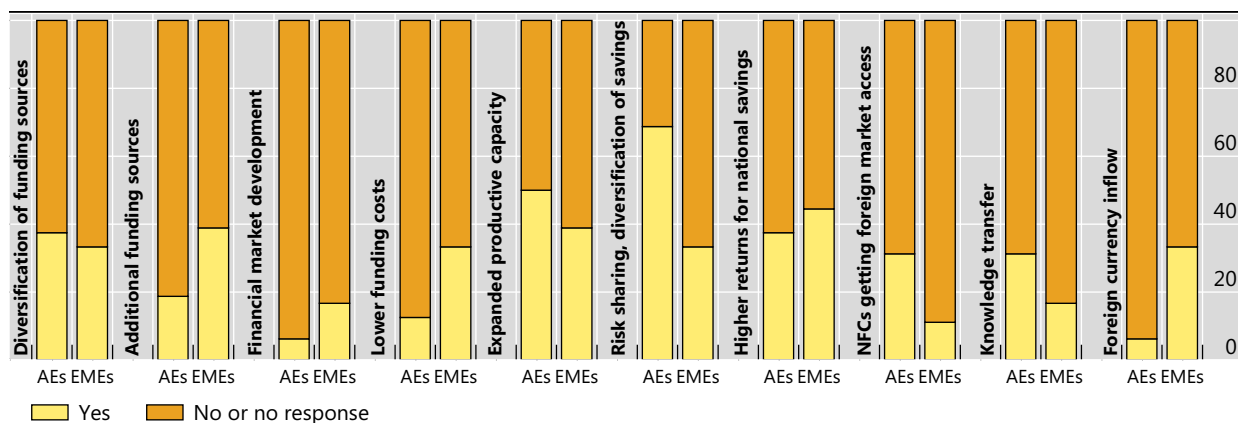
Source: CGFS Working Group, Survey on changing patterns of capital flows, August 2020, question 10b.

## B3 Benefits and risks

What are the main benefits related to capital flows?

Percentage of central banks within each group

Graph B13

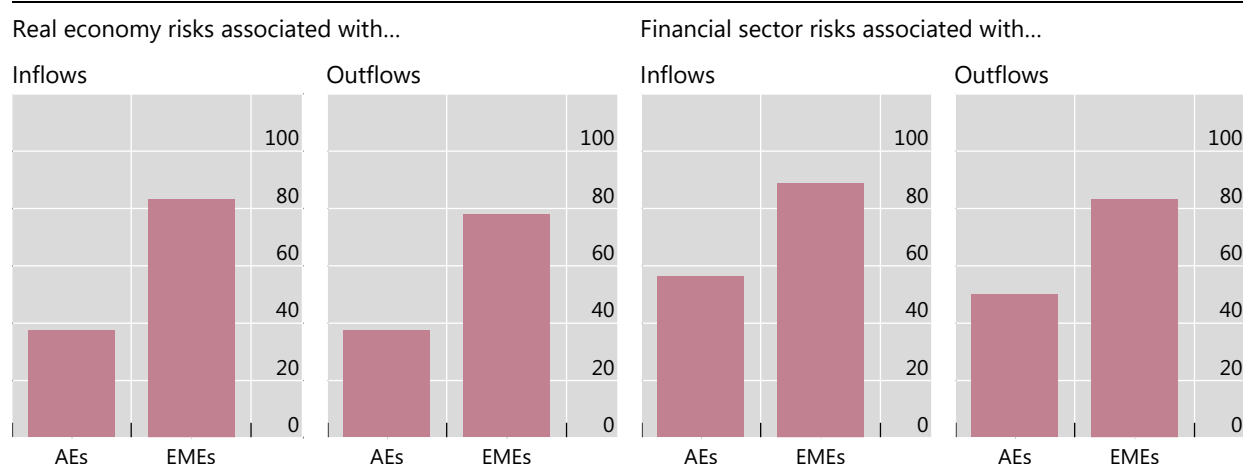


Source: CGFS Working Group, Survey on changing patterns of capital flows, August 2020, question 12.

## What are the long-term risks associated with capital flows?

Percentage of central banks that answered "yes"

Graph B14

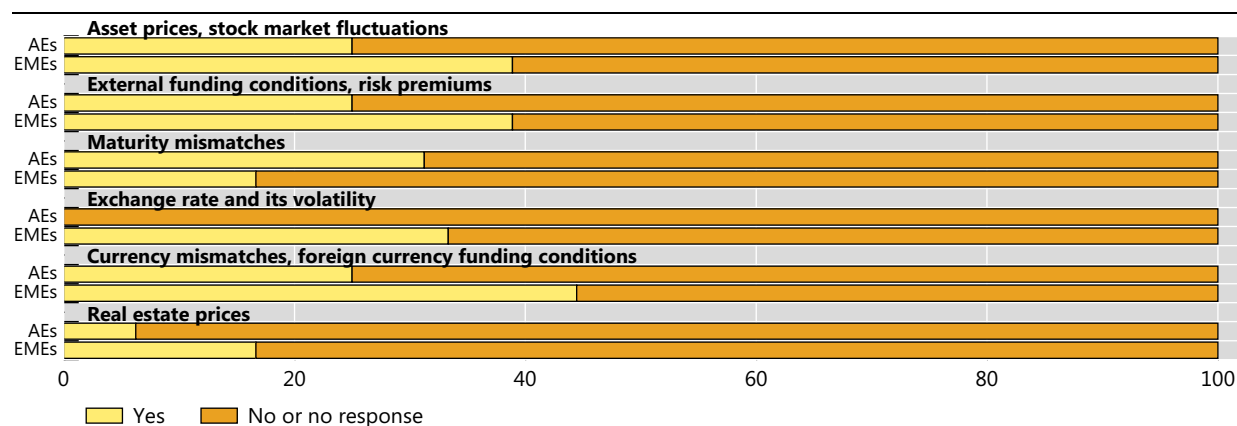


Source: CGFS Working Group, Survey on changing patterns of capital flows, August 2020, question 13.

## How can risks associated with inflows be measured?

Percentage of central banks within each group

Graph B15

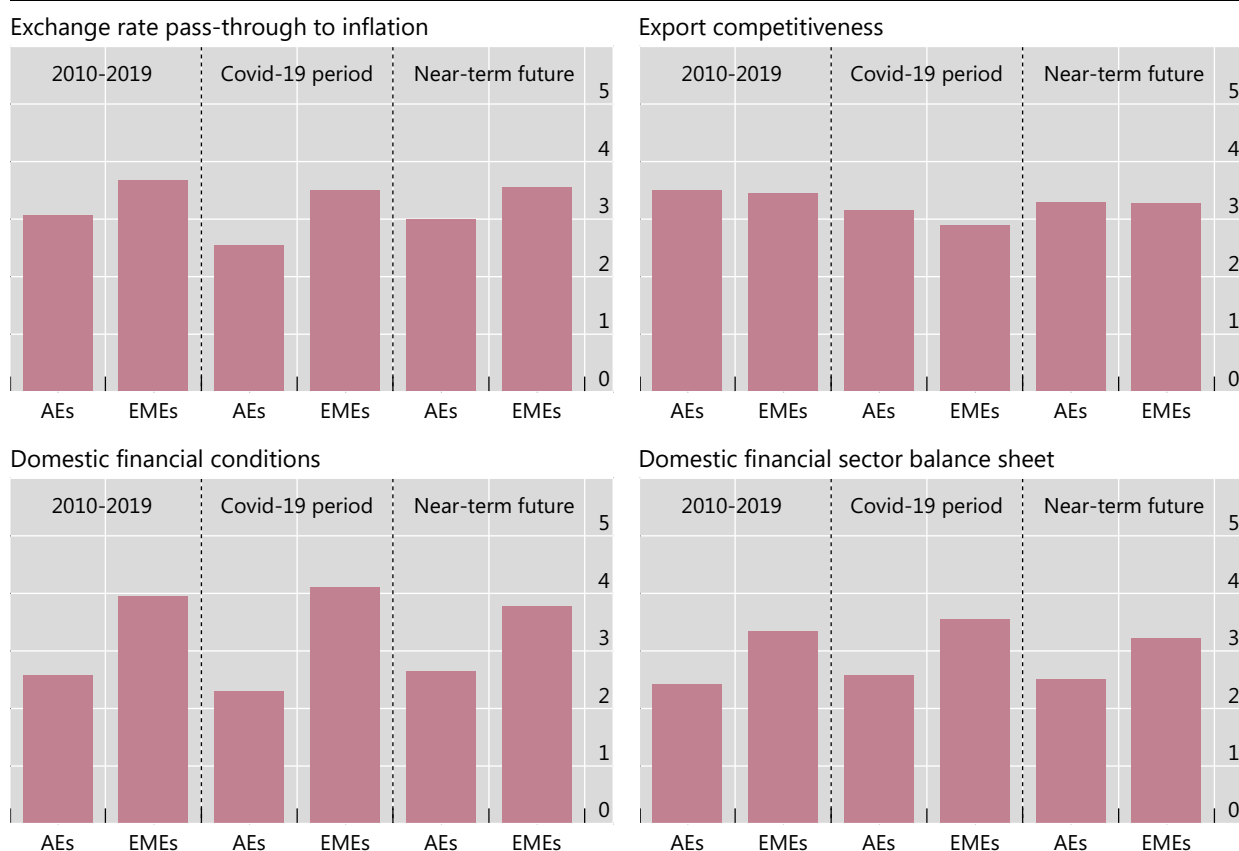


Source: CGFS Working Group, Survey on changing patterns of capital flows, August 2020, question 13.

## Which are the main channels through which the exchange rate affects the economy?

Average scale (1=not relevant, 5=very relevant)

Graph B16



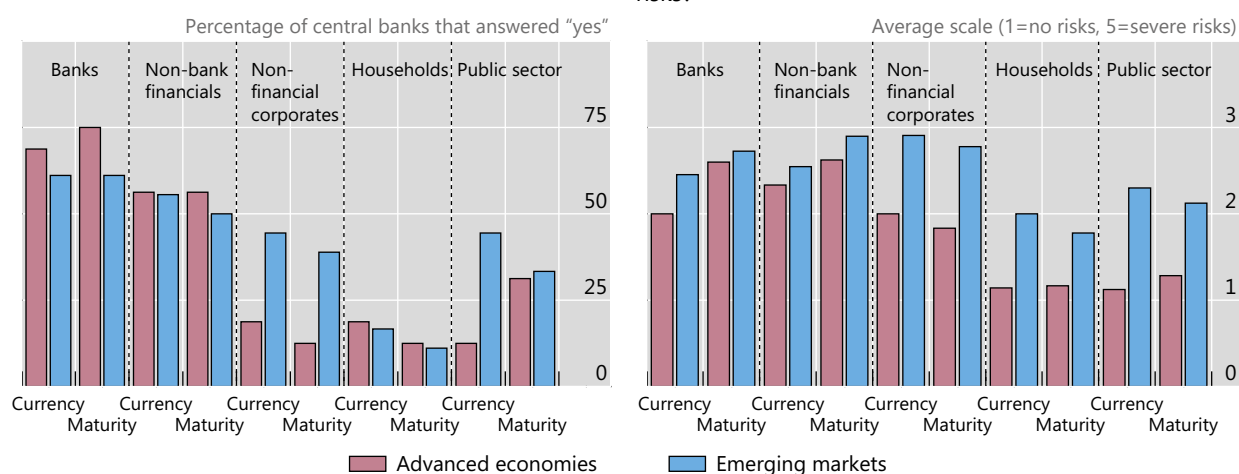
Source: CGFS Working Group, Survey on changing patterns of capital flows, August 2020, question 14.

## Importance of currency and maturity mismatches

Graph B17

Which mismatches do central banks monitor?

Which mismatches are associated with high economic risks?



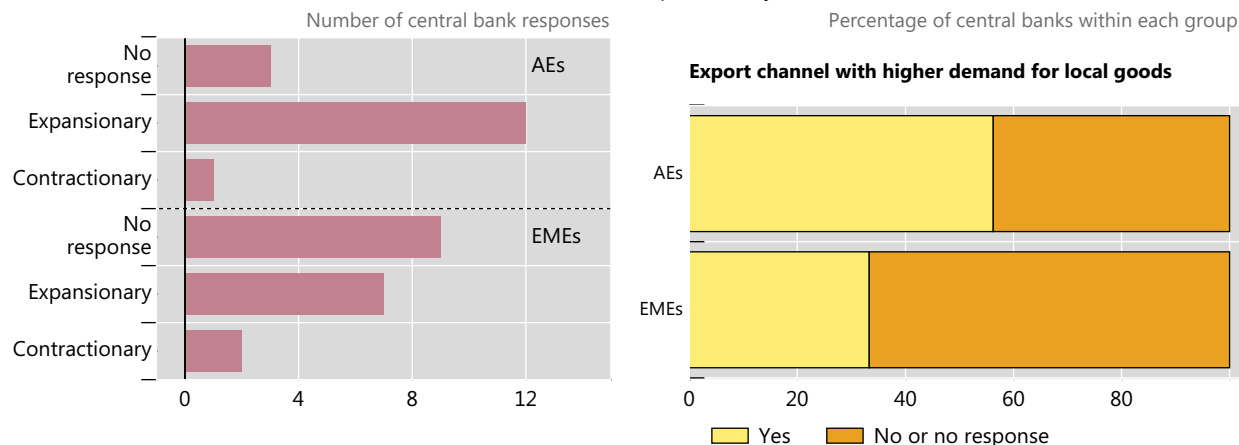
Source: CGFS Working Group, Survey on changing patterns of capital flows, August 2020, question 16.

## Effects of an exchange rate depreciation

Graph B18

Economic effect of a local currency depreciation

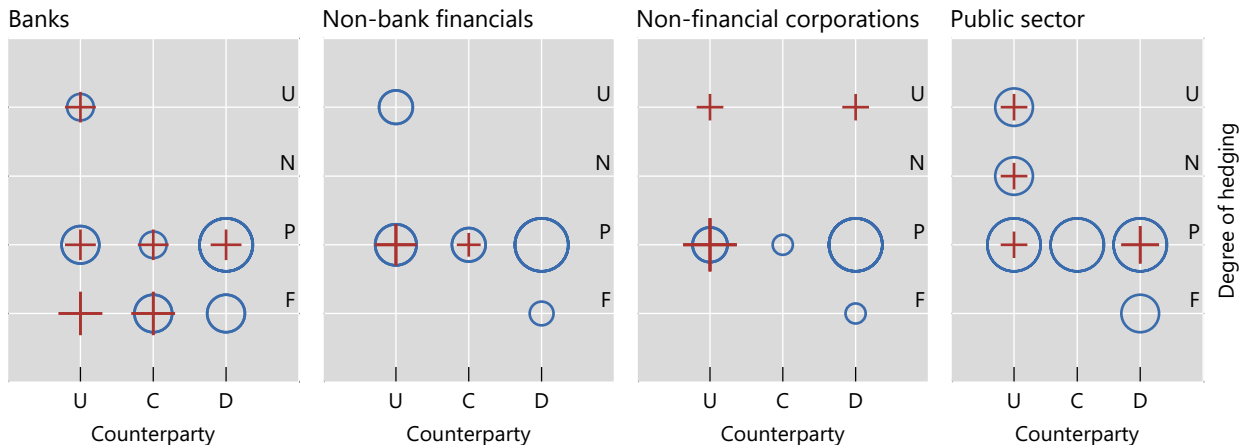
Why does a local currency depreciation have expansionary effects?



Source: CGFS Working Group, Survey on changing patterns of capital flows, August 2020, questions 16f and 16g.

## Hedging of currency mismatches in 2020 by the domestic sector<sup>1</sup>

Graph B19



U = unknown; C = cross-border; D = domestic; F = fully hedged; P = partly hedged; N = not hedged at all.

<sup>1</sup> Marker size represents the number of countries within AEs and EMEs that correspond to each coordinate.

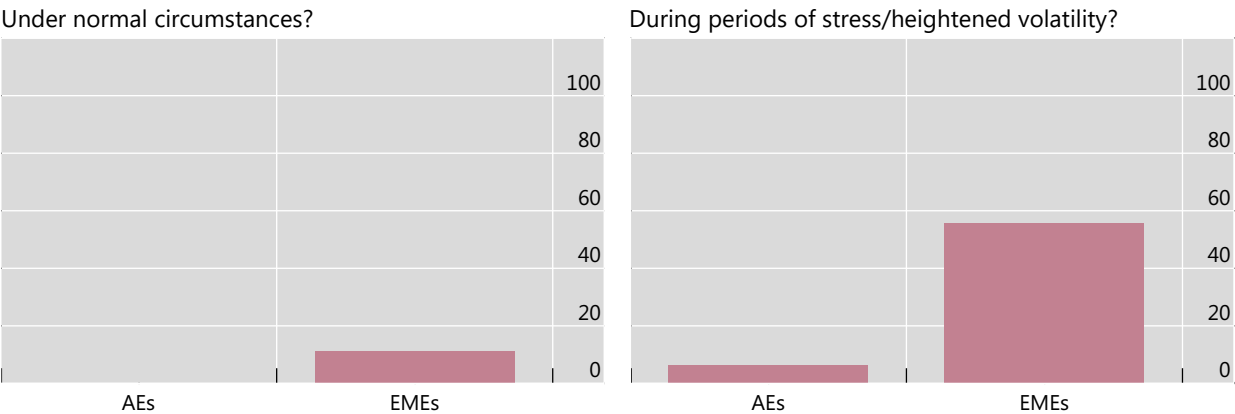
Source: CGFS Working Group, Survey on changing patterns of capital flows, August 2020, question 17.

B4 Policy Issues

Does the central bank actively respond to exchange rate and capital flow fluctuations

Percentage of central banks that answered “yes”

Graph B20



Source: CGFS Working Group, Survey on changing patterns of capital flows, August 2020, question 20.

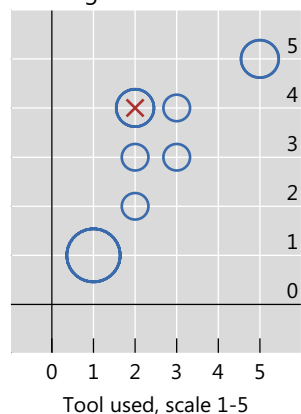
## What tools did the central bank use to address exchange rate and capital flow fluctuations before the Covid-19 crisis and how effective were they?<sup>1</sup>

x-axis scale (1 = not used; 5 = often used); y-axis scale (1 = least effective; 5 = most effective)

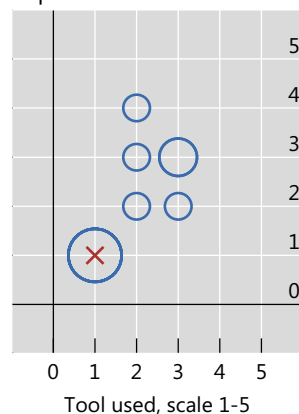
Graph B21

### Monetary policy

#### Exchange rate fluctuations

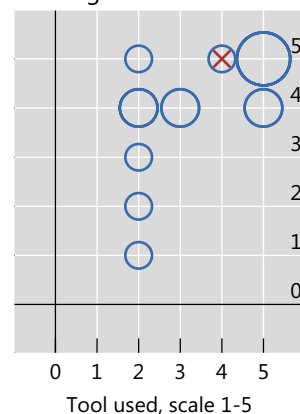


#### Capital flows fluctuations

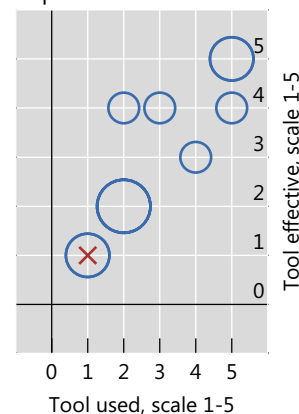


### Foreign exchange interventions

#### Exchange rate fluctuations

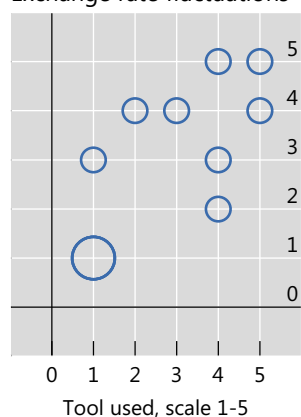


#### Capital flows fluctuations

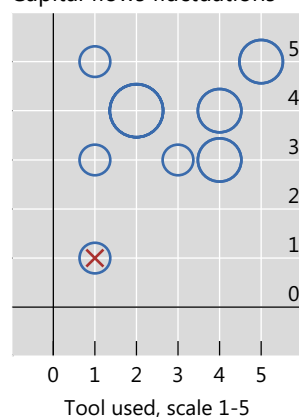


### Macro-prudential policy

#### Exchange rate fluctuations

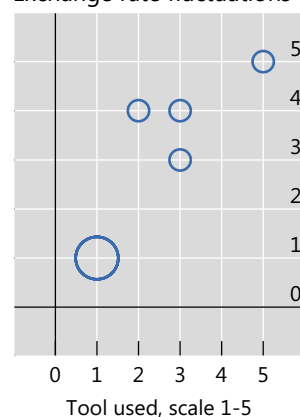


#### Capital flows fluctuations

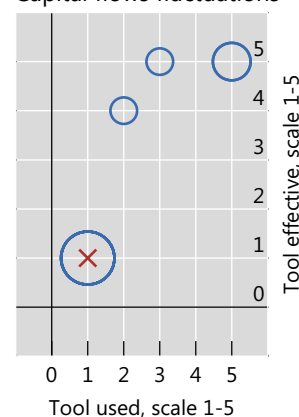


### Capital flows management tools

#### Exchange rate fluctuations



#### Capital flows fluctuations



× Advanced economies    ○ Emerging market economies

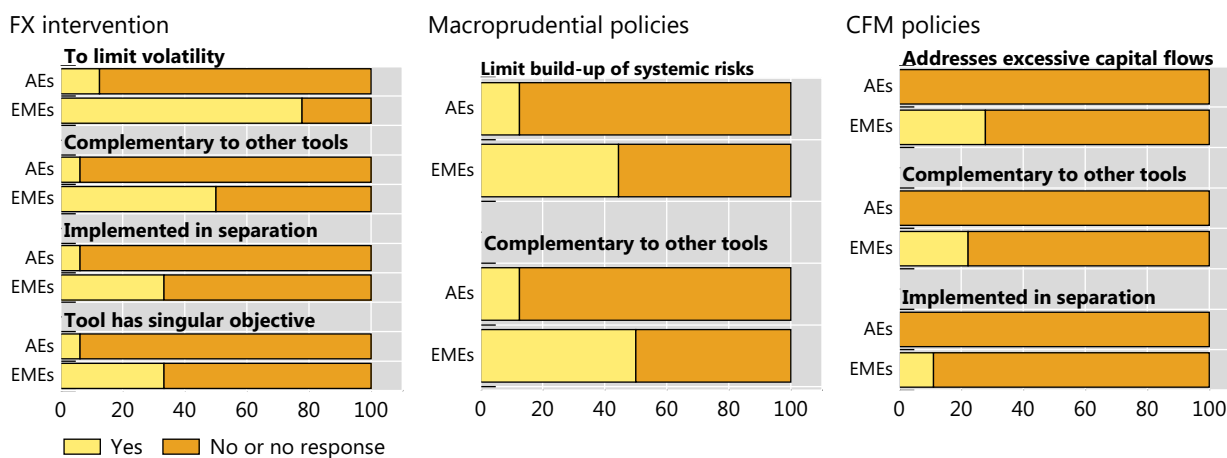
<sup>1</sup> Marker size represents the number of central banks within AEs and EMEs that correspond to each coordinate.

Source: CGFS Working Group, Survey on changing patterns of capital flows, August 2020, question 21.

## Central banks' views about the effectiveness of policy tools

As a percentage of central banks within each group

Graph B22

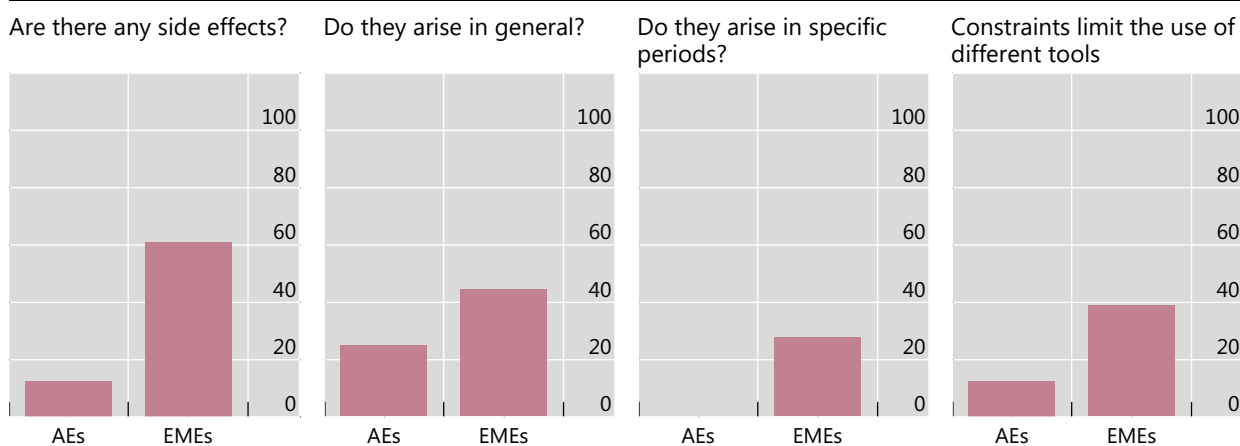


Source: CGFS Working Group, Survey on changing patterns of capital flows, August 2020, question 22b, 22c, and 22d.

## Policy tools: side effects and constraints<sup>1</sup>

Percentage of central banks within each group that answered "yes"

Graph B23



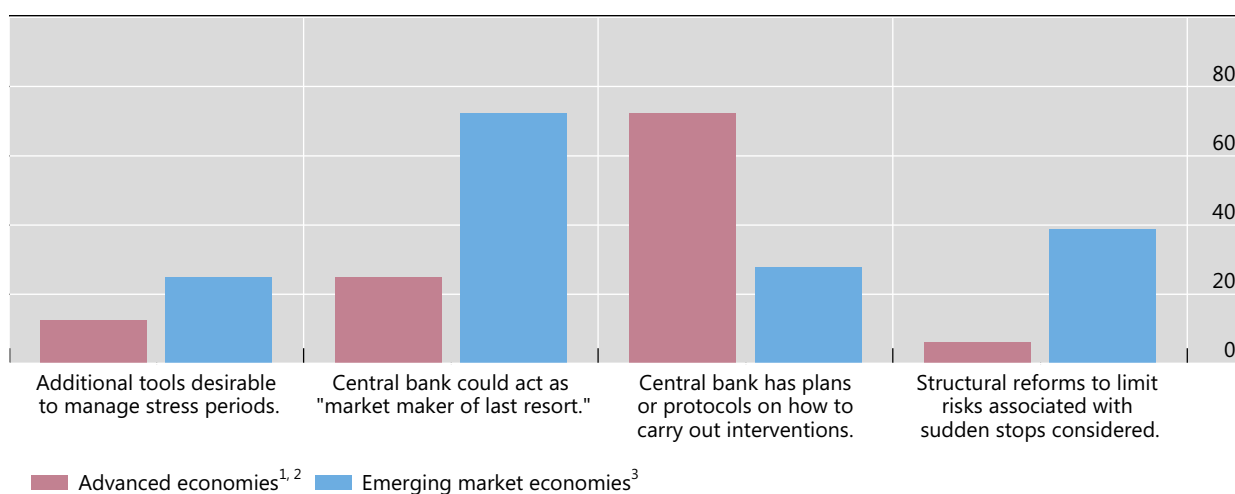
<sup>1</sup> Excluding responses of euro area central banks (BE, DE, ES, FR, IT, LU, and NL).

Source: CGFS Working Group, Survey on changing patterns of capital flows, August 2020, question 23 and 25.

## New tools and contingency plans

Percentage of central banks within each group that answered "yes"

Graph B24



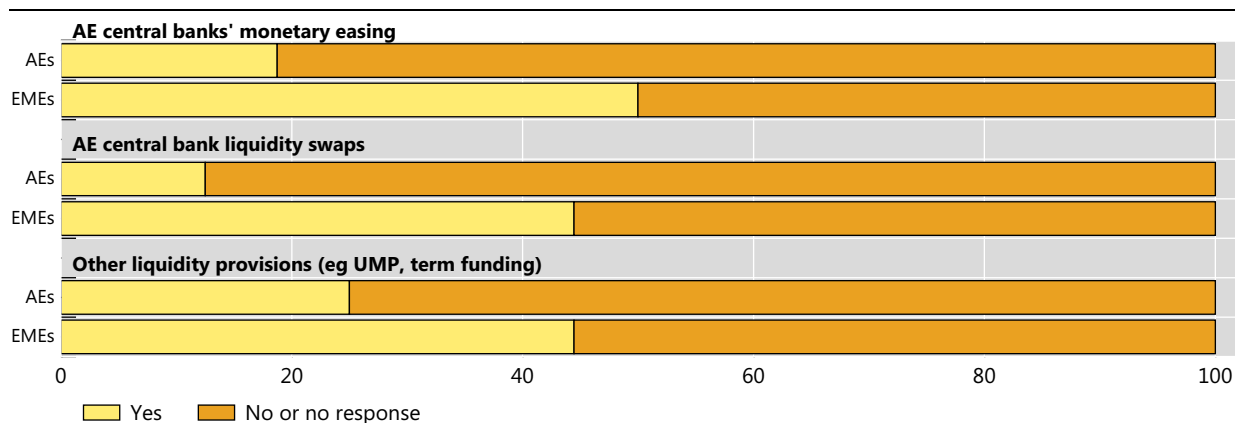
<sup>1</sup> AU, CA, CH, JP, NZ, SE, UK, and US for the first three statements. <sup>2</sup> Also includes Euro area central banks for the last statement. <sup>3</sup> AR, BR, CN, CL, CO, HK, IN, KR, MX, MY, PE, PH, RU, SA, SG, TH, TR, and ZA.

Source: CGFS Working Group, Survey on changing patterns of capital flows, August 2020, question 27 and 30.

## Which policy measures adopted by major central banks in response to the Covid-19 crisis were the most useful to alleviate market stress?

Percentage of central banks within each group

Graph B25



Source: CGFS Working Group, Survey on changing patterns of capital flows, August 2020, question 28.

## Annex C Empirical analyses

### C1 Impact of index inclusion: Chinese A-shares in MSCI Emerging Markets Index

The inclusion of an EME asset in a benchmark index brings benefits and risks not only for the included country, but also for other economies whose respective shares in an index are recalibrated.<sup>2</sup> Benefits are mainly related to larger inflows of capital (Sienaert (2012)), decreased inflow sensitivity to domestic shocks (Arslanalp et al (2020)) and an increase in market depth (Pandolfi and Williams (2019)). Risks include higher capital flow procyclicality (Raddatz and Schmukler (2012)) and higher sensitivity to global shocks (Arslanalp and Tsuda (2015), Cerutti et al (2019)). These risks are relatively greater in countries where ETFs hold a higher share of the equity market (Converse et al (2020)) and during crisis episodes (Ferriani (2020)), asset price distortions (Raddatz et al (2017)) and currency movements (Pandolfi and Williams (2019)). Moreover, Pandolfi and Williams (2020) find heterogeneous effects on firms in countries included in sovereign bond indices in terms of abnormal returns as well as income, employment, dividends and total assets. While positive outcomes are particularly pronounced for financial and government-related firms, negative outcomes are experienced by firms operating in tradeable industries.

Changes in benchmarks have important effects on passive as well as active fund portfolio allocations. Raddatz et al (2017) define the “benchmark effect” as the set of channels through which international equity and bond indices affect global asset allocations and associated prices. This Annex documents the importance of the “benchmark effect” in a prominent case study, namely the inclusion of Chinese A-shares in the MSCI Emerging Market Index.<sup>3</sup> In June 2017, the American financial index company MSCI announced the addition of domestic Chinese equities, denominated in renminbi (A-shares), to its Emerging Market Index starting in June 2018. MSCI started with an inclusion factor (IF) of up to 5%, followed by a revision in February 2019 that increased the total IF to 20% in three steps.

Fund-level data are used to study how the increase of the Chinese share in the MSCI Emerging Market Index affected asset allocation by fund managers. The database covers open-ended and exchange-traded funds included in the Morningstar category “Global emerging markets equity” from January 2015 to June 2020. The sample comprises about 1200 funds and, similar to Raddatz et al (2017), these are grouped into four categories depending on the degree of active management. The first piece of data, reported in Graph C1.1, shows that there has been a generalised upward trend in average exposure to Chinese assets, pervasive across all fund categories. However, average exposure to Chinese assets is strongly correlated with portfolio management style. Funds that closely track the MSCI EM Index showed the highest average share, approximately 37% at the end of the sample, compared to around the 25% of actively managed funds. Moreover, average Chinese weight responds quite differently to the two revisions of the MSCI benchmark, with immediate adjustment after the first announcement and seemingly no reaction immediately following the second change in the IF.<sup>4</sup>

<sup>2</sup> This Annex summarises the preliminary findings of S Antonelli, F Corneli, F Ferriani and A Gazzani (2021): “Benchmark effects from the inclusion of Chinese A-shares in MSCI global indices”, mimeo, Bank of Italy.

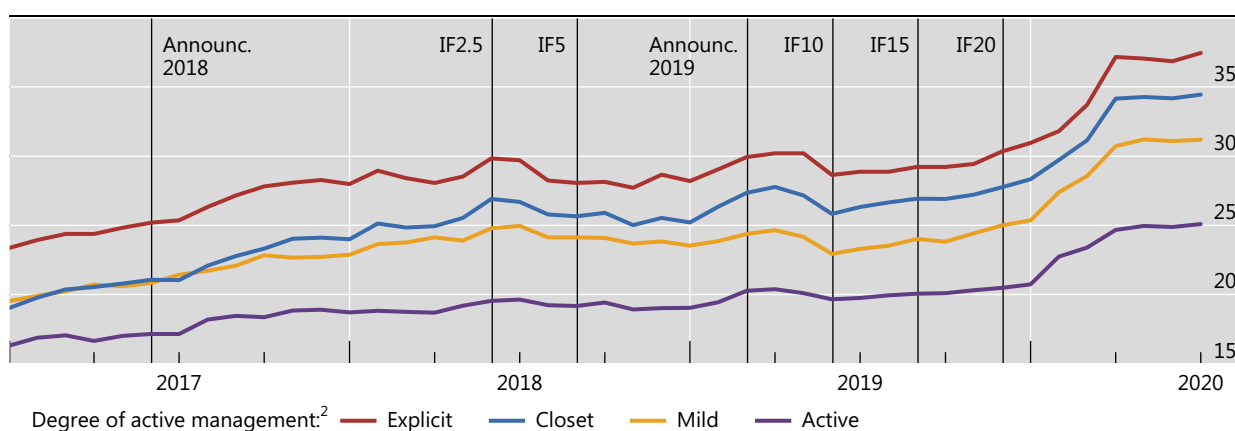
<sup>3</sup> For a discussion of Chinese inclusion in benchmark indices see also Lalanne and Peresa (2019) and Chen et al (2019).

<sup>4</sup> Country weights are not adjusted for price effects, as this is a non-trivial exercise linked to heterogeneous funds’ management style, which is beyond the scope of this analysis. However, Chinese equities’ performance is included in the BVARX model to control for such a price effect and identify a benchmarking shock that is cleansed from past and contemporaneous changes in equity prices.

## Exposure to Chinese assets by degree of active management

Average share of Chinese equities, in per cent<sup>1</sup>

Graph C1.1



<sup>1</sup> Average share of Chinese equities in mutual funds included in the Morningstar category "Global emerging markets equity". <sup>2</sup> Funds are classified according to their degree of active management, evaluated in terms of tracking errors with respect to the MSCI EM index. "Explicit" funds exhibit the lowest degree of active management; "active" funds the highest.

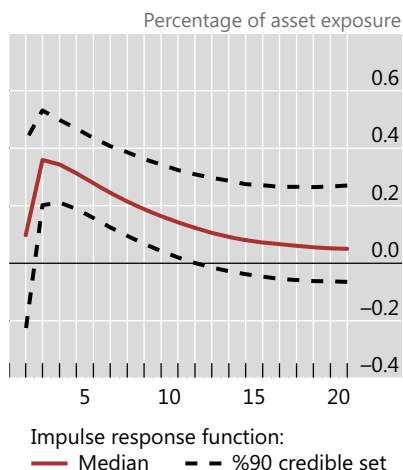
Sources: Bank of Italy; Morningstar; CGFS Working Group calculations.

Following Pandolfi and Williams (2020) and Raddatz et al (2017), an empirical analysis is conducted to explore whether index inclusion has spurred capital inflows beyond what could be predicted by standard push-pull factors. Monthly fund allocation in China is used as a proxy for capital inflows into the country from January 2015 to December 2019. Data is obtained from the EPFR database and provides a measure of overall industry exposure. A Bayesian Vector Autoregressive model with exogenous variables (BVARX) is used to assess the dynamic effects on capital flows to China of a shock to the Chinese's share in the MSCI EM index (benchmarking shock) while controlling for alternative push and pull factors. The advantage of this approach is that the information contained in the several financial variables included in the BVARX should mitigate issues related to the anticipation of changes in index benchmarks. The endogenous variables that are included in the system and that are listed according to the following order for identification are the Chinese equity index (CSI300), the Chinese share in the MSCI EM index, capital flows to China (as a percentage of asset exposure), the Chinese EMBI spread, and GDP Consensus Forecast for the current and next year. The exogenous variables that control for global financial conditions are the US term spread (10 year - 3 month Treasury yield spread), the VIX and the Wu-Xia US shadow Federal Fund Rate (Wu and Xia (2016)).

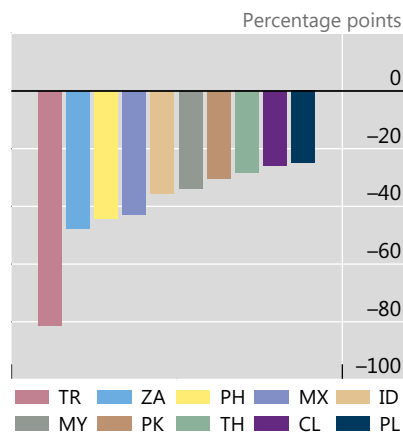
The impulse response functions robustly indicate that an increase in the level of exposure to Chinese assets leads to a statistically significant increase in capital flows to China, whereas the other control variables exhibit responses of little significance (Graph C1.2, left-hand panel).<sup>5</sup>

<sup>5</sup> Robustness exercises are conducted by including the Covid-19 crisis and using a BVAR following Lenza and Primiceri (2020) to account for the sharp increase in volatility during this crisis. The results align with those presented in the baseline specification.

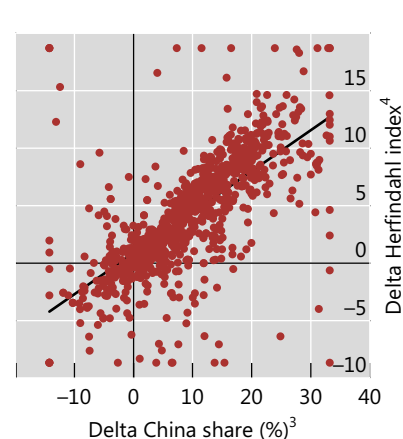
Impulse response functions to a benchmarking shock: Capital flows to China<sup>1</sup>



Most impacted EMEs from MSCI inclusion of Chinese A-shares<sup>2</sup>



Exposure to Chinese assets and portfolio concentration



CL = Chile; ID = Indonesia; MY = Malaysia; MX = Mexico; PH = Philippines; PK = Pakistan; PL = Poland; TH = Thailand; TR = Turkey; ZA = South Africa.

<sup>1</sup> The Bayesian VARX is estimated on data 2015M1-2019M12 with one lag under flat (Jeffreys) prior. The benchmarking shares, spreads and Consensus Forecasts enter in raw values, whereas equity prices are included in log-levels. Capital flows to China are expressed as a percentage of total net assets. <sup>2</sup> Impact is measured as the median variation in the country exposure of funds' portfolios following both revisions of the MSCI EM index over the median country exposure computed throughout the entire time span. <sup>3</sup> Fund-level variation in the amount of Chinese equities. <sup>4</sup> Fund-level variation in the geographical concentration of asset portfolios.

Sources: Bank of Italy; Morningstar; CGFS Working Group calculations.

The increasing weight of Chinese equities had significant effects on the relative importance of other EMEs. According to MSCI, the weight of Chinese equity in the MSCI EM Index at the end of 2019 was greater than the combined weight of the three largest constituents of the index excluding China, namely South Korea, Taiwan and India. The centre panel of Graph C1.2 shows the ten most impacted countries, suggesting that several countries lost some of their relative importance with the rise in Chinese equities. Another immediate consequence of mutual funds' increased exposure to Chinese assets has been the increase in the concentration of funds' portfolios. The right-hand panel of Graph C1.2 shows that funds with the greatest increase in portfolio exposure to Chinese equities also saw the greatest increase in their overall country concentration.

From a financial stability perspective, these effects could be concerning. An increase in portfolio similarities is likely to exacerbate the vulnerabilities stemming from the rapidly growing use of passive investment vehicles that mechanically replicate global equity benchmarks (Miyajima and Shim (2014), IMF (2019a), and IMF (2019b), among many others).

## C2 Panel regression analysis of capital flow patterns

The Working Group's panel regression analysis shows that global economic growth became a significant driver of total capital flows to EMEs, while other global factors lost their impact. The analysis below aims to disentangle the key push and pull drivers of capital flow patterns. However, while the approach can highlight some basic correlations, it cannot identify causal relationships. Furthermore, the linear specification below does not incorporate any interactions between different drivers.

To estimate how potential drivers shape capital flow patterns, the baseline specification draws on a panel regression approach while letting fixed effects absorb time-invariant country-specific factors (Avdjiev et al (2020)).

$$(Inflows/GDP)_{it} = \alpha + \beta' Pull_{it} + \delta' Push_t + v_i + \epsilon_{it}$$

- The dependent variable  $Inflows/GDP_{it}$  denotes gross capital inflows to country  $i$  in quarter  $t$  scaled by GDP while distinguishing between total inflows, portfolio debt and other investment liability inflows.<sup>6</sup>
- Push factors in vector  $Push_t$  are the logged VIX (log\_Vix) serving as a measure of global risk sentiment, changes in global liquidity as proxied by US benchmark rates ( $\Delta Rate$ ), and the growth of nominal global GDP ( $\Delta GDP_{global}$ ). Following Avdjiev et al (2020), changes in US benchmark rates are constructed such that they equal the US policy rate until 2008Q4 and then match Leo Krippner's shadow rate to proxy monetary policy in the US.
- Pull factors in vector  $Pull_{it}$  refer to the recipient country  $i$  and they include nominal GDP growth ( $\Delta GDP_{local}$ ), changes in the country's sovereign rating ( $\Delta SovRating$ ), and Chinn and Ito's (2008) measure of financial openness (Chinn-Ito). The sovereign rating is computed as the quarterly mean based on the long-term foreign-currency sovereign ratings from Fitch, Moody's and S&P, which are translated into numeric categories with higher values denoting higher creditworthiness of the sovereign.

The sample covers 33 EMEs from 2000Q1 to 2018Q4.<sup>7</sup> While the panel for the baseline analysis is not balanced, results are robust to using a subset of 10 EMEs with full data for all periods.<sup>8</sup> The pre-crisis period covers the 2000Q1–2007Q4 period while the post-crisis period covers 2010Q1–2019Q4.

Descriptive statistics suggest that total capital inflows increased slightly from 7.6% to 8.2% of local GDP and also became more volatile after the GFC (Table C2.1). The two components of total flows exhibit divergent patterns, as portfolio bonds almost doubled from 0.63% to 1.25% while other liabilities dropped from 2.11% to 1.36%. Other differences in the explanatory variables after the GFC include the policy rate turning negative and economic growth slowing at the global and local levels.

Baseline results displayed in Table C2.2 highlight three findings. First, total EME inflows scaled by GDP have become insensitive to the negative impact of global risk and changes in monetary policy, while the impact of global economic growth became more significant after the GFC. Second, a more detailed analysis by flow type reveals that, while the impact of global growth dominates, risk appetite still has little significance as a driver of scaled portfolio bond inflows. Third, among the pull factors, local GDP growth and long-term structural factors like financial openness have become less significant post-GFC.

<sup>6</sup> For total and other investment liability inflows, official loans from the IMF are excluded. The three dependent variables are winsorised at the 1% level in each tail to mitigate the effects of outliers.

<sup>7</sup> The 33 EMEs comprise Argentina, Armenia, Azerbaijan, Bolivia, Brazil, Bulgaria, Chile, China, Colombia, Costa Rica, Ecuador, El Salvador, Georgia, Guatemala, Hungary, Indonesia, Jordan, Macedonia, Malaysia, Mauritius, Mexico, Morocco, Paraguay, Peru, Philippines, Poland, Romania, Russian Federation, South Africa, Thailand, Turkey, Ukraine and Uruguay.

<sup>8</sup> The strictly balanced sample with 10 EMEs comprises Bulgaria, Colombia, Costa Rica, El Salvador, Peru, Philippines, Poland, Russian Federation, South Africa and Turkey.

Checks confirm that the results are broadly robust. Neither using lags across all covariates, like in Forbes and Warnock (2012, 2020), nor winsorising the dependent variable at the 5% level in each tail has a meaningful effect on the main findings.

Descriptive Statistics					Table C2.1
	mean	sd	N	min	max
Pre-GFC					
Total Inflows/GDP	7.56	10.43	766	−17.65	96.49
Portfolio Bond/GDP	0.63	2.81	766	−7.76	13.27
Other liabilities/GDP	2.11	5.53	766	−14.99	25.23
log_Vix	2.88	0.32	766	2.40	3.56
ΔRate	3.30	1.81	766	1	6.5
ΔGDP_global	2.25	1.74	766	−1.69	5.24
ΔGDP_local	3.28	4.70	766	−33.63	21.33
Chinn-Ito	0.56	1.34	766	−1.92	2.33
ΔSov Rating	2.27	0.66	766	1	4
Post-GFC					
Total Inflows/GDP	8.22	17.80	1145	−17.65	118.17
Portfolio Bond/GDP	1.25	3.28	1145	−7.76	13.27
Other liabilities/GDP	1.36	5.18	1145	−14.99	25.23
log_Vix	2.80	0.26	1145	2.33	3.41
ΔRate	−1.28	2.20	1145	−5.23	2.39
ΔGDP_global	0.80	1.91	1145	−3.37	4.69
ΔGDP_local	0.95	4.70	1145	−33.09	24.38
Chinn-Ito	0.61	1.38	1145	−1.92	2.33
ΔSov Rating	2.53	0.69	1145	1	4

Panel regression analysis of capital flow patterns

Table C2.2

	Total Inflows		PF Bond Inflows		Other Liability Inflows	
	Pre-GFC	Post-GFC	Pre-GFC	Post-GFC	Pre-GFC	Post-GFC
	b/se	b/se	b/se	b/se	b/se	b/se
log_Vix	−7.284*** (1.589)	2.058 (1.484)	−1.785*** (0.458)	−1.152** (0.539)	−1.409 (0.840)	0.357 (0.799)
ΔRate	−3.209*** (1.032)	−0.151 (0.531)	−0.528** (0.247)	−0.063 (0.198)	−0.842 (0.552)	−0.228 (0.242)
ΔGDP_global	0.174 (0.217)	0.605** (0.231)	−0.010 (0.053)	0.230*** (0.057)	0.061 (0.151)	0.089 (0.089)
ΔGDP_local	0.205** (0.101)	−0.004 (0.088)	0.054*** (0.019)	0.012 (0.028)	0.165** (0.066)	0.058 (0.038)
Chinn-Ito	4.286** (1.956)	1.660 (1.557)	−0.143 (0.200)	−0.110 (0.373)	1.714*** (0.577)	−0.125 (0.349)
ΔSovRating	2.513 (2.947)	1.920 (1.387)	−0.585 (0.918)	0.147 (0.628)	2.895* (1.489)	1.330 (0.931)
r <sup>2</sup>	0.403	0.486	0.155	0.056	0.246	0.106
N	766	1,145	766	1,145	766	1,145
# of countries	33	33	33	33	33	33

Note: The dependent variable is capital flows scaled by local GDP. The type of capital flow is indicated in the first row. All specifications include country fixed effects. Robust standard errors in parentheses are clustered by country with \*\*\* p<0.01, \*\* p<0.05 and \* p<0.1.

### C3 Machine learning analysis

A machine learning (ML) analysis confirms the increasing relevance of global growth, but it also suggests that the drivers of capital flow patterns became more interlinked after the GFC. These growing interlinkages probably emerge in the context of changing pipes with the increased participation of global non-bank investors. In order to address the econometric shortcomings of the panel regression analysis (Annex C2), the Working Group applied a machine learning approach based on random forest techniques.<sup>9</sup> The basic idea was to assess the relative importance of the different drivers of capital flows while avoiding potential biases that can arise from outliers, overfitting and multicollinearity.<sup>10</sup>

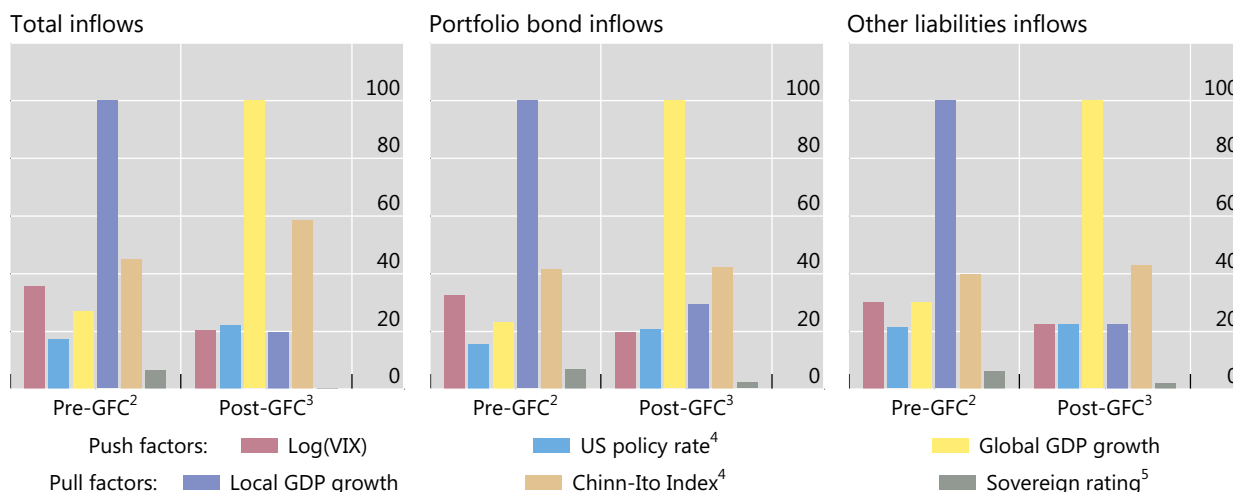
This random forest analysis proceeds in parallel to the panel regressions described in Annex C2.

- The dependent variable is total, portfolio bond and other investment inflows into 33 EMEs, all normalised by GDP.
- Push and pull factors enter as explanatory variables. Push factors include global risk aversion as measured by the VIX (in log), changes in global liquidity proxied by quarterly changes in the US shadow rate, and global GDP growth. Pull factors include a country's local GDP growth, changes in sovereign ratings and the Chinn-Ito index (in levels) as a measure of financial openness.
- 33 EMEs enter the sample, which is split into two periods. The pre-GFC period ranges from 2000Q1 to 2007Q4, while the post-GFC period covers 2010Q1 to 2018Q4.

#### Factors driving gross capital inflows into EMEs: evidence from a machine learning analysis

The maximum value is indexed at 100<sup>1</sup>

Graph C3.1



<sup>1</sup> Based on random forest techniques, the value indicates variable importance in relative terms where the maximum value is indexed at 100. The underlying sample covers 33 EMEs as described in Annex C2. <sup>2</sup> Pre-GFC period covers 2000Q1 to 2007Q4. <sup>3</sup> Post-GFC period covers 2010Q1 to 2018Q4. <sup>4</sup> In level. <sup>5</sup> Changes in 4 discrete rating categories.

Sources: Bank of Japan; IMF, *Balance of Payments Statistics*; CGFS Working Group calculations.

<sup>9</sup> Random forest techniques are a way to model non-linear relationships and visualise variable importance as well as interactions between variables. It is based on bootstrapping and aggregating multiple decision trees (Breiman (2001)). In recent years, such techniques have been increasingly applied in the economic and finance literature (eg Badia et al (2020), Washimi (2020)).

<sup>10</sup> The algorithm for minimising mean squared errors (MSEs) of the dependent variable is used as a measure of the relative importance of each driver. Permutation-based variable importance is defined as the decrease in a model score (MSEs) when a single feature value is randomly shuffled. The higher the variable importance, the higher the contribution to reducing MSEs.

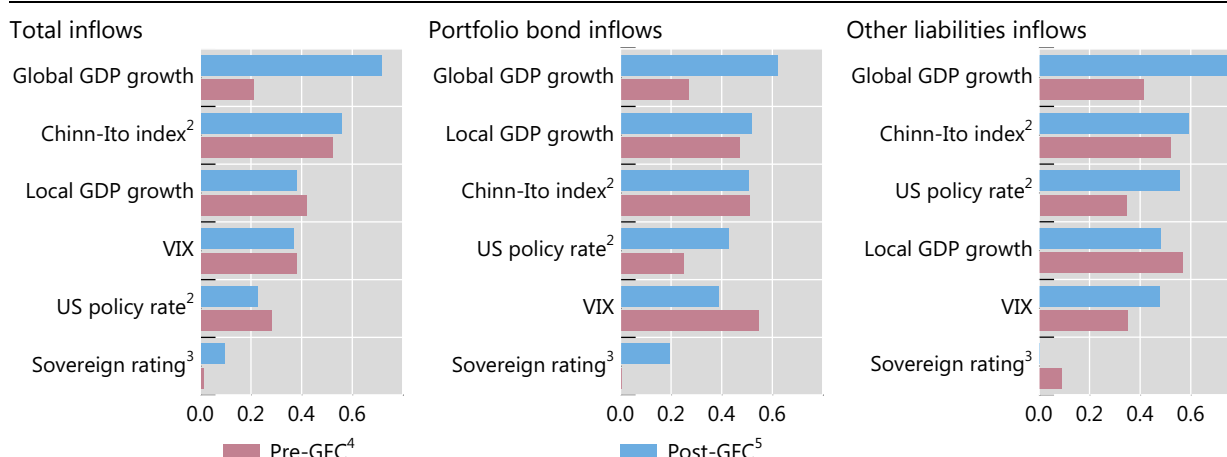
The ML results support the findings of the panel analysis in that global growth stands out as the most relevant driver of capital flows post-GFC. There are differences in that the ML analysis highlights the role of pull factors relatively more (Graph C3.1). ML results suggest that capital account openness remains an important country-specific pull factor post-GFC, while local economic growth has lost its dominant role. In contrast to the panel regression results, the variable importance of global liquidity does not seem to decline after the GFC, while risk aversion becomes less relevant across all types of capital flows.

Conflicting messages on the relative importance of drivers could arise in the context of increased interaction between them after the GFC. To assess the extent of interaction effects, H-statistics can be used to measure the significance of the way one particular driver interacts with all other drivers in predicting capital flow patterns.<sup>11</sup> The results (Graph C3.2) indicate that interactions between drivers increased notably after the GFC. In other words, it suggests that the role of push factors, in particular global growth, has changed post-GFC as a result of their own effects as well as their interactions with pull factors. One interpretation could be that the growing role of global pipes such as the participation of global investors might have helped strengthened the interlinkages between drivers. Even though the ML analysis overcomes some of the shortcomings of the regression analysis, the identification of potential causal relationships was beyond the scope of the analysis.

## Overall interaction strength

H-statistic<sup>1</sup>

Graph C3.2



<sup>1</sup> The H-statistic takes a value between zero and one. <sup>2</sup> In level. <sup>3</sup> Changes in 4 discrete rating categories. <sup>4</sup> Pre-GFC period covers between 2000Q1 and 2007Q4. <sup>5</sup> Post-GFC period covers between 2010Q1 and 2018Q4.

Sources: Bank of Japan; IMF, *Balance of Payments Statistics*; CGFS Working Group calculations.

<sup>11</sup> Technically, it uses the concept of partial dependence plots – the marginal effect of one particular variable on predicted outcome, averaging out the effects of all other explanatory variables – and is defined as the variance of the difference between observed bivariate partial dependence plots and the two individual partial dependence plots (Friedman and Popescu (2008)).

## C4 Sudden stop analysis

The Working Group's sudden stop analysis highlights the role of regional spillover effects and suggests that a tightening of global liquidity significantly increases the likelihood of sudden stops after the GFC. By contrast, stronger local economic growth can significantly reduce the likelihood of a sudden stop. To compare the drivers of extreme capital flow episodes with the drivers of capital flow patterns, the analysis follows Forbes and Warnock (2020) by using a complementary log-log approach (cloglog) while focusing on the same set of push and pull factors as in the panel analysis of Annex C2. In this context,  $\Phi$  stands for a cumulative distribution function, which in case of the cloglog regression reads as  $\Phi(x) = 1 - \exp(-\exp(x))$ .

$$\Pr(\text{Stop}_{it} = 1) = \Phi(\alpha + \beta' \text{Pull}_{it} + \delta' \text{Push}_t + \nu_i + \epsilon_{it})$$

- The dependent variable *Stop* is a binary variable denoting a sudden stop (ie a sharp decline in capital inflows) exhibited by a particular type of capital flow to country *i* in quarter *t*. The identification of sudden stops aligns with the periods identified in Graph 1.8 of Chapter 1.
- Push factors in vector **Push**<sub>*t*</sub> are the logged VIX (log\_Vix) serving as a measure of global risk sentiment, changes in global liquidity as proxied by US benchmark rates ( $\Delta\text{Rate}$ ), and the growth of nominal global GDP ( $\Delta\text{GDP}_{\text{global}}$ ). Following Avdjiev et al (2020), changes in US benchmark rates are constructed such that they equal the US policy rate until 2008Q4 and then match Leo Krippner's shadow rate to proxy monetary policy in the US.
- Pull factors in vector **Pull**<sub>*it*</sub> refer to the recipient country *i* and they include nominal GDP growth ( $\Delta\text{GDP}_{\text{local}}$ ), changes in the country's sovereign rating, and Chinn and Ito's (2008) measure of financial openness (Chinn-Ito). The sovereign rating is computed as the quarterly mean based on the long-term foreign-currency sovereign ratings from Fitch, Moody's and S&P, which are translated into numeric categories with higher values denoting higher creditworthiness of the sovereign ( $\Delta\text{SovRating}$ ).
- In line with Forbes and Warnock (2020), potential regional spillover effects that signal a sudden stop in a neighbouring country are included (Stop in region).
- The sample periods and definitions also match the panel analysis presented in Annex C2.<sup>12</sup>

Descriptive statistics on the sample of 33 EMEs suggest that sudden stops in total capital inflows became more frequent post-GFC, increasing from 5% to 11% as a share of all observations in the respective sample. When isolating portfolio debt inflows, the frequency of sudden stops stayed almost constant at 10%. By contrast, for other investment liability inflows, sudden stops became less frequent, dropping from 12% of all observations to 9% after the GFC. While the core set of explanatory variables follows the flow analysis with average policy rates turning negative and economic growth dropping, a measure of sudden stops in the region aims to capture contagion. Its averages reveal that the occurrence of sudden stops in the same geographical region fell slightly from 59% of all pre-GFC observations to 52% post-GFC.

The sudden stop analysis yields the following main results. First, while a tightening in US monetary policy raises the likelihood of a sudden stop in portfolio bond flows after the GFC, global risk aversion is revealed to be insignificant (Table C4.2). Second, there remains robust evidence that, after the GFC, stronger local growth reduces the likelihood of a sudden stop in all types of flows. Finally, potential spillover effects stand out in that a sudden stop in one country significantly increases the likelihood of a sudden stop in neighbouring countries.

The main findings remain unchanged when running the following robustness checks. When using lags across all covariates, like in Forbes and Warnock (2012, 2020), or alternative measures of global

<sup>12</sup> The 33 EMEs comprise Argentina, Armenia, Azerbaijan, Bolivia, Brazil, Bulgaria, Chile, China, Colombia, Costa Rica, Ecuador, El Salvador, Georgia, Guatemala, Hungary, Indonesia, Jordan, Macedonia, Malaysia, Mauritius, Mexico, Morocco, Paraguay, Peru, Philippines, Poland, Romania, Russian Federation, South Africa, Thailand, Turkey, Ukraine and Uruguay.

liquidity, the significance of spillover effects and local GDP growth remains unaffected. By contrast, when using the 10-year US yield or the Goldman Financial Conditions Index as proxies of global liquidity, the effect on the likelihood of a sudden stop becomes insignificant.

Descriptive Statistics					Table C4.1
	mean	sd	N	min	max
Pre-GFC					
Stop(Total Inflows/GDP)	0.05	0.22	766	0	1
Stop(Portfolio Bond/GDP)	0.10	0.30	766	0	1
Stop(Other liabilities/GDP)	0.12	0.32	766	0	1
log_Vix	2.88	0.32	766	2.40	3.56
$\Delta$ Rate	3.30	1.81	766	1.00	6.50
$\Delta$ GDP_global	2.25	1.74	766	-1.69	5.24
$\Delta$ GDP_local	3.28	4.70	766	-33.63	21.33
Chinn-Ito	0.56	1.34	766	-1.92	2.33
$\Delta$ SovRating	2.27	0.66	766	1	4
Stop in region	0.59	0.49	766	0	1
Post-GFC					
Stop(Total Inflows/GDP)	0.11	0.31	1145	0	1
Stop(Portfolio Bond/GDP)	0.11	0.32	1145	0	1
Stop(Other liabilities/GDP)	0.09	0.29	1145	0	1
log_Vix	2.80	0.26	1145	2.33	3.41
$\Delta$ Rate	-1.28	2.20	1145	-5.23	2.39
$\Delta$ GDP_global	0.80	1.91	1145	-3.37	4.69
$\Delta$ GDP_local	0.95	4.70	1145	-33.09	24.38
Chinn-Ito	0.61	1.38	1145	-1.92	2.33
$\Delta$ SovRating	2.53	0.69	1145	1	4
Stop in region	0.52	0.50	1145	0	1

## Sudden stop analysis

Table C4.2

	Stop(Total Inflows/GDP)		Stop(Portfolio Bond/GDP)		Stop(Other liabilities/GDP)	
	Pre-GFC	Post-GFC	Pre-GFC	Post-GFC	Pre-GFC	Post-GFC
	b/se	b/se	b/se	b/se	b/se	b/se
log_Vix	-1.795 (1.250)	0.042 (0.516)	-1.418* (0.833)	0.496 (0.359)	-0.435 (0.715)	0.632 (0.762)
ΔRate	-0.965 (0.759)	0.159 (0.222)	-0.479 (0.565)	0.621*** (0.145)	-0.409 (0.577)	-0.003 (0.226)
ΔGDP_global	0.073 (0.163)	-0.067 (0.076)	0.155** (0.069)	0.036 (0.060)	0.037 (0.060)	-0.081 (0.093)
ΔGDP_local	-0.081** (0.032)	-0.064*** (0.018)	-0.069** (0.027)	-0.055*** (0.013)	-0.047*** (0.014)	-0.047** (0.020)
Chinn-Ito	-0.079 (0.213)	0.040 (0.105)	0.038 (0.157)	0.095 (0.088)	-0.029 (0.120)	-0.159 (0.097)
ΔSovRating	-0.606 (0.663)	-1.223** (0.618)	0.103 (0.759)	-0.087 (0.583)	-0.733* (0.390)	-1.862*** (0.451)
Stop in region	2.117*** (0.303)	1.852*** (0.248)	1.260*** (0.303)	1.817*** (0.189)	1.772*** (0.235)	1.576*** (0.269)
N	766	1,145	766	1,145	766	1,145
# of countries	33	33	33	33	33	33

Note: The dependent variable is binary, indicating a sudden stop in capital flows scaled by local GDP. The type of capital flow is provided in the first row. Standard errors in parentheses with \*\*\* p<0.01, \*\* p<0.05 and \* p<0.1.

## C5 Diversification benefits

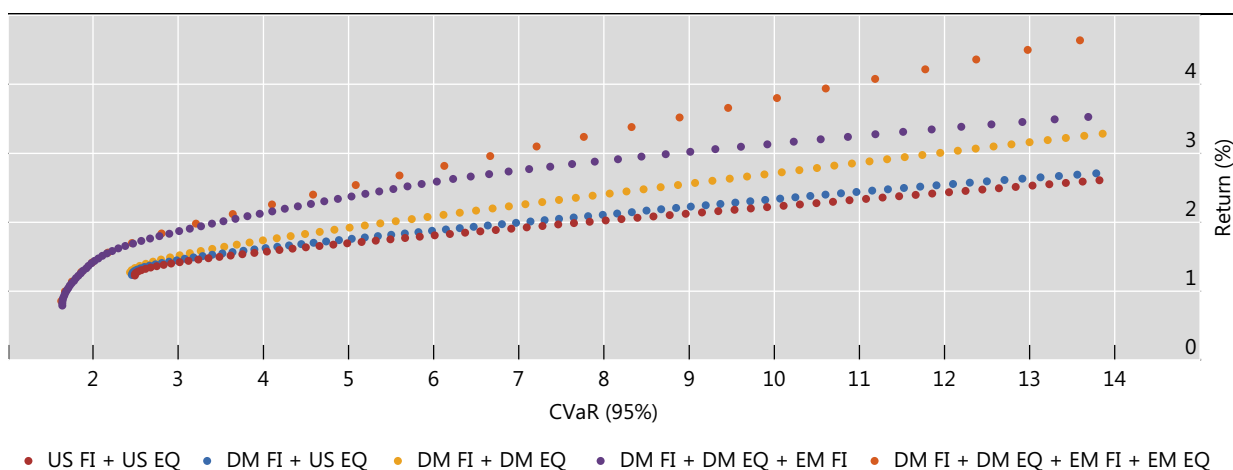
The inclusion of EM assets in global investors' portfolios can offer significant diversification benefits. EM assets, including fixed income and equity, increase portfolio mean returns and reduce risk when added to a basket of eligible assets of advanced economies. This is a consequence of the higher risk premium embedded in EM assets and the low or negative correlation between this source of risk and other risk factors.

The exercise in this Annex assumes that a USD investor starts from an investable universe comprising developed market assets, both fixed income and equity in local currency (DM FI and DM Eq),<sup>13</sup> and expands their investment universe to the EM sphere in fixed income, local and hard currency government bonds, and equities in local currency. The exercise also assumes that the preferences that best represent a global investor are defined by an objective of maximising mean returns and minimising risk, defining risk as the expected losses of the portfolio (CVaR).

The results of the study are shown in Graph C5.1, which shows the benefits of sequentially adding different asset classes to a benchmark portfolio that starts investing only in US assets (US Eq and US FI). As can be seen in the chart, the benefits of adding DM FI are relatively moderate, as DM yields were extremely low by historical standards and US rates were the higher yielding asset within DM. It should be noted that this inclusion adds to the portfolio DM FX exposure, which is typically associated with a higher level of risk compared to plain US fixed income, in a context of compressed risk premiums. These two elements combined notably reduce the diversification benefit of adding DM FI. In the next step, DM Eq excluding the US are added to the set of investable possibilities, showing a small diversification benefit for low levels of risk, but a clear improvement in returns expectations associated with higher levels of risk.

Efficient frontiers of different investable universes based on historical information for the period from Aug 2015 to Aug 2020

Graph C5.1



<sup>1</sup> For fixed income, total return Bloomberg Barclays indices, most of them containing government bonds with maturities between 1 and 20 years, were used for each country except for the UK, for which an index from 2- to 30-year government bonds is used. For equity markets, the most representative stock exchange indices were used. In the particular case of developed markets, the main references were S&P 500 for the US, Euro Stoxx for Europe, FTSE 100 for the UK and Nikkei 225 for Japan. The optimisation process to determine the efficient frontiers is based on the CVaR (95%) minimisation, and it is performed using weekly historical returns from August 31st 2015 to August 31st 2020.

Sources: Bank of Mexico; Bloomberg; CGFS Working Group calculations.

<sup>13</sup> US FI: United States Fixed Income; US Eq: United States Equities; DM FI: Developed Markets Fixed Income; DM Eq: Developed Markets Equities; EM FI: Emerging Markets Fixed Income; EM Eq: Emerging Markets Equities. Developed markets include the United States, Germany, United Kingdom, Canada, Sweden, Japan, Australia and New Zealand. Emerging markets include Brazil, Colombia, Peru, Chile, Argentina, Poland, Hungary, Turkey, South Africa, Russia, Czech Republic, China, Malaysia, South Korea, Thailand, Indonesia, Philippines, India and Taiwan.

In regard to EM assets, investing in EM FI adds a very different yield level (usually much higher) and a currency component that is potentially more volatile, but that could move in a very different way from the rest of the assets in the portfolio given the more idiosyncratic factors that could explain EM FX movements, thus adding diversification benefits to the portfolio. The results show a clear shift in the north-west direction of the efficient frontier, which means that for a specific level of risk the investor can reach a higher expected return. Finally, when EM Eq is added to the investable universe (blue line on the chart), the results show that the risk-return profile improves significantly for higher levels of risk. In sum, adding EM assets to a DM-based portfolio enhances the risk-return profile of said portfolio. As such, adding a so-called riskier asset in fact reduces overall portfolio risk. These results justify EM exposure and constitute an important driver of EM flows.

## C6 Capital inflows and credit supply in Latin America<sup>14</sup>

What impact do capital inflows have on domestic corporate loans in EMEs? Changes in capital inflows affect local banks' funding opportunities which, in turn, influence their lending. Concerns could arise if capital inflows affect new lending in a very specific market segment, namely if the riskiest firms borrow from the banks that most rely on wholesale funding or from the banks with the highest shares of non-performing loans (NPLs) in their portfolio.

Under the auspices of the Consultative Group of Directors of Financial Stability in the Americas, a working group analysed lender-borrower relationships, using credit registry data to disentangle the drivers of credit supply from those of credit demand. The analysis was conducted separately for five countries in Latin America – Brazil, Chile, Colombia, Mexico and Peru – using a common methodology which was adapted to take into account country-specific institutional details. Each country-team estimated the following panel equation:

$$\Delta \log(\text{loans})_{f,b,t} = \beta_1 BChar_{b,t-1} + \lambda_1 (FRisk_{f,t-1} \times BChar_{b,t-1}) + \lambda_2 (Kflow_{t-1} \times BChar_{b,t-1}) + \delta (Kflow_{t-1} \times BChar_{b,t-1} \times FRisk_{f,t-1}) + FE_b + FE_{f,t} + \varepsilon_{f,b,t}$$

The dependent variable was the percentage change in outstanding loans granted by bank  $b$  to firm  $f$  at time  $t$ . Capital inflows ( $Kflow_{t-1}$ ) were measured by two alternative indicators: other investment debt from Balance of Payments (BOP) data and cross-border interbank loans from the BIS locational banking statistics.  $FRisk_{f,t-1}$  included firms with the highest credit risk (eg based on a rating or high firm leverage). Finally,  $BChar_{b,t-1}$  alternated between two measures: bank funding and bank credit risk. In the first specification, the Bank funding indicator highlighted banks with a share of wholesale funding in the top decile. In the second specification, Bank risk highlighted banks with NPL ratios in the top decile. The triple interaction term explored whether bank-specific characteristics amplified risks in the context of lending to the least creditworthy firms. First, the triple effect answered the question of whether banks with more wholesale funding made more loans to the riskiest borrowers. The alternative triple interaction clarified whether the riskiest banks made the riskiest loans during periods of high capital inflows. Firm-by-time fixed effects ( $FE_{f,t}$ ) helped separate demand and supply effects, while bank fixed effects included fixed bank characteristics like nationality, business model etc.<sup>15</sup>

The results show that capital inflows can lead to an increase in credit to the riskiest firms. These effects are stronger for the banks that most depend on wholesale funding or those that report the highest shares of NPLs in their portfolios (Table C6.1).<sup>16</sup> First, on average, the banks with the highest share of wholesale funding grant more credit to the riskiest firms (Table C6.1, second column), with capital inflows strengthening this effect significantly. For the banks that rely most heavily on wholesale funding, a rise in interbank-related capital inflows (as a percentage of GDP) increases credit growth to the riskiest firms (Table C6.1, fourth column). At the individual country level, the results are more nuanced (Graph C6.1, left-hand panel). The positive relationship between capital inflows and credit granted to the riskiest firms by banks with the highest wholesale funding ratios is highly significant for Mexico and Colombia, while

<sup>14</sup> This Annex summarises the preliminary findings from research conducted by a working group of the Consultative Council for the Americas, Consultative Group of Directors of Financial Stability. The more comprehensive background paper will be published as Cantú et al (2021). Working group members are Fernando Chertman (Central Bank of Brazil), Toni Santos (Central Bank of Brazil), Rodrigo Alfaro (Central Bank of Chile), Facundo Luna (Central Bank of Chile), Miguel Sarmiento (Central Bank of Colombia), Roberto Lobato (Bank of Mexico), Calixto Lopez (Bank of Mexico), Gerald Cisneros (Central Reserve Bank of Peru) and Rafael Nivin (Central Reserve Bank of Peru) and Carlos Cantú (BIS). The working group thanks Sara G. Castellanos, Nathan Converse, Julian Di Giovanni and Pinar Yeşin for helpful comments and support.

<sup>15</sup> See Khwaja and Mian (2008).

<sup>16</sup> The between-study heterogeneity describes the percentage of variation across studies that is due to heterogeneity rather than chance. Meta-analysis techniques were used to obtain mean effect estimates. See Cantú, Claessens and Gambacorta (2020).

the results from Chile and Brazil point in the same direction but tend to be less significant (Graph C6.1, left-hand panel).

Capital inflows fuel growth to riskier firms<sup>1</sup>

Table C6.1

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\Delta \log(\text{loan})$	Bank fund	FRisk* BFund	Kflow* BFund	Kflow* BFund*FRisk	Bank risk	FRisk* BRisk	Kflow* BRisk	Kflow* Brisk*FRisk
Mean effect: <sup>2</sup>	<b>0.007*</b>	<b>0.017***</b>	0.11	<b>1.304**</b>	-0.002	<b>0.016*</b>	-0.211	<b>1.008**</b>
	(0.003)	(0.005)	(0.177)	(0.581)	(0.008)	(0.009)	(0.157)	(0.401)
Between-study heterogeneity (%): <sup>3</sup>	41%	80%	45%	46%	73%	92%	58%	72%
Observations:	10	10	10	10	10	10	10	10

<sup>1</sup> Capital inflows measured by the *other investment debt* component from BOP data and by *interbank loans* from the BIS locational banking statistics. Bank fund = indicator variable equal to 1 if bank's share of wholesale funding is in the top decile. Bank risk = indicator variable equal to 1 if bank's share of non-performing loans is in the top decile. <sup>2</sup> Results of a random effects meta-analysis. The mean effect corresponds to the weighted average of coefficient reported by each country. The weight is calculated as the inverse of the estimate's standard error, as reported in the underlying study, plus the estimated between-study variance. The studies' specification includes firm-by-time fixed effects and bank fixed effects. Countries included were Brazil, Chile, Colombia, Mexico and Peru. <sup>3</sup> Percentage of the residual variation that is attributable to between-study heterogeneity.

Notes: \*\*\*, \*\* and \* denote significance at the 1%, 5% and 10%, respectively. Standard errors in parenthesis.

Second, there is some evidence suggesting that the banks with the highest NPL ratios are more likely to lend to the riskiest firms in general (Table C6.1, sixth column), and capital inflows seem to reinforce this effect. For the banks with the highest shares of non-performing loans on balance sheet, an increase in interbank-related capital inflows (as a percentage of GDP) increases credit growth to riskier firms (Table C6.1, eighth column). This finding suggests that an increase in bank-related capital inflows can relax the funding constraints faced by the domestic banks that have the riskiest loan portfolios. At the individual country level, evidence from Brazil, Mexico and Chile strongly supports this finding. Overall, these results suggest that it is cross-border interbank lending, as a sub-component of the broader BOP measure of capital inflows, that is behind the increased supply of credit in the domestic corporate loan market.

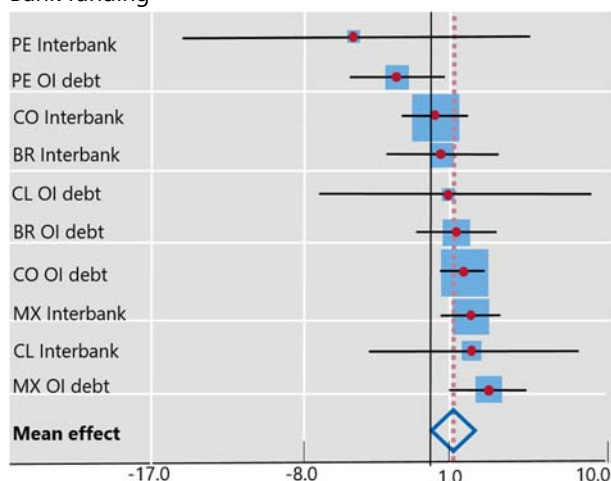
In sum, capital inflows, particularly cross-border interbank loans, can serve as an important source of funding to domestic banks with lower funding limits, possibly translating into higher domestic credit growth. However, the presented results point to an easing of financing conditions for borrowers of lower credit quality as well. If credit to these borrowers was mispriced, capital inflows might lead to a more efficient allocation of financial resources. However, a downside of these surges could be an increase in riskier positions held by some banks. In response to the economic effects of the Covid-19 crisis, central banks in advanced economies have implemented several liquidity facilities in order to ease banks' funding restrictions. If the increase in liquidity results in higher cross-border interbank flows, it may generate higher credit risk in EMEs despite the fact that jurisdictions have set in place measures to mitigate potential side effects.

## Capital inflows and credit granted by vulnerable banks to riskiest firms<sup>1</sup>

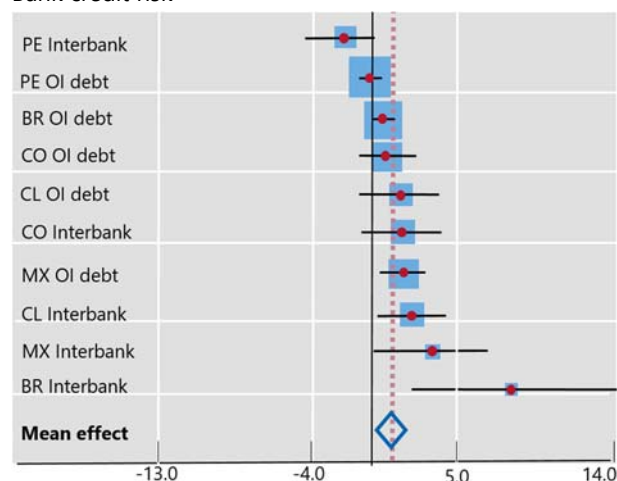
Country-level coefficients triple interaction  $Kflow_{t-1} \times BChar_{b,t-1} \times FRisk_{f,t-1}$

Graph C6.1

### Bank funding<sup>2</sup>



### Bank credit risk<sup>3</sup>



<sup>1</sup> Results from a random effects meta-analysis. Red dots correspond to the country-level coefficients of the triple interaction effect of capital inflows, bank characteristics and firm risk on credit growth. The horizontal black line corresponds to the 95% confidence interval of the country estimate. The size of the blue square represents the weight of the country estimate in the mean effect (dotted line). The weight is calculated as the inverse of the estimate's standard error plus the estimated between-study variance. The blue diamond corresponds to the mean effect 95% confidence interval. <sup>2</sup> Indicator variable equal to 1 if bank's share of wholesale funding is in the top decile. <sup>3</sup> Indicator variable equal to 1 if bank's share of non-performing loans is in the top decile.

Source: IMF, *Balance of Payments Statistics*; BIS locational banking statistics (LBS); CGFS Working Group calculations.

## Annex D Members of the Working Group

Co-chairs	Gerardo Israel García López Livio Stracca
National Bank of Belgium	Christophe Piette
European Central Bank	Roland Beck Beatrice Scheubel
Bank of France	Jean-Charles Bricongne Rémy Lecat
Deutsche Bundesbank	Axel Brüggemann Andreas Röthig
Hong Kong Monetary Authority	Maggie Mok
Reserve Bank of India	Shri Manmohan
Bank of Italy	Flavia Corneli Fabrizio Ferriani
Bank of Japan	Kazuaki Washimi
Bank of Korea	Byung Jae Choi
Bank of Mexico	Joaquin Rodrigo Cano Jauregui Sara Gabriela Castellanos
Netherlands Bank	Carlijn Eijking
Bank of Spain	Juan Carlos Berganza Pedro del Rio Luis Molina
Swiss National Bank	Thomas Nitschka Pinar Yeşin
Bank of England	Fernando Eguren Martín Mark Joy Jeremy Martin Carlos Eduardo van Hombeeck Simon Whitaker
Board of Governors of the Federal Reserve System	Nathan Converse
Federal Reserve Bank of New York	Julian Di Giovanni
Bank for International Settlements	Cathérine Koch (Secretary) Kostas Tsatsaronis Philip Wooldridge

Workstreams were led by Pinar Yeşin (Chapter 1), Beatrice Scheubel (Chapter 2), Nathan Converse (Chapter 3), Sara Gabriela Castellanos and Joaquin Rodrigo Cano Jauregui (Chapter 4). In addition to the members listed above, important contributions were made by Thomas Heyden (ECB) as well Óscar Palacios, Paloma Corcuera, Alejandra Mucino, Alberto Tepox and Enrique Hernández (Bank of Mexico). Mert Önen (BIS) provided research support. Meskerem Ayalew-Duthaler, Dora Dolea and Annette Stockreisser (BIS) provided administrative support.