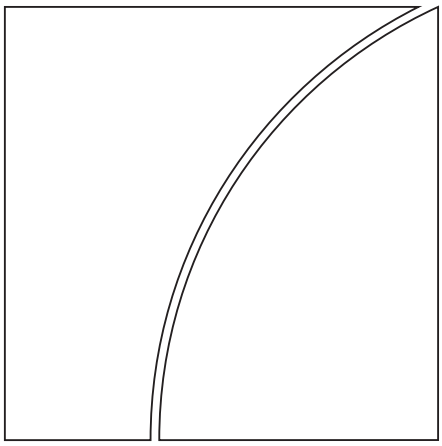
BANK FOR INTERNATIONAL SETTLEMENTS



85th Annual Report

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Basel, 28 June 2015

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The economic chapters of this Report went to press on 17–19 June 2015 using data available up to 29 May 2015.

Conventions used in this Report

lhs, rhs	left-hand scale, right-hand scale
billion	thousand million
trillion	thousand billion
%pts	percentage points
...	not available
.	not applicable
–	nil or negligible
$	US dollar unless specified otherwise

Components may not sum to totals because of rounding.

The term "country" as used in this publication also covers territorial entities that are not states as understood by international law and practice but for which data are separately and independently maintained.

85th Annual Report

submitted to the Annual General Meeting
of the Bank for International Settlements
held in Basel on 28 June 2015

Ladies and Gentlemen,

It is my pleasure to submit to you the 85th Annual Report of the Bank for International Settlements for the financial year which ended on 31 March 2015.

The net profit for the year amounted to SDR 542.9 million, compared with SDR 419.3 million for the preceding year. Details of the results for the financial year 2014/15 may be found on pages 167–8 of this Report under "Financial activities and results".

The Board of Directors proposes, in application of Article 51 of the Bank's Statutes, that the present General Meeting apply the sum of SDR 125.6 million in payment of a dividend of SDR 225 per share, payable in any constituent currency of the SDR, or in Swiss francs.

The Board further recommends that SDR 20.9 million be transferred to the general reserve fund and the remainder – amounting to SDR 396.4 million – to the free reserve fund.

If these proposals are approved, the Bank's dividend for the financial year 2014/15 will be payable to shareholders on 2 July 2015.

Basel, 19 June 2015

JAIME CARUANA
General Manager

Overview of the economic chapters

Chapter I: Is the unthinkable becoming routine?

Globally, interest rates have been extraordinarily low for an exceptionally long time, in nominal and inflation-adjusted terms, against any benchmark. Such low rates are the most remarkable symptom of a broader malaise in the global economy: the economic expansion is unbalanced, debt burdens and financial risks are still too high, productivity growth too low, and the room for manoeuvre in macroeconomic policy too limited. The unthinkable risks becoming routine and being perceived as the new normal.

This malaise has proved exceedingly difficult to understand. The chapter argues that it reflects to a considerable extent the failure to come to grips with financial booms and busts that leave deep and enduring economic scars. In the long term, this runs the risk of entrenching instability and chronic weakness. There is both a domestic and an international dimension to all this. Domestic policy regimes have been too narrowly concerned with stabilising short-term output and inflation and have lost sight of slower-moving but more costly financial booms and busts. And the international monetary and financial system has spread easy monetary and financial conditions in the core economies to other economies through exchange rate and capital flow pressures, furthering the build-up of financial vulnerabilities. Short-term gain risks being bought at the cost of long-term pain.

Addressing these deficiencies requires a triple rebalancing in national and international policy frameworks: away from illusory short-term macroeconomic fine-tuning towards medium-term strategies; away from overwhelming attention to near-term output and inflation towards a more systematic response to slower-moving financial cycles; and away from a narrow own-house-in-order doctrine to one that recognises the costly interplay of domestic-focused policies. One essential element of this rebalancing will be to rely less on demand management policies and more on structural ones, so as to abandon the debt-fuelled growth model that has acted as a political and social substitute for productivity-enhancing reforms. The dividend from lower oil prices provides an opportunity that should not be missed. Monetary policy has been overburdened for far too long. It must be part of the answer but cannot be the whole answer. The unthinkable should not be allowed to become routine.

Chapter II: Global financial markets remain dependent on central banks

Accommodative monetary policies continued to lift prices in global asset markets in the past year, while diverging expectations about Federal Reserve and ECB policies sent the dollar and the euro in opposite directions. As the dollar soared, oil prices fell sharply, reflecting a mix of expected production and consumption, attitudes to risk and financing conditions. Bond yields in advanced economies continued to fall throughout much of the period under review and bond markets entered uncharted territory as nominal bond yields fell below zero in many markets. This reflected falling term premia and lower expected policy rates. The fragility of otherwise

buoyant markets was underscored by increasingly frequent bouts of volatility and signs of reduced market liquidity. Such signs were perhaps clearest in fixed income markets, where market-makers have scaled back their activities and market-making has increasingly concentrated in the most liquid bonds. As other types of players, such as asset managers, have taken their place, the risk of "liquidity illusion" has increased: market liquidity appears ample in normal times, but vanishes quickly during market stress.

Chapter III: When the financial becomes real

Plummeting oil prices and a surging US dollar shaped global activity in the year under review. These large changes in key markets caught economies at different stages of their business and financial cycles. The business cycle upswing in the advanced economies continued and growth returned to several of the crisis-hit economies in the euro area. At the same time, financial downswings are bottoming out in some of the economies hardest-hit by the Great Financial Crisis. But the resource misallocations stemming from the pre-crisis financial boom continue to hold back productivity growth. Other countries, less affected by the crisis, notably many EMEs, are experiencing different challenges. The shift in global conditions has coincided with slowing output growth and peaks in domestic financial cycles. There is the danger that slowing growth in EMEs could expose financial vulnerabilities. Better macroeconomic management and more robust financial structures, including longer debt maturities and reduced exposure to currency risk, have increased resilience. But the overall amount of debt has increased and the shift from banks to capital market funding could raise new risks.

Chapter IV: Another year of monetary policy accommodation

Monetary policy continued to be exceptionally accommodative, with many authorities easing or delaying tightening. For some central banks, the ultra-low policy rate environment was reinforced with large-scale asset purchase programmes. In the major advanced economies, central banks pursued significantly divergent policy trajectories, but all remained concerned about the dangers of inflation running well below inflation objectives. In most other economies, inflation rates deviated from targets, being surprisingly low for some and high for others. The deviation of inflation from expected levels and questions surrounding the sources of price changes underscore an incomplete understanding of the inflation process, especially regarding its medium- and long-term drivers. At the same time, signs of growing financial imbalances around the globe highlight the risks of accommodative monetary policies. The persistence of those policies since the crisis casts doubt on the suitability of current monetary policy frameworks and suggests that resolving the tension between price stability and financial stability is the key challenge. This puts a premium on accounting for financial stability concerns much more systematically in monetary policy frameworks.

Chapter V: The international monetary and financial system

The suitable design of international monetary and financial arrangements for the global economy is a long-standing issue. A key shortcoming of the existing system

is that it tends to heighten the risk of financial imbalances, leading to booms and busts in credit and asset prices with serious macroeconomic consequences. These imbalances often occur simultaneously across countries, deriving strength from international spillovers of various types. The global use of the dollar and the euro allows monetary conditions to affect borrowers well beyond the respective issuing economies. Many countries also import monetary conditions when setting policy rates to limit interest rate differentials and exchange rate movements against the major currencies. The global integration of financial markets tends to reinforce these dynamics, by allowing common factors to drive capital flows and a common price of risk to move bond and equity prices. Policies to keep one's own house in order by managing financial cycles would help to reduce such spillovers. In addition, central banks need to better internalise spillovers, not least to avoid the effects of their actions spilling back into their own economies. Moving beyond enlightened self-interest would require international cooperation on rules constraining domestic policies.

Chapter VI: Old and new risks in the financial landscape

Risks in the financial system have evolved against the backdrop of persistently low interest rates in advanced economies. Despite substantial efforts to strengthen their capital and liquidity positions, advanced economy banks still face market scepticism. As a result, they have lost some of their traditional funding advantage relative to potential customers. This adds to the challenges stemming from the gradual erosion of interest income and banks' growing exposure to interest rate risk, which could weaken their resilience in the future. By contrast, EME banks have so far benefited from market optimism amid buoyant conditions that may be masking the build-up of financial imbalances. For their part, insurance companies and pension funds have faced ballooning liabilities and muted asset returns. Asset-liability mismatches are weakening institutional investors and threaten to spill over into the real economy. As these investors offload risks onto their customers and banks retreat from traditional intermediation, asset managers are taking on an increasingly important role. Regulatory authorities are carefully monitoring the financial stability implications of the growing asset management sector.

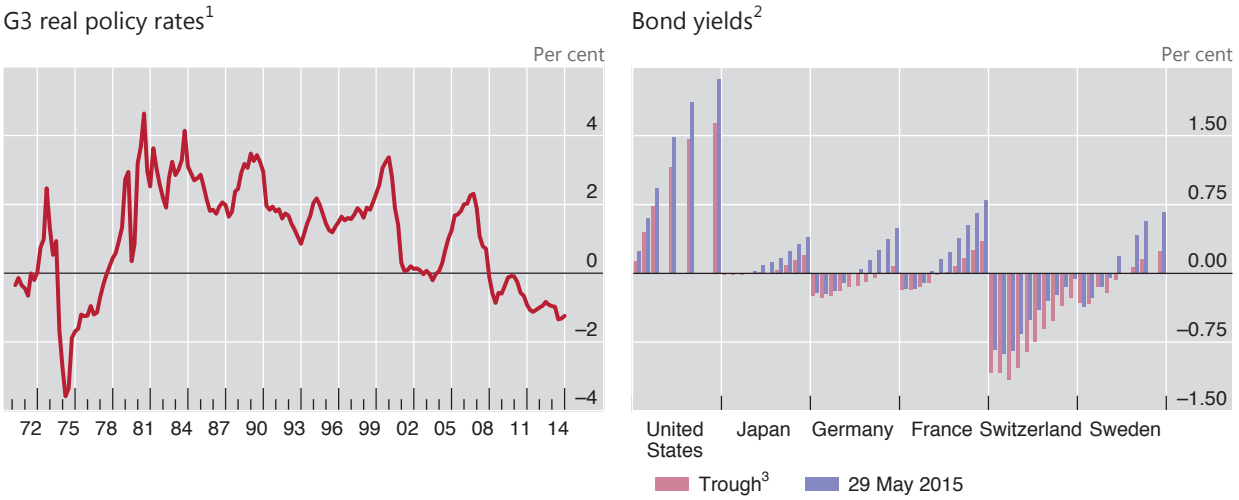
I. Is the unthinkable becoming routine?

Interest rates have never been so low for so long (Graph I.1). They are low in nominal and real (inflation-adjusted) terms and low against any benchmark. Between December 2014 and end-May 2015, on average around $2 trillion in global long-term sovereign debt, much of it issued by euro area sovereigns, was trading at *negative* yields. At their trough, French, German and Swiss sovereign yields were negative out to a respective five, nine and 15 years. Such yields are unprecedented. Policy rates are even lower than at the peak of the Great Financial Crisis in both nominal and real terms. And in real terms they have now been negative for even longer than during the Great Inflation of the 1970s. Yet, exceptional as this situation may be, many expect it to continue. There is something deeply troubling when the unthinkable threatens to become routine.

Such low rates are only the most obvious symptom of a broader malaise, despite the progress made since the crisis. Global economic growth may now be not far from historical averages but it remains unbalanced. Debt burdens are still high, and often growing, relative to output and incomes. The economies hit by a balance sheet recession are still struggling to return to healthy expansion. In several others, financial imbalances show signs of building up, in the form of strong credit and asset price increases, despite the absence of inflationary pressures. Monetary policy has taken on far too much of the burden of boosting output. And in the meantime, productivity growth has continued to decline.

This malaise has proved exceedingly hard to understand. Debates rage. Building on last year's analysis, this Annual Report offers a lens through which to interpret what is going on. The lens focuses on financial, medium-term and global

Interest rates have been exceptionally and persistently low — Graph I.1



[1] Nominal policy rate less consumer price inflation excluding food and energy. Weighted averages for the euro area (Germany), Japan and the United States based on rolling GDP and PPP exchange rates. [2] Yield per maturity; for each country, the bars represent the maturities from one to 10 years. [3] For the United States, 30 January 2015; for Japan, 19 January 2015; for Germany, 20 April 2015; for France, 15 April 2015; for Switzerland, 23 January 2015; for Sweden, 17 April 2015.

Sources: Bloomberg; national data.

factors, whereas the prevailing perspective focuses more on real, short-term and domestic factors.

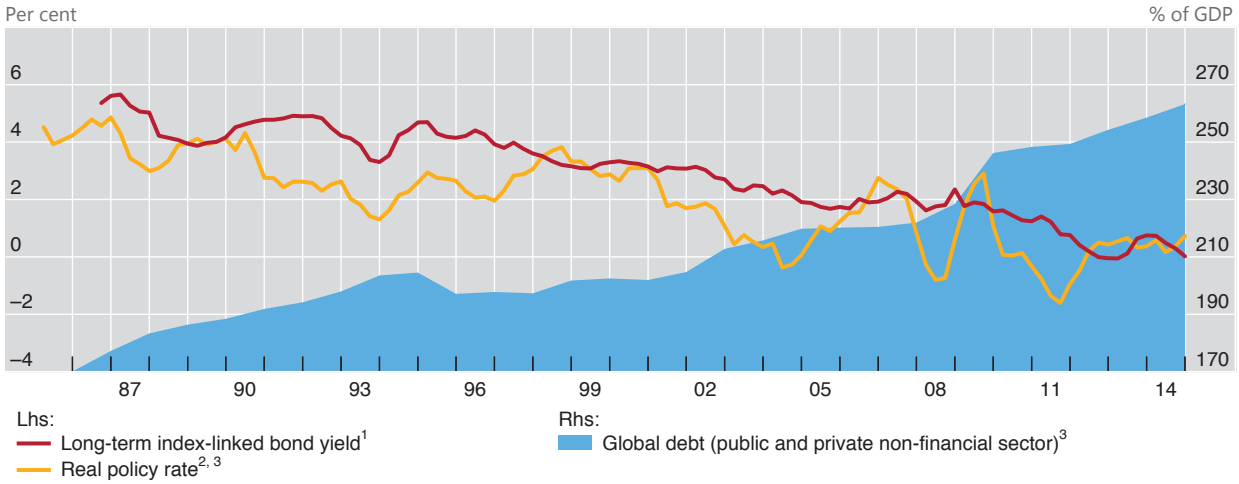
We argue that the current malaise may to a considerable extent reflect a failure to come to grips with how financial developments interact with output and inflation in a globalised economy. For some time now, policies have proved ineffective in preventing the build-up and collapse of hugely damaging financial imbalances, whether in advanced or in emerging market economies (EMEs). These have left long-lasting scars in the economic tissue, as they have sapped productivity and misallocated real resources across sectors and over time.

Our lens suggests that the very low interest rates that have prevailed for so long may not be "equilibrium" ones, which would be conducive to sustainable and balanced global expansion. Rather than just reflecting the current weakness, low rates may in part have contributed to it by fuelling costly financial booms and busts. The result is too much debt, too little growth and excessively low interest rates (Graph I.2). In short, low rates beget lower rates.

There is a domestic and an international dimension to all this. Domestic policy regimes have been too narrowly concerned with short-term output and inflation stabilisation, losing sight of slower-moving but more costly financial cycles. And the international monetary and financial system (IMFS) has exacerbated these shortcomings. This has been most evident post-crisis. As monetary policy in the core economies has pressed down hard on the accelerator but failed to get enough traction, pressures on exchange rates and capital flows have spread easy monetary and financial conditions to countries that did not need them, supporting the build-up of financial vulnerabilities. A key manifestation has been the strong expansion of US dollar credit in EMEs, mainly through capital markets. The system's bias towards easing and expansion in the short term runs the risk of a contractionary outcome in the longer term as these financial imbalances unwind.

The right response is hard to implement. The policy mix will be country-specific, but its general features are not. What is required is a triple rebalancing in national and international policy frameworks: away from illusory short-term macroeconomic

Interest rates sink as debt soars — Graph I.2



[1] From 1998, simple average of France, the United Kingdom and the United States; otherwise only the United Kingdom. [2] Nominal policy rate less consumer price inflation. [3] Aggregate based on weighted averages for G7 economies plus China based on rolling GDP and PPP exchange rates.

Sources: IMF, *World Economic Outlook*; OECD, *Economic Outlook*; national data; BIS calculations.

fine-tuning towards medium-term strategies; away from overwhelming attention to near-term output and inflation towards a more systematic response to slower-moving financial cycles; and away from a narrow own-house-in-order doctrine to one that recognises the costly interplay of domestic-focused policies.

In this rebalancing, one essential element will be to rely less on demand management policies and more on structural ones. The aim is to replace the debt-fuelled growth model that has acted as a political and social substitute for productivity-enhancing reforms. The dividend from lower oil prices provides an opportunity that should not be missed. Monetary policy, overburdened for far too long, must be part of the answer, but it cannot be the whole answer.

The rest of the chapter digs further into the problem in a quest to unearth its possible solution. The first section reviews the global economy's evolution in the past year and assesses the prospects and risks ahead. The second provides the suggested lens through which to understand the forces that have been shaping, and will continue to shape, that evolution. The third considers the policy implications.

The global economy: where it is and where it may be going

Looking back: recent evolution

Where did we leave the economy at this point in time last year? Output growth was not far away from historical averages; and advanced economies (AEs) were gaining momentum even as EMEs had lost some. Except in a few EMEs, inflation was low, in some notable cases below central bank targets. Subdued risk-taking in the real economy contrasted with aggressive risk-taking in financial markets: anaemic investment coexisted with buoyant asset prices and unusually low volatility. Market performance seemed to hinge on extraordinary monetary accommodation as stock and bond indices responded to central bankers' every word and deed. As bank balance sheets in crisis-hit economies were slowly healing, market-based finance was surging. The balance sheets of the non-financial private sector were evolving along a clear divide: in crisis-hit countries the sector was deleveraging at varying but slow speeds; elsewhere it was leveraging up, sometimes uncomfortably fast. Fiscal policy was generally under strain, with debt-to-GDP ratios continuing to rise even as several AEs consolidated their finances. As a result, global private plus public sector debt-to-GDP ratios were edging up. Monetary policy was testing what, at the time, appeared to be its outer limits.

Since then, there have been two major developments. First, the oil price has fallen sharply, with lesser declines for other commodities. The drop of around 60% from July 2014 to March 2015 was the third largest in the last half-century, after those following the Lehman default and the OPEC cartel breakdown in 1985. The price has only partially recovered since then. Second, the US dollar has appreciated strongly. Over the same period, the dollar's trade-weighted exchange rate rose by around 15% – one of the sharpest appreciations on record within a similar window. The shift has been especially large vis-à-vis the euro.

Much ink has been spilled on the oil price. But, like that of any other asset, the price of oil is driven by a combination of market expectations about future production and consumption, risk attitudes and financing conditions (Chapter II). This time, a key factor was the realisation that OPEC had become more concerned about market share and would no longer restrict production as in the past – a true game changer. This explanation better fits the timing and steepness of the price drop than do worries about weakening global demand. In addition, hedging activity by highly indebted individual producers may have played a role.

Regardless of its drivers, the oil price drop has already provided, and will continue to provide, a welcome boost to the global economy (Chapter III). A fall in the price of a key input in global production is bound to be expansionary. This will be all the more visible to the extent that it does not reflect a fall in global demand. Even so, there will be obvious gainers and losers, and the interaction of oil price trends with financial vulnerabilities bears watching (see below).

The sharp dollar appreciation has multiple causes and uncertain effects. It started when firming expectations of divergent macroeconomic conditions and central bank policies made US dollar assets relatively more attractive. It became entrenched once the ECB surprised markets with its large-scale asset purchase programme. The impact of the appreciation through trade is mainly redistributional but welcome to the extent that it has shifted growth momentum from stronger to weaker economies. But the ultimate impact will depend on its imprint on financial vulnerabilities and on how policies, not least monetary policies, in turn react to currency movements. Here, the large stock of dollar debt run up by non-US residents looms large (see below).

Together, the oil price drop and dollar appreciation help explain, and in part reflect, the further plunge of short- and long-term interest rates. They help explain it to the extent that a lower oil price has added to global disinflationary pressures. They reflect it to the extent that exceptionally easy monetary policy in some jurisdictions prompts easing elsewhere. Just think of the Swiss National Bank's or the Danish central bank's decision to test the limits of negative interest rates as the exchange rates came under huge pressure.

Where has this left the world? On the surface, perhaps, not far from where we left it last year. Global growth is little changed, and the rotation from EMEs to AEs has continued. Inflation is somewhat lower, due mainly to temporary and positive supply side factors (Chapter IV). Financial markets have shown mixed signals: volatility has normalised somewhat and risk-taking in corporate debt markets has eased, especially in EMEs. Yet equity prices have soared further and markets still seem to take their cue from central bank policies (Chapter II). US monetary policy normalisation appears closer, but the timing is still uncertain. Banks have continued to heal, although doubts remain, and this has further boosted market-based finance (Chapter VI). Private sector balance sheets have evolved further in the same direction, with some countries deleveraging and others leveraging up, but little has changed overall (Chapter III).

Beneath the surface, though, the medium-term risks and tensions have increased, inherent as they are in a faulty debt-fuelled global growth model. And it is to these risks and tensions that we now turn.

Looking ahead: risks and tensions

To understand the main medium-term risks, it is useful to divide countries into two groups: those that were badly hit by the Great Financial Crisis, and those that were not. For, almost a decade on, the long shadow of the crisis is still with us (Chapter III).

In the least affected countries, the main risk is that of peaking domestic financial cycles, often coupled with external vulnerabilities. This group includes some AEs, notably commodity exporters, and many EMEs, notably some of the largest. In these economies, prolonged domestic credit booms have taken private sector debt-to-GDP ratios to new heights, often in tandem with strong increases in property prices. And in a number of them, as in the past, external sources of credit expansion, especially in foreign currency, have played a role. For example, US dollar credit to non-banks in EMEs has almost doubled since early 2009, to exceed $3 trillion. Especially at risk are commodity exporters, buoyed by a commodity

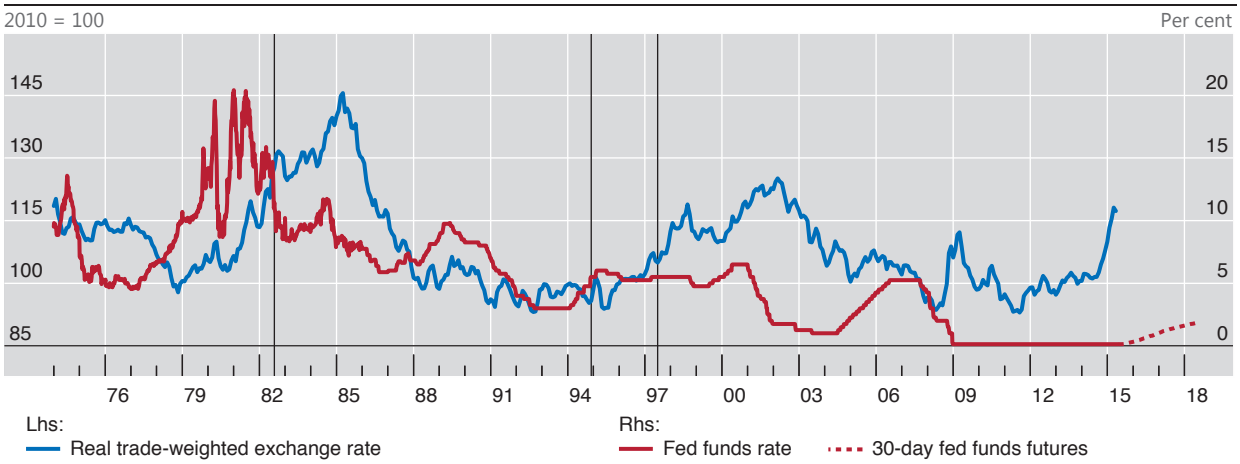
"supercycle" and turbocharged by exceptionally easy global funding conditions. No wonder that estimates for potential growth rates have already halved in Latin America. China plays a pivotal role in all this: it is a huge economy and commodity importer that has slowed considerably under the weight of its pervasive financial imbalances.

In several respects, EMEs are in better shape than in the 1980s and 1990s, when tighter monetary conditions in the United States and an appreciating dollar triggered crises (Graph I.3). Macroeconomic frameworks are stronger and exchange rates more flexible. The financial system infrastructure is more robust, and prudential regulation, not least the macroprudential setup, is tighter. For instance, despite the eye-catching US dollar figures, foreign exchange debt as a percentage of GDP is not as high as in the past. Indeed, that was the aim of developing local currency bond markets – to put an end to "original sin". And foreign exchange reserves are now much larger.

Even so, caution is called for. A seemingly solid performance in terms of growth, low inflation and fiscal probity did not insulate Asian economies in the 1990s. Foreign exchange exposures are now concentrated in the corporate sector, where currency mismatches are harder to measure. There are limits to how far official reserves can be mobilised to plug private sector funding liquidity shortfalls or to defend currencies. And it remains to be seen how the shift from banks to asset managers will influence asset price dynamics: the size asymmetry between suppliers and recipients of funds has not got any smaller, and markets could react violently if pressures became one-sided – liquidity will certainly evaporate in the heat of a rush for the exits. The 2013 "taper tantrum" was only an incomplete test: it reflected traditional balance of payments and macroeconomic concerns, but did not coincide with any more damaging unwinding of domestic financial imbalances.

One thing is for sure: gone are the days when what happened in EMEs largely stayed there. The EMEs' heft in the global economy has soared since the Asian crisis, from about one third to almost half of global GDP in purchasing power terms. And in some cases, their external financial exposures can be quite large from a global perspective, even if small in relation to the domestic economy. Take, in particular, China. At end-2014, it was the world's eighth largest borrower in terms of the $1 trillion in cross-border bank claims – double the amount outstanding just two

US monetary policy and dollar appreciation around EME financial crises — Graph I.3



The solid vertical lines indicate: the Latin American debt crisis (1982), the Tequila crisis (1994) and the Asian financial crisis (1997).

Sources: Bloomberg; national data; BIS.

years before – or the 11th largest on the more than $450 billion its nationals had borrowed in international debt securities markets by end-March 2015.

Different risks attend the countries most affected by the crisis, which are still deleveraging or starting to releverage. Three are worth highlighting.

The first relates to the medium-term costs of persistent ultra-low interest rates. These can inflict serious damage on the financial system (Chapters II and VI). Such rates sap banks' interest margins and returns from maturity transformation, potentially weakening balance sheets and the credit supply, and are a source of major one-way interest rate risk. Ultra-low rates also undermine the profitability and solvency of insurance companies and pension funds. And they can cause pervasive mispricing in financial markets: equity and some corporate debt markets, for instance, seem to be quite stretched. Such rates also raise risks for the real economy. In the shorter term, the plight of pension funds is just the most visible reminder of the need to save more for retirement, which can weaken aggregate demand. Over a longer horizon, negative rates, whether in inflation-adjusted or in nominal terms, are hardly conducive to rational investment decisions and hence sustained growth. If the unprecedented journey towards lower negative nominal interest rates continues, technical, economic, legal and even political boundaries may well be tested.

The second risk relates to the prolonged reliance on debt as a substitute for productivity-enhancing reforms. It is always tempting to postpone adjustment, even though the drag that high public debt can exert on growth has been well documented. Ageing populations compound this challenge in at least two ways. Economically, they make the debt burden much harder to bear. Politically, they heighten the temptation to boost output temporarily through demand management policies: the tyranny of headline growth figures, unadjusted for demographics, contributes to this. For example, it is not remarked often enough that, in terms of its working age population, Japan's growth has outpaced that of many of its advanced economy peers, not least the United States. On that basis, in 2000–07, Japan grew at a cumulative rate of 15%, almost twice as fast as the United States (8%) – the reverse of what headline growth rates show (10% and 18%). The difference is even bigger if the post-crisis years are also considered.

The third risk relates to the Greek crisis and its impact on the euro area. In some respects, developments in Greece, and in the euro area more generally, are akin to the broader global challenges but amplified by institutional specificities – a toxic mix of private and public debt and too little commitment to badly needed structural adjustments. As a result, monetary policy, seen as a quick fix to buy time, has borne the brunt of the burden. On strictly economic grounds, the euro area seems better placed to cope with contagion than when the crisis first broke out. Yet uncertainty lingers, and the potential for political contagion is even harder to assess.

Not included in this list is the risk of persistently low inflation or outright deflation. True, the risk depends on country-specific factors. But the current policy debate tends to overplay it (Chapter IV). First, it is sometimes not stressed enough that recent price declines largely reflect the fall in oil and other commodity prices. Their transient impact on inflation should be superseded by the longer-lasting boost to expenditure and output, especially in energy-importing countries. Second, there is a tendency to draw general conclusions from the Great Depression – a unique episode that may have had more to do with the large drop in asset prices and with banking crises than with deflation per se. In general, the longer historical record reveals that the link between deflation and growth is a weak one. Finally, the evidence also suggests that the real economic damage has so far stemmed from the interplay of debt with property prices, and not so much with goods and services prices, as the latest recession confirms. At the same time, policy responses should also take into account our still limited understanding of the inflation process.

The resulting picture is that of a world that has been returning to stronger growth but where medium-term tensions persist. The wounds left by the crisis and subsequent recession are healing, because balance sheets are being repaired and some deleveraging has taken place. Recently, the strong and unexpected boost from energy prices has helped too. In the meantime, monetary policy has done its utmost to support near-term demand. But the policy mix has relied too much on measures that, directly or indirectly, have entrenched dependence on the very debt-fuelled growth model that lay at the root of the crisis. These tensions manifest themselves most visibly in the failure of global debt burdens to adjust, the continued decline in productivity growth and, above all, the progressive loss of policy room for manoeuvre, both fiscal and monetary.

The deeper causes

Why has this happened? One possible answer lies in a blend of politics and ideas. The natural bias of political systems is to encourage policies that buy short-term gain at the cost of risking long-term pain. The reasons are well known and need no elaboration here. But, as ideas influence policy, their effect becomes all the more insidious because of that bias. Thus, the pressing question is whether prevailing economic paradigms are sufficiently good guides for policy.

Ideas and perspectives

Once the crisis broke out, there was widespread agreement that the dominant macroeconomic perspectives had failed to ward off the crisis because they ruled it out. To simplify somewhat, the presumption was that price stability was sufficient for macroeconomic stability and that either the financial system was self-stabilising or that its failure could not be very damaging.

Unfortunately, progress in tackling these shortcomings has been disappointing. Financial factors still appear to be hovering at the periphery of *macroeconomic* thinking. True, huge efforts have been made to bring them closer to the core: economists have worked hard to develop models that can accommodate them. But these efforts have not yet permeated deeply enough into the policy debate: macroeconomic stability and financial stability remain uncomfortable bedfellows.

If one strips the prevailing analytical view of all its nuances and focuses on how it is shaping *the policy debate*, its basic logic is simple. There is an excess or shortfall of final demand for domestic production (an "output gap") that determines domestic inflation, not least by underpinning inflation expectations. Aggregate demand policies are then used to eliminate that gap and so achieve full employment and stable inflation; fiscal policy affects spending directly, and monetary policy indirectly, through real (inflation-adjusted) interest rates. The exchange rate, if allowed to float, permits the authorities to set monetary policy freely in line with domestic needs and will, over time, also balance the current account. If each country adjusts its monetary and fiscal levers so as to close the output gap *period by period*, everything will be fine, domestically and globally.

Of course, to varying degrees, financial factors do make their appearance. For instance, in some cases too much debt is seen as widening the demand shortfall. In others, the possibility of financial instability is fully recognised. But then, at the end of the day, when all is said and done, the basic conclusions do not change. All demand shortfalls should be treated equally, ie through standard aggregate demand policies. And financial instability should best be addressed separately, through prudential policy, albeit with a stronger systemic (macroprudential)

orientation. Following a tidy separation principle, monetary and fiscal policies are best left free to address standard macroeconomic concerns, very much as before. From this perspective, we are back in the familiar pre-crisis world. It feels oddly like *Groundhog Day*.

Last year's Annual Report offered a different analytical lens that brought different policy conclusions into view. That lens seeks to bring financial factors back to the core of macroeconomics, and stresses the medium term over the short term and the global over the domestic. Three basic elements, developed further in this year's Report, are essential.

First, the behaviour of inflation may not be a fully reliable guide to sustainable (or potential) output. This is because financial imbalances often build up when inflation is low and stable, declining or even negative. The hallmarks of these imbalances are booming credit and asset prices, particularly property prices, and signs of aggressive risk-taking in financial markets, such as low credit spreads and falling volatility. When these financial booms finally collapse, they can cause devastating and long-lasting economic damage. This was clearly true of the Great Financial Crisis. But that episode simply replayed a recurrent historical pattern, from the pre-Great Depression financial boom in the United States – prices actually fell for part of the roaring 1920s – to the crisis in Japan in the early 1990s and those in Asia in the mid-1990s.

If financial booms have common characteristics, it should be possible to identify some of the danger signals in advance. And the evidence does indicate that proxies for such financial booms can provide useful information about the risks ahead *as events unfold* (in "real time"). Such indicators would have helped establish that output was running above its sustainable, or potential, level ahead of the most recent crisis in the United States – something that typical estimates used in policymaking, partly distorted by subdued inflation, have done only ex post, as they rewrite history based on new information (Box IV.C). This is the reason why, for the United States, knowledge of the deviations of the debt service ratio and leverage from their long-term values in the mid-2000s would have helped project the behaviour of output during the subsequent recession and recovery (Box III.A). And it explains why the behaviour of credit and property prices during the boom, or that of the debt service ratio or even that of credit growth alone, has proved a useful indicator of future banking distress and costly recessions across countries.

Why is inflation an insufficiently reliable signal of sustainability, contrary to what the prevailing paradigm suggests? There are at least two possible reasons.

One has to do with the type of credit expansion involved. Instead of financing the purchase of newly produced goods or services, which lifts expenditures and output, strong credit growth may simply be paying for existing assets, either "real" (eg housing or companies) or financial (eg simple assets or more complex forms of financial engineering). Neither of these impinges directly on inflationary pressures.

The other has to do with what explains (dis)inflation. Supply-driven disinflations tend to boost output while providing fertile ground for the build-up of financial imbalances. Examples include forces such as the globalisation of the real economy (eg the entry of former communist countries into the world trading system), technological innovation, greater competition, and falling prices for key production inputs such as oil. The difference between supply- and demand-driven disinflations may well explain the historically weak empirical link between deflation and growth.

Second, the busts that follow financial booms do much more damage, and are less amenable to traditional aggregate demand policies. Growing empirical evidence indicates that the corresponding recessions are deeper, subsequent recoveries

weaker, output potential permanently lost, and post-recession growth rates possibly lower. Indeed, the post-crisis experience has followed a similar pattern, despite the unprecedented monetary stimulus and initial fiscal expansion.

The reasons have to do with the strong undercurrents that the boom leaves in its wake. The financial sector is broken. Households and/or companies face large debt overhangs and asset quality problems. And, importantly, financial booms interact perversely with productivity growth. They can mask its secular decline, eroded by structural deficiencies, behind an illusory feel-good factor (see the *84th Annual Report*). They can also undermine it more directly, by causing long-lasting resource misallocations, in both capital and labour (Box III.B). Taking cross-country estimates at face value, the impact can be quite large, up to nearly 1 percentage point per year during the boom and much larger after a crisis breaks out.

Under these conditions, and once the acute financial crisis phase is over, aggregate demand policies are pushing on a string. Undercapitalised financial institutions restrict and misallocate credit. Overindebted borrowers pay back debt. And misallocated resources cannot respond to an indiscriminate stimulus. In other words, not all output gaps are born equal, amenable to identical remedies; and post-crisis their size may not be as large as it appears. Thus, unless the underlying problems are addressed head-on, short-term gain may be purchased at the price of long-term pain: debt does not come down sufficiently, the policy room for manoeuvre shrinks further and the seeds are sown for the next financial bust. None of this, however, means higher inflation. Paradoxically, an easing bias in the short term may end up being contractionary longer-term.

Third, when the exchange rate becomes the point of least resistance, problems can be exacerbated globally. Since after a financial bust monetary policy has only limited traction on expenditures through domestic channels, the responsiveness of inflation and output to the exchange rate is stronger. Currency depreciation has a more immediate, mechanical effect on prices. And to the extent that it diverts demand away from other countries, it can boost output. But if, as argued below, exchange rates fail to insulate countries sufficiently from external influences, the appreciations will be resisted and the end result will be competitive depreciations and a looser monetary policy stance globally. Thus, if, on balance, policies are *already* too loose for lasting financial and macroeconomic stability, because of an unbalanced policy mix, the outcome will be worse. Once more, short-term gain may result in long-term pain.

Excess financial elasticity

It is now possible to put these various pieces together and diagnose what may be wrong with the functioning of the global economy. In this view, policies have been unable to constrain the build-up and collapse of damaging financial booms, ie the global economy exhibits "excess financial elasticity" – think of an elastic band that can be stretched out further and further until, eventually, it snaps back more painfully. This reflects three shortcomings: in the interplay between financial markets and the economy; in domestic policy regimes; and in the interaction of these regimes through the IMFS. Take each in turn.

By now, there is a keen appreciation that self-equilibrating forces in the financial system are weak, and that this can amplify business fluctuations. There is a mutually reinforcing feedback between loosely anchored perceptions of risk and value, on the one hand, and weak financing constraints, on the other. For a (long) while, asset valuations soar, risk-taking increases and financing becomes easier until, at some point, the process goes into reverse. Thus, the financial system is said to be "procyclical". The crisis revealed this once more, and with a vengeance.

The degree of procyclicality, or the system's elasticity, hinges on domestic policy regimes, and their evolution has increased it. First, financial liberalisation back in the 1980s eased financing constraints and made funding easier and cheaper to obtain. Meanwhile, prudential safeguards have lagged behind. Second, the emergence of monetary policy regimes focused on near-term inflation control has meant that policy would be tightened during financial booms only if inflation increased but would then be loosened aggressively and persistently during busts. Third, fiscal policy has failed to recognise the hugely flattering effect that financial booms have on fiscal accounts and the limited effectiveness of untargeted measures during busts. Taken together, these developments have resulted in an easing bias that allows financial booms to grow bigger, last longer and collapse more violently.

Importantly, the current IMFS has further increased this excess elasticity through the interaction of monetary and financial regimes (Chapter V).

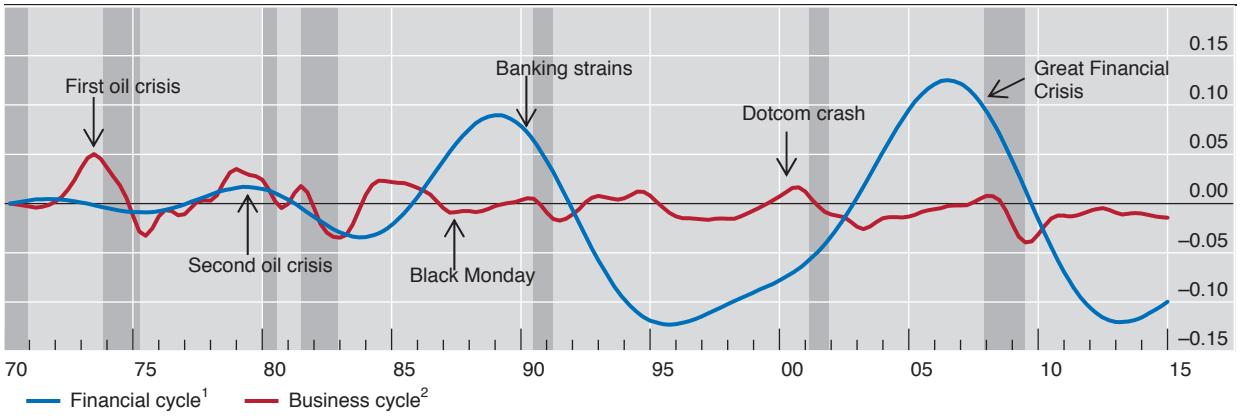
The interaction of monetary regimes has spread the easing bias from the core economies to the rest of the world. This happens directly, because key international currencies – above all, the US dollar – are extensively used outside the issuing country's borders. Thus, the core countries' monetary policies directly influence financial conditions elsewhere. More importantly, an indirect effect works through the aversion of policymakers to unwelcome exchange rate appreciation. As a result, policy rates are kept lower and, if countries resort to foreign exchange intervention, yields are further compressed once the proceeds are invested in reserve currency assets.

The interaction of financial regimes, through the free mobility of capital across currencies and borders, reinforces and channels these effects. Freely mobile capital adds a key external source of funding during domestic booms. And it makes exchange rates subject to "overshooting" for exactly the same reasons as domestic asset prices are, ie loosely anchored perceptions of values, risk-taking and ample funding. Think, for instance, of popular strategies such as momentum trading and carry trades; or of the self-reinforcing feedback between exchange rate appreciation, lower foreign currency debt burdens and risk-taking. More generally, free capital mobility generates surges in risk-taking across countries, regardless of their specific conditions, inducing strong co-movements in long-term yields, asset prices and financing flows. Again, the stronger and more long-lasting these surges are, the more violent the subsequent reversal. Global liquidity, or the ease of financing in international markets, moves in irregular but powerful waves.

The historical evidence is broadly consistent with these observations. The lens helps explain why the scale and duration of financial booms and busts (financial cycles) have increased since the early 1980s (Graph I.4) – a development also supported by the progressive globalisation of the real economy, as trade barriers have come down and new countries have joined in, boosting global growth prospects while generating disinflationary pressures. It helps explain why, globally, inflation-adjusted interest rates have trended down and appear quite low regardless of benchmarks and why foreign exchange reserves have soared. It helps explain why, post-crisis, US dollar credit has surged outside the United States, directed largely towards EMEs. And it helps explain why we have been seeing signs of the build-up of financial imbalances in EMEs as well as in some advanced economies less affected by the crisis and highly exposed to international influences.

Note that, in this story, current account imbalances do not figure prominently. Current account deficits need not coincide with the build-up of financial imbalances. In fact, some of the most damaging financial imbalances in history have occurred in surplus countries – most spectacularly in the United States before the Great Depression and Japan from the late 1980s. And strong financial booms have recently occurred, or are now taking place, in several surplus countries, including China, the Netherlands, Sweden and Switzerland. The relationship between current

Financial and business cycles in the United States Graph I.4



[1] The financial cycle as measured by frequency-based (bandpass) filters capturing medium-term cycles in real credit, the credit-to-GDP ratio and real house prices; Q1 1970 = 0. [2] The business cycle as measured by a frequency-based (bandpass) filter capturing fluctuations in real GDP over a period from one to eight years; Q1 1970 = 0.

Sources: M Drehmann, C Borio and K Tsatsaronis, "Characterising the financial cycle: don't lose sight of the medium term!", *BIS Working Papers*, no 380, June 2012; BIS calculations.

accounts and financial imbalances is more nuanced: a reduction in the surplus or increase in the deficit tends to reflect the build-up of those imbalances. This has policy implications to which we will return.

Why are interest rates so low?

All this raises the fundamental question that lies at the heart of the current policy debate: Why are market interest rates so low? And are they "equilibrium (or natural) rates", ie are they where they should be? How are the market and equilibrium rates determined? The prevailing analytical perspective and the one proposed in this Report come up with different answers.

Most holders of either view would agree that *market* interest rates are determined by the interplay of central banks' and market participants' decisions (Chapter II). Central banks set the short-term policy rate and influence long-term rates through signals about how they will set short-term rates and, increasingly, through large-scale purchases along the maturity spectrum. Market participants set deposit and loan rates and, through their portfolio choices, help determine longer-term market rates. Their decisions will reflect many factors, including risk appetite, views about profitable investments, regulatory and accounting constraints and, of course, expectations about what central banks will do (Chapter II). In turn, actual inflation determines ex post inflation-adjusted rates and expected inflation ex ante real rates.

But are the interest rates that prevail in the market actually *equilibrium* rates? Take first the short-term rate, which central banks set. When we read that central banks can have only a transitory impact on inflation-adjusted short-term rates, what is really meant is that, at some point, unless central banks set them at their "equilibrium" level, or sufficiently close to it, something "bad" will happen. Exactly what that "bad" outcome is will depend on one's view of how the economy works.

In the prevailing view – one embedded in the popular "savings glut" and "secular stagnation" hypotheses – the answer is that inflation will rise or fall, possibly even turn into deflation. Inflation provides the key signal, and its behaviour depends on the degree of economic slack. The corresponding equilibrium rate is also known

as the "Wicksellian" natural rate: it equates output with its potential, or saving and investment at full employment. To be sure, in practice policymakers also consider economic slack independently. But, in the final analysis, since slack is very hard to measure, they tend to revise its estimate based on what happens to inflation. For example, if unemployment falls below its presumed "equilibrium" level but inflation does not increase, they will infer that there is still slack in the economy.

In the view proposed here, inflation need not reliably signal that rates are at their "equilibrium" level. Rather, the key signal may be the build-up of financial imbalances. After all, pre-crisis, inflation was stable and traditional estimates of potential output proved, in retrospect, far too optimistic. If one acknowledges that low interest rates contributed to the financial boom whose collapse caused the crisis, and that, as the evidence indicates, both the boom and the subsequent crisis caused long-lasting damage to output, employment and productivity growth, it is hard to argue that rates were at their equilibrium level. This also means that interest rates are low today, at least in part, because they were too low in the past. Low rates beget still lower rates. In this sense, low rates are self-validating. Given signs of the build-up of financial imbalances in several parts of the world, there is a troubling element of déjà vu in all this.

Shifting the focus from short-term to long-term rates does not change the picture. There is no reason to presume that these long-term rates will be at their equilibrium level any more than short-term rates are. Central banks and market participants fumble in the dark, seeking either to push rates towards equilibrium or to profit from their movement. After all, long-term rates are just another asset price. And asset prices often do follow unsustainable and erratic paths, as when they are at the root of financial instability.

Policy implications

What are the policy implications of this analysis? The first is that monetary policy has been overburdened for too long, especially post-crisis. The second, more general one, is the need to rebalance policies away from aggregate demand management to initiatives that are more structural in character. True, this is politically difficult. But there is no other way to sustainably raise output and productivity growth and to shake off debt addiction. The specific blend of measures will naturally be country-specific, but it will generally involve improving the flexibility of product and labour markets, providing an environment conducive to entrepreneurship and innovation, and boosting labour force participation. This would also help relieve the huge pressure that has been placed post-crisis on fiscal and, above all, monetary policy. The oil dividend provides a tailwind for implementing such reforms and should not be wasted. The analysis is also a wake-up call for commodity exporters that may be tempted to avoid painful adjustments as their revenues fall sharply.

Beyond this, there are questions about how best to adjust policy frameworks, nationally and internationally, in order to take financial factors more systematically into account and about what to do at the current juncture.

Adjusting frameworks

As noted in last year's Annual Report, constraining the excess financial elasticity of individual economies calls for broad-based adjustments in domestic fiscal, prudential and monetary frameworks. The basic strategy would be to rein in financial booms more deliberately and to address financial busts more effectively.

Compared with current ones, the resulting policies would be less asymmetrical over financial cycles, less procyclical and less biased towards easing over successive booms and busts. Take each type of policy in turn.

The priority for fiscal policy is to ensure that it behaves countercyclically and that it preserves sufficient room for manoeuvre during busts. This means, first and foremost, ensuring long-term sustainability – a daunting challenge in many jurisdictions (Chapter III). It also means exercising extra prudence during financial booms, so as not to overestimate the underlying solidity of fiscal positions: sustainable output and growth look rosy, fiscal revenues are bloated, and the contingent liabilities needed to deal with the bust remain hidden. During a bust, that fiscal space should ideally be used to speed up private sector balance sheet repair. This applies to banks – but only if private sector backstops prove insufficient – and non-banks alike. The range of options includes recapitalisation, temporary nationalisation and, for non-banks, outright debt relief. By tackling the root problem, this would be a more efficient use of public money than untargeted expenditures or tax cuts. More fundamentally, there is a strong case for eliminating the subsidy of debt over equity, so common in tax codes.

The priority for prudential policy is to strengthen its systemic or "macroprudential" orientation, so as to tackle procyclicality head-on. Basel III indeed moves in that direction with its countercyclical capital buffer, as does the implementation of full-fledged macroprudential frameworks in national jurisdictions. These deploy a range of instruments designed to strengthen the financial system's resilience and, ideally, to constrain financial booms (Chapter IV). Examples include maximum loan-to-value or debt-to-income ratios, proactive adjustments to capital requirements and provisioning, restrictions on non-core bank funding, and macroprudential (banking system-wide) stress tests.

At the same time, two big gaps remain (Chapter VI). One is how best to address the risks raised by the rapid growth of non-bank financial intermediaries. To be sure, insurance companies have always been regulated, although not so much from a systemic perspective. And work has been under way for some time on "shadow banks" – leveraged players active in maturity transformation. But attention has only recently turned to the asset management industry. Here the concern is not so much the failure of individual firms, but the impact of their collective behaviour on systemic stability through asset prices, market liquidity and funding conditions. Even when unleveraged, these investors are quite capable of generating leverage-like behaviour. The second gap is how best to address sovereign risk, including for banks. Several regulatory provisions and supervisory practices favour sovereign exposures. But sovereigns can be quite risky and, historically, have often been at the root of bank failures. Moreover, favouring them often comes at the expense of small and medium-sized enterprises, thereby stifling productive activities and employment. The right approach needs to be systemic and comprehensive, addressing the various types of exposure. The Basel Committee on Banking Supervision has recently taken up this challenge. That work should be pursued without delay or hesitation.

The priority for monetary policy is to ensure that financial stability concerns are incorporated more symmetrically during booms and busts (Chapter IV). The frameworks should allow for scope to tighten during financial booms even if near-term inflation is low and stable, and to ease less aggressively and persistently during busts.

While a number of objections have been raised to this proposal, none of them appears to be a show-stopper. Indeed, similar objections were levelled against adopting inflation targeting frameworks, which many regarded as a step in the dark.

A first objection is that there are no reliable indicators for the build-up of financial imbalances. But considerable progress has been made in this area, and

macroprudential frameworks already actively rely on such assessments. Moreover, as noted, standard monetary policy benchmarks are unobservable and measured with great uncertainty, eg economic slack, potential output and equilibrium real interest rates. Even measuring the relevant inflation expectations is fraught with difficulties.

A second objection is that monetary policy has little impact on financial booms, and hence on credit expansion, asset prices and risk-taking. But these are key channels through which monetary stimulus influences aggregate demand. Indeed, this is the strategy that central banks have *explicitly* followed post-crisis to reanimate the economy. And, if anything, the evidence suggests that central banks have been very successful in influencing financial markets and financial risk-taking but less so in boosting risk-taking in the real economy and hence output.

The deeper question is how to reconcile such a strategy with inflation objectives. The strategy requires greater tolerance for persistent inflation deviations from target, especially when disinflation is driven by positive supply side forces. Are central banks prepared to accept them? And are the frameworks flexible enough? This will necessarily vary across central banks.

Arguably, some of the current frameworks already provide central banks with sufficient flexibility. Some arrangements, for instance, explicitly include the option to allow inflation to return to the long-run target only slowly over time, depending on the factors that drove it off track. This, of course, requires careful, and possibly quite challenging, explanation and communication. Two factors could in part explain why central banks may not have fully used this flexibility. One is their perception of the trade-offs involved. For example, they may see deflation as a kind of red line that, once crossed, triggers a self-reinforcing destabilising process. Another is the possibility of using macroprudential tools instead.

Even so, in a number of cases the frameworks and the mandates underpinning them may be seen as too restrictive. If so, adjustments could be made. These might even go as far as revisiting mandates, if necessary, such as by assigning greater weight to financial stability considerations. But, if chosen, this route would need to be travelled with great care. The revision process and final outcome could be unpredictable and might open the door to unwelcome political economy pressures.

On balance, the priority should be to use the existing room for manoeuvre to the full, and to encourage analytical perspectives that highlight the costs of failing to incorporate financial stability considerations into monetary frameworks. Building sufficient public support is critical. Mandates could then be revisited only as a last resort.

What about the IMFS? Putting one's own house in order, along the principles described, would already be a major step: it would greatly reduce the negative spillovers to the rest of the global village. But there is a need to go further (Chapter V).

This has long been recognised for the "financial" dimension of the system. The need for improvement has been the basis for increasingly tight cooperation in the development and implementation of commonly agreed prudential standards as well as in day-to-day supervision of banks. True, the journey has not been smooth, and momentum inevitably slows as the memories of a crisis fade. But the journey is continuing, particularly in the various initiatives under way under the aegis of the Basel Committee on Banking Supervision and the Financial Stability Board (see below). Progress requires unflagging commitment: the risk that national priorities and biases will gain the upper hand always lurks around the next corner.

By contrast, the recognition has been far less common for the "monetary" dimension of the system, at least since the breakdown of Bretton Woods. Here, it is

worth distinguishing between crisis management and crisis prevention. In crisis management, cooperation has been long-standing, mainly through foreign exchange swap lines; in crisis prevention, which means in routine monetary policy settings, it has been much softer.

As regards crisis management, central banks have built on the successful cooperation during the Great Financial Crisis. Among the central banks of major currency areas, foreign currency swap lines exist or could be established quickly as needed. And there may be some room to strengthen these mechanisms further, even though risk management and governance issues loom large.

But international arrangements for emergency liquidity support cannot, and should not, substitute for cooperative efforts to prevent financial crises. They cannot, because the economic and social costs of a crisis are simply too large and unpredictable. And they should not, because of moral hazard and the tendency to overburden central banks.

Two factors have severely hindered monetary policy cooperation outside crises. The first has to do with diagnosis and hence the perceived need to act. As explained above, the prevailing view is that flexible exchange rates, combined with inflation-focused domestic regimes, can foster the right global outcomes. As a result, discussions on how to promote global coordination have centred on how to deal with current account imbalances, which are less amenable to monetary policy measures. Indeed, the terms "imbalance" and "current account imbalance" have been treated as synonymous. The second factor has to do with mandates and hence the incentive to act. National mandates raise the bar: actions must clearly be seen to promote the interests of one's own country. In other words, there is no perceived need and no incentive.

Yet neither factor should halt proceedings. The excess financial elasticity perspective highlights the need for cooperation: international spillovers and spillbacks are just too damaging. Moreover, it shifts the focus onto financial imbalances – the blind spot of present arrangements. Indeed, in this view, the exclusive focus on current account imbalances has sometimes been counterproductive. It has, for example, encouraged pressure on current account surplus countries to expand domestic demand even as financial imbalances were building up, as in the case of Japan in the 1980s or China post-crisis. As regards incentives, national mandates have not prevented tight cooperation in the prudential sphere.

How far could cooperation realistically go? At a minimum, enlightened self-interest, based on a thorough exchange of information, should be feasible. This would mean taking spillovers and spillbacks more systematically into account when setting policies. Large jurisdictions that are home to international currencies have a special responsibility. Cooperation could even extend to occasional joint decisions, on both interest rates and foreign exchange intervention, beyond those seen during crises. Unfortunately, a stronger sense of urgency and shared responsibility would be needed to develop new global rules of the game that would help instil greater discipline in national policies.

What to do now?

Room for manoeuvre in macroeconomic policy has been narrowing with every passing year. In some jurisdictions, monetary policy is already testing its outer limits, to the point of stretching the boundaries of the unthinkable. In others, policy rates are still coming down. Fiscal policy, after the post-crisis expansion, has been throttled back, as sustainability concerns have mounted. And fiscal positions are deteriorating in EMEs where growth is slowing. What, then, should be done now, besides redoubling reform efforts to strengthen productivity growth?

For fiscal policy, the overriding priority is to make sure that sovereign debt is on a sustainable path, which in many cases it is not (Chapter III). This is the precondition for lasting monetary, financial and macroeconomic stability. And it is also what defines the near-term room for manoeuvre. When longer-term growth prospects are in doubt, it would be highly imprudent to push for more expansionary fiscal policies – a mistake made often enough in the past. For countries that do have fiscal space and need to use it, the challenge is how to do so most effectively. This means, first and foremost, facilitating private sector balance sheet repair, supporting reforms that boost long-term productivity growth and a greater but judicious emphasis on investment at the expense of current transfers. The quality of public spending matters more than its quantity.

For monetary policy, there is a need to fully appreciate the risks to financial and hence macroeconomic stability associated with current policies. True, there is great uncertainty about how the economy works. But precisely for this reason it seems imprudent to push the burden of tackling financial stability risks entirely onto prudential policies. As always, the correct calibration will be country-specific. But, as a general rule, a more balanced approach would mean attaching more weight than hitherto to the risks of normalising too late and too gradually. And, where easing is called for, the same should apply to the risks of easing too aggressively and persistently.

Given where we are, normalisation is bound to be bumpy. Risk-taking in financial markets has gone on for too long. And the illusion that markets will remain liquid under stress has been too pervasive (Chapter II). But the likelihood of turbulence will increase further if current extraordinary conditions are spun out. The more one stretches an elastic band, the more violently it snaps back. Restoring more normal conditions will also be essential for facing the next recession, which will no doubt materialise at some point. Of what use is a gun with no bullets left? Therefore, while having regard for country-specific conditions, monetary policy normalisation should be pursued with a firm and steady hand.

All this naturally puts a premium on strengthening prudential safeguards (Chapter VI). Macroprudential tools should be applied with vigour, but without entertaining unrealistic expectations about what they can do on their own. Where appropriate, balance sheet repair should be pursued energetically, through loss recognition and recapitalisations. And the regulatory initiatives under way should be implemented promptly and comprehensively. In particular, the recalibration of the banks' leverage ratio is critical as a means of providing a reliable backstop for the risk-weighted minimum capital requirements. Likewise, it will be essential to set a tough standard for interest rate risk in the banking book at a time when nominal interest rates have been so exceptionally low for so long.

Conclusion

The global economy is growing again at rates not far from the historical average. Lower oil prices should boost it further in the near term even as they temporarily put further downward pressure on prices. But not all is well. Debt burdens and financial risks are still too high, productivity growth too low and room for manoeuvre in macroeconomic policy too limited. Global economic expansion is unbalanced. Interest rates that have been extraordinarily low for exceptionally long are the outward sign of this malaise.

Nothing is inevitable about this. The problems we face are man-made and can be solved by the wit of man. This chapter has provided one possible diagnosis out of the many on offer: our view is that the current plight reflects, to a considerable

extent, the inability of policy frameworks to come to grips with the global economy's "excess financial elasticity" – its propensity to generate hugely damaging financial booms and busts. These leave enduring and deep wounds in the economic tissue that, unless properly treated, impede the economy's return to a healthy and sustainable expansion – one that does not set it up for the next disruptive cycle. In the long term, this risks entrenching instability and chronic weakness.

One may disagree with this diagnosis. It is harder, though, to disagree with the general principle of being prudent whenever diagnoses are uncertain. Prudence means following a treatment that allows for the possibility of error. From this perspective, current macroeconomic policy frameworks appear too one-sided. When all is said and done, they are still based on the presumption that inflation will suffice as a reliable gauge of sustainability or, if it will not, that financial stability risks can be adequately addressed through prudential policies alone. This is a familiar viewpoint: caveats aside, it harks back to the pre-crisis way of doing things.

A more balanced approach would have a number of features. It would seek to address financial booms and busts through a combination of policies – monetary, fiscal and prudential – rather than prudential policy alone. It would rebalance the mix away from demand management policies, especially monetary policy, towards structural measures. And it would not presume that, if one's own house is in order, the global village will be too.

Shifting the focus from the short to the longer term is more important than ever. Over the past decades, it is as if the emergence of slow-moving financial booms and busts has slowed down economic time relative to calendar time: the economic developments that *really* matter now take much longer to unfold. Meanwhile, the decision horizons of policymakers and market participants have shortened. Financial markets have compressed reaction times and policymakers have chased financial markets more and more closely in what has become an ever tighter, self-referential, relationship. Ultimately, it is this combination of slowing economic time and shorter decision horizons that helps explain where we are – and how, before we know it, the unthinkable can become routine. It should not be allowed to.

II. Global financial markets remain dependent on central banks

During the period under review, from mid-2014 to end-May 2015, accommodative monetary policies continued to lift prices in global asset markets. Investors' risk-taking remained strong as expectations of policy rate increases were pushed out further and additional asset purchases undertaken. As a result, bond prices climbed, equity indices repeatedly hit new highs and prices of other risky assets also rose. Moreover, global investors' exposure to riskier assets continued to increase.

As central banks remained in easing mode, bond yields in advanced economies continued to fall throughout much of the period under review. In a number of cases, bond markets entered uncharted territory as nominal bond yields fell below zero for maturities even beyond five years. This was mainly due to falling term premia, but also reflected downward revisions of expected future policy rates. Towards the end of the period, bond markets – in particular in Europe – saw sharp yield reversals as investors became increasingly uneasy about stretched valuations.

Signs of market fragility were evident more widely too. Bouts of volatility occurred with increasing frequency across markets, and signs of illiquidity in fixed income markets began to appear. As market-makers have scaled back their activities after the Great Financial Crisis, asset managers have become more important as sources of liquidity. Such shifts, in combination with increased official demand, may have reduced liquidity and reinforced liquidity illusion in certain bond markets.

Expectations of increasingly divergent monetary policies in the United States and the euro area resulted in widening interest rate differentials, and, as a result, the dollar soared and the euro plummeted. In addition to these outsize exchange rate swings, foreign exchange markets saw big rate moves more generally. These included the surge of the Swiss franc following the Swiss National Bank's discontinuation of its minimum exchange rate against the euro, and rapid depreciation of currencies for a number of energy-producing countries.

In parallel with the dollar's surge, oil prices fell sharply in the second half of 2014 before stabilising and recovering somewhat in the second quarter of 2015. Although the oil price drop was particularly severe, commodity prices declined more generally. The rapid price moves in commodity markets reflected a combination of weak demand, in particular from EMEs, and, in the case of oil, stronger supply. But they may also have reflected increased activity on the part of financial investors in commodity markets, as these markets are becoming a more integral part of global financial markets more broadly, as well as rising indebtedness in the energy sector.

The first section of this chapter describes the main developments in global financial markets between mid-2014 and end-May 2015. The second focuses on the extraordinarily low yields in government bond markets. The third section explores rising fragilities in financial markets, with emphasis on risks of liquidity illusion in fixed income markets. The final section discusses the growing linkages between commodities – in particular oil – and financial markets.

Further monetary accommodation but diverging outlook

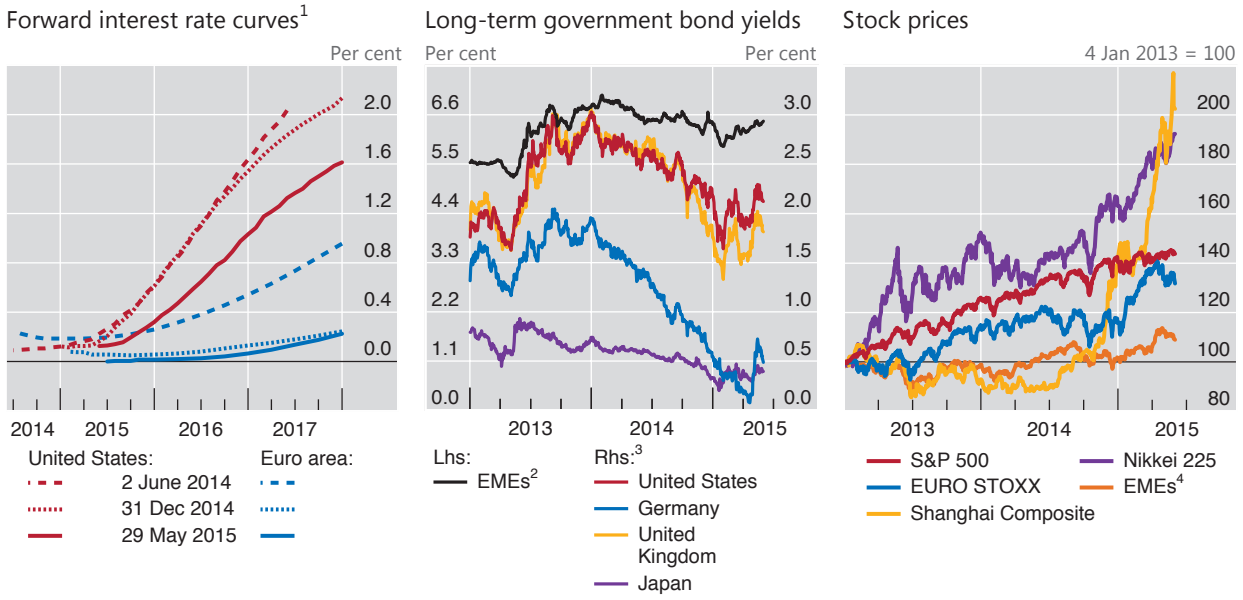
Increasing macroeconomic and monetary policy divergence during the past year set the scene for global financial markets. The United States, in particular, continued to recover while the euro area, Japan and a number of emerging market economies (EMEs) faced weakening growth prospects during much of the period under review (Chapter III). Against this backdrop, actual and expected monetary policy moves diverged. The US Federal Reserve ended its large-scale asset purchase programme and continued to take gradual steps to prepare markets for an eventual increase in the federal funds target rate. Still, as global disinflationary pressures grew, largely due to falling oil prices, the vast majority of central banks eased policy (Chapter IV). As a result, US forward interest rates diverged from forward rates elsewhere, especially vis-à-vis the euro area (Graph II.1, left-hand panel).

The renewed wave of monetary accommodation supported prices across asset classes. As near zero interest rate expectations were pushed out further and additional asset purchases undertaken, yields on government bonds fell to record lows in a number of advanced economies (Graph II.1, centre panel). Moreover, a growing share of sovereign debt traded at negative yield levels (see discussion below). The fall in euro area bond yields that had begun in 2014 accelerated in early 2015 as the ECB launched its expanded asset purchase programme. As a result, 10-year government bond yields in Germany fell to levels as low as 7.5 basis points in April 2015. Those for a number of other euro area countries, including France, Italy and Spain, also reached record lows. Even in Japan, where bond yields have been exceptionally low for many years, 10-year bond yields reached a new trough of 20 basis points in January 2015. However, a sharp global yield reversal in late April and May 2015 suggested that investors had viewed some of the previous declines as excessive.

Much of the decline in yields that took place up to April 2015 reflected falling term premia (see below). Expectations that near zero policy interest rates would

Easier monetary policies support asset prices

Graph II.1



[1] For the United States, 30-day federal funds rate futures; for the euro area, three-month Euribor futures. [2] JPMorgan GBI-EM Broad Diversified Index, yield to maturity in local currency. [3] Ten-year government bond yields. [4] MSCI Emerging Markets Index.

Sources: Bloomberg; Datastream.

remain in place for longer than previously anticipated also played a role, especially at shorter maturities. Central bank purchases of government bonds added to the downward pressure on premia and yields, as did the move by some central banks to negative policy rates. Expectations that the Federal Reserve was inching closer to its first rate hike kept the level of US bond yields somewhat higher than in several other advanced economies. But US yields nevertheless continued to fall at a moderate pace throughout the second half of 2014 and into early 2015 before the decline was halted (Graph II.1, centre panel).

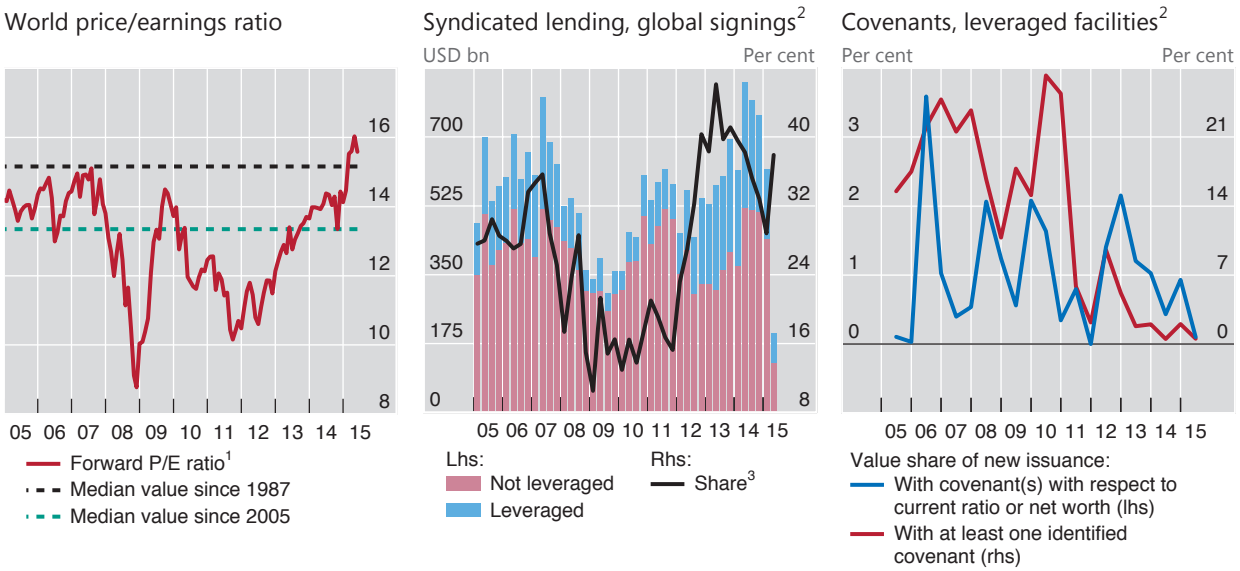
In parallel with the drop in bond yields, investors continued to exhibit a strong search for yield. As a result, equity prices rose to record highs in many markets (Graph II.1, right-hand panel), even as the macroeconomic outlook remained relatively weak (Annex Table A1). Although EME equity markets were generally less buoyant, there were exceptions: the Shanghai Composite index surged by 125% during the period under review, despite mounting reports of a slowing Chinese economy. As valuations became increasingly stretched, equity prices underwent a few sharp but brief corrections in late April and May 2015.

Signs of stronger risk-taking were evident in market prices as well as in quantity-based indicators. Global P/E ratios continued on an upward trek that had started in 2012, which brought them above the median value both for the past decade and since 1987 (Graph II.2, left-hand panel). In the syndicated loan market, the share of leveraged loans, which are granted to low-rated and highly leveraged borrowers, rose to almost 40% of new signings in April and May 2015 (Graph II.2, centre panel). And the share of those loans featuring creditor protection in the form of covenants stayed very low (Graph II.2, right-hand panel).

Global investors' increased exposure to riskier asset classes was also evident in EME corporate bond markets. Corporations in EMEs have issued growing amounts of debt in international markets at progressively longer maturities since 2010 (Graph II.3, left-hand panel). At the same time, the debt servicing capacity of EME

Signs of increased financial risk-taking

Graph II.2

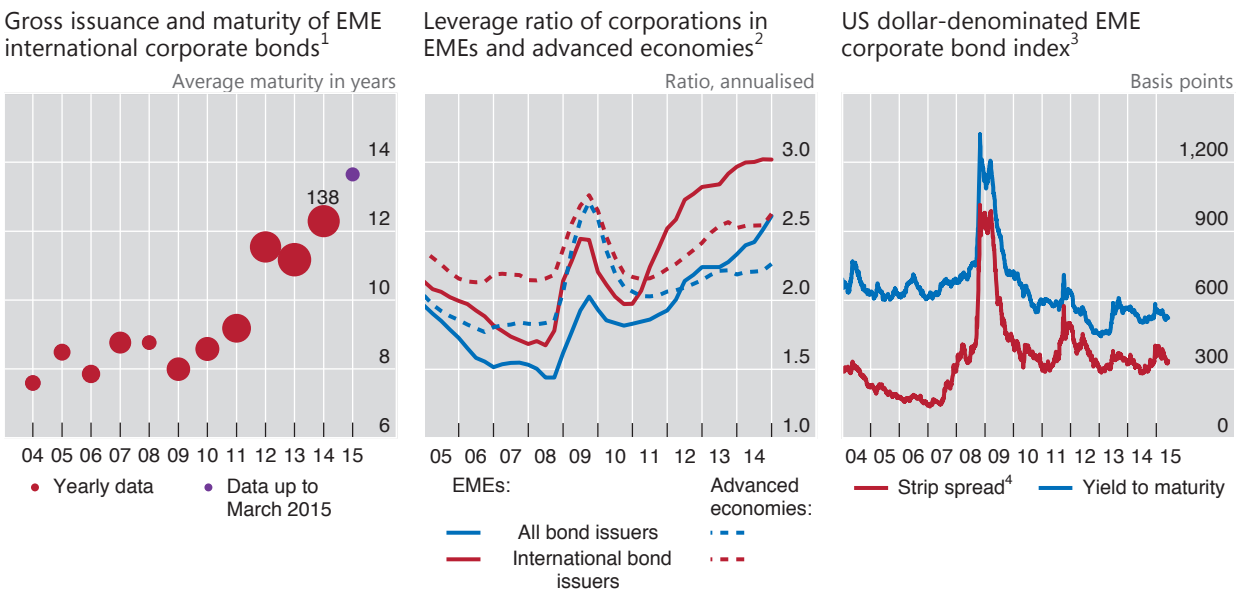


[1] Twelve-month forward price/earnings ratio of the world equity index compiled by Datastream. [2] Based on data available up to 21 May 2015; "leveraged" includes "highly leveraged". [3] Of leveraged loans in total syndicated loan signings.

Sources: Datastream; Dealogic; BIS calculations.

Increasing duration and credit risk for EME corporate bond investors

Graph II.3



[1] Sum of issuance by non-financial and non-bank financial corporations of EMEs by residence. The size of balloons reflects relative volume of gross issuance in each year. The figure next to the balloon for 2014 is the amount of gross issuance in 2014 in billions of US dollars. EMEs: Brazil, Bulgaria, Chile, China, Colombia, the Czech Republic, Estonia, Hong Kong SAR, Hungary, Iceland, India, Indonesia, Korea, Latvia, Lithuania, Malaysia, Mexico, Peru, the Philippines, Poland, Romania, Russia, Singapore, Slovenia, South Africa, Thailand, Turkey and Venezuela. [2] Leverage ratio = total debt/EBITDA, where EBITDA is earnings before interest, tax, depreciation and amortisation; calculated as a trailing four-quarter moving average; EMEs are those listed in footnote 1; advanced economies are the euro area, Japan, the United Kingdom and the United States. [3] JPMorgan CEMBI Broad Diversified index. [4] Spread over US Treasuries.

Sources: JPMorgan Chase; S&P Capital IQ; BIS international debt securities database; BIS calculations.

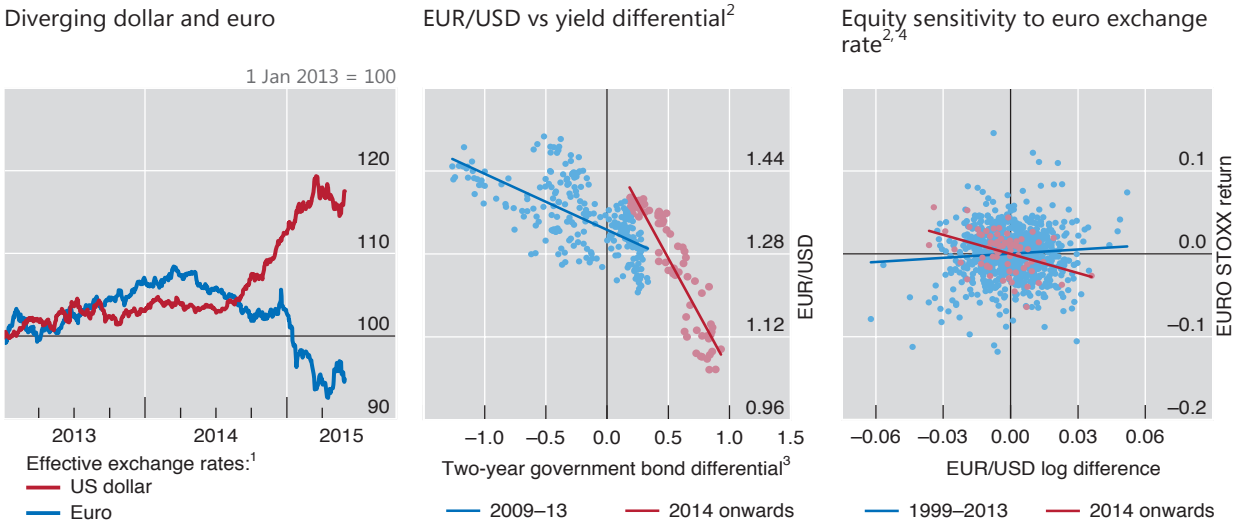
corporate bond issuers has deteriorated. In particular, the leverage ratio of EME corporations has been increasing fast to reach the highest level in a decade, exceeding that of advanced economy corporations, both for entities issuing internationally and for those financing themselves in domestic debt markets (Graph II.3, centre panel). Despite the strong issuance and increased riskiness of EME corporate bonds, investors have generally not pushed up their required risk premium (Graph II.3, right-hand panel).

Outsize exchange rate moves during the past year were a key manifestation of the substantial influence of monetary policy on financial markets. The US dollar experienced one of the largest and fastest appreciations on record, surging by around 15% in trade-weighted terms between mid-2014 and the first quarter of 2015 before stabilising (Graph II.4, left-hand panel). At the same time, the euro dropped by more than 10%. Reflecting divergent monetary policy stances, the widening interest rate differential between dollar and euro debt securities increasingly encouraged investors to move into dollar assets, seemingly playing a bigger role than in the past (Graph II.4, centre panel). This underscores the growing importance of policy rate expectations for exchange rate developments.

As exchange rates became increasingly sensitive to monetary policy expectations, equity prices became more responsive to exchange rate movements. This was particularly so in the euro area, where since 2014 a statistically significant relationship has emerged between returns on the EURO STOXX index and the euro/US dollar exchange rate. Specifically, a 1% depreciation of the euro has, on average, coincided with a rise in equity prices of around 0.8% (Graph II.4, right-hand panel). No such relationship had been apparent previously, from the introduction of the euro.

The dollar soars, the euro plunges

Graph II.4



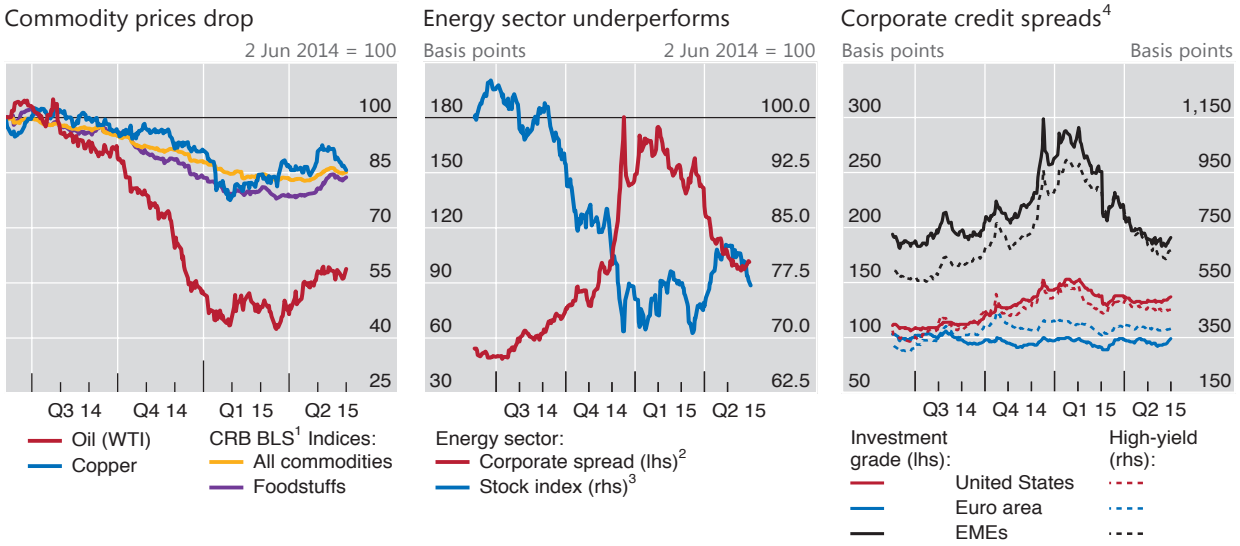
[1] BIS nominal effective exchange rate broad indices. A decline (increase) indicates a depreciation (appreciation) of the currency in trade-weighted terms. [2] End-of-week observations. [3] Two-year government bond yield differential between the United States and Germany (in percentage points). [4] A positive (negative) EUR/USD log difference corresponds to an appreciation (depreciation) of the euro vis-à-vis the dollar.

Sources: Bloomberg; BIS; BIS calculations.

Just like foreign exchange markets, commodity markets saw broad-based price swings, with oil prices falling particularly sharply. The price of West Texas Intermediate (WTI) crude oil fell from above $105 in mid-2014 to $45 per barrel in January 2015 before stabilising and partially recovering (Graph II.5, left-hand panel).

Oil plunge puts energy sector under pressure

Graph II.5



[1] Commodity Research Bureau – Bureau of Labor Statistics. [2] The difference between the option-adjusted spreads of investment grade debt of energy sector corporates and the overall corporate sector for EMEs, the euro area and the United States (computed as a simple average). The EME energy sector index consists of both investment grade and high-yield debt. [3] Simple average of energy stock prices; for the United States, S&P 500 equity index; for the euro area and EMEs, the MSCI. [4] Option-adjusted spreads over US Treasury notes.

Sources: Bank of America Merrill Lynch; Bloomberg; Datastream.

Box II.A

The oil price: financial or physical?

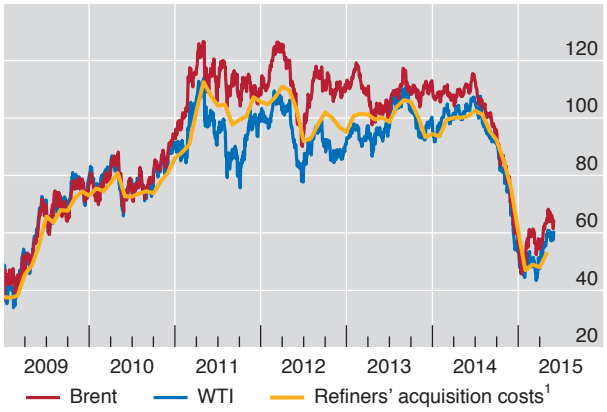
Oil and, more generally, energy are key production inputs. The oil price, therefore, is an important determinant of production decisions and also has a significant impact on inflation dynamics. This box discusses the interaction of physical and financial prices, with a specific focus on two aspects. The first is the extent to which oil is akin to conventional financial assets: price swings are driven by changes in expectations, not only by the current conditions in the physical market. The second is the relationship of the oil futures curve with the physical market: as the shape of the former is determined by current conditions of the physical market, it would be misleading to interpret it as an indicator of the expected price path.

Over the past decade, as financial activity in oil and other markets surged, many commentators started referring to commodities as an asset class. The analogy is warranted to some extent: popular oil price benchmarks such as Brent and West Texas Intermediate (WTI) are actually futures, and their price depends on players' interaction in the futures markets. However, oil is a physical asset, and the futures contracts are backed by it. So, futures and physical prices must be tied together: should a misalignment between conditions in the physical market and in the futures market materialise, players can store oil and sell it forward (or vice versa), eventually bringing prices back into line.① Consequently, while physical prices are normally less volatile, they track quite closely the futures benchmarks (Graph II.A, left-hand panel).

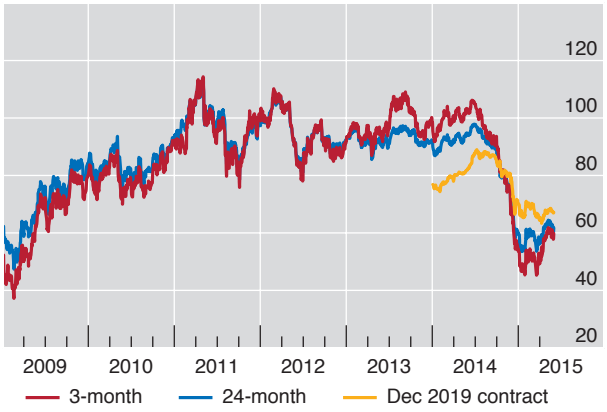
Physical and futures prices of oil co-move closely

In US dollars per barrel — Graph II.A

Price of oil and refiners' acquisition costs



WTI oil futures strips



[1] Refiners' acquisition cost of domestic and imported crude oil.

Sources: Bloomberg; Datastream.

The parallel between conventional assets and oil extends also to the futures curve. For a conventional asset, the difference between spot and futures prices (the so-called basis) is determined by the cost of carry (largely a function of interest rates), and by the stream of dividends and interest payments that the asset yields. Oil generates no cash stream, but agents attach a premium to holding it physically because of its value for production and consumption rather than on paper – the so-called convenience yield. The convenience yield is unobservable, and varies over time according to the conditions of the underlying physical market: at times of tightness, the convenience yield would be high, as agents attach a high value to holding a scarce resource. By contrast, the convenience yield could even turn negative when supply is abundant in the physical market and inventories are high: in such a situation, holding physical oil is not advantageous, as slack in the physical market would ensure easy access to the resource in case of need. So, while the oil futures curve is normally negatively sloped (backwardation) due to a positive convenience yield, its slope can turn positive (contango) at times of inventory overhang. It is therefore no surprise that the futures curve currently slopes upwards (Graph II.A, right-hand panel).

An important consequence of the presence of a convenience yield is that it would be wrong to interpret a positively (or negatively) sloped supply curve as evidence of bullish (or bearish) expectations. The price of any

futures contract will indeed include a component reflecting expectations, but this is likely to be concealed by changes in the convenience yield. As argued above, when markets are tight, the high convenience yield is likely to produce a negatively sloped futures curve in spite of expectations of continued tightness, ie high prices. By contrast, slack in the physical market will produce a positively sloped supply curve which does not signal bullish expectations, but simply abundant physical supply.

Since futures and physical prices are jointly determined, price movements are driven by changes in current and expected conditions in the physical markets. Due to the high liquidity of futures markets, such changes will be quickly processed and incorporated in observed prices. Thus, as for other assets, changes in expectations are the key driver of price movements. The recent fall in the price of oil is no exception. While prices started to decline in June 2014, the fall accelerated substantially in mid-November, when OPEC announced that it would not reduce its output. This is a significant deviation from OPEC's strategy to achieve stable prices, and is likely to have substantially changed agents' expectations of prospective supply conditions.

The overall macroeconomic environment, which largely influences expectations of demand and supply of oil over time, is therefore a key driver of oil price fluctuations.② Furthermore, prices will also reflect risk perceptions and attitudes, which will in turn depend on financing conditions. As a result, monetary policy is itself an important driver of oil prices. Loose monetary policy may boost oil prices through expectations of higher growth and inflation. Moreover, easy financing conditions will reduce the cost of holding inventories and carrying speculative positions.③

① In practice, a number of factors prevent instantaneous arbitrage of price misalignments, both real (eg access to storage) and financial (eg market liquidity or agents' indebtedness). For a detailed discussion, see M Lombardi and I van Robays, "Do financial investors destabilize the oil price?", *ECB Working Papers*, no 1346, June 2011. ② This point is developed in L Kilian, "Not all oil price shocks are alike: disentangling demand and supply shocks in the crude oil market", *American Economic Review*, vol 99, June 2009. ③ For a detailed discussion of monetary policy transmission to commodity prices, including alternative channels, see A Anzuini, M Lombardi and P Pagano, "The impact of monetary policy shocks on commodity prices", *International Journal of Central Banking*, vol 9, September 2013.

This was the largest and fastest oil price drop since the one around the time of the Lehman Brothers collapse. The fact that non-energy commodity prices also declined – albeit by much less than oil – indicated that at least part of the oil price drop reflected broader macroeconomic conditions, including weaker growth prospects in EMEs. However, the sharp decline was also due to market-specific factors (see Box II.A and the last section in this chapter). Particularly important was the November 2014 OPEC announcement that its members would not reduce their output despite falling prices.

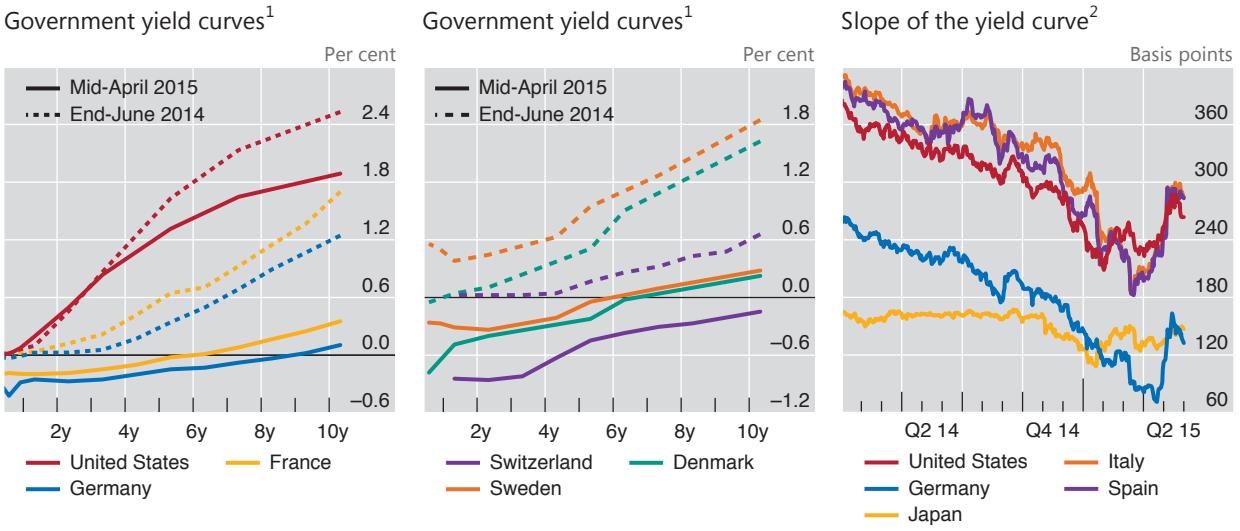
With oil and other energy commodities hit especially hard, the energy-producing sector came under intense pressure as its profit outlook plunged. As a result, energy firms' stock prices fell sharply and corporate bond yields soared compared with other sectors, before recovering as oil prices stabilised and bounced back in early 2015 (Graph II.5, centre panel). Given the rapid growth of the energy sector's share in corporate bond markets in recent years (see discussion below), the surge and subsequent fall in energy bond yields strongly influenced corporate credit spread movements more broadly (Graph II.5, right-hand panel).

Bond yields drop into negative territory

A striking development during the past year was the rapidly rising incidence of negative-yielding nominal bonds, even at long maturities. This occurred as several central banks, including the ECB, introduced negative policy rates (Chapter IV). At their lowest, around mid-April 2015, German and French government bond yields dropped below zero for maturities up to nine and five years, respectively (Graph II.6, left-hand panel). In Switzerland, where the National Bank cut its policy rate to −0.75% after discontinuing the exchange rate floor against the euro, the government yield curve sank below zero for maturities even beyond 10 years

Falling yields, flattening curves

Graph II.6



[1] The dotted lines represent observations on 30 June 2014, the solid lines those on 15 April 2015. [2] Difference between the 30-year and one-year government bond yields for each country.

Source: Bloomberg.

(Graph II.6, centre panel). In Denmark and Sweden, where policy rates were pushed below zero, the domestic yield curves became negative out to about five years. With short-term rates already at record lows in many economies, such yield movements meant a further massive flattening of yield curves up to early 2015 (Graph II.6, right-hand panel).

As the decline in yields gathered pace during late 2014 and early 2015, investors became increasingly uneasy about stretched valuations. This made bond markets ripe for a sudden reversal, which materialised at the end of April and in May 2015 (Graph II.1, centre panel). The surge in yields was particularly strong in the euro area. German 10-year bond yields, for example, rose from their record lows below 10 basis points in the second half of April to above 70 basis points in mid-May, and other euro area countries saw similar increases. Bond yields outside Europe also rose, although to a generally smaller extent.

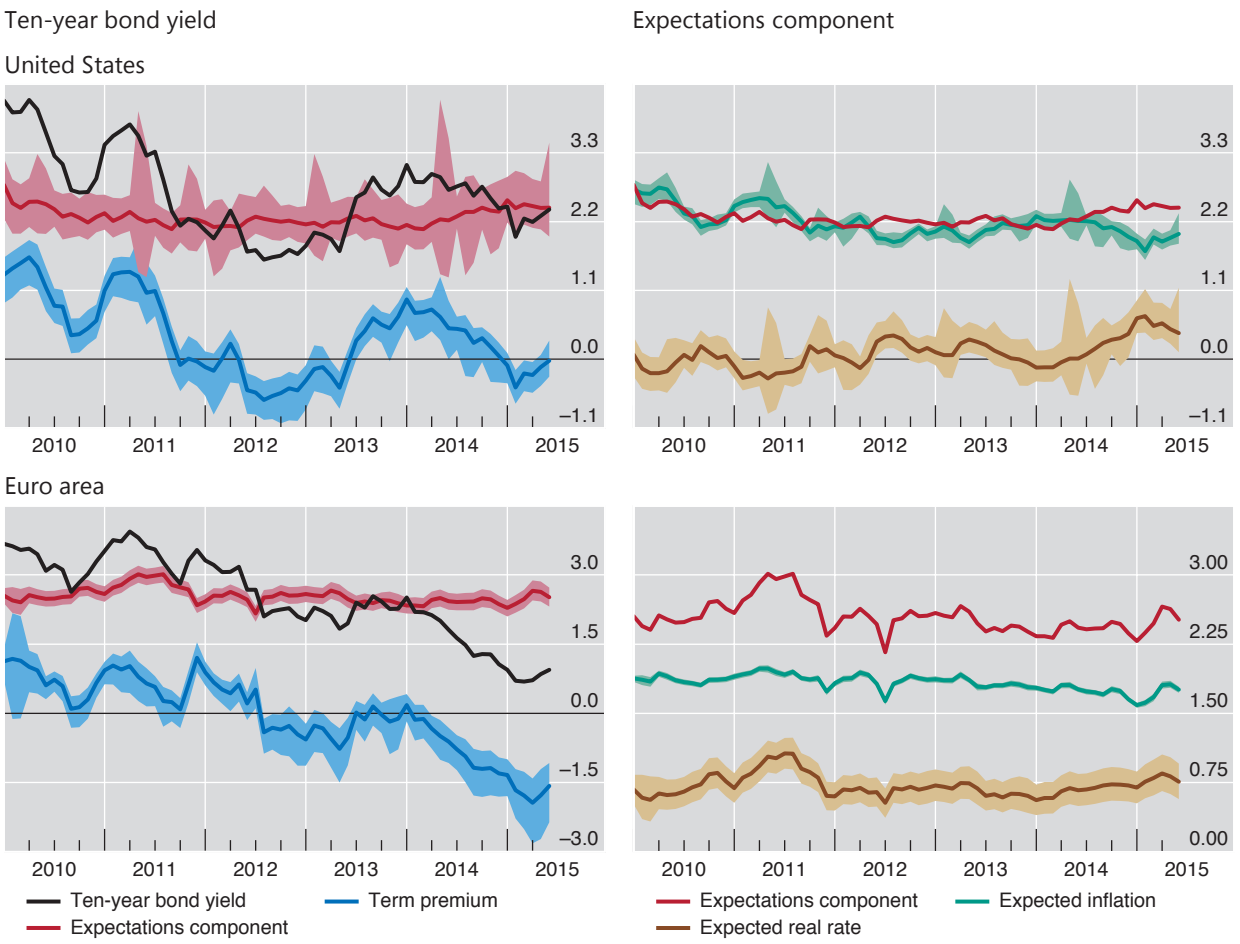
Pronounced declines in term premia played a key role in the fall in yields seen up to late April 2015. A decomposition of 10-year US and euro area bond yields into expectations of future interest rates and premia components shows that, between mid-2014 and April 2015, the estimated term premium fell by 60 basis points in the United States and by 100 basis points in the euro area (Graph II.7, left-hand panels). In the case of the United States, this was partly offset by a rise in the expectations component of about 15 basis points. This increase, in turn, was entirely due to higher expected real interest rates (plus 40 basis points), consistent with expectations of a relatively imminent lift-off of US policy rates, whereas expectations of lower inflation had a counteracting effect (minus 25 basis points; Graph II.7, top right-hand panel). As fluctuations in the expectations component in the euro area were not statistically significant, the drop in the term premium accounted for the entire fall in bond yields there (Graph II.7, bottom panels).

No doubt, central bank asset purchases played a key role in the decline of term premia and yields, reinforcing the effects of lower expected policy rates. This was especially the case in the euro area (see discussion below). Moreover, the timing of the shifts indicates that the effect of these purchases spilled over to the US bond

Falling term premia push yields lower[1]

In per cent

Graph II.7



[1] Decomposition of the 10-year nominal yield according to an estimated joint macroeconomic and term structure model; see P Hördahl and O Tristani, "Inflation risk premia in the euro area and the United States", *International Journal of Central Banking*, September 2014. Yields are expressed in zero coupon terms; for the euro area, French government bond data are used. The shaded areas represent 90% confidence bands for the estimated components, based on 100,000 draws of the model parameter vector from its distribution at the maximum likelihood estimate and the associated covariance matrix.

Sources: Bloomberg; BIS calculations.

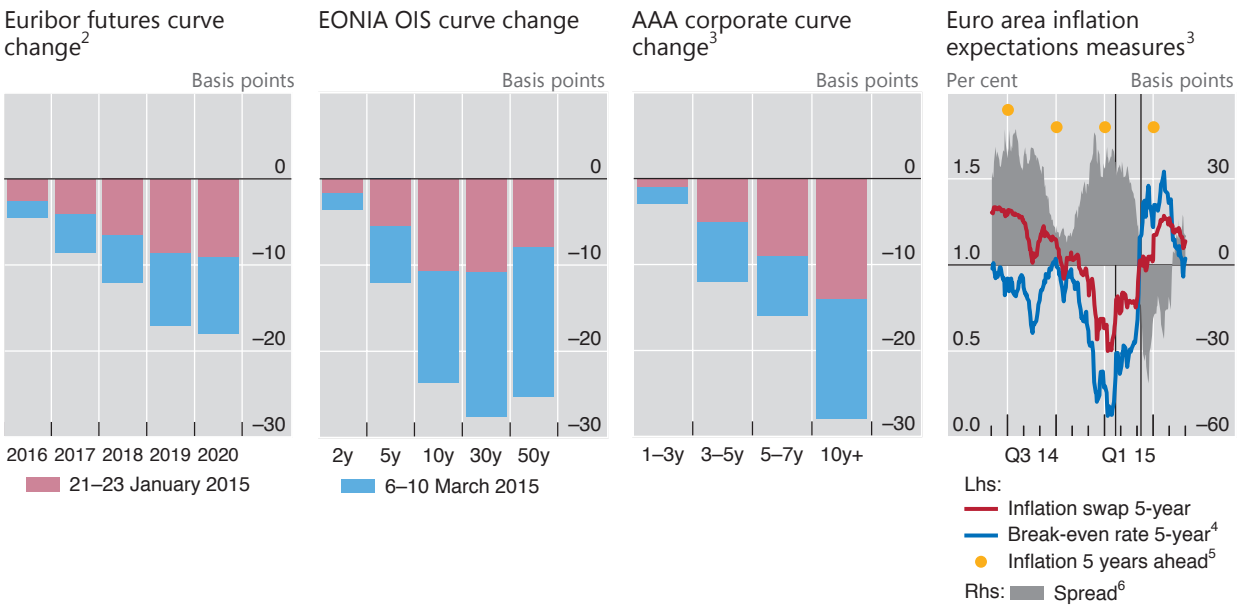
market, as investors chasing higher yields moved into US Treasuries (see also Chapter V).

The impact of the ECB's expanded asset purchase programme on euro area interest rates was clearly visible. Both the programme's announcement on 22 January 2015 and the start of the purchases on 9 March 2015 generated large price swings. The two events shifted the term structure of three-month Euribor futures downwards by up to 18 basis points, roughly corresponding to a nine-month postponement of the expected interest rate lift-off (Graph II.8, first panel). In addition, the two events pushed down 10-year German and French government bond yields by over 30 basis points.

Lower term premia influenced other long-duration assets, beyond those directly targeted by the purchases. EONIA overnight index swap (OIS) rates fell by 23 and 28 basis points for 10- and 30-year maturities, respectively (Graph II.8, second panel). Moreover, even though the ECB's expanded purchases targeted only official sector securities, yields on euro area AAA-rated corporate bonds dropped

The ECB's asset purchase programme has a strong effect on interest rates[1]

Graph II.8



[1] Changes from one day before to one day after the announcement of the asset purchase programme (22 January 2015) and the start of the purchases (9 March 2015). [2] Futures for March 2016, March 2017, March 2018, March 2019 and March 2020. [3] The vertical lines indicate the announcement of the ECB asset purchase programme on 22 January 2015 and the start of the purchases on 9 March 2015. [4] Based on French government bonds. [5] Based on the ECB Survey of Professional Forecasters. [6] Spread between five-year inflation swap rates and five-year break-even rates.

Sources: Bank of America Merrill Lynch; Bloomberg; Datastream; BIS calculations.

across the entire maturity spectrum, and more strongly for longer-duration bonds, as investors intensified their search for yield (Graph II.8, third panel).

The effects of central bank purchases were perhaps most obvious in the price reaction of euro area inflation-linked bonds. As the Eurosystem was getting closer to implementing its asset purchases, euro area break-even inflation rates rose significantly. Much of this increase was a direct consequence of the purchase programme rather than of higher inflation expectations: inflation swap rates rose much less, and survey measures of expected inflation remained stable. In fact, the spread between inflation swap rates and the corresponding break-even inflation rates can be viewed as an indicator of the liquidity premia in the two markets relative to nominal bonds. The typically positive spread between the two moved sharply lower, dropping 40 basis points into negative territory at the five-year maturity (Graph II.8, last panel). This suggests that in anticipation of the ECB purchases – which were explicitly announced to include index-linked bonds – investors sharply reduced their required liquidity premia on these securities, thereby pushing real yields down much more than nominal yields. This is in line with the US evidence on the Federal Reserve's purchases of Treasury Inflation-Protected Securities (TIPS).

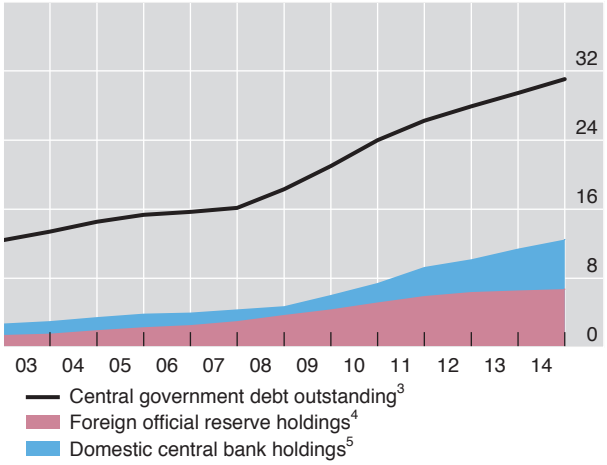
Central bank asset purchases have reinforced the growing weight of official holdings in government bond markets. Such holdings have increased considerably post-crisis in major economies' government debt markets, especially for securities denominated in reserve currencies (see also Chapter V). Domestic central banks account for the lion's share of the increase. Between 2008 and 2014, their share of the amount outstanding increased from almost 6% to more than 18%, or from $1.0 trillion to around $5.7 trillion, based on data for the United States, the euro

Official holdings of government securities grow[1]

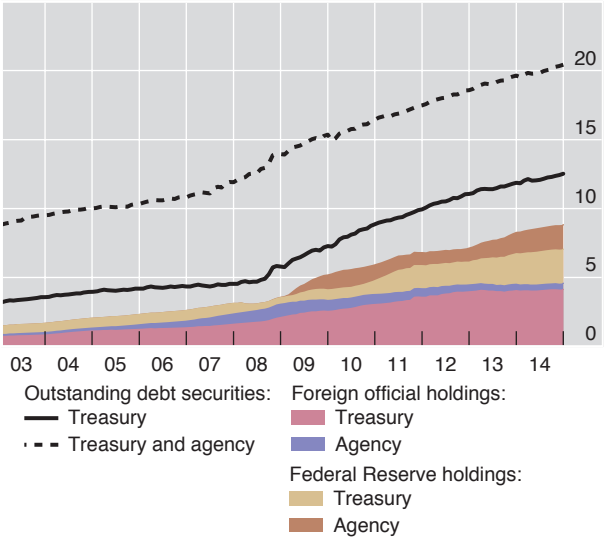
In trillions of US dollars

Graph II.9

Official holdings of government securities[2]



Official holdings of US Treasury and agency securities[6]



[1] Different valuation methods based on source availability. [2] Covers the euro area, Japan, the United Kingdom and the United States; for the euro area, Japan and the United Kingdom, converted into US dollars using end-2014 constant exchange rates. [3] For the United States, total marketable Treasury securities, excluding agency debt. [4] For euro- and yen-denominated reserves, 80% is assumed to be government debt securities; for dollar-denominated reserves, as reported by the US Treasury International Capital System; for sterling-denominated reserves, holdings by foreign central banks. [5] For the euro area, national central bank holdings of general government debt and ECB holdings under the Securities Market Programme. [6] Agency debt includes mortgage pools backed by agencies and government-sponsored enterprises (GSEs) as well as issues by GSEs; total outstanding Treasury securities are total marketable Treasury securities.

Sources: ECB; Bank of Japan flow of funds accounts; Federal Reserve flow of funds accounts; IMF, COFER; UK Debt Management Office; US Department of the Treasury; Datastream; national data; BIS calculations.

area, United Kingdom and Japan (Graph II.9, left-hand panel).[1] The share of holdings by the foreign official sector has remained more stable, increasing from just above 20% to almost 22%, but the increase in absolute amounts has been sizeable, from $3.7 trillion to $6.7 trillion. On top of their holdings of government securities, official institutions have also purchased significant amounts of other debt securities. The Federal Reserve's holdings of US agency debt securities, for example, increased by over $1.7 trillion between 2008 and 2014, while foreign official holdings declined somewhat (Graph II.9, right-hand panel).

The downward pressure on bond yields exerted by central banks and other official institutions has been reinforced by investor behaviour. In part, investors' actions have reflected a search for yield. As bond yields further out along the maturity spectrum dropped below zero in a number of economies, investors sought still-positive yields in longer-dated bonds at the expense of duration risk. In some cases, their search for safety may also have played a role: benchmark euro area yields have tended to fall whenever concerns about the situation in Greece have intensified. And, in the background, financial regulatory reforms as well as greater demand for collateral in financial transactions have generally favoured holdings of sovereign bonds.

[1] Part of these increases is due to valuation effects, as in some cases sources report market value and in others face value.

In addition, investors' hedging behaviour has been at work. Institutions such as pension funds and insurance companies have been under pressure to hedge the longer duration of their liabilities induced by the drop in yields. As they have sought to match the increased duration of their liabilities through purchases of long-term swaps, they have put additional downward pressure on yields and further intensified the demand for long-term fixed rates. Such behaviour highlights that institutional mandates could help generate self-reinforcing spirals in an environment where yields have been continuously pushed lower by a combination of central bank action and investor responses.

As yields dropped further below zero, concerns grew about the impact of negative rates on financial market functioning. Thus far, where negative policy rates have been imposed, these have been transmitted to money markets without major disruptions. Negative yields further out along the term structure in part reflect expectations that negative rates will prevail for some time. The longer the negative rate environment persists, the more likely it is that investors may change their behaviour, possibly in ways that are detrimental to financial market functioning.

Potential vulnerabilities can arise if institutional arrangements create a discontinuity at zero interest rates. There are several such examples. For instance, yields on most European constant net asset value funds turned negative in the first quarter of 2015, testing the effectiveness of new contractual provisions that prevent the funds from "breaking the buck". Moreover, in some market segments, negative interest rates can complicate hedging. Some instruments, such as certain floating rate notes, set a zero floor for interest payments, either explicitly or implicitly. Hedging such instruments, or securities that depend on their cash flows, becomes problematic as standard interest rate swaps pass through negative interest payments, thereby creating a cash flow mismatch. A similar discontinuity arises if banks are unwilling to pass on negative yields to their depositors, effectively exposing themselves to additional risk if interest rates were to move further into negative territory. Chapter VI provides a more detailed analysis of the impact of negative interest rates on financial institutions.

Rising volatility puts the spotlight on market liquidity

In the past year, volatility in global financial markets began to rise from the unusually low levels that prevailed in mid-2014 (see last year's Annual Report), spiking a few times (Graph II.10, left-hand and centre panels). The spikes, which followed years of generally declining volatility, often reflected concerns about the diverging global economic outlook, uncertainty about the monetary policy stance and fluctuations in oil prices. Investors also began to demand higher compensation for volatility risk. In particular, after narrowing until mid-2014, the gap between implied volatility and expectations of realised volatility ("volatility risk premium") in the US equity market started to widen (Graph II.10, right-hand panel).

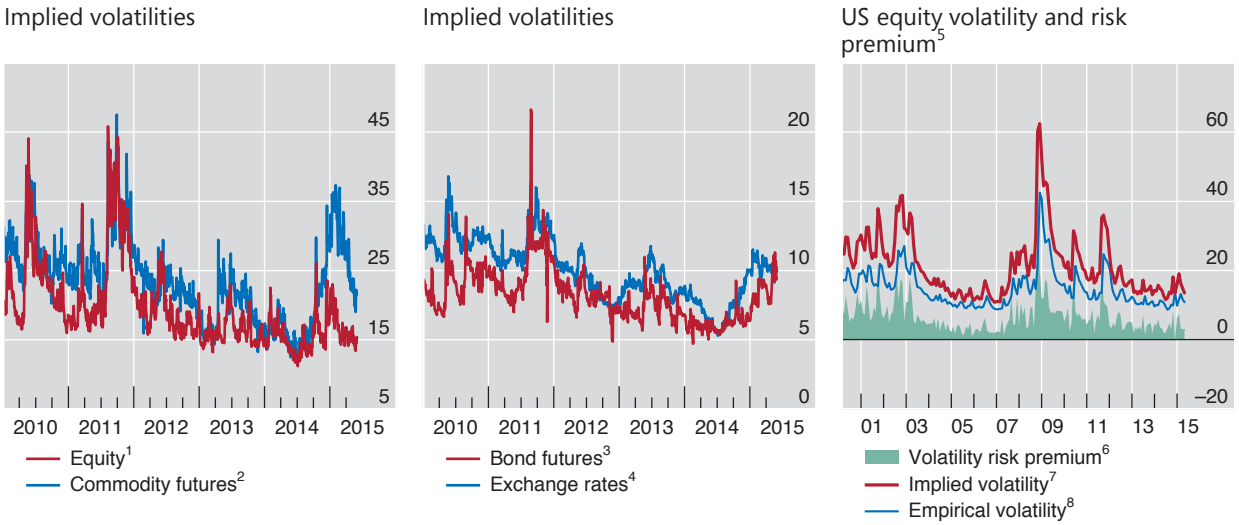
As risky assets such as equities and high-yield bonds were hit during these bouts of volatility, investors flocked to safe government bonds, sending their yields to new lows. The easing actions of central banks helped to quickly quell such spikes. Nevertheless, nervousness in financial markets seemed to return with increasing frequency, underscoring the fragility of otherwise buoyant markets.

A normalisation in volatility from exceptionally low levels is generally welcome. To some extent, it is a sign that investors' risk perceptions and attitudes are becoming more balanced. That said, volatility spikes induced by little new information about economic developments highlight the impact of changing financial market characteristics and market liquidity.

Signs of market fragility after a period of declining and unusually low volatility

In percentage points

Graph II.10



[1] Implied volatility of S&P 500, EURO STOXX 50, FTSE 100 and Nikkei 225 indices; weighted average based on market capitalisation. [2] Implied volatility of at-the-money options on commodity futures contracts on oil, gold and copper; simple average. [3] Implied volatility of at-the-money options on long-term bond futures of Germany, Japan, the United Kingdom and the United States; weighted average based on GDP and PPP exchange rates. [4] JPMorgan VXY Global index. [5] Monthly averages of daily data. [6] Estimate obtained as the difference between implied and empirical volatility. [7] VIX. [8] Forward-looking estimate of empirical (or realised) volatility obtained from a predictive regression of one-month-ahead empirical volatility on lagged empirical volatility and implied volatility.

Sources: Bloomberg; BIS calculations.

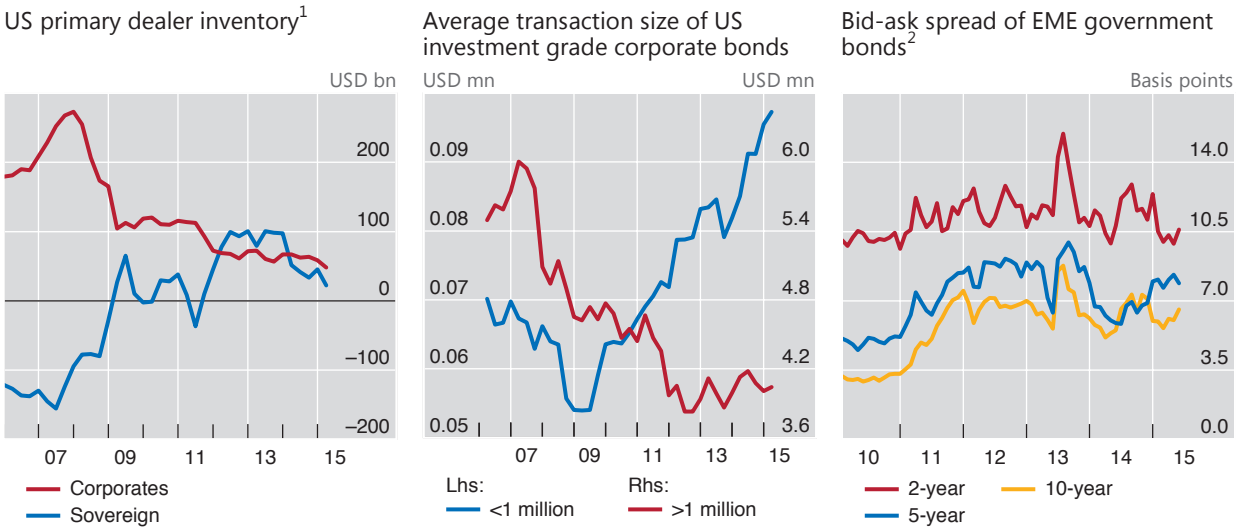
There are two aspects to market liquidity. One is structural, as determined by factors such as investors' willingness to take two-way positions and the effectiveness of order-matching mechanisms. This type of liquidity is important in quickly and efficiently dealing with *transitory* order imbalances. The other reflects one-sided, more *persistent* order imbalances, as when investors suddenly all head in the same direction. If investors persistently underestimate and underprice this second aspect, markets may appear liquid and well functioning in normal times, only to become highly illiquid once orders become one-sided, regardless of structural features.

In the wake of the financial crisis, specialised dealers, also known as market-makers, have scaled back their market-making activities, contributing to an overall reduction in the liquidity of fixed income markets. For example, the turnover ratio of US Treasuries and investment grade corporate bonds, calculated as the ratio of primary dealers' trading volume to the amount outstanding of respective securities, has been on a declining trend since 2011. Some of the drivers for this retrenchment are related to dealers' waning risk tolerance and reassessments of business models (Box VI.A). Others have to do with new regulations, which are aimed at bringing the costs of market-making and other trading-related activities more into line with the underlying risks and those they generate for the financial system. Finally, increasing official sector holdings of government securities may also have contributed to lower market liquidity.

Changes in market-makers' behaviour have had varying effects on the liquidity of different bond market segments. Market-making has concentrated in the most liquid bonds. For example, market-makers in the United States have trimmed their net holdings of relatively risky corporate bonds while increasing their net US Treasury positions (Graph II.11, left-hand panel). At the same time, they have cut

Market-making and market liquidity have become more concentrated

Graph II.11



[1] Net dealer positions; for corporate bonds, calculated as total corporates up to April 2013 and thereafter as the sum of net positions in commercial paper, investment and below-investment grade bonds, notes and debentures and net positions in private label mortgage-backed securities (residential and commercial); for sovereign bonds, calculated as the sum of net positions in T-bills, coupons and Treasury Inflation-Indexed Securities or Treasury Inflation-Protected Securities. [2] Simple average across Bulgaria, China, Chinese Taipei, Colombia, the Czech Republic, India, Indonesia, Israel, Korea, Mexico, Poland, Romania, South Africa, Thailand and Turkey; for each country, monthly data are calculated from daily data based on a simple average across observations.

Sources: Federal Reserve Bank of New York; Bloomberg; FINRA TRACE; BIS calculations.

the average size of relatively large trades of US investment grade corporate bonds (Graph II.11, centre panel). More generally, a number of market-makers have become more selective in offering services, focusing on core clients and markets.

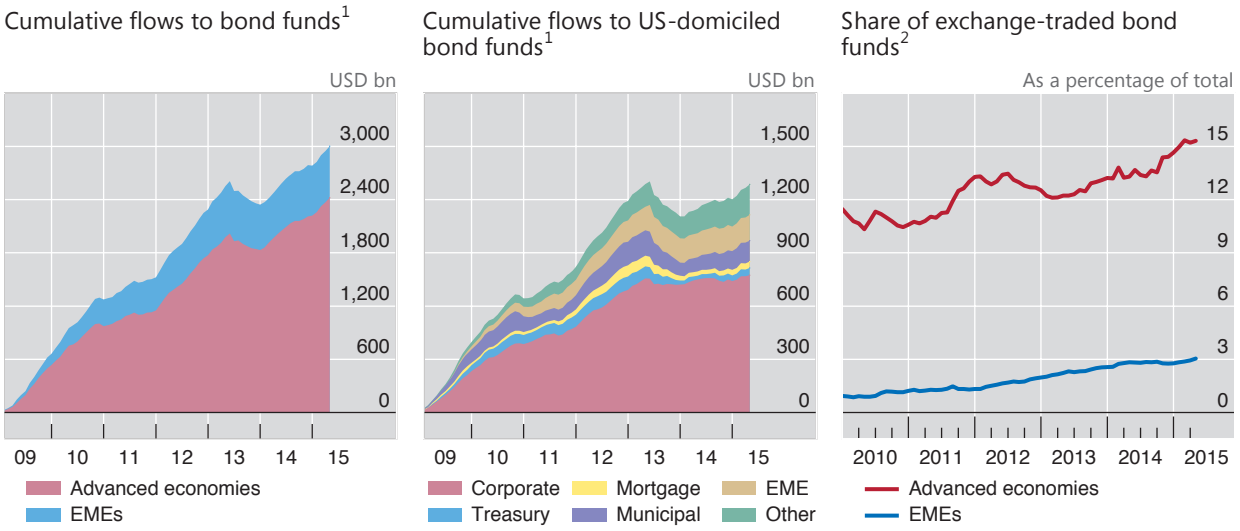
As a result, there are signs of liquidity bifurcation in bond markets. Market liquidity has increasingly concentrated in the traditionally most actively traded securities, such as the government bonds of advanced economies, at the expense of less liquid ones, such as corporate and EME bonds. For example, the bid-ask spread of EME government bonds has remained high since 2012, with a large spike during the taper tantrum (Graph II.11, right-hand panel).

Even seemingly very liquid markets, such as the US Treasury market, are not immune to extreme price moves. On 15 October 2014, the yield on 10-year US Treasury bonds fell almost 37 basis points – more than the drop on 15 September 2008 when Lehman Brothers filed for bankruptcy – only to rebound by around 20 basis points within a very short period. These sharp moves were extreme relative to any economic and policy surprises at the time. Instead, an initial shock was amplified by deteriorating liquidity when a material share of market participants, who had positioned themselves for a rise in long-term rates, tried to quickly exit their crowded positions. Automated trading strategies, especially high-frequency ones, further boosted the price swings.

Another key change in bond markets is that investors have increasingly relied on fixed income mutual funds and exchange-traded funds (ETFs) as sources of market liquidity. Bond funds have received $3 trillion of investor inflows globally since 2009, while the size of their total net assets reached $7.4 trillion at the end of April 2015 (Graph II.12, left-hand panel). Among US bond funds, more than 60% of inflows were into corporate bonds, while inflows to US Treasuries remained small (Graph II.12, centre panel). Moreover, ETFs have gained importance in both advanced economy and EME bond funds (Graph II.12, right-hand panel). ETFs

Bond funds have grown rapidly post-crisis

Graph II.12



[1] Includes mutual funds and exchange-traded funds (ETFs). [2] The ratio of cumulative flows to ETFs investing in bonds issued by advanced economies (or EMEs) to cumulative flows to both mutual funds and ETFs investing in bonds issued by advanced economies (or EMEs).

Sources: Lipper; BIS calculations.

promise intraday liquidity to investors as well as to portfolio managers who seek to meet inflows and redemptions without buying or selling bonds.

The growing size of the asset management industry may have increased the risk of liquidity illusion: market liquidity seems to be ample in normal times, but vanishes quickly during market stress. In particular, asset managers and institutional investors are less well placed to play an active market-making role at times of large order imbalances. They have little incentive to increase their liquidity buffers during good times to better reflect the liquidity risks of their bond holdings. And, precisely when order imbalances develop, asset managers may face redemptions by investors. This is especially true for bond funds investing in relatively illiquid corporate or EME bonds.[2] Therefore, when market sentiment shifts adversely, investors may find it more difficult than in the past to liquidate bond holdings.

Central banks' asset purchase programmes may also have reduced liquidity and reinforced liquidity illusion in certain bond markets. In particular, such programmes may have led to portfolio rebalancing by investors from safe government debt towards riskier bonds. This new demand can result in narrower spreads and more trading in corporate and EME bond markets, making them look more liquid. However, this liquidity may be artificial and less robust in the event of market turbulence.

A key question for policymakers is how to dispel liquidity illusion and support robust market liquidity. Market-makers, asset managers and other investors can take steps to strengthen their liquidity risk management and improve market transparency. Policymakers can also provide them with incentives to maintain robust liquidity during normal times to weather liquidity strains in bad times – for example, by encouraging regular liquidity stress tests. When designing stress tests, it is important to take into consideration that seemingly prudent individual actions

[2] See K Miyajima and I Shim, "Asset managers in emerging market economies", *BIS Quarterly Review*, September 2014, pp 19–34, and IMF, *Global Financial Stability Report*, April 2015, for empirical evidence.

may in fact exacerbate one-sided markets, and hence the evaporation of liquidity, if they imply similar positioning by a large number of market participants. Finally, it is vital that policymakers improve their understanding of liquidity amplification mechanisms and investor behaviour, especially in relatively illiquid markets.

Growing linkages between commodities and financial markets

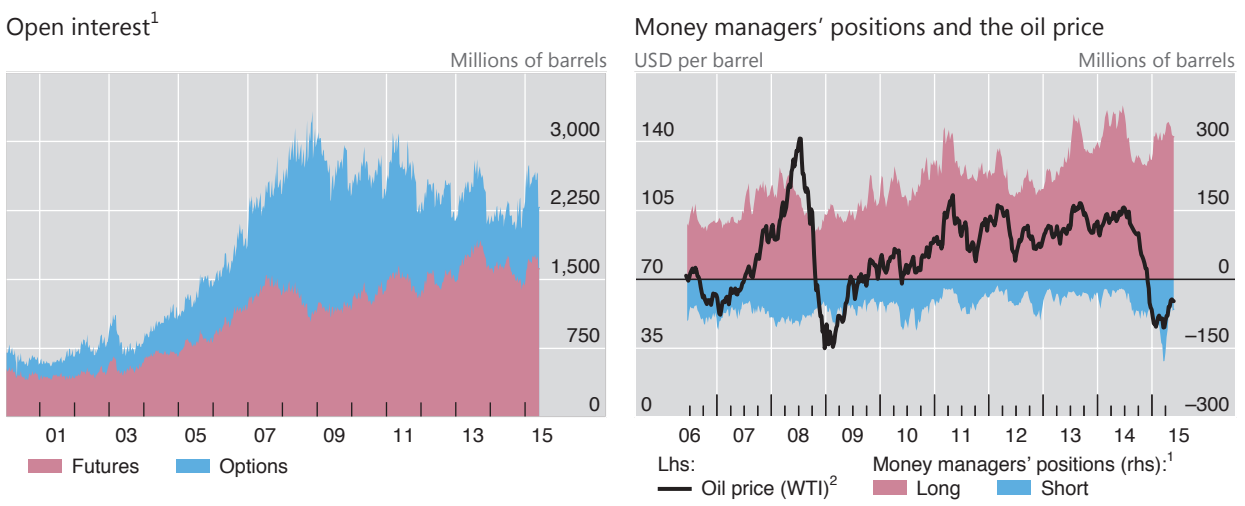
The recent episode of rapidly falling oil prices has highlighted the close linkages between commodity and financial markets. Some of these linkages have been known for some time, including financial investors' increased activity in physical commodity markets and the growth in commodity-linked derivatives markets. Others are more recent, such as commodity producers' growing indebtedness, in particular among oil producers, and the feedback effects that this may have on commodity prices and even the dollar (Box II.B).

The nature of the production process makes commodities a natural underlying asset for derivative contracts. The extraction of oil and many other commodities requires high upfront investment, and commodity producers are exposed to considerable risks – eg weather-related risks for agricultural commodities and geopolitical risks for commodities in general. Thus, commodity producers have an interest in hedging their risks by selling their future production at a given price today (via futures and forwards) or securing a floor to that price (via options). On the other side of such contracts typically are producers of final or intermediate goods who use commodities as production inputs, or investors who want to get exposure to commodities to earn a return or diversify risk.

Activity in commodity derivatives markets has surged over the past decade, in parallel with a broad-based upswing of commodity prices. Focusing on oil in particular, the number of hedged barrels of WTI oil has more than tripled since 2003 (Graph II.13, left-hand panel), while physical production has risen by only about 15%.

This increased activity in commodity derivatives is a double-edged sword. On the one hand, it should increase the range of hedging opportunities, raise market

Growing importance of investors in oil markets — Graph II.13



[1] Crude oil, light sweet, NYMEX. [2] Weekly prices based on daily price averages from Wednesday to Tuesday.

Sources: Bloomberg; Datastream.

Box II.B

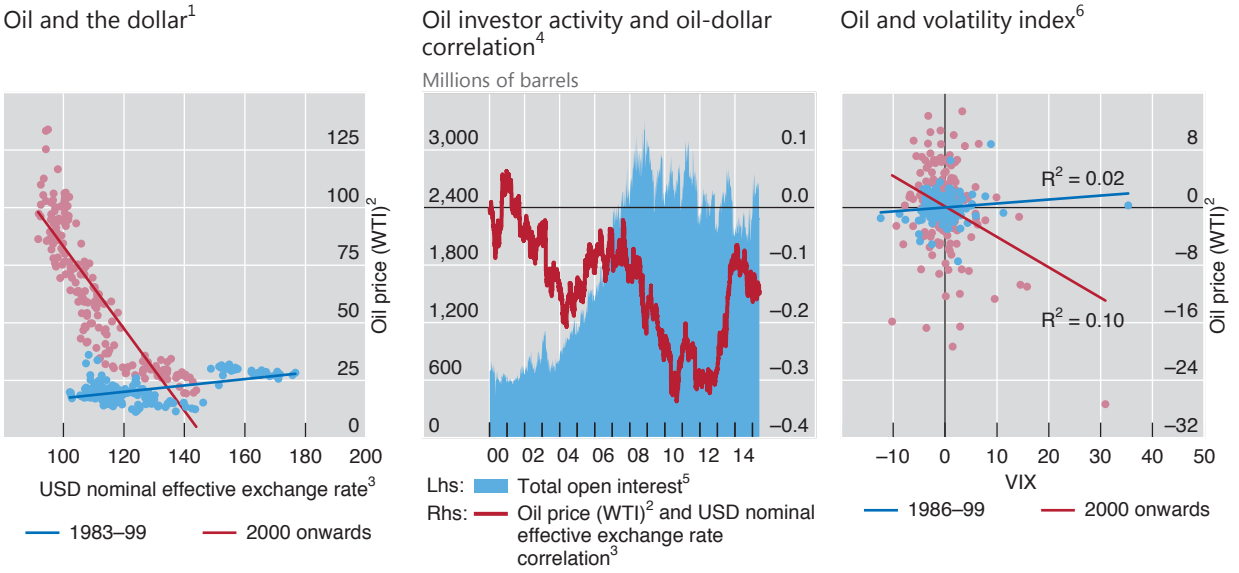
What drives co-movements in the oil price and the dollar?

The sharp appreciation of the US dollar and the rapid fall in the oil price are two of the most noteworthy market developments of the past year. As argued in this chapter, diverging monetary policies played a key role in the dollar's strength, whereas a combination of increasing supply, falling demand and market-specific factors were important in explaining the oil price drop. It is less clear, however, to what extent the two phenomena are linked. This box discusses some of the possible links.

The relationship between the trade-weighted US dollar exchange rate and the price of crude oil has changed over time (Graph II.B, left-hand panel). Evidence from before the 1990s points to a positive correlation. The reason is unclear. One argument is that oil exporters spent a large share of oil revenues on US goods, which had a tendency to improve the US trade balance, and hence to boost the dollar exchange rate, when oil became more expensive.① Accordingly, as the share of oil producers' imports from the United States declined relative to the US share in their oil exports, this channel became less potent. Another possible explanation is that a worsening economic outlook in the United States would typically result in a weaker currency and a lower demand for oil. This channel, too, would have become weaker as the US share in global output declined.

Tight links between oil, the dollar and financial markets

Graph II.B



[1] Average of values across the month. [2] In US dollars per barrel. [3] BIS nominal effective exchange rate narrow index; a decline (increase) indicates depreciation (appreciation) of the US dollar in trade-weighted terms. [4] Correlation calculated by using Engle's (2002) Dynamic Conditional Correlation GARCH model. [5] Crude oil, light sweet, NYMEX. [6] One-month differences.

Sources: Bloomberg; BIS calculations.

Since the early 2000s, a stronger US dollar exchange rate has gone hand in hand with a lower oil price, and vice versa (Graph II.B, left-hand and centre panels). The prominent role of the US dollar as invoicing currency for commodities is one possible explanation: oil producers outside the United States may adjust the dollar price of oil in order to stabilise their purchasing power. At the same time, increasing investment activity in oil futures and options may also play a role.② The monetary policy stance of the Federal Reserve or flight to safety episodes that naturally influence the US dollar exchange rate may also affect financial investors' risk-taking, prompting them to move out of oil as an asset class when the US dollar becomes a safe haven currency and into oil when they are willing to take on more risk. Consistent with this view, the right-hand panel of Graph II.B illustrates the increasingly strong negative relationship between oil prices and financial investors' risk aversion, as measured by the VIX index.

Another financial channel could reflect the attributes of oil as both the main source of income and an asset backing the liabilities of oil producers. For example, when the oil price stayed high, EME firms borrowed, sometimes heavily, to invest in oil extraction, with oil stocks acting as implicit or explicit collateral in these debt contracts. As

access to credit and collateral prices are closely linked, the fall in oil prices eroded oil producers' profits and simultaneously tightened their financing conditions. This would induce firms to hedge or cut their dollar liabilities, thereby increasing the demand for dollars. The strong negative relationship between oil prices and spreads on high-yield debt of oil producers is consistent with this view.③

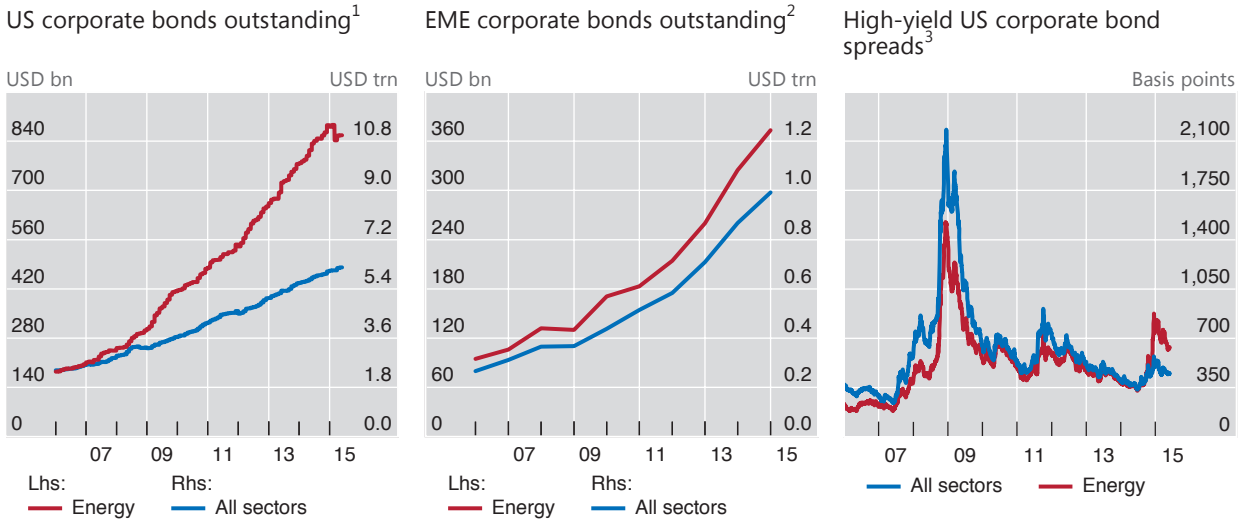
① See R Amano and S van Norden, "Oil prices and the rise and fall of the US real exchange rate", *Journal of International Money and Finance*, vol 17(2), April 1998. ② See M Fratzscher, D Schneider and I van Robays, "Oil prices, exchange rates and asset prices", *ECB Working Papers*, no 1689, July 2014. ③ See D Domanski, J Kearns, M Lombardi and H S Shin, "Oil and debt", *BIS Quarterly Review*, March 2015, pp 55–65.

liquidity, reduce price volatility, and more generally improve the price formation mechanism, at least in normal times. On the other hand, investors' decisions are subject to rapidly shifting expectations about price trends and fluctuations in risk appetite and financing constraints. This may induce them to withdraw from the market at times of losses and heightened volatility (Graph II.13, right-hand panel).

Bigger and more liquid commodity futures markets mean that commodity prices tend to react more quickly and strongly to macroeconomic news. Changes in commodity investor sentiment often seem to be largely driven by the general macroeconomic outlook, rather than by commodity-specific factors. This could also explain the recent stronger co-movements in commodity and equity prices. The extent to and speed with which arbitrage opportunities can be exploited between the physical and futures markets are critical to price formation. They influence the degree to which fluctuations in futures prices transmit to the prices commodity producers charge and, vice versa, the degree to which changes in the consumption and production of a given commodity are reflected in futures prices (Box II.A).

Rising energy sector debt and widening spreads

Graph II.14



[1] Face value of Merrill Lynch high-yield and investment grade corporate bond indices. [2] Face value; energy sector includes oil & gas and utility & energy firms; bonds issued in US dollars and other foreign currency by firms based in Brazil, Bulgaria, Chile, China, Colombia, the Czech Republic, Estonia, Hong Kong SAR, Hungary, India, Indonesia, Israel, Korea, Latvia, Lithuania, Mexico, Peru, the Philippines, Poland, Romania, Russia, Singapore, Slovenia, South Africa, Thailand, Turkey and Venezuela. [3] Option-adjusted spread over US Treasury notes.

Sources: Bank of America Merrill Lynch; Bloomberg; Dealogic.

Oil producers' easier access to financing has sharply boosted indebtedness in the sector. The persistently high prices recorded over recent years made it profitable to exploit alternative sources of oil, such as shale oil and deep-water sources. To reap hefty expected profits, oil firms boosted investment, in many cases through debt. The amount outstanding of bonds issued by US and EME energy firms, including oil and gas companies, has more or less quadrupled since 2005, growing at a much faster pace than in other sectors (Graph II.14, left-hand and centre panels).

After the recent sharp oil price fall, the oil sector's high indebtedness has exacerbated the rise in financing costs. Indeed, energy firms' bond yields soared when oil prices plummeted (Graph II.5, left-hand and centre panels). And bond yields of US energy firms in the high-yield segment, which had normally been lower than those of other sectors, rose well above them (Graph II.14, right-hand panel).

High indebtedness may, in addition, have amplified the oil price drop. As oil prices fell, energy firms' refinancing costs rose and their balance sheets weakened. Rather than cutting back production, some firms may have tried to preserve cash flows by boosting output and/or selling futures in an attempt to lock in prices. In line with this, oil production in the United States, including shale oil extraction, remained strong as oil prices fell, leading to a rapid build-up in the levels of crude oil in US storage up to the first quarter of 2015.[3]

[3] See D Domanski, J Kearns, M Lombardi and H S Shin, "Oil and debt", *BIS Quarterly Review*, March 2015, pp 55–65, for further details and evidence.

III. When the financial becomes real

Plummeting oil prices and a surging US dollar shaped the global macroeconomic environment in the year under review. These large changes in conditions in key markets caught economies at different stages of their business and financial cycles.

Supported by falling energy costs, the business cycle upswing in the advanced economies continued. The shift in exchange rates dampened US growth while aiding a return to growth in the euro area. Although financial conditions eased further in the countries hardest-hit by the crisis, the shadow of the pre-crisis financial boom lingered on. The resource misallocations linked to the past rapid credit expansion continued to hold back productivity growth. The legacy of high public debt limited governments' fiscal room for manoeuvre, while ageing societies further complicate the adjustments necessary to make fiscal positions sustainable.

In several respects, conditions were quite different in many emerging market economies (EMEs) that had been less affected by the crisis. Falling commodity export revenues and rising costs of servicing dollar debt coincided with slowing growth and peaks in domestic financial cycles. In the past, the combination of slowing growth and maturing credit booms in EMEs often ended in serious financial stress, especially when global financial conditions were tight. Better macroeconomic management and more robust financial structures, including longer debt maturities and reduced exposure to currency risk, have increased resilience. But higher overall private sector debt, both loans from the domestic banking system and capital market finance from abroad, could offset the gains from a sounder debt structure.

This chapter begins by reviewing the shifting growth patterns over the past year. It then assesses the long-lasting impact of earlier financial booms on growth in advanced economies and concludes by examining financial vulnerabilities in EMEs in the light of recent financial booms and slowing growth.

Shifting growth patterns

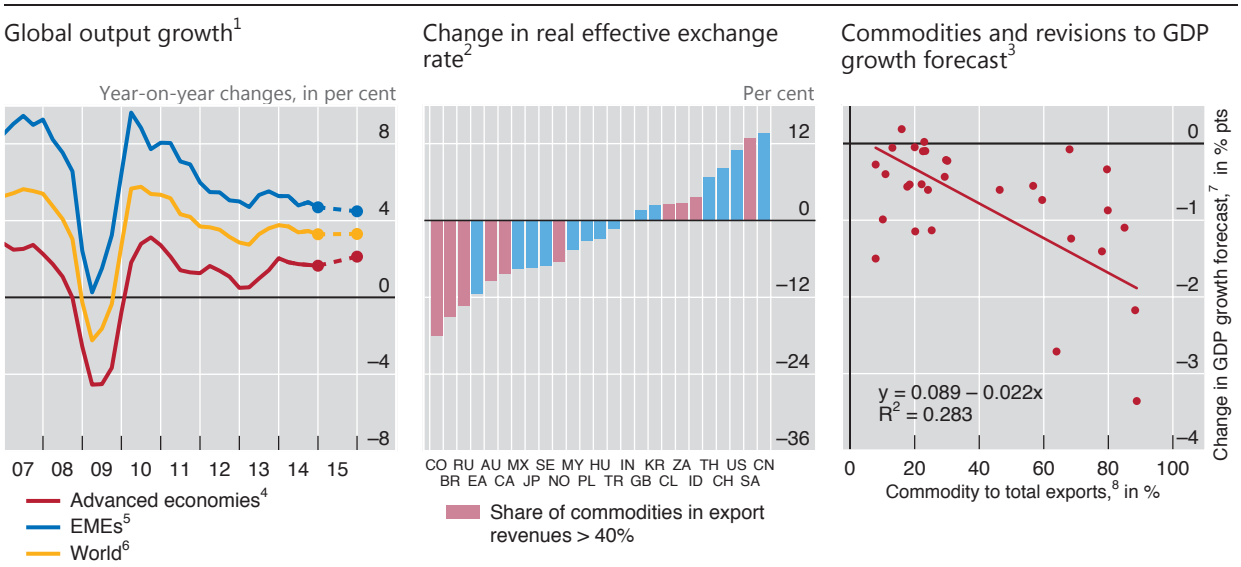
Over the past year, the global economy grew at close to its long-term average rate. World GDP expanded by 3.4% in 2014 (Annex Table A1), roughly in line with the average since 1980. However, this figure masks significant shifts in growth momentum across countries.

The upswing in the advanced economies continued (Graph III.1, left-hand panel). Further expansion in the United States and the United Kingdom contrasted with a return to modest growth in the euro area and a gradual recovery in Japan. The US economy grew by 2.4% in 2014, supported by rapidly declining unemployment. Output contracted in the first quarter of 2015, in part due to weaker exports. Output in the euro area expanded by 0.9% in 2014, and forecasters expect the recovery to gain pace in 2015. Growth returned to Spain and Portugal, and the Italian economy is expected to pick up in 2015. Japanese consumption dropped markedly after the April 2014 sales tax increase. Other advanced economies grew by an average 2.4%, albeit with widening differentials across countries.

Economic activity in EMEs lost further momentum. Growth weakened by around 0.3 percentage points to 4.9% in 2014, with the trend continuing into 2015. But again, this hides significant cross-country differences. Private demand growth in China slowed further, in part due to a softer real estate sector. This contrasted with

Shifting patterns of growth

Graph III.1



AU = Australia; BR = Brazil; CA = Canada; CH =Switzerland; CL = Chile; CN = China; CO = Colombia; EA = euro area; GB = United Kingdom; HU = Hungary; ID = Indonesia; IN = India; JP = Japan; KR = Korea; MX = Mexico; MY = Malaysia; NO = Norway; PL = Poland; RU = Russia; SA = Saudi Arabia; SE = Sweden; TH = Thailand; TR = Turkey; US = United States; ZA = South Africa.

[1] GDP-weighted averages using PPP exchange rates; forecasts are shown as dots. [2] Between July 2014 and April 2015; a positive value indicates an appreciation. [3] Countries listed in footnotes 4 and 5 excluding Hungary, India, Italy and Russia. [4] Australia, Canada, Denmark, the euro area, Japan, New Zealand, Norway, Sweden, Switzerland, the United Kingdom and the United States. [5] Argentina, Brazil, Chile, China, Colombia, the Czech Republic, Hong Kong SAR, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Peru, the Philippines, Poland, Russia, Saudi Arabia, Singapore, South Africa, Thailand and Turkey. [6] Countries listed in footnotes 4 and 5. [7] Change in forecast for 2015 GDP growth between July 2014 and May 2015. [8] Average share of commodities in export revenues between 2004 and 2013.

Sources: UN Comtrade database; Consensus Economics; national data; BIS calculations.

accelerating activity in India and Korea. Growth in most other Asian EMEs slowed in 2014 but is expected to pick up in 2015. The Brazilian economy contracted in the second half of 2014, even as most other Latin American economies performed better. Growth in central and eastern Europe accelerated by 2 percentage points to 3.1%.

Plummeting oil prices and the US dollar appreciation influenced growth around the world from mid-2014 onwards. In late May 2015, crude oil prices were 40% lower in dollar terms year on year (Chapter II). Between July 2014 and April 2015, the US dollar trade-weighted real exchange rate appreciated by around 10%, while the euro depreciated by a similar magnitude and the yen by 7.5% (Graph III.1, centre panel).

The macroeconomic impact of these large price swings is yet to fully play out. Lower oil prices due to increased supply should boost economic activity through lower input costs and higher real incomes. Indeed, the oil price drop boosted consumer confidence in major advanced economies and contributed to the recent increase in consumption in the euro area. By contrast, changes in exchange rates mainly redistribute growth. US export growth decreased from 4% year on year in the second quarter of 2014 to 3% in the first quarter of 2015 against the backdrop of a stronger dollar.

Many EMEs have already felt stronger effects. Economic activity in commodity-producing economies has weakened. Between July 2014 and May 2015, downward revisions to 2015 growth forecasts were larger for countries more dependent on commodity exports (Graph III.1, right-hand panel). Lower commodity prices have led to investment cuts, particularly in the oil and gas sector. Moreover, commodity exporters have lost fiscal revenues.

Where are countries in the financial cycle?[1]

Graph III.2

Real credit growth[2]

Real residential property price growth[3]

AU = Australia; BR = Brazil; CA = Canada; CH = Switzerland; CN = China; DE = Germany; ES = Spain; FR = France; GB = United Kingdom; GR = Greece; IN = India; IT = Italy; JP = Japan; KR = Korea; MX = Mexico; NL = Netherlands; PT = Portugal; TR = Turkey; US = United States; ZA = South Africa. Asia = simple average of Hong Kong SAR, Indonesia, Malaysia, the Philippines, Singapore and Thailand; central and eastern Europe (CEE) = simple average of Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania and Russia; Nordic = simple average of Finland, Norway and Sweden.

[1] An upswing (downswing) is identified if both indicators (real credit growth and real residential property price growth) for a country provide clear positive (negative) readings over both horizons. [2] Total credit to the private non-financial sector deflated by the GDP deflator (for Sweden, deflated using consumer prices). [3] Deflated using consumer price indices. [4] Data not available. [5] Annualised average growth rates. [6] Year-on-year change, in per cent.

Sources: OECD; Datastream; national data; BIS; BIS calculations.

In addition, commodity exporters experienced some of the largest real exchange rate depreciations. This supports exports and could eventually boost investment in export industries and help rebalance activity. The currencies of most commodity importers also fell against the US dollar, although not necessarily in trade-weighted terms. In fact, some economies, particularly in emerging Asia, saw real exchange rate appreciations, which depressed net exports.

The broad US dollar appreciation has also increased the costs of servicing dollar debt. Dollar credit outside the United States has increased markedly in recent years, to $9.5 trillion by the end of 2014 (Chapter V). While more than half of this debt is owed by borrowers resident in advanced economies, residents in EMEs have borrowed more than $3 trillion. The importance of currency mismatches in EMEs is explored in more detail in this chapter's final section.

The shift in growth patterns caught economies at different stages of the financial cycle.[1] In many of the economies that experienced a home-grown bust,

[1] While there is no consensus definition of financial cycles, they are generally measured by the co-movement of a broad set of financial variables. The most parsimonious representation is in terms of credit and property prices, but other measures of risk-taking may add further information. The

financial cycles are turning up again. Both credit and property prices rebounded in the United States (Graph III.2). In the United Kingdom, credit to the private sector continued to fall but property prices grew vigorously. Credit also continued to fall in Greece, Italy and Spain, although the decline in property prices slowed or, in the case of Spain, reversed.

Unusually accommodative global monetary and financial conditions have fuelled financial booms in many of the smaller advanced and emerging market economies that were relatively unscathed by the Great Financial Crisis (Chapter V). Some of these booms are now showing signs of peaking. Real credit growth slowed in many EMEs, including many emerging Asian economies as well as Brazil and Turkey. In addition, property prices are signalling the turning of financial cycles in several economies. This is particularly evident in China, where residential property prices declined by nearly 7% over the past year in real terms (Graph III.2, bottom panel). Residential property prices also declined in Mexico, and their growth rate has weakened substantially in Brazil – a sign that the financial booms are maturing. By contrast, weaker commodity prices have not yet dented the financial booms in Australia, Canada and Norway, which experienced strong credit and property price growth over the past four quarters.

The current configuration of business and financial cycles poses different challenges for advanced economies and many EMEs. For the former, in particular the countries at the centre of the crisis, the issue is how to ensure healthy long-term growth without a new credit boom-bust cycle. For the latter, the key is how to ensure financial and economic stability amidst weaker growth and peaking financial booms.

Growth and the financial cycle in the advanced economies

The interaction between the financial cycle, on the one hand, and aggregate demand and production, on the other, goes some way towards explaining the lacklustre recovery in many advanced economies in recent years (see also the *84th Annual Report*).

Financial cycles affect spending directly through both debt service burdens and the impact of leverage (Box III.A). During financial booms, increases in asset prices boost the value of collateral, making borrowing easier. At the same time, more debt means higher debt service burdens, especially if interest rates increase, which constrains spending. As long as asset prices keep rising, leverage-financed spending may offset this effect, but once the financial boom runs out of steam, falling asset prices raise leverage and thus make it more difficult for households and firms to borrow, compounding the drag from higher debt service burdens. After a financial bust, it takes time for spending to normalise. Even if interest rates fall quickly, as in 2008–09, high debt keeps debt service burdens up. And depressed asset prices generate credit constraints that ease only gradually. In fact, the interaction of leverage and debt service burdens explains the evolution of US spending in the aftermath of the Great Financial Crisis fairly well.

Overall, at the current stage of the financial cycle, financing constraints seem to be of minor importance for corporate investment. Instead, recent BIS research suggests that the cross-country pattern mostly reflects high uncertainty about the

interactions between these variables can have major macroeconomic consequences. For instance, banking crises or periods of considerable financial distress often follow financial-cycle peaks, as confirmed in many countries by the Great Financial Crisis. See BIS, *84th Annual Report*, Chapter IV, for further elaboration.

Box III.A

Financial cycles and the real economy

The financial cycle has shaped the evolution of many economies both before and after the Great Financial Crisis. Recent work casts further light on some of the underlying dynamics, highlighting two variables: aggregate leverage (the stock of credit relative to asset prices) and debt service burdens (interest payments plus amortisations relative to income).① While the impact of leverage has been widely explored, the role of the debt service burden has not received much attention, despite sizeable negative effects on private sector expenditure growth.

Two long-run relationships between credit, GDP, asset prices and interest rates tie down aggregate leverage and the aggregate debt service burden. First, a relationship between the credit-to-GDP ratio and real asset prices anchors aggregate leverage. This relationship works through collateral constraints: in the long run higher real asset prices support a higher credit-to-GDP ratio. A second long-run relationship exists between the credit-to-GDP ratio and interest rates. For the same amount of income, higher levels of debt can be carried when interest rates are lower. This relationship defines the sustainable level of the debt service burden.

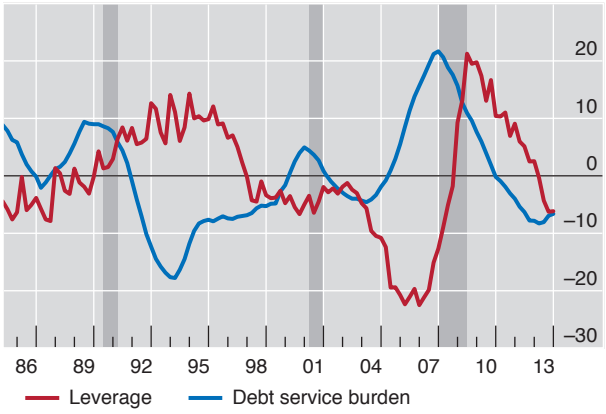
Deviations from the long-run anchors of leverage and the debt service burden influence output significantly. Developments in the United States around the Great Financial Crisis are an example. In the early 2000s, asset prices were high and interest rates were low relative to outstanding debt levels, allowing households and corporates to borrow more. Asset prices outpaced credit growth, keeping aggregate leverage well below long-run values (Graph III.A, left-hand panel). This provided ample room for more credit, which also raised expenditure. But this boost was gradually offset by a growing negative drag on disposable income from increasing debt service burdens. This explains why output in the mid-2000s grew at around average, despite rapidly expanding credit. When the financial boom ran out of steam and asset prices began to fall, aggregate leverage increased strongly, constraining the private sector's borrowing capacity. This depressed expenditure even further, leading to a severe recession. Monetary policy responded by lowering interest rates, which gradually fed into lower debt service costs, reducing the drag on demand.

The dynamics of adjustment to deviations of leverage and the debt service burden from their long-run values embedded in this simple model do a surprisingly good job of matching the evolution of economic activity in the United States during the Great Recession and after.② Even when the model is estimated only up to the fourth

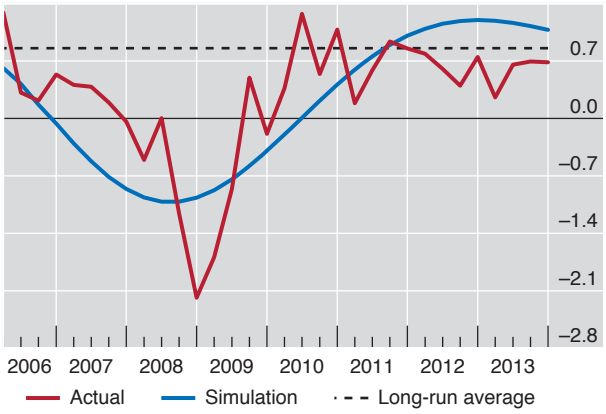
Leverage and the debt service burden are important drivers of expenditure

Graph III.A

Deviation of leverage and the debt service burden from long-run average[1]



Actual and model-implied expenditure growth in the United States[2]



The shaded areas denote recession periods as defined by NBER.

[1] Leverage: aggregate credit-to-asset price ratio relative to long-run values, measured by deviations of the credit-to-GDP ratio from the long-run relationship with real asset prices. Debt service burden: debt service payments to income relative to long-run values, measured by deviations of the credit-to-GDP ratio from the long-run relationship with nominal lending rates. [2] The simulated path is based on a cointegrated VAR model estimated on data from Q1 1985 to Q4 2004. This sample also provides the reference point for the long-run average of expenditure growth. The simulation starts from the leverage and debt service burden conditions in Q4 2005 and assumes that the other variables are initially at their average levels. It then traces out the adjustment path back to equilibrium without any further shocks.

Source: M Juselius and M Drehmann, "Leverage dynamics and the real burden of debt", *BIS Working Papers*, no 501, May 2015.

quarter of 2005, an "out of sample" forecast projects expenditure growth as falling to –1% per quarter at the end of 2009, a downturn of similar magnitude to the Great Recession. It also points to a drawn-out recession and recovery, with private sector expenditure growth returning to historical norms only in early 2012, not far from the actual outcome (Graph III.A, right-hand panel).

① See M Juselius and M Drehmann, "Leverage dynamics and the real burden of debt", *BIS Working Papers*, no 501, May 2015. The long-run relationships are estimated by a cointegrated vector auto-regression (VAR) model on US data (1985–2013) that includes the credit-to-GDP ratio, the average lending rate on the stock of credit, real residential property prices, real commercial property prices and real equity prices. The effects of leverage and the debt service burden on the economy are estimated by using an expanded VAR system that includes the growth in credit, private sector expenditure, other expenditure and asset prices, all in real terms, as well as the average lending rate on the stock of credit. ② Importantly, the model embeds the conduct of monetary policy revealed by the data up to that point.

economy's future evolution.[2] Strong debt-financed merger and acquisition activity and, in the United States, high levels of share buybacks also point to accommodative financial conditions for the corporate sector.[3] That said, firms in some countries, most notably smaller firms in the euro area, still find access to bank credit more restrictive than pre-crisis, although this constraint eased during the period under review.[4]

Credit boom-induced resource misallocations stifle productivity

More fundamentally, earlier financial booms may still weigh on long-term growth prospects through their damaging effect on productivity growth. Financial booms typically go hand in hand with significant resource misallocations (Box III.B). In particular, labour is diverted to booming sectors with relatively low future productivity growth. Preliminary estimates suggest that the misallocation during the credit boom between 2004 and 2007 reduced annual labour productivity growth by around 0.2 percentage points in the United States, 0.4 percentage points in Italy, around 0.7 percentage points in Spain and around 1 percentage point in Ireland compared with a counterfactual in which credit to GDP grew at its 1994–2004 country-specific average (Graph III.3, left-hand panel).

The impact of these misallocations became even larger in subsequent years, once the boom turned to bust. Similar estimates suggest that productivity growth in 2008–13 would have been approximately 1.8 percentage points higher in Ireland, 1.2 percentage points higher in Spain, 0.5 percentage points higher in France and 0.4 percentage points higher in the United States, had the pre-crisis credit-to-GDP ratio grown at its 1994–2004 rate (Graph III.3, right-hand panel). Thus, the fallout from credit booms may well have exacerbated the trend decline in productivity growth in advanced economies (see the *84th Annual Report*). By the same token, lower productivity growth in recent years need not be permanent.[5]

2 See R Banerjee, J Kearns and M Lombardi, "(Why) Is investment weak?", *BIS Quarterly Review*, March 2015, pp 67–82.

3 See A van Rixtel and A Villegas, "Equity issuance and share buybacks", *BIS Quarterly Review*, March 2015, pp 28–29.

4 See ECB, "Survey on the access to finance of enterprises in the euro area, October 2014 to March 2015", June 2015.

5 For a discussion of possible explanations of the low growth in advanced economies in recent years, see C Teulings and R Baldwin (eds), *Secular stagnation: facts, causes, and cures*, a VoxEU.org eBook, CEPR Press, 2014, and references therein.

Resource misallocations from credit booms hold back productivity growth

Annualised average growth rates — Graph III.3

DK = Denmark; ES = Spain; FR = France; GB = United Kingdom; IE = Ireland; IT = Italy; SE = Sweden; US = United States

[1] Loss in annual labour productivity growth relative to a counterfactual in which credit grew at the 1994–2004 country-specific average during 2004–07; in percentage points. [2] In per cent.

Sources: EU, KLEMS; OECD, STAN; GGDC 10-sector database; BIS calculations.

High public debt reduces growth, and ageing will make this worse

Another drag on long-term growth in most advanced economies is the level of public debt.[6] Already generally high pre-crisis, this has ballooned since 2007. The average ratio of gross public debt to GDP is expected to reach 120% in the advanced economies at the end of 2015, well above the pre-crisis average of 75% (Annex Table A3). Some countries have much higher debt ratios, for instance Japan (234%), Greece (180%) and Italy (149%). While most countries have taken steps to strengthen fiscal positions, with fiscal balances forecast to improve by around 1.6% of GDP in 2015 compared with 2012–14, this has not yet set them on a sustainable long-term path.

With much higher public debt compounded by demographic pressures, governments now have little fiscal room for manoeuvre. To illustrate, Graph III.4 (left-hand panel) presents simulations of debt-to-GDP ratios that extrapolate age-related expenditure by applying current entitlements to population projections.[7] Age-related spending will eventually put debt on an upward path. The simulations show that, under current plans, debt will initially decline in Germany and the United Kingdom and stabilise in the United States, but age-related spending will eventually reverse the trend – even at current, extraordinarily low effective interest rates. In Japan, the ratio will continue to rise, despite the modest expected increase in age-related spending. The expected debt service burden can act as a tax on private investment and labour. The result is lower investment, lower growth and, for a given tax rate, lower tax revenues.

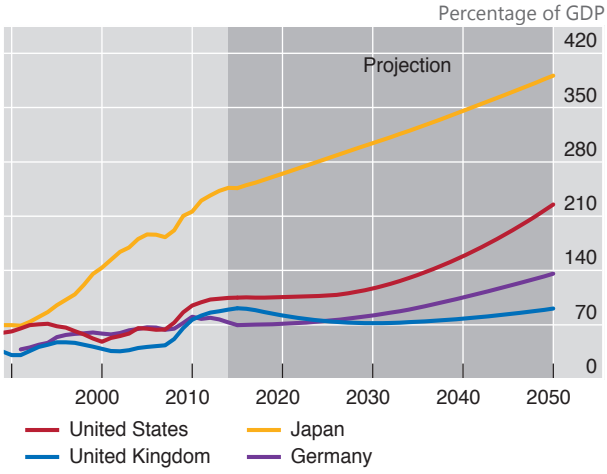
6 See S Cecchetti, M Mohanty and F Zampolli, "The real effects of debt", in Federal Reserve Board of Kansas City, *Economic Symposium 2011: achieving maximum long-run growth*, 2011, pp 145–96.

7 Based on the current forecasts for 2015 debt and assuming that the primary balance evolves in line with the national authorities' latest projections up to the last calendar year for which they are available. For subsequent years, the primary balance net of age-related spending is assumed to remain constant as a share of GDP.

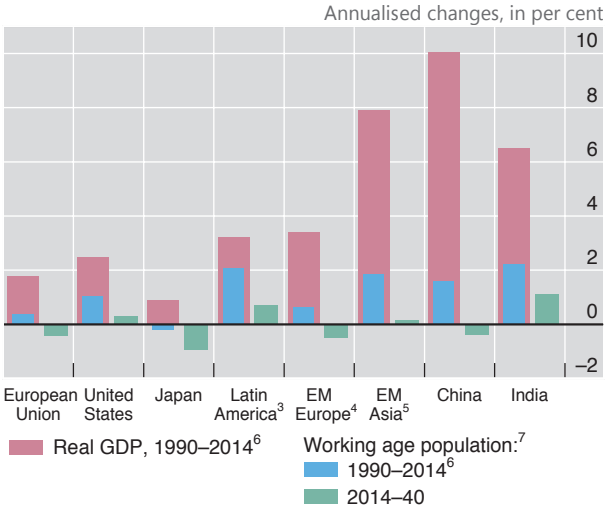
Ageing will weigh on public debt and growth

Graph III.4

General government debt projections[1]



Working age population contribution to GDP growth[2]



[1] Nominal debt values; incorporates projected increases in age-related spending. Effective interest rates on average borrowing costs are assumed to remain at their projected 2015 level between 2016 and 2050. [2] Weighted averages based on 2014 GDP and PPP exchange rates. [3] Argentina, Brazil, Chile, Colombia, Mexico and Peru. [4] Emerging Europe: Bosnia and Herzegovina, Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Macedonia (FYR), Poland, Romania, Russia, Serbia, Slovakia, Slovenia, Turkey and Ukraine. [5] Emerging Asia: Bangladesh, China, Hong Kong SAR, India, Indonesia, Korea, Malaysia, Myanmar, Pakistan, the Philippines, Singapore, Thailand and Vietnam. [6] For emerging Europe, 1995–2014 (for Serbia, 1997–2014). [7] Aged 20 to 64 years.

Sources: European Commission; IMF; Japanese Cabinet Office; OECD; UK Office for Budget Responsibility; United Nations; US Congressional Budget Office; BIS calculations.

Ageing is not just an issue for advanced economies, however. In an increasing number of EMEs, ageing populations will weigh on growth and public finances. Between 1990 and 2014, the rapidly expanding working age population accounted for around one third of GDP growth in the United States and European Union, and for significantly more in Latin America (Graph III.4, right-hand panel). By contrast, between 2014 and 2040 its projected decline will lower GDP growth every year, by around 1 percentage point in Japan and around 0.5 percentage points in the European Union, emerging Europe and China.

Sustaining economic growth in the face of population ageing poses formidable challenges for policymakers. A wide range of measures can mitigate the ageing-related decline in the workforce. Labour participation, especially in older age categories and among women, can still increase. Given that jobs now tend to be less physically demanding, there is room for longer careers. In addition, structural reforms that directly address the decline in trend productivity growth, ranging from lighter regulation to better education, could enhance the quality, and hence productivity, of the labour force (see the *83rd Annual Report*, Chapter III).

How strong are EMEs?

On the surface, the current configuration of credit booms, downward growth revisions and tighter dollar funding conditions looks similar to that which preceded previous episodes of serious financial stress in EMEs. However, a proper assessment of potential vulnerabilities should also take into account the important changes that have taken place in EMEs in recent years, strengthening their resilience.

While past EME financial crises were quite diverse, they shared some common elements.[8] First, they followed periods of upbeat investor sentiment that turned into gloom when a change in external conditions exposed weaknesses in underlying growth models. Second, a combination of loose financial conditions in advanced economies and insufficient exchange rate flexibility had contributed to overly accommodative domestic monetary and financial conditions and real exchange rate appreciations. This in turn had helped stoke asset price booms and a surge in credit, much of it short-term and denominated in foreign currency. Third, the interaction of disappointing growth and fragile debt structures turned what might have been a cyclical slowdown into a financial crisis, with serious economic and social costs. Exchange rates came under huge pressure. When countries devalued, high foreign currency debt magnified the burden on borrowers. At the same time, short debt maturities forced countries into large and immediate adjustments to meet debt service obligations. Questions about the private and government sectors' ability to honour their debts paralysed capital markets and economic activity. Finally, crises triggered severe contagion to other EMEs.

How does the current situation compare with that prevailing before previous episodes of stress? Developments in the real economy and financial vulnerabilities more specifically are considered in turn.

Disappointment risk

EMEs have experienced one of the longest high-growth spells on record. Since 2002, output has expanded by an average of over 6% per annum (Graph III.5, left-hand panel). The rate was close to 10% for China, around 6% for emerging Asia excluding China, and 3.5% in Latin America and central and eastern Europe. The Great Recession interrupted the growth spurt only briefly, with the notable exception of some central and eastern European countries. Growth fell to 3% in 2009 but bounced back to 9% in 2010. Since then, however, growth has declined gradually, albeit with significant cross-country variation.

Some moderation from these very high rates is probably unavoidable. But a slowdown could cast doubt on EMEs' underlying economic strength for at least three reasons. First, high commodity prices or strong capital inflows may have led to overly optimistic estimates of potential output. Second, the resource misallocations that can arise during financial booms could have weakened productivity. Third, the heavy debt service burdens from credit booms can weigh on medium-term growth.

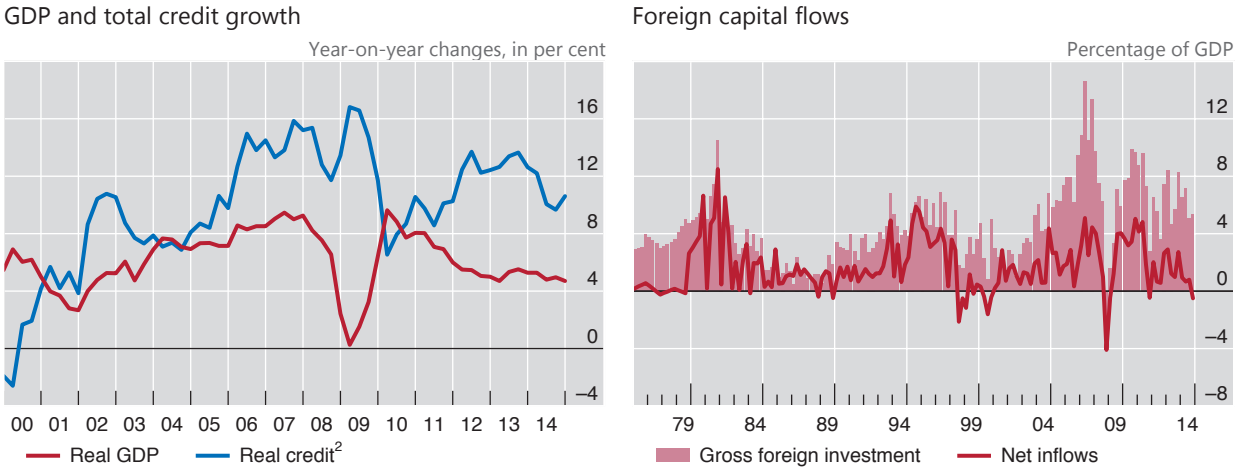
Disappointing growth was key in both the Latin American debt crisis of 1982 and the Asian financial crisis of 1997–98. Both followed a strong growth spell that came to a halt earlier than many had expected. In Mexico and Chile, as well as in most other Latin American countries, growth had relied heavily on commodity production and ran out of steam once the terms of trade dropped and interest rates rose rapidly in the early 1980s. In Asia, growth had been heavily geared towards manufactured goods exports and real estate. To some extent, the boom faltered when deteriorating terms of trade exposed the low profitability of much of the investment.

Then, as now, rapid growth coincided with financial booms, fuelled by large capital inflows and accommodative monetary policy both domestically and abroad (see also Chapter V). The past 10 years have seen the largest gross foreign

[8] See C Borio and P Lowe, "Assessing the risk of banking crises", *BIS Quarterly Review*, December 2002, pp 43–54; and P-O Gourinchas and M Obstfeld, "Stories of the twentieth century for the twenty-first", *American Economic Journal: Macroeconomics*, January 2012, pp 226–65.

GDP, credit and capital inflows in EMEs[1]

Graph III.5



[1] Aggregates are weighted averages based on GDP and PPP exchange rates of Argentina, Brazil, Chile, China, Colombia, the Czech Republic, Hong Kong SAR, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Peru, the Philippines, Poland, Russia, Saudi Arabia, Singapore, South Africa, Thailand and Turkey. [2] Total credit to the private non-financial sector deflated by the GDP deflator.

Sources: IMF, *Balance of Payments Statistics, International Financial Statistics* and *World Economic Outlook;* Datastream; Institute of International Finance; national data; BIS calculations.

investment as a percentage of the recipient economy's GDP in over a century, higher than those before the 1982 debt crisis or the Asian financial crisis (Graph III.5, right-hand panel). These inflows have fuelled domestic credit and asset price booms (Graph III.5, left-hand panel). Since 2004, real credit has grown by around 12% per year and real property prices have increased by around 40% on average.

Rising commodity prices and domestic financial booms have undoubtedly boosted output, but it would be unwise to treat these effects as permanent. Higher interest rates in the advanced economies, in particular in the United States, could quickly feed into higher domestic rates in EMEs and tighter domestic financial conditions, for example by reducing investors' incentives to reach for yield (see Chapter V for a discussion of international policy spillovers). And the oil price collapse has shown how quickly conditions in commodity markets can change.

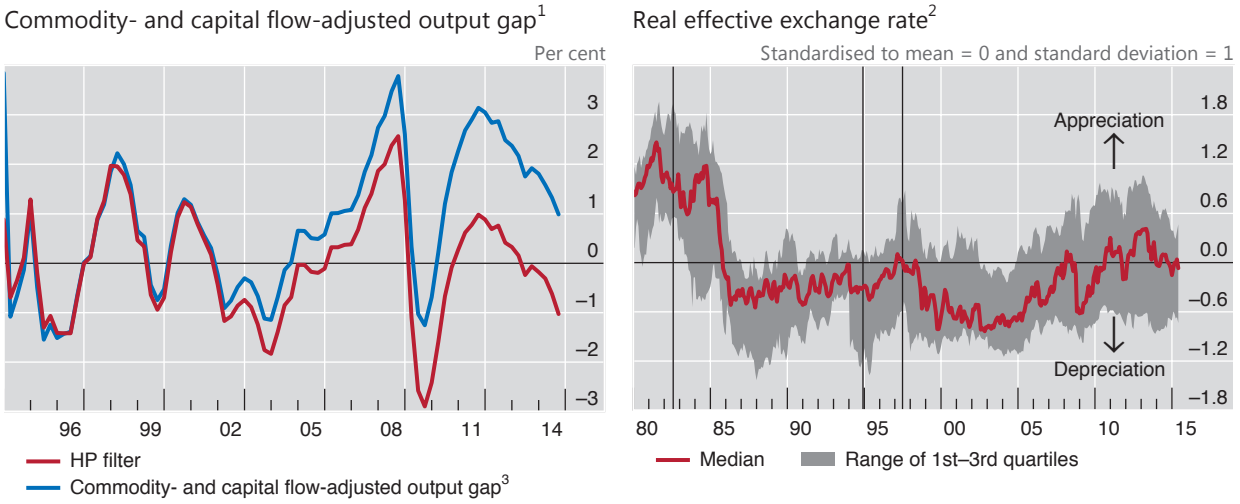
Estimates of the difference between actual and potential output ("output gaps") that correct for the cyclical effect of higher commodity prices and capital flows illustrate this point. They indicate that traditional measures could have overestimated potential output by around 2% on average across Brazil, Chile, Colombia, Mexico and Peru since 2010 (Graph III.6, left-hand panel) Therefore, reversals in these factors could well result in disappointing growth outcomes.

The financial booms of the last 10–15 years could also weigh on growth in the medium term. Historically, credit booms and real exchange rate appreciation in EMEs have coincided with resource shifts from the tradable to non-tradable sectors. For instance, during the late-1970s boom the non-commodity tradable sector grew only half as fast as GDP in Mexico and Chile. When the commodity boom ended, the non-commodity tradable sector was small and hence unable to absorb the resources shed by the contracting sectors. Such resource misallocations can substantially weaken productivity growth and require painful adjustment.

Real trade-weighted exchange rates also appreciated visibly during the recent boom, although with significant variation across countries (Graph III.6, right-hand panel). Between early 2009 and mid-2013, the median real effective exchange rate relative to historical averages in EMEs increased to its highest level in three decades.

Commodity prices and capital inflows overstate potential output and push up real exchange rates

Graph III.6



The black vertical lines in the right-hand panel indicate the beginning of a crisis: August 1982 (Mexican debt moratorium), December 1994 (Mexican devaluation) and July 1997 (floating of the Thai baht).

[1] Aggregates are weighted averages based on GDP and PPP exchange rates of Brazil, Chile, Colombia, Mexico and Peru. For Peru, data up to Q4 2013. [2] Country sample includes Argentina, Brazil, Chile, China, Colombia, the Czech Republic, Hong Kong SAR, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Peru, the Philippines, Poland, Russia, Saudi Arabia, Singapore, South Africa, Thailand and Turkey. [3] Computed according to the methodology of C Borio, P Disyatat and M Juselius, "A parsimonious approach to incorporating economic information in measures of potential output", *BIS Working Papers*, no 442, February 2014. The dynamic output gap equation is augmented with net inflows and country-specific commodity prices.

Sources: IMF, *Balance of Payments Statistics, International Financial Statistics* and *World Economic Outlook*; UN Comtrade database; Datastream; national data; BIS calculations.

However, it has since fallen to a level close to its long-term average. Whether this indicates that a correction has already happened or heralds further exchange rate shifts is not clear.

Financial vulnerabilities

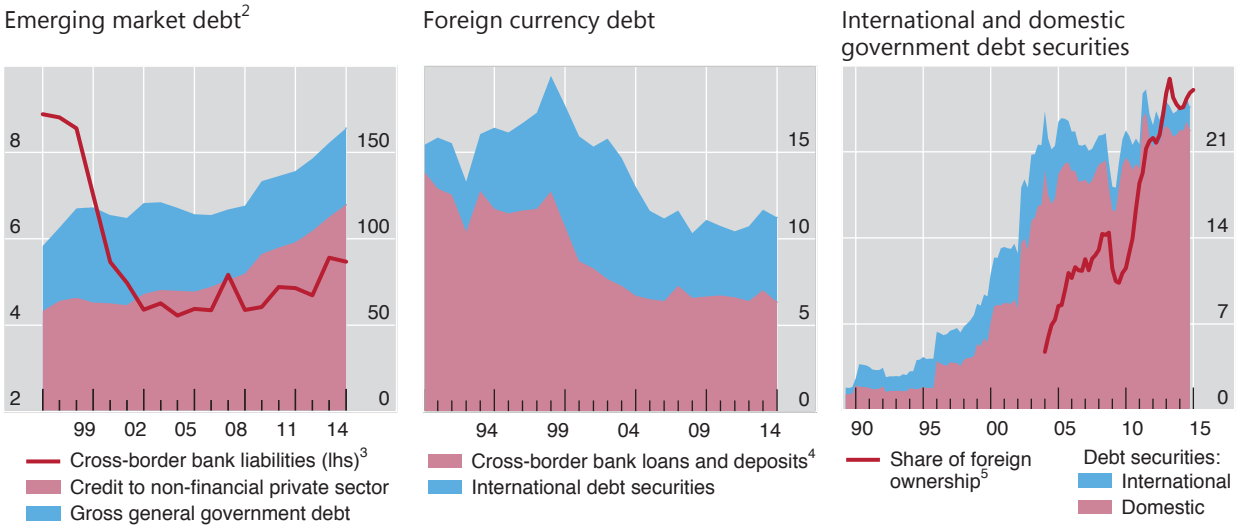
Without the amplification through financial channels, the underlying weaknesses in EMEs in Latin America in the early 1980s or Asia in the 1990s would not have resulted in severe crises. Large debts and fragile financial structures made them vulnerable to external and internal shocks. When growth slowed and global financial conditions tightened, it became increasingly difficult to refinance this debt, often exposing vulnerabilities in domestic banking sectors.

The short maturity and currency denomination of debt magnified these problems. When the countries eventually devalued, soaring debt burdens in domestic currency terms challenged the ability of the private and/or government sectors to honour their debts. The need to repay external lenders in foreign currency triggered balance of payments crises. In addition, tighter external financing conditions and a plunging exchange rate generated a domestic credit crunch, which also affected sectors without any currency mismatches.

Today, high debt has raised the vulnerability of EMEs. The combined debt of the government and non-financial private sectors is around 50% higher in relation to GDP than at the time of the Asian financial crisis in 1997 (Graph III.7, left-hand panel). Government debt has fluctuated around 45% of GDP since the mid-1990s, whereas credit to the private non-financial sector increased from around 60% of

Emerging market debt[1]

Amounts outstanding by residence, as a percentage of GDP — Graph III.7



[1] Aggregates are weighted averages based on GDP and PPP exchange rates of Argentina, Brazil, Chile, China, Colombia, the Czech Republic, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Peru, the Philippines, Poland, Russia, Saudi Arabia, South Africa, Thailand and Turkey. [2] Countries listed in footnote 1 excluding Hungary, Saudi Arabia and Turkey. [3] Cross-border bank loans and deposits plus international debt securities issued by banks. [4] Cross-border bank loans and deposits to bank and non-bank sectors denominated in euros, Japanese yen, Swiss francs, pounds sterling and US dollars. Prior to Q4 1995, cross-border bank claims denominated in the listed foreign currencies. [5] Simple averages of foreign investors' share in the local government debt market for the countries listed in footnote 1 excluding Argentina, Chile, China, the Philippines and Saudi Arabia.

Sources: IMF, *International Financial Statistics* and *World Economic Outlook*; www.carmenreinhart.com/data; Datastream; Institute of International Finance; national data; BIS locational banking statistics by residence and debt securities statistics by residence; BIS estimates.

GDP in 1997 to around 120% in 2014. The role of EME banks' cross-border funding in this boom has been limited, declining from around 9% of GDP before the Asian financial crisis to around 5% in 2014.

Early warning indicators of banking stress point to risks arising from strong credit growth (Annex Table A4). Credit gaps – the deviation of private sector credit from its long-term trend – are well above 10% in countries as diverse as Brazil, China, Indonesia, Singapore and Thailand. In the past, two thirds of all readings above this threshold were followed by serious banking strains in the subsequent three years.[9] True, despite rapid credit growth, low interest rates have kept debt service ratios around their long-term level in most countries, albeit with some notable exceptions. Households and firms in Brazil, China and Turkey spend significantly more on servicing their debt than in the past. But, more generally, an increase in interest rates would push up debt service ratios in other countries as well, especially in Asia.

By contrast, the risks arising from foreign currency debt appear to be somewhat lower. On average, the ratio of foreign currency cross-border bank borrowing and international debt securities to GDP has decreased relative to 1997 (Graph III.7, centre panel). This has been driven by a decline in the ratio of cross-border bank loans, from over 10% of GDP to around 6% in 2014. Excluding China, foreign currency debt is currently around 14% of GDP, compared with nearly 20% in 1997.

[9] See M Drehmann, C Borio and K Tsatsaronis, "Anchoring countercyclical capital buffers: the role of credit aggregates", *International Journal of Central Banking*, vol 7, no 4, December 2011, pp 189–240.

Financial booms and labour misallocation

Aggregate productivity growth can essentially reflect two broad factors: first, and most obviously, technical progress and more and better human and physical capital in the various industries; second, reallocations of capital and labour from poorly performing sectors to those that perform well. This box provides evidence that credit booms tend to undermine this second factor. During periods of strong credit growth, labour increasingly flows into sectors with low future productivity gains (typically sectors that are particularly credit-intensive even though they may not be very productive in the long run). This depresses productivity growth – and thus potential output – even long after credit has stopped growing.

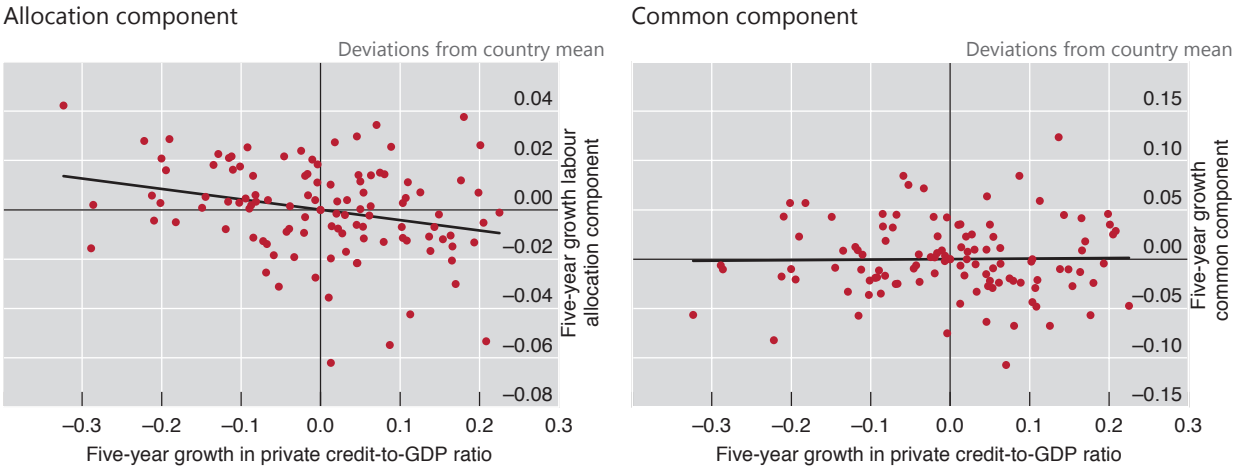
Aggregate productivity growth can be decomposed into a common component and an allocation component. The common component measures economy-wide productivity growth assuming a fixed sectoral composition, ie no labour flows across sectors. The allocation component measures the contribution of labour reallocation across sectors, ie whether labour flows into sectors with higher productivity growth.① Here, we compute this decomposition for a panel of 22 economies since 1979 and over non-overlapping five-year periods. We then analyse how each of these components relates to growth in the ratio of private credit to GDP.

Empirical estimates suggest that financial booms, as reflected in rapid growth in the private credit-to-GDP ratio, coincide with a lower allocation component. This means that labour flows into sectors with lower productivity growth (Graph III.B.1, left-hand panel). By contrast, the common component appears to be unrelated to private credit (Graph III.B.1, right-hand panel). Credit expansions may still boost output growth through higher demand and investment, but not productivity growth. To gain a sense of the economic significance, consider the US experience. Between 2004 and 2007, labour productivity grew by 1.2% per year, but labour reallocations made a negative 0.3 percentage point contribution. Over the same period, private credit to GDP grew by 4.5% per year. Taking the estimates at face value, if credit to GDP had grown by only 1.5%, the drag on productivity growth would have been eliminated.

Labour reallocations can also affect the subsequent evolution of aggregate productivity, particularly following financial crises. To illustrate this, we focus on turning points in GDP to working population and explore if the path of aggregate productivity following the turning point depends on labour reallocations prior to the turning point. Two conclusions emerge. First, past labour reallocations towards high productivity gain sectors contribute positively to subsequent aggregate productivity (solid lines vs dashed lines in Graph III.B.2). Second, labour reallocations have a

Credit booms lead to labour misallocation[1]

Graph III.B.1

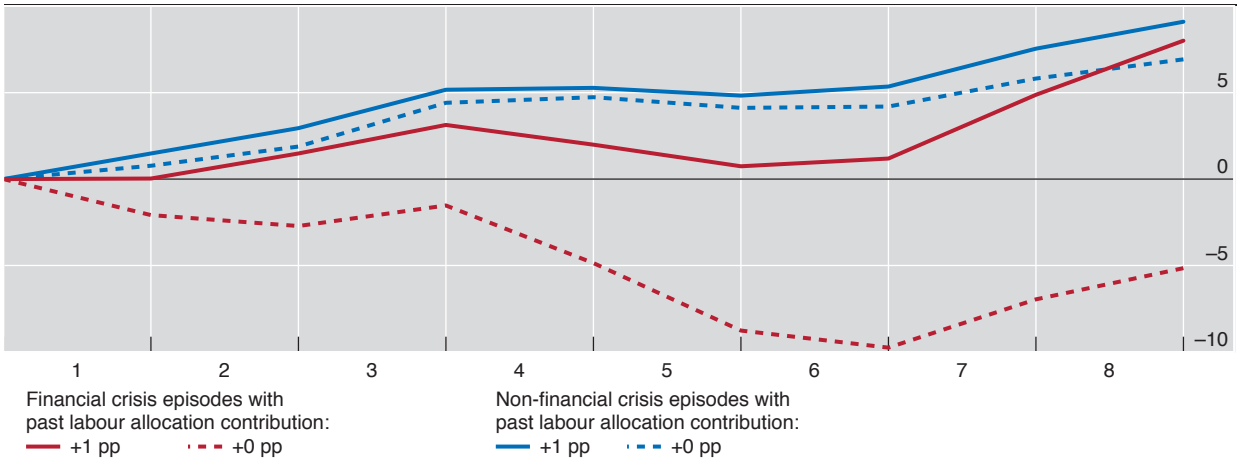


[1] The left-hand panel plots the growth rate in private credit to GDP against the allocation component of labour productivity growth, both variables being taken as deviations from country and period means. The right-hand panel plots the growth rate in private credit to GDP against the common component of labour productivity growth, both variables being taken as deviations of from country and period means. The sample includes 22 economies (Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Korea, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom and the United States) and six periods of five years (1979–84; 1984–89; 1989–94; 1994–99; 1999–2004; 2004–09).

Source: BIS calculations.

The effect of financial crises and labour reallocation on productivity[1]

Deviation from peak, in per cent — Graph III.B.2



[1] Simulations based on local projection regressions of the percentage deviation of labour productivity from the peak year. The independent variables include the allocation and the common components of productivity growth over the three-year period prior to the peak. Effects are shown separately for peaks associated with a financial crisis (red lines) and peaks not associated with a financial crisis (blue lines). Solid lines show the projection of labour productivity conditional on a positive allocation component contribution of 1 percentage point per year in the three years prior to the peak. Dashed lines are conditional on a zero contribution of the allocation component prior to the peak.

Source: BIS calculations.

much larger effect after a financial crisis hits the economy (solid red line vs dashed red line in Graph III.B.2). In this case, past misallocations generate a significant and long-lasting drag on aggregate productivity growth (a 10 percentage point cumulative shortfall after five years). In the US case, for instance, our estimates suggest that the labour reallocations over the period 2004–07, interacting with the following financial crisis, shaved US productivity growth by 0.45 percentage points every year between 2008 and 2013. Thus, financial booms can lead to stagnant productivity as a result of the interaction between resource misallocations and financial crises that they induce.

① For details, see C Borio, E Kharroubi, C Upper and F Zampolli, "Labour reallocation and productivity dynamics: financial causes, real consequences", mimeo, 2015.

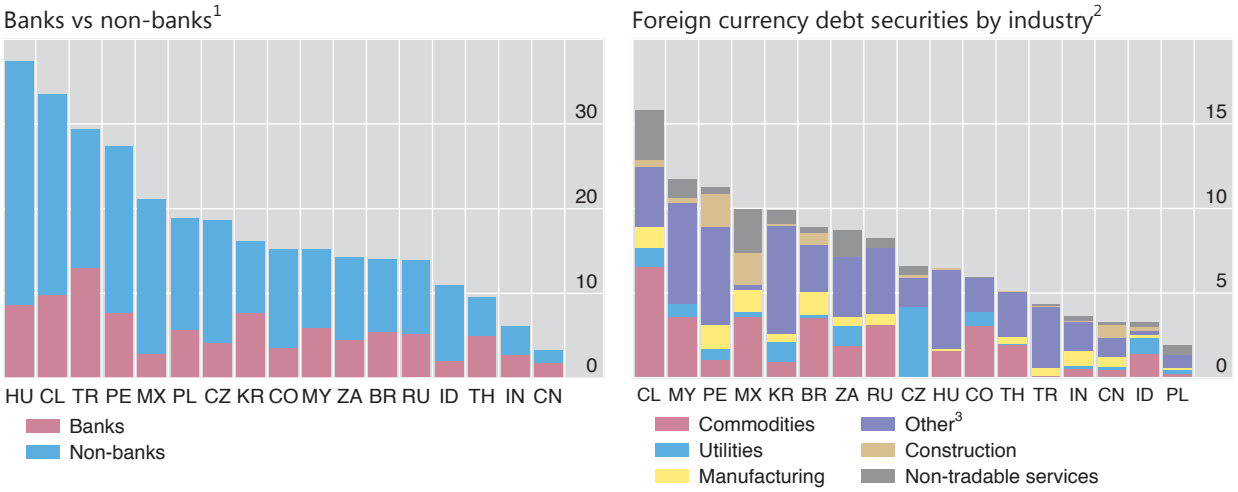
Similarly, government debt structures have become less fragile. Governments increasingly issue bonds in local markets (Graph III.7, right-hand panel). As a result, the share of international debt securities has decreased from around 40% of the total in 1997 to around 8% in 2014.

That said, this does not insulate economies from foreign influences. For one, local currency long-term interest rates in EMEs tend to co-move closely with those in the major reserve currencies (Box V.C in Chapter V). In fact, the share of domestic government debt held by foreign investors has surged from around 9% in 2005 to over 25% on average in EMEs. In Mexico, Indonesia, Poland and Peru, this share is over 35%. Large portfolio reallocations could lead to large swings in asset prices.

Moreover, risks from currency mismatch, mainly from corporate borrowing, remain in some countries despite the overall decline in EME foreign currency debt. Foreign currency debt in the form of debt securities and cross-border bank lending is in the region of 30% of GDP in Hungary, Chile and Turkey, with between a third and a quarter in banks (Graph III.8, left-hand panel), but is also relatively high in Peru, Mexico, Poland, the Czech Republic and Korea. It is unclear to what extent this

Foreign currency debt

Amounts outstanding, as a percentage of nominal GDP — Graph III.8



BR = Brazil; CL = Chile; CN = China; CO = Colombia; CZ = the Czech Republic; HU = Hungary; ID = Indonesia; IN = India; KR = Korea; MX = Mexico; MY = Malaysia; PE = Peru; PL = Poland; RU = Russia; TH = Thailand; TR = Turkey; ZA = South Africa.

[1] Cross-border bank loans and deposits (denominated in euros, Japanese yen, Swiss francs, pounds sterling and US dollars) by residence as of Q4 2014, plus foreign currency debt securities by residence as of end-March 2015. [2] By nationality of issuer, as of end-March 2015. [3] Finance, insurance, publishing and holding companies.

Sources: IMF, *World Economic Outlook*; Dealogic; BIS locational banking statistics by nationality and residence; BIS calculations.

gives rise to currency mismatches, as data on financial hedges are patchy. Much of the foreign currency debt securities issuance by EME non-financial corporations has been by firms producing tradable goods (Graph III.8, right-hand panel), which may have foreign currency revenues that provide a natural hedge for their foreign currency obligations.

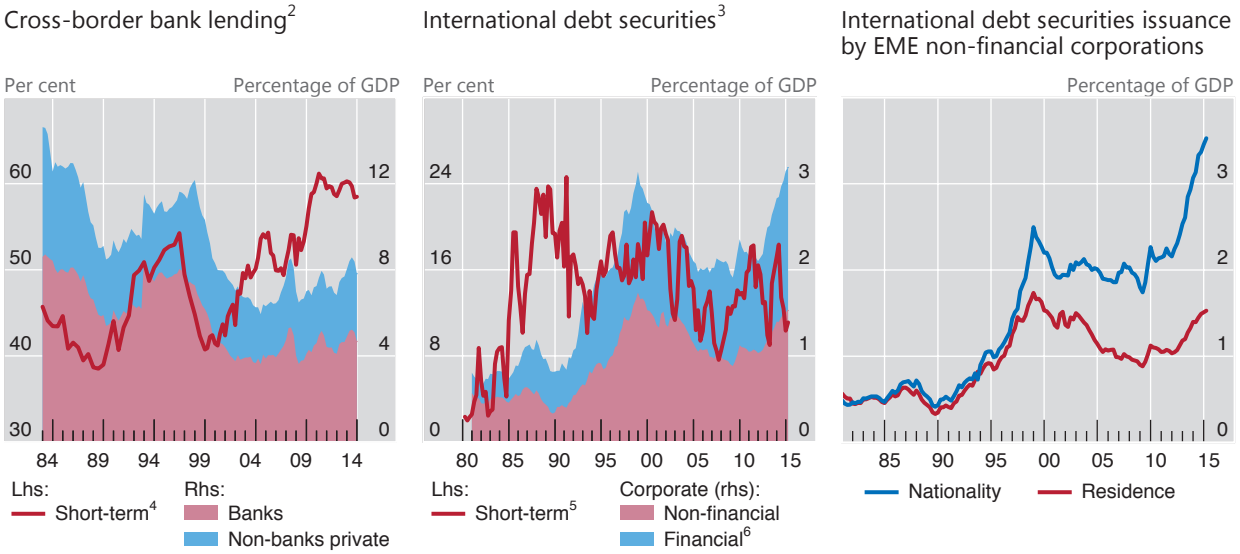
But natural hedges may not be that effective if export revenues drop when the currency of denomination strengthens, as is often the case for commodity revenues. And financial hedges may also be vulnerable at times of very large exchange rate changes. For instance, many EME corporates suffered heavy foreign exchange losses in the aftermath of the Lehman bankruptcy in 2008, partly because of the popularity of contracts that left them exposed to big currency moves.[10]

Finally, the shift of private borrowing from banks to markets has uncertain consequences. Banks still account for the bulk of domestic lending, but their share in cross-border lending has fallen significantly since the Great Financial Crisis (Graph III.9, left-hand panel). In contrast, amounts outstanding of private sector debt securities from EMEs increased to over 3% by early 2015 (Graph III.9, centre panel), although with great variation across countries. In addition, non-financial firms issued debt securities worth 2% of GDP through their offshore affiliates (Graph III.9, right-hand panel). On the one hand, this shift has reduced rollover risk. The share of debt securities with a remaining maturity of less than one year is now around 10%, compared with 60% for cross-border bank debt. The share of short-term bank debt is particularly high in China. On the other hand, the behaviour of footloose investors may amplify price dynamics under stress (see below).

[10] See M Chui, I Fender and V Sushko, "Risks related to EME corporate balance sheets: the role of leverage and currency mismatch", *BIS Quarterly Review*, September 2014, pp 35–47.

Private sector debt in EMEs[1]

Amounts outstanding — Graph III.9



[1] Aggregates are weighted averages based on GDP and PPP exchange rates of Argentina, Brazil, Chile, China, Colombia, the Czech Republic, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Peru, the Philippines, Poland, Russia, Saudi Arabia, South Africa, Thailand and Turkey. [2] Cross-border bank loans and deposits by residence; prior to Q4 1995, cross-border bank claims. [3] By residence. [4] Short-term (with a remaining maturity of up to one year) lending as a share of total international claims. [5] Securities with a remaining maturity of up to one year as a share of the sum of non-financial and financial corporate debt securities (excluding central banks). [6] Excluding central banks.

Sources: IMF, *World Economic Outlook*; BIS consolidated banking statistics, locational banking statistics by residence and international debt securities statistics; BIS calculations.

Lines of defence

Since the late 1990s, EMEs have worked hard to strengthen various lines of defence to limit the risk of financial stress and manage it more effectively if it arises.

A first possible line of defence against external crises is larger private sector asset holdings abroad. Foreign assets held by the private sector in EMEs increased from around 30% of GDP in the mid-1990s to around 45% by 2014 (Graph III.10, left-hand panel). However, liquidating private sector external assets in times of stress may be difficult in practice. First, assets and liabilities are usually held by different people. Second, assets may be illiquid. Finally, foreign asset holdings may be adversely affected by the very same market conditions that trigger stress.

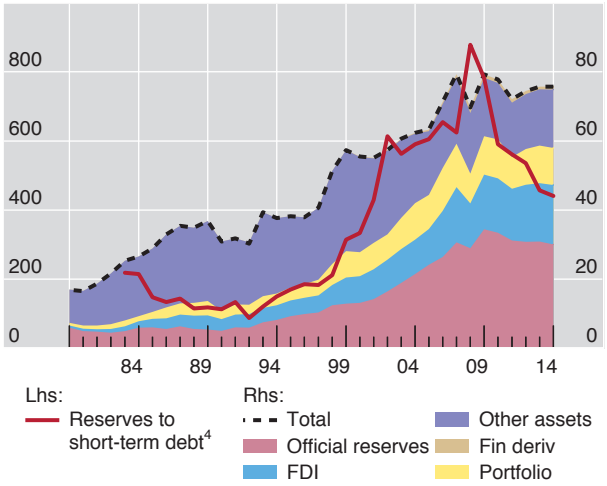
Perhaps the most visible line of defence is official foreign exchange reserves, which have risen massively. Official reserves in EMEs increased from around 10% of GDP in the mid-1990s to around 30% in 2014, although they have declined slightly more recently. To be sure, reserve holdings vary greatly across countries. For example, Saudi Arabia currently has around 100% of GDP in official reserves; China, Peru, Malaysia, Thailand and Hungary between 30 and 45%; Chile, Mexico, India, Turkey and South Africa between 10 and 20%; and Argentina around 5%. Still, reserve holdings generally exceed short-term liabilities. In addition, they have been complemented on an ad hoc basis by central bank foreign exchange swap lines and by other facilities, such as the IMF's Flexible Credit Line.

While such larger war chests no doubt provide considerably more protection than in the past, there are still questions about how effectively they can be deployed. In particular, it can be challenging to channel official reserves to the right

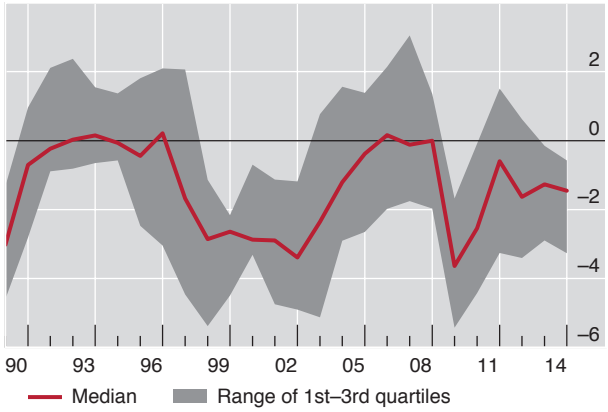
Lines of defence[1]

As a percentage of GDP — Graph III.10

Gross international assets[2]



General government overall balance[3]



[1] Country sample includes Argentina, Brazil, Chile, China, Colombia, the Czech Republic, Hong Kong SAR, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Peru, the Philippines, Poland, Russia, Saudi Arabia, Singapore, South Africa, Thailand and Turkey. [2] Aggregates are weighted averages based on GDP and PPP exchange rates of countries listed in footnote 1; excluding Argentina, Malaysia and South Africa for 2014. [3] General government net lending/borrowing-to-GDP ratio. [4] Official reserves as a share of debt with a remaining maturity of up to one year. Debt is defined as the sum of international debt securities by residence (all sectors) and consolidated international claims on an immediate counterparty basis (all sectors).

Sources: IMF, *International Financial Statistics* and *World Economic Outlook*; updated and extended version of dataset constructed by P Lane and G M Milesi-Ferretti in "The external wealth of nations mark II: revised and extended estimates of foreign assets and liabilities, 1970–2004", *Journal of International Economics* 73, November 2007, pp 223–50; BIS consolidated banking statistics and international debt securities statistics; BIS calculations.

places to plug liquidity gaps in the private sector. Moreover, authorities may be reluctant to intervene for a variety of reasons, including a desire to avoid setting the wrong incentives or being seen to run out of ammunition too quickly.

More fundamentally, greater macroeconomic flexibility from improvements in policy frameworks should have increased EMEs' resilience. On the monetary side, the shift from policy frameworks centred on fixed exchange rates to inflation targeting should give additional scope to better manage credit booms and associated vulnerabilities. More flexible exchange rates also increase a country's ability to adjust to changes in the economic environment. Over the past year some EMEs, especially in Latin America, have experienced very large exchange rate depreciations without this triggering a crisis.

Even so, these changes have not fully insulated countries from external developments. As discussed in Chapter V, exchange rate flexibility has only partially shielded EMEs from monetary policy spillovers in advanced economies. And the recent experiences of Brazil and Turkey, both of which raised policy rates at a time of slowing activity, illustrate the constraints on domestic monetary policy in the face of large capital outflows related to the tightening of monetary policy in advanced economies.

The capacity of fiscal policy to absorb shocks appears limited. Fiscal deficits are larger than in 2007 (Graph III.10, right-hand panel). Moreover, the median general government financial deficit of 1.5% of GDP in 2014 masks significant differences: Brazil and India have budget deficits of more than 6% of GDP. And financial booms are likely to have flattered public accounts. As discussed in more detail in last year's

Annual Report, this reflects an overestimation of potential output and growth, the revenue-rich nature of financial booms and the build-up of contingent liabilities that may need to be addressed in the bust. The experience of countries such as Spain and Ireland, whose fiscal positions looked deceptively strong ahead of the Great Financial Crisis, is a clear case in point.

Financial and real contagion

Today, EMEs are much more integrated into the global economy and financial system than before. Therefore, any serious financial strains, were they to materialise, would have larger repercussions globally than in the past.

Past financial crises in EMEs triggered widespread contagion. First, global investors withdrew from countries that shared some of the characteristics of the countries at its epicentre. For example, in 1997 the spectre of the crisis spread from Thailand to Indonesia, and then to Malaysia, the Philippines and Korea. Second, common lenders transmitted strains. For example, in the Latin American debt crisis contagion spread through the US banking system, which was heavily exposed to the region.

It is not yet clear to what extent changes in financial structure have changed the potential for contagion. The growing presence of regional banking in Asia today could have increased the likelihood of direct contagion in the region. Between 2007 and 2014, the share of banks in Asia and the Pacific in international claims on emerging Asia increased from around a third to nearly three fifths, while that of euro area banks declined to 15%, less than half its 2007 level. By contrast, there is some evidence from the "taper tantrum" that global investors in emerging markets have become more discriminating (see the *84th Annual Report*, pp 29–30). This should reduce contagion from perceived – rather than actual – similarities. However, investors might differentiate less during a broader retrenchment.

One key change is the increased importance of actions by asset managers and investors in EME bond funds. The shift from bank lending to market finance and the associated longer maturities, along with the higher share of domestic currency debt, mean that some risk has moved from debtors to creditors. There is evidence that both asset managers and the ultimate owners of the assets tend to behave in a correlated manner, buying when prices go up and selling when they fall, limiting the benefits of a more diversified investor base (Chapter VI).[11] Collective action problems with diverse investors may also make it harder for policymakers to stem large withdrawals than in the case of withdrawals by international banks.

More importantly, contagion need not be confined to other EMEs: the 1982 Latin American debt crisis led to significant problems in the US banking system. Today, borrowers from EMEs account for 20% of the foreign exposures of BIS reporting banks (on a consolidated, ultimate risk basis) and for 14% of all outstanding debt securities. Any losses on these exposures are bound to have important consequences for at least some large creditors. Similarly, EMEs make up 20% of the market capitalisation of the MSCI Global, a broad equity index.

Furthermore, the effects would not be limited to financial channels. EMEs have been the main drivers of global growth in recent years, quite unlike in previous periods. They account for approximately half of world GDP in PPP terms, compared with around one quarter at the time of the Latin American debt crisis, and a third before the Asian financial crisis in 1997. Their contribution to global growth has

[11] See K Miyajima and I Shim, "Asset managers in emerging market economies", *BIS Quarterly Review*, September 2014, pp 19–34.

increased from around 1 percentage point in the 1980s to over 2 points since the early 2000s. The collapse of global trade between 2008 and 2009 by more than 20% clearly illustrates how financial crises can affect real economic activity.

Taken together, there are a number of reasons to believe that EMEs are more resilient today than in the 1980s and 1990s: macroeconomic frameworks are sturdier; exchange rate flexibility has increased; financial system infrastructure is more robust and prudential regulation more stringent. The lines of defence are stronger, most visibly in the growth of foreign exchange reserves. And the development of local currency bond markets has reduced government overreliance on foreign currency debt.

Yet some other developments call for caution. Credit has grown very rapidly, often exceeding levels that have been followed by serious banking strains in the past. And a solid macroeconomic performance may not insulate EMEs from foreign shocks. Foreign currency debt levels are lower relative to GDP, but concentrated in the corporate sector, where currency mismatches are harder to measure. Mobilising reserves effectively to counter liquidity shortages in specific sectors or support domestic currencies may prove challenging. Finally, the shift from bank finance to foreign asset managers may have altered market dynamics in ways that are not well understood.

IV. Another year of monetary policy accommodation

Monetary policy continued to be exceptionally accommodative over the past year. Many authorities eased further or delayed tightening. Central bank balance sheets remained at unprecedentedly high levels; and they grew even larger in several jurisdictions where the ultra-low policy rate environment was reinforced with large purchases of domestic and foreign assets.

Monetary policies in the major advanced economies diverged, as the US economy strengthened relative to the euro area and Japan. But sharp declines in the prices of oil and other commodities and continued weakness in the growth of wages heightened concerns about the persistence of below-target inflation and at times even the dangers of deflation.

The differing cyclical positions of the major advanced economies and the associated exchange rate shifts complicated policy choices for other advanced economies as well as for emerging market economies. Inflation outturns were quite diverse: many central banks were combating low inflation while a smaller number faced the opposite problem. The deviation of inflation from expected levels and questions surrounding the supposed drivers of price changes underscored uncertainties about the inflation process. For some economies, the strong appreciation of their currencies against the euro and the yen reinforced growing disinflation pressures. The reduction in policy rates, in a few cases to negative levels, further raised financial vulnerabilities. The lower bound for policy rates, and financial stability considerations, limited the scope for further easing.

Another year of exceptionally expansionary monetary policy raises the question of whether existing policy frameworks are fit for their intended purpose. Historically high debt levels and signs of financial imbalances point to an increasing tension between price stability and financial stability. Against the backdrop of divergent monetary policies, the risk of competitive easing should not be underestimated (see also Chapter V).

This chapter first reviews the past year's developments in monetary policy. It then assesses what is known and what is not known about the inflation process and explores the degree to which monetary policy frameworks could be adjusted to more systematically incorporate financial stability considerations.

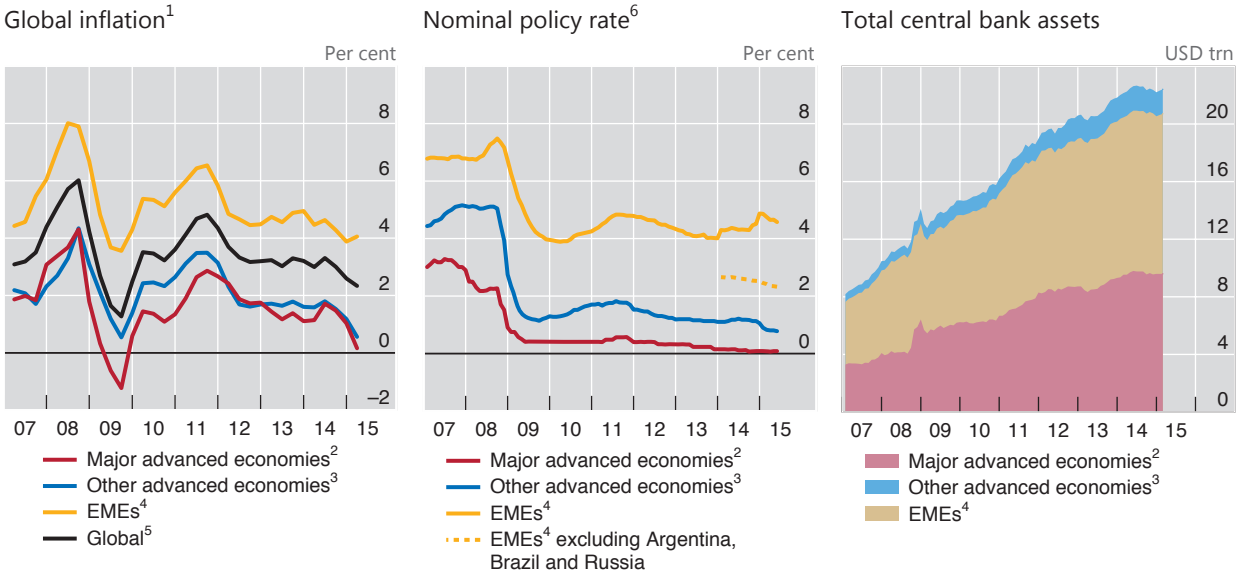
Recent monetary policy developments

Monetary policy remained exceptionally easy in most economies in the period under review. The sharp drop in oil prices, alongside smaller declines for other commodity prices, pushed down inflation (Graph IV.1, left-hand panel). Lower inflation and the slowdown in economic activity led most central banks to cut policy rates (Graph IV.1, centre panel). Central bank balance sheets in the aggregate continued to grow in domestic currency terms and were around record highs in US dollar terms despite the dollar's appreciation (Graph IV.1, right-hand panel). A small number of emerging market economies raised rates, some to fight sharp depreciation pressures on their currencies.

The divergence of policy trajectories in the major advanced economies was a prominent theme during the year. The Federal Reserve kept its policy rate

Monetary policy remains very accommodative amid disinflation

Graph IV.1



[1] Consumer price inflation. Aggregates based on rolling GDP and PPP exchange rates; year-on-year. [2] The euro area, Japan and the United States. [3] Australia, Canada, Denmark, New Zealand, Norway, Sweden, Switzerland and the United Kingdom. [4] Argentina, Brazil, Chile, China, Chinese Taipei, Colombia, the Czech Republic, Hong Kong SAR, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Peru, the Philippines, Poland, Russia, Saudi Arabia, Singapore, South Africa, Thailand and Turkey. [5] Countries listed in footnotes 2, 3 and 4. [6] Policy rate or the closest alternative; simple averages.

Sources: IMF, *International Financial Statistics* and *World Economic Outlook*; CEIC; Datastream; national data; BIS calculations.

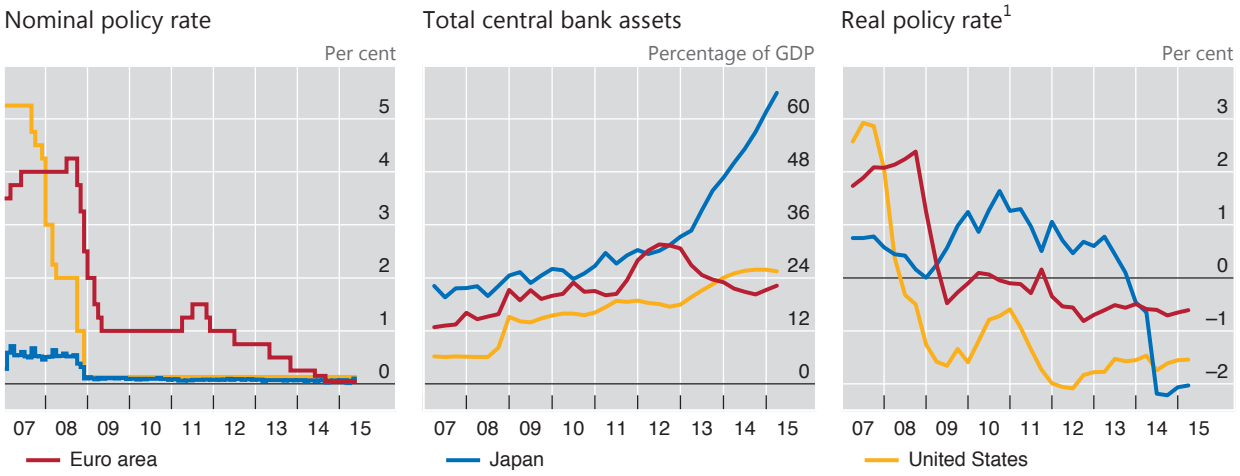
unchanged at 0–0.25% (Graph IV.2, left-hand panel) and concluded its two-year asset purchase programme in October (Graph IV.2, centre panel). The decision to end the programme after purchasing about $1.6 trillion of government bonds and mortgage-backed securities reflected a better outlook for the labour market and the economy more broadly. The Federal Reserve also indicated that it would be likely to start raising its policy rate before the end of 2015.

In contrast, the ECB eased policy further to address concerns about the risks of prolonged low inflation, including a downward drift in longer-term inflation expectations. In September 2014, the ECB cut the rate on the deposit facility further below zero (–0.2%). In early 2015, it launched a large-scale asset purchase programme. Aimed at acquiring a monthly average of €60 billion in public and private sector securities, the programme was slated to last at least until end-September 2016 and until inflation was consistent with achieving the ECB's inflation objective of less than, but close to, 2% over the medium term.

The Bank of Japan also sharply expanded its asset purchase programme, as the prospect of achieving its 2% inflation objective had become more challenging. It raised the target for the annual expansion of the money base under the quantitative and qualitative easing programme (QQE) by ¥10–20 trillion, to ¥80 trillion. It also shifted purchases to longer maturities to compress bond yields. As a result, its balance sheet grew to around 65% of GDP in early 2015, up from 35% at the programme's start in April 2013.

The extraordinary degree of monetary accommodation in the major advanced economies is highlighted by very low inflation-adjusted interest rates at short and long horizons. Real policy interest rates calculated using core inflation (headline consumer price inflation excluding food and energy) remained well below zero (Graph IV.2, right-hand panel). Long-term government bond yields were also below

Policy rates are low and central bank assets high in major advanced economies Graph IV.2



[1] Nominal policy rate less consumer price inflation excluding food and energy.

Sources: Datastream; national data; BIS calculations.

inflation in many economies. Forward curves for policy rates indicated that markets expected this highly unusual environment to persist for quite some time.

Central banks outside of the major advanced economies were left to factor these very accommodative, but increasingly divergent, monetary policies into their own policy decisions. The divergence raised the spectre of sharp shifts in exchange rates. At the same time, the drop in commodity prices lowered inflation pressures around the globe. Against this backdrop, most central banks eased policy (Graph IV.3, left-hand panel). As a result, policy rates generally continued to be well below historical norms and even negative in several economies (Graph IV.3, right-hand panel).

The reasons behind the policy decisions varied. Many central banks eased policy aggressively given concerns about very low inflation or deflation, or exchange rate developments. In particular, the central banks of Denmark, Sweden and Switzerland pushed down their policy rates well into negative territory. The negative rate in Denmark helped ease pressure on its exchange rate peg to the euro. The Swiss National Bank abandoned its exchange rate floor against the euro when its balance sheet approached 90% of GDP; the negative policy rate helped mitigate the impact of the appreciation pressures on the currency.

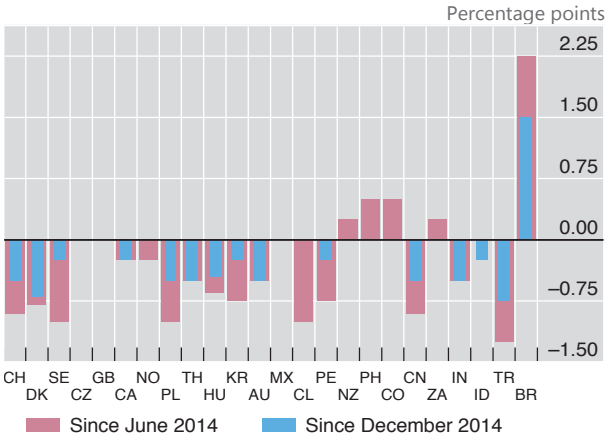
With inflation and its policy rate around zero, the Czech National Bank reiterated its commitment to an accommodative stance and to maintaining its exchange rate floor until the second half of 2016. The central banks in Hungary and Poland eased policy as they experienced deflation despite strong real economic activity. The Bank of Thailand reduced its policy rate as inflation turned negative, and the Bank of Korea cut its policy rate to a historical low as inflation fell towards zero.

Central banks in a number of commodity exporting economies also cut policy rates. Among them, the central banks in Australia, Canada and Norway eased as inflation declined along with commodity prices, even though core inflation remained close to target. They also faced the prospect of weaker economic activity as commodity-producing sectors were adversely affected, despite some offset from currency depreciation. The central banks of New Zealand and South Africa tightened policy in mid-2014 in response to higher inflation prospects; thereafter,

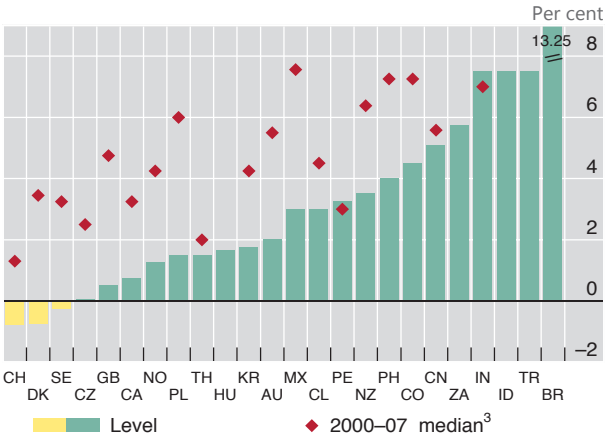
Most policy rates were cut from already low levels[1]

Graph IV.3

Change in policy rate[2]



Most policy rates are well below historical norms



AU = Australia; BR = Brazil; CA = Canada; CH = Switzerland; CL = Chile; CN = China; CO = Colombia; CZ = Czech Republic; DK = Denmark; GB = United Kingdom; HU = Hungary; ID = Indonesia; IN = India; KR = Korea; MX = Mexico; NO = Norway; NZ = New Zealand; PE = Peru; PH = Philippines; PL = Poland; SE = Sweden; TH = Thailand; TR = Turkey; ZA = South Africa.

[1] Nominal policy rate or the closest alternative as of end-May 2015. [2] Change in policy rate from date indicated to end-May 2015. [3] Median values not shown: for Brazil and Turkey, 17.5; for Hungary and South Africa, 9.5; for Indonesia, 11.4.

Sources: National data; BIS calculations.

they kept rates unchanged as inflation pressures eased and, in New Zealand, because of concerns about the implications of the strength of the exchange rate.

In contrast, commodity-exporting economies in Latin America faced inflation pressures (Graph IV.4, left-hand panel). In much of the region, inflation was above target in 2014 and was forecast to remain high. Even so, the central banks of Chile and Peru lowered rates in the second half of 2014 as the drop in metal and oil prices heralded weaker price pressures and slower growth. In Mexico, where inflation was running in the middle of its target range, rates were kept unchanged. The central bank of Colombia raised rates to address high inflation. In Brazil, rising inflation and concerns about the stability of capital flows caused the central bank to tighten policy significantly despite weak output.

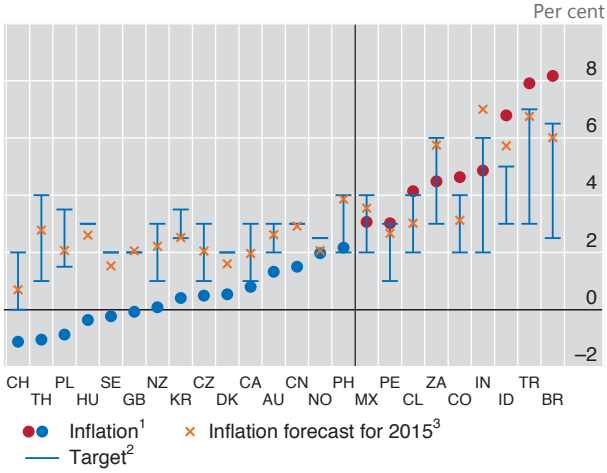
In China and India, the central banks eased, but policy rates were still close to recent historical norms. China's central bank cut interest rates and reduced required reserve ratios to counter a slowing pace of economic activity. The growth of monetary and credit aggregates had slowed modestly, in part as a result of tighter regulation of shadow banking. The easing in India came against the backdrop of a deceleration of inflation from a high single digit pace, strong economic growth, and an improved fiscal situation. The authorities in India also announced a new monetary policy framework agreement, with a 4% target for consumer price inflation from early 2016 onwards.

On balance, last year's monetary policy developments outside the major advanced economies appear to have been driven mainly by inflation and exchange rate developments (Graph IV.4, right-hand panel). Economies with inflation running well above target felt stronger currency depreciation pressures and had a tighter policy stance than would otherwise be implied by domestic inflation and output developments alone. The converse was true for those facing currency appreciation pressures.

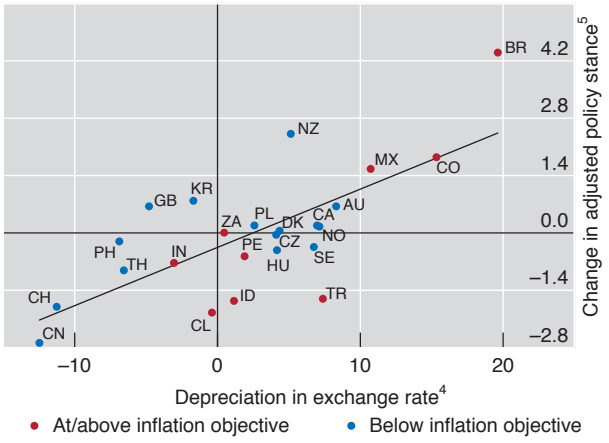
Finally, signs of financial imbalances (Chapter III) are presenting many of these economies with financial stability concerns. Since the Great Financial Crisis,

Policy stances have been influenced by inflation performance and exchange rates Graph IV.4

Inflation is below target for many, above for others



Exchange rate and policy changes are correlated



AU = Australia; BR = Brazil; CA = Canada; CH = Switzerland; CL = Chile; CN = China; CO = Colombia; CZ = Czech Republic; DK = Denmark; GB = United Kingdom; HU = Hungary; ID = Indonesia; IN = India; KR = Korea; MX = Mexico; NO = Norway; NZ = New Zealand; PE = Peru; PH = Philippines; PL = Poland; SE = Sweden; TH = Thailand; TR = Turkey; ZA = South Africa.

[1] Consumer price inflation as of April 2015; year-on-year. [2] As of April 2015; for Denmark, the ECB inflation target. [3] Consensus Economics forecast as of June 2014 for 2015. [4] Changes in the nominal effective exchange rate from June 2014 to May 2015. A positive (negative) number indicates depreciation (appreciation); in per cent. [5] Changes from June 2014 to May 2015 in the nominal policy rate not explained by changes in output growth and inflation adjusted for exchange rate pass-through; in percentage points.

Sources: Consensus Economics; JPMorgan Chase; national data; BIS; BIS calculations.

deleveraging has progressed in some economies, but in others, housing prices and debt remain very high and in many cases have grown further. Post-crisis developments in credit and asset prices have featured prominently in central bank communications, and many central banks have highlighted the risk that low policy rates might contribute to the build-up of financial imbalances. Overall, however, short-term macroeconomic factors have been the dominant justification for policy decisions; financial developments have been far less prominent.

What drives inflation?

In many economies, inflation fell during the past year from already low levels. These recent changes in headline inflation largely reflected volatile fluctuations in oil and food prices and exchange rates, factors that are often considered short-term (or proximate) drivers of inflation. Core inflation, which excludes food and energy prices, has been relatively low for some time, which raises important questions about the effects of other drivers of inflation, namely the medium-term (or cyclical) and long-term (or secular) drivers. Despite decades of research and experience, the inflation effects of the cyclical and secular drivers remain much less clear than those of the proximate drivers.

Proximate drivers

The short-term effect of commodity prices and exchange rates on inflation is generally well understood. Energy is given a large weight in the consumer price index (CPI) of various countries, so changes in energy prices have a strong and

immediate impact on headline inflation. The price of energy can change markedly over short periods, as it did in the past year. Changes in food prices tend to be less volatile but can still have a significant effect, especially in emerging market economies, where food accounts for a larger share of the basket of goods and services that make up the CPI.

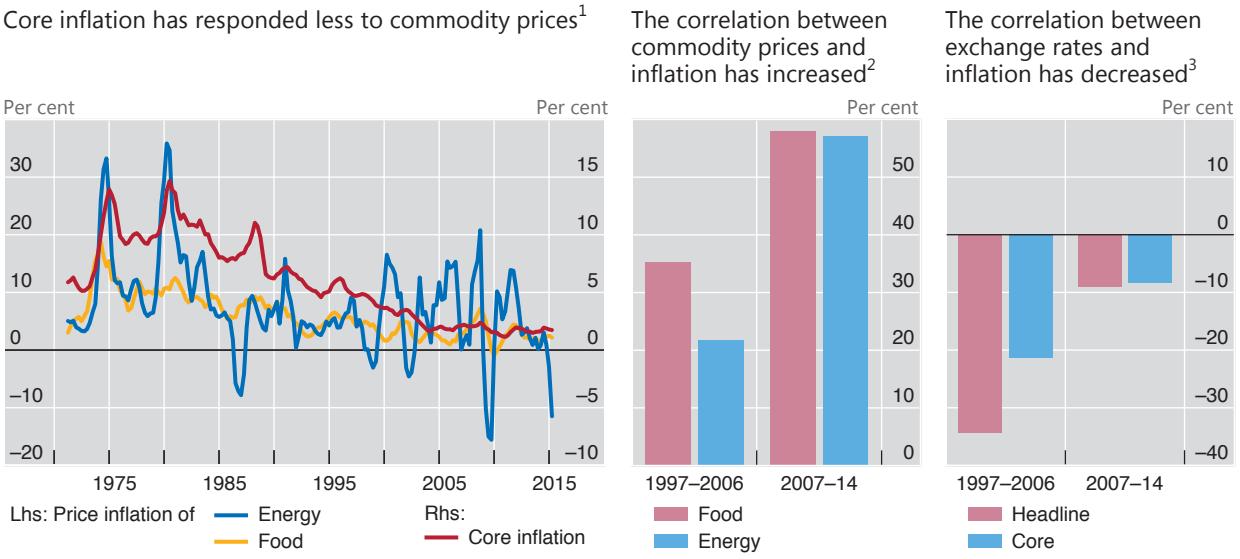
The degree to which changes in commodity prices pass through to other prices has declined over time. In the 1970s and 1980s, for example, increases in oil prices led to price increases for other goods, thereby tending to raise core inflation and inflation expectations. In the past two decades, however, these so-called "second-round" price effects on core inflation have become much more muted (Graph IV.5, left-hand panel) even as the effect of commodity prices on overall inflation has grown (Graph IV.5, centre panel).

Changes in exchange rates are also an important proximate driver of headline and core inflation. Imported items, or those that are subject to international competition, represent a large share of CPI baskets. Because the price of many of these items is set in global markets, changes in the exchange rate affect domestic costs.

Despite the increasing share of tradable items in the CPI over the past couple of decades, exchange rate pass-through to both headline and core inflation has declined (Graph IV.5, right-hand panel). Several factors appear to have contributed to this decline. One is better-anchored inflation expectations. With inflation low and stable, firms and households are less likely to expect central banks to accommodate exchange rate movements that would lead to persistent deviations of inflation from target. Evidence points to some additional factors that may be reducing the pass-

The pass-through of commodity prices and exchange rates to inflation is changing

Graph IV.5



[1] Core inflation is consumer price inflation (headline inflation) excluding food and energy; OECD country aggregates. [2] Correlation of headline inflation and first lag of commodity price inflation expressed in local currencies; based on year-on-year data. Simple averages across: Argentina, Australia, Brazil, Canada, Chile, China, Chinese Taipei, Colombia, the Czech Republic, Denmark, the euro area, Hong Kong SAR, Hungary, India, Indonesia, Japan, Korea, Malaysia, Mexico, New Zealand, Norway, Peru, the Philippines, Poland, Russia, Saudi Arabia, Singapore, South Africa, Sweden, Switzerland, Thailand, Turkey, the United Kingdom and the United States; quarterly data. [3] Correlation of headline inflation and the second lag of the change in the nominal effective exchange rate (BIS broad definition); based on year-on-year data. Simple averages across all economies listed in footnote 2 except, for core inflation, Argentina, China, Hong Kong SAR, Malaysia, Russia, Saudi Arabia and South Africa, which are excluded because of data limitations; quarterly data.

Sources: OECD, *Main Economic Indicators*; Bloomberg; CEIC; Datastream; national data; BIS; BIS calculations.

through effect of exchange rate changes: the advent of integrated supply chains, which give multinational firms a greater ability to absorb exchange rate changes; easier access to cheaper hedging; and a shift in the composition of imports towards items, such as manufactured goods, whose prices display a lower pass-through.

Cyclical drivers

The relationship between inflation and the business cycle, captured by measures of economic slack such as the unemployment gap, rests on strong theoretical foundations. However, the empirical relationship is generally far weaker and has been evolving along with changes in the global economy and financial system. For example, the post-crisis behaviour of inflation highlights the sometimes tenuous link between inflation and economic slack. Inflation was stronger than expected in 2010–11, given the severity of the crisis and the recession-induced excess capacity. Later on, even as labour markets strengthened and the global economy continued recovering, core inflation in many advanced and emerging market economies was either falling or running below central bank objectives.

The weakness of the empirical link between inflation and the business cycle has a number of explanations. First, spare capacity may be mismeasured, as it is not directly observed and must be estimated. For example, in the labour market, the unemployment rate is observable, but cyclical or structural changes in labour force participation can alter the unobserved effective amount of underutilised labour. Second, different methodologies and assumptions for estimating economic slack in the labour market or in the economy as a whole can produce quite different results. Third, many measures of spare capacity are subject to real-time errors, and so a clear picture of slack at a given time may become possible only at a much later date.

At the same time, evidence – often underappreciated – increasingly indicates that inflation now responds less to domestic cyclical activity and more to global movements than it has in the past. For example, the global output gap (Graph IV.6, left-hand panel) appears to have become more important in driving inflation. In fact, the effect of global spare capacity is now estimated to be larger than that of domestic spare capacity (see the *84th Annual Report*).[1] Similarly, the post-crisis share of cross-country inflation explained by a single common factor has increased, a development seemingly unforeseen in private sector forecasts (Graph IV.6, centre panel). In other words, global drivers of inflation are apparently becoming more important, but they are not particularly well understood.

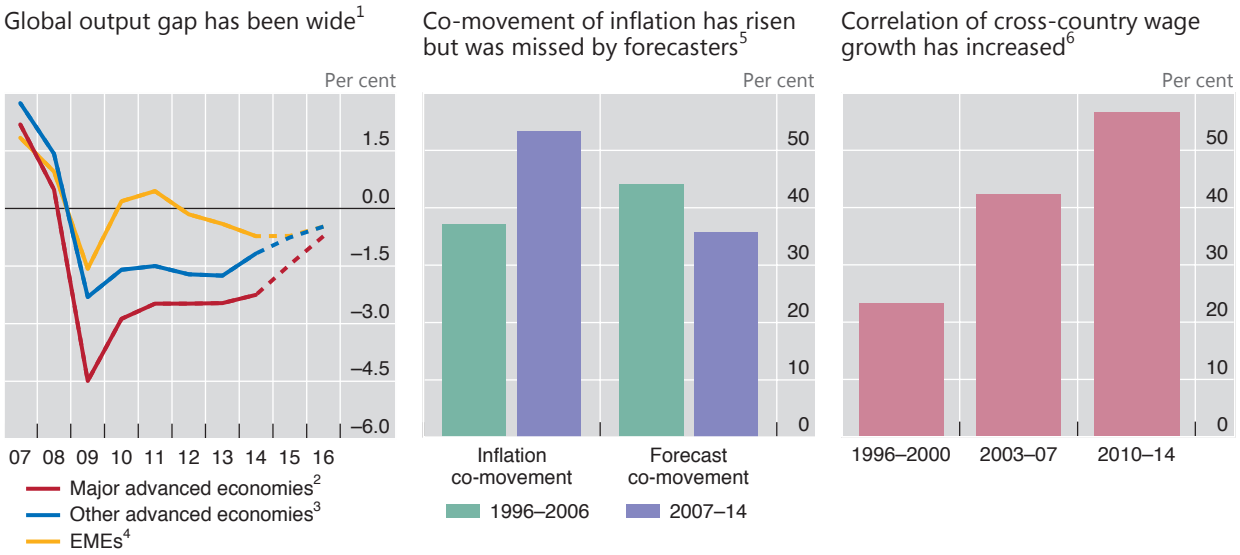
The higher responsiveness of inflation to global conditions reflects several factors, including the greater integration of product and factor markets. And since this greater integration can influence the pricing power of domestic producers and the bargaining power of workers, the effect of global conditions on inflation goes well beyond their direct impact through import prices.

The effect of common global trends is also visible in labour markets. Domestic unit labour costs have become more correlated across economies even outside of recessionary periods (Graph IV.6, right-hand panel). This development is consistent with evidence that inflation has become less sensitive to changes in spare domestic capacity or, in other words, with evidence that domestically oriented Phillips curves have become flatter.

Uncertainty about the link between inflation and domestic spare capacity suggests greater risks for monetary policymaking: central banks may miscalibrate

[1] See also C Borio and A Filardo, "Globalisation and inflation: new cross-country evidence on the global determinants of domestic inflation", *BIS Working Papers*, no 227, May 2007.

Domestic cyclical drivers of inflation matter less and global more — Graph IV.6



[1] Aggregates based on rolling GDP and PPP exchange rates; the dashed line is the IMF forecast for 2015 and 2016; output gap as a percentage of potential output. [2] The euro area, Japan and the United States. [3] Australia, Canada, Denmark, New Zealand, Norway, Sweden, Switzerland and the United Kingdom. [4] Argentina, Brazil, Chile, China, Chinese Taipei, Colombia, the Czech Republic, Hong Kong SAR, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Peru, the Philippines, Poland, Russia, Singapore, South Africa, Thailand and Turkey. [5] Variance of inflation explained by first principal component; for individual economies listed in footnotes 2, 3 and 4 plus selected euro area countries: Austria, Belgium, Finland, France, Germany, Greece, Italy, the Netherlands, Portugal and Spain. [6] Correlation of growth in nominal unit labour costs (year-on-year) with the cross-country average. Simple average for economies: Australia, Canada, the Czech Republic, Denmark, the euro area, Hungary, Japan, Korea, Norway, Poland, South Africa, Sweden, Switzerland, the United Kingdom and the United States.

Sources: IMF, *World Economic Outlook*; OECD, *Economic Outlook*; Consensus Economics; national data; BIS calculations.

their policy if they place too much weight on past correlations that underestimate the role of global factors.

Secular drivers

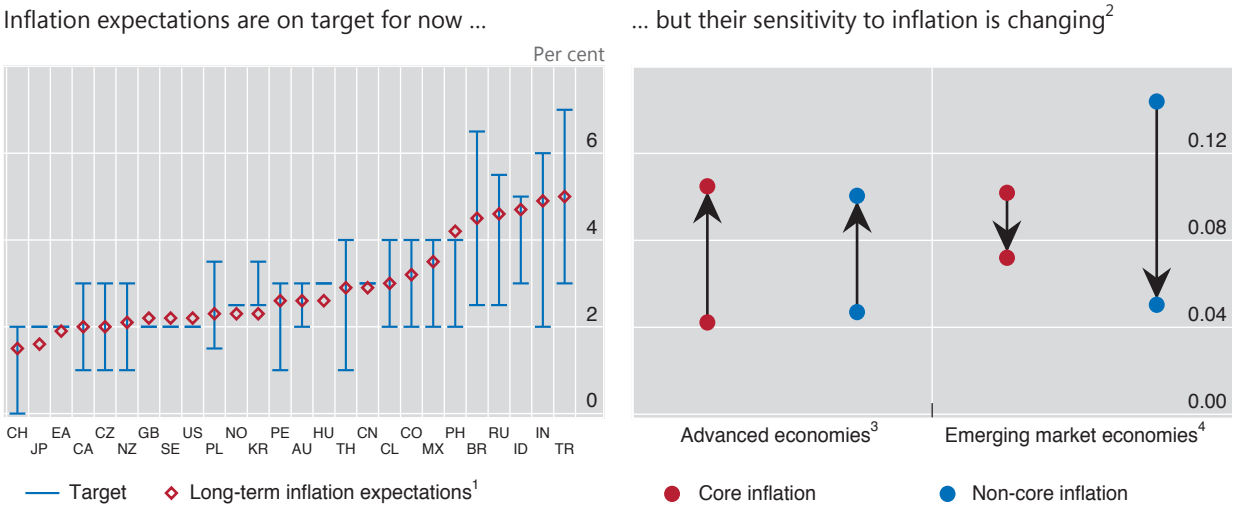
Understanding the effects of the secular (or long-term) drivers of inflation is critical to assessing inflation trends. The main secular drivers are inflation expectations, wage trends, globalisation and technology. Arguably, these drivers have generally had a disinflationary impact, although their strength has been subject to considerable debate. Each of these drivers has been influenced by a range of policy choices and structural changes.

Inflation expectations have drifted down as monetary policy regimes have successfully become more focused on inflation control. Indeed, long-term inflation expectations are now tightly aligned with central banks' explicit objectives (Graph IV.7, left-hand panel). The attainment of low, well-anchored inflation expectations has been seen as a key achievement, especially because they influence longer-run pricing decisions and contract setting.

Nonetheless, the understanding of what determines inflation expectations is still incomplete and continues to evolve. For example, a current concern is that inflation expectations may have become less well anchored, especially in economies with a policy rate near the effective lower bound, slow growth, and inflation running persistently below target. In advanced economies, inflation expectations have seemingly become more sensitive to short-term inflation (Graph IV.7, right-hand panel). This behaviour appears to be consistent with the research, which generally

Long-term inflation expectations are still anchored

Graph IV.7



AU = Australia; BR = Brazil; CA = Canada; CH = Switzerland; CL = Chile; CN = China; CO = Colombia; CZ = Czech Republic; EA = euro area; GB = United Kingdom; HU = Hungary; ID = Indonesia; IN = India; JP = Japan; KR = Korea; MX = Mexico; NO = Norway; NZ = New Zealand; PE = Peru; PH = Philippines; PL = Poland; RU = Russia; SE = Sweden; TH = Thailand; TR = Turkey; US = United States.

[1] April 2015 Consensus Economics forecast for six- to 10-year-ahead inflation expectations. [2] Estimated coefficients from regression of six- to 10-year-ahead inflation expectations on year-on-year consumer price inflation excluding food and energy (core inflation) and non-core inflation. The arrows indicate the change in coefficients from the 2000–07 sample to the 2010–14 sample; the change is statistically significant (at the 1% level) for core inflation in advanced economies and (at the 5% level) for non-core inflation in emerging market economies. [3] Australia, Canada, the euro area, Japan, New Zealand, Norway, Sweden, Switzerland, the United Kingdom and the United States. [4] Brazil, Chile, China, Colombia, the Czech Republic, India, Indonesia, Korea, Mexico, Poland, Russia, South Africa and Turkey.

Sources: Consensus Economics; Datastream; national data; BIS calculations.

finds that while inflation expectations are influenced by central bank objectives, they are also affected by past inflation. However, this backward-looking element of long-term inflation expectations has historically tended to respond rather slowly to changes in inflation.

The measurement of inflation expectations is also subject to considerable uncertainty. Questions remain about whether financial-market-based measures accurately reflect changing inflation expectations or whether these measures are distorted by spurious market-specific factors (Chapter II). Moreover, the inflation expectations of firms and workers are likely to be more relevant in price determination than those of professional forecasters. Unfortunately, measures for firms and workers are not always available, and when they are, they often are of questionably quality and display significant volatility.

Wage trends have also changed over recent decades. For example, the indexation of wages to inflation is much less prevalent now than it was in the 1970s, which accounts for some reduction in inflation persistence. Wage dynamics have also changed as a result of increased labour competition in advanced economies. The competition initially came from the greater integration of low-cost emerging market economies (including formerly state-controlled economies) into the global trading system. The competition spread and intensified as global integration strengthened and the range of goods and services that could be traded internationally widened, in part as a result of new technologies (eg via outsourcing). This partly explains why, for a number of advanced economies, labour's share of national income has declined steadily over the past 25 years. More generally, technological advances that have allowed the direct substitution of capital for

labour have played a similar role. Think, for instance, of computers, software and robotics automating previously manual processes.

The emergence of cheaper competitors has made labour and product markets much more contestable. Accordingly, the pricing power of the more expensive producers and the bargaining power of labour have been reduced – disinflationary forces whose effects go well beyond those suggested by the increase in global trade and integration. Thus, globalisation and technological change together have contributed to persistent, if hard to measure, disinflationary tail winds.

In sum, various inflation drivers have been shaping the inflation process in ways that at times have been difficult to fully understand. The heightened uncertainty has naturally carried over to inflation forecasting.[2] While the quantitative importance of the proximate drivers of inflation is relatively well understood, they can change unpredictably. There is considerable uncertainty about the overall impact of cyclical and secular factors, even as the relevance of global factors is rising relative to domestic ones. The uncertainties inevitably complicate policy, especially in frameworks that are tightly defined around inflation targets over short horizons.

Integrating financial stability concerns into monetary policy frameworks

The persistence of exceptionally easy monetary policy some eight years after the eruption of the financial crisis raises questions about its efficacy and, ultimately, about the suitability of current monetary policy frameworks. To be sure, price stability remains the cornerstone of monetary policy. However, the nature of the risks to price stability has been evolving. Worries over high inflation have been replaced of late with concerns about very low inflation and possibly deflation even in the context of high and rising debt and frothy asset prices. In this environment, resolving the tension between price stability and financial stability is the key challenge if economies are to avoid the problems that arose before the financial crisis. That is, can central banks preserve price stability while more systematically accounting for financial stability considerations?

One lesson from the financial crisis is that ignoring the financial cycle can be very costly. In the run-up to the crisis, credit and asset prices soared even as inflation remained low and stable. Since the crisis, similar patterns have again emerged in some economies (Graph IV.8 and Chapter III). The pre-crisis experience illustrated that financial vulnerabilities can build up even when inflation is quiescent. Low inflation can provide a false signal of overall economic stability.

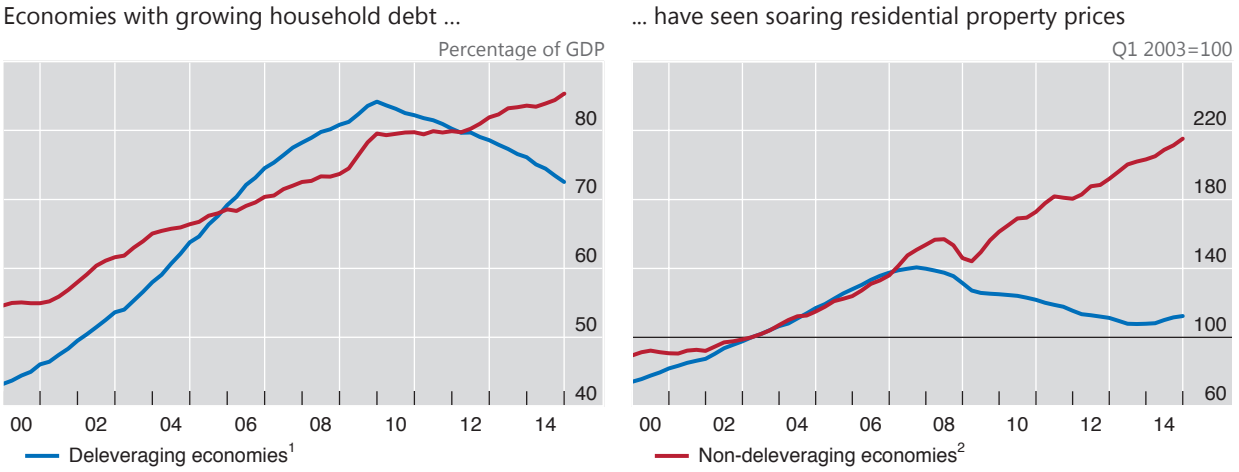
Despite the recent experience, the role of financial stability concerns in monetary policy is still subject to major disagreements. A common view is that macroprudential policies should be the first line of defence against financial imbalances; monetary policy should simply be a backstop, responding to financial stability concerns only after macroprudential policies have done all they can.

This view is supported by a sort of separation principle. Only macroprudential tools (eg loan-to-value ratios, countercyclical capital buffers, etc) are to be used against slow-moving financial booms and busts; monetary policy would then be left to focus on its traditional countercyclical role of managing inflation and business fluctuations.

[2] Many central banks publish ranges around their inflation forecasts, often derived from their historical forecast errors. These ranges generally suggest odds of only three-in-four that inflation will be within a 2 percentage point interval at a one-year horizon. At longer horizons, the uncertainty tends to be even larger.

Worrisome household debt and house price trends persist

Graph IV.8



[1] Simple average for economies with significant deleveraging of household credit since the Great Financial Crisis: Greece, Ireland, Italy, Portugal, Spain, the United Kingdom and the United States. [2] Simple average for economies without significant deleveraging of household credit since the Great Financial Crisis: Australia, Canada, Hong Kong SAR, Korea, New Zealand, Norway, Singapore and Sweden.

Sources: OECD *Economic Outlook*; national data; BIS; BIS calculations.

The separation principle is intuitively appealing and has the merit of simplifying policy assignments; but it becomes less compelling if one considers the way in which macroprudential policy and monetary policy jointly influence financial activity. Box IV.A highlights the close interrelationship between macroprudential and monetary policies as well as the similarity in their transmission mechanisms. To be sure, their reach differs markedly. But both of them fundamentally influence funding costs and risk-taking, which in turn affect credit, asset prices and the macroeconomy.

Moreover, while assessments differ, the experience with macroprudential tools is, on balance, not very supportive of the separation principle. It is not clear that targeted macroprudential tools can be as effective as policy rates in preventing excessive risk-taking in all parts of the financial system. The policy rate is the key determinant of the universal price of leverage in a given currency; it affects all financing in the economy and is not susceptible to regulatory arbitrage. In this sense, policy interest rates are more blunt but have a more pervasive effect. In light of this, the exclusive reliance on macroprudential tools to tame financial booms and busts is risky – all the more so if monetary and prudential tools are pulling in opposite directions. Experience suggests that the two sets of tools are most effective when used as complements, leveraging each other's strengths.

A recent empirical analysis indicates the potential usefulness of monetary policy in this context (Box IV.B). Policy rates appear to have a significant effect on credit and asset prices, especially property prices. And this effect seems to have been growing since the mid-1980s, following financial liberalisation. It is no coincidence that the amplitude and length of financial cycles has considerably increased since then (see the *84th Annual Report*). Moreover, the same analysis finds that, after explicitly accounting for the effect on credit and property prices, monetary policy has had a reduced effect on output. Together, these findings suggest that a monetary policy focused on managing near-term inflation and output may do so at the cost of higher fluctuations in credit and asset prices than in the past.

A common argument against using monetary policy to address financial stability concerns is the lack of good metrics with which to track the financial cycle

Box IV.A

Monetary policy and macroprudential policy: complements or substitutes?

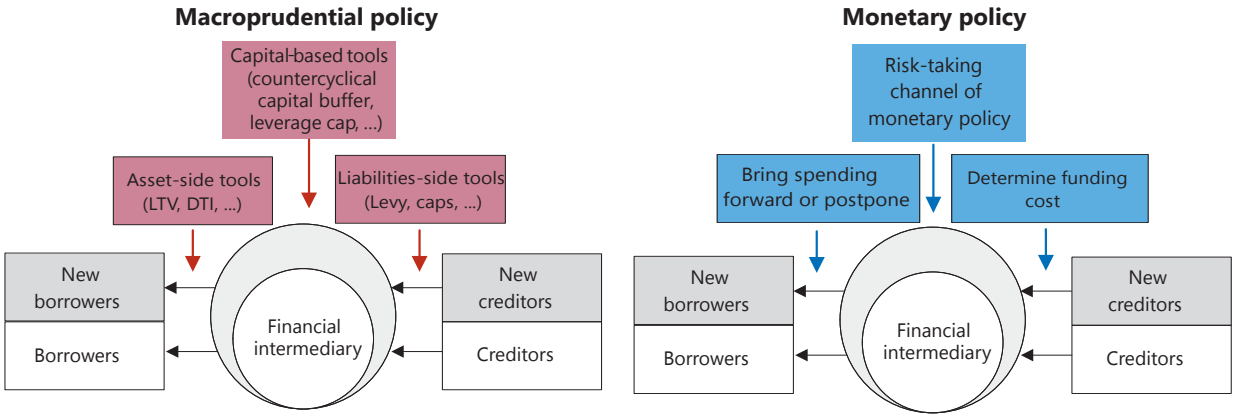
Macroprudential policies aim to (i) strengthen the resilience of the financial system and (ii) mitigate financial booms and subsequent busts. How well do macroprudential policies interact with monetary policy in addressing the second of these two concerns?①

Both monetary policy and macroprudential policy influence the financial intermediation process, operating on the assets, liabilities and leverage of intermediaries (Graph IV.A). For instance, both policies can induce a reallocation of spending over time by influencing the cost and availability of credit for consumers and firms. These policies, however, differ in scope and impact. Macroprudential policy often targets specific sectors, regions or practices (eg through loan-to-value limits and debt-service ratio rules), whereas interest rates have a more pervasive impact on private sector incentives and on the financial system.

An important policy question is whether monetary and macroprudential policies should in general pull in the same direction (ie as complements) or in opposite directions (ie as substitutes). Some recent discussions of macroprudential policies treat the two sets of policies as substitutes: while monetary policy is kept loose, macroprudential policy is invoked to mitigate the resulting financial stability implications, at least for particular sectors or types of borrowing. But when these policies are pulling in opposite directions, economic agents are simultaneously facing incentives to borrow more and to borrow less, suggesting tensions in the policy mix. Initial theoretical research points to monetary and macroprudential policies being best used mainly as complements, not substitutes, although results can vary by the nature of the adverse development.

Macroprudential tools and monetary policy are interrelated

Graph IV.A



LTV = loan-to-value; DTI = debt-to-income.

Source: H S Shin, "Macroprudential tools, their limits and their connection with monetary policy", panel remarks at the IMF Spring Meeting on "Rethinking macro policy III: progress or confusion?", Washington DC, April 2015, www.bis.org/speeches/sp150415.htm.

Indeed, experience indicates that these tools tend to be used together as complements. A recent study of Asia-Pacific economies documents that monetary policy and macroprudential policies over the past decade have been used to pull in the same direction, as indicated by the positive correlations reported in Table IV.A. Furthermore, the empirical evidence indicates that tighter macroprudential policies together with higher interest rates have been effective in reducing real credit growth. Statistical questions remain about whether and when macroprudential policies have been on average more powerful than monetary policy.

Correlation of policy changes in Asia-Pacific economies[1] Table IV.A

	Policy rate	Non-interest rate monetary policy measures	Prudential measures on housing credit	Prudential measures on banking inflows and foreign exchange exposures
Policy rate	1.00			
Non-interest rate monetary policy measures	0.22	1.00		
Prudential measures on housing credit	0.16	0.19	1.00	
Prudential measures on banking inflows and foreign exchange exposures	0.20	0.30	0.09	1.00

[1] Changes in the policy rate are actual. For changes in the other policy actions, +1 is assigned for tightening, 0 for no change and –1 for loosening. Quarterly data from 2004 to 2013 for Australia, China, Hong Kong SAR, India, Indonesia, Japan, Korea, Malaysia, New Zealand, the Philippines, Singapore and Thailand.

Source: Adapted from Table 15 of V Bruno, I Shim and H S Shin, "Comparative assessment of macroprudential policies", *BIS Working Papers*, no 502, June 2015.

① See H Hannoun, "Towards a global financial stability framework", speech at the SEACEN Governors' Conference, Siem Reap, Cambodia, 26 February 2010.

and financial stability risks more generally. The problem is indeed serious, but the past decade has seen considerable progress in devising and improving such metrics. One practical approach has been to track credit and asset price trends. More generally, the challenge is not specific to monetary policy. And the very establishment of macroprudential policy frameworks, in which central banks often play a key role, is predicated on the presumption that the need for good metrics can be tackled successfully.

At the same time, the difficulties with the more familiar yardsticks used in the pursuit of price stability should not be underestimated. Economic slack and inflation expectations are not observed directly; they have to be estimated, and the estimates are subject to considerable uncertainty and bias. In fact, recent evidence suggests that using information about the financial cycle, such as the behaviour of credit and property prices, can produce better estimates of potential output and underlying slack in real time than traditional methodologies, which often draw on the behaviour of inflation (Box IV.C). Indeed, ahead of the financial crisis, the methodologies widely used in policymaking generally failed to detect that output was above its sustainable level. Estimates that take the boom in credit and property prices into account can help to correct this bias.

By the same token, metrics informed by the state of the financial cycle may also help calibrate monetary policy, even though this will necessarily be a matter of trial and error. As outlined in Chapter I, a general strategy would call for more deliberate and persistent monetary policy tightening during financial booms, even if near-term inflation is low or declining. All else equal, Taylor rules not adjusted for the state of the financial cycle could set a sort of lower bound, as they have been calibrated with inflation, not financial imbalances, in mind (Box IV.C). During financial busts, the strategy would be to ease less aggressively and persistently. The restraint in easing would reflect the weaker influence of expansionary monetary policy when (i) the financial system is impaired, (ii) the private sector has taken on too much debt and (iii) the misallocation of resources accumulated during the boom weighs on

Monetary transmission to output, credit and asset prices

After the Great Inflation of the 1970s, economies and financial systems worldwide changed markedly. Low inflation rates became the norm in many countries, and financial liberalisation and globalisation progressed rapidly. In particular, housing finance arrangements evolved substantially and have become more integrated with capital markets through the spreading of securitisation, rising loan-to-value ratios and the advent of credit tied to home equity. Also, bond markets have deepened, facilitating firms' access to capital market funding, and financial globalisation has considerably broadened the investor base. As a result, the level of debt relative to income has risen significantly. Moreover, non-bank lenders are a much larger source of credit, and more debt is in the form of mortgages.

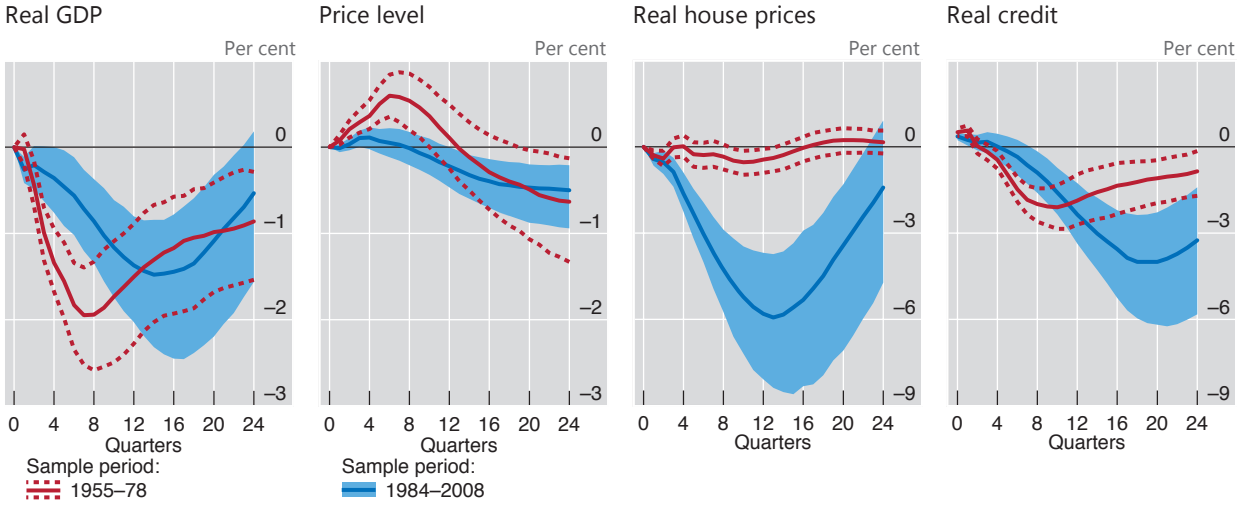
These developments could also have altered the transmission of monetary policy. Although studies for the United States suggest that the transmission has not changed much over time,① their focus has been on the transmission to the real economy, largely ignoring the interrelationship with credit and asset prices.

A standard vector autoregression model (VAR) extended to include house prices and total credit to the private non-financial sector does find evidence of significant changes in transmission in the US economy (Graph IV.B).② An unexpected increase of 100 basis points in the US policy rate is estimated to have a smaller impact on output in the recent period: a maximum impact of –2% is reached after eight quarters in the earlier period and –1.5% after 14 quarters in the later one. While the long-term impact for the price level is very similar, the reaction has become more muted. In contrast, the differential impact of monetary policy on house prices and credit across the two sample periods is substantial: for real house prices, the estimated maximum impact has soared by a factor of twelve (from –0.5% to –6%); and for total credit, it has doubled from –2% to –4%.③

These findings suggest that credit and house price booms have become more sensitive to countervailing changes in monetary policy rates. Moreover, the output costs associated with policy tightening have generally fallen, given monetary policy's more muted impact on real output. Put differently, the results indicate that smoothing short-term swings in output and inflation now comes at the cost of greater swings in credit and property prices than in the past.

The financial cycle has become increasingly sensitive to policy rates

Impulse responses to a 100-basis-point increase in the policy interest rate[1] Graph IV.B



[1] For the United States; median and the 68% probability range of the impulse responses.

Source: BIS calculations.

① See eg G Primiceri, "Time varying structural vector autoregressions and monetary policy", *Review of Economic Studies*, vol 72, 2005, pp 821–52; and J Boivin, M Kiley and F Mishkin, "How has the monetary transmission mechanism evolved over time?", in B Friedman and M Woodford (eds), *Handbook of Monetary Economics*, vol 3A, North Holland, 2011, pp 369–422. ② The VAR comprises five variables: log real GDP, log GDP deflator, log real house prices, the US policy rate (the federal funds rate) and log real credit. The monetary policy shock is identified using a Cholesky identification scheme with variables ordered as they are listed. For more details, see B Hofmann and G Peersman, "Revisiting the US monetary transmission mechanism", *BIS Working Papers*, forthcoming. ③ O Jorda, M Schularick and A Taylor, "Betting the house", *Journal of International Economics*, forthcoming, also find that loose monetary conditions lead to booms in real estate lending and house prices bubbles, especially in the postwar period.

potential output (Chapters I and III and the *84th Annual Report*). And this approach would also reflect the understanding that forceful easing with limited effectiveness produces unintended effects on the financial system and the economy, domestically and internationally (Chapters III, V and VI). Calibration issues would loom large, but – as in the pursuit of price stability, and especially until sufficient experience is accumulated – there is no alternative to gradual experimentation.

A more challenging concern is how best to balance the possible trade-offs between financial stability and macroeconomic stabilisation, ie price stability and near-term output stabilisation. To some extent, this is an issue of the relevant policy horizon. Financial vulnerabilities take considerable time to build up. And as witnessed in the aftermath of the financial crisis, a financial bust has long-lasting debilitating effects on the macroeconomy, including possibly for inflation. Hence, extending the horizon beyond the traditional two to three years helps reconcile financial stability with traditional objectives. After all, financial instability is a concern precisely because of the damage it imposes on the real economy. Given the uncertainties embedded in longer-term forecasts, the extension of the horizon should not be interpreted as extending point forecasts. Rather, it is intended as a means to examine more systematically the risks to the outlook posed by financial factors, given their longer fuse.

Even so, when it comes to tolerating deviations of inflation from objectives, the issue remains, how long is too long? The post-crisis period has shown that persistent disinflation, and even deflation, can go hand in hand with worrying booms in asset prices and credit. To be sure, this constellation is by no means unprecedented and was rather common during the era of the gold standard. Most famously, it prevailed during the 1920s, ahead of the Great Depression in the United States. But the constellation was far less common in the post-World War II, inflation-prone period and emerged again only after inflation came under tighter control.

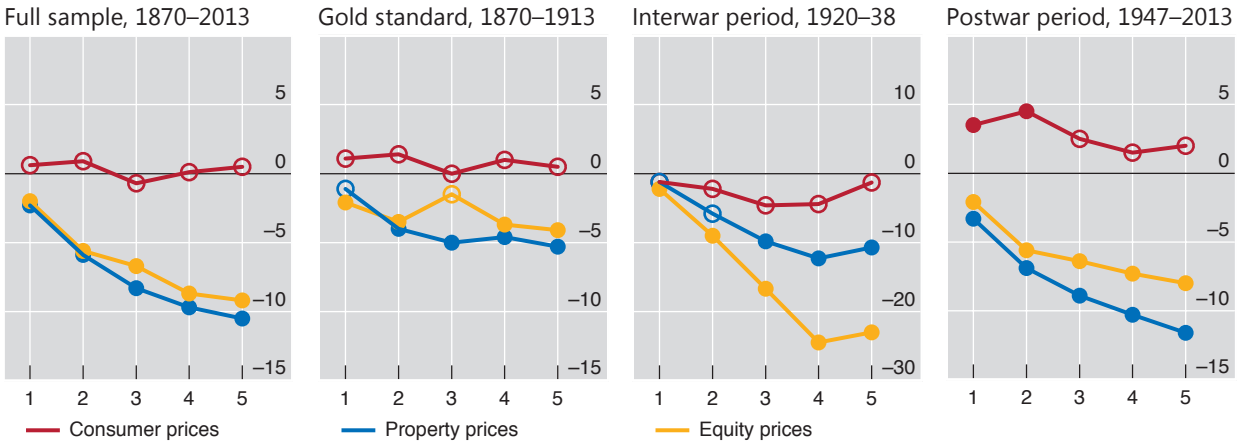
Two well founded concerns, one specific and one more general, have discouraged policymakers from tolerating persistent deviations of inflation from numerical objectives.

The specific concern is deflation risk. Much of the recent policy debate has been predicated on the assumption that all deflations are pernicious and cause great economic damage. The sense is that a drop in aggregate prices will likely trigger a deflationary spiral. Output will fall and – especially if interest rates are stuck at the zero lower bound – expectations of continued price declines will raise inflation-adjusted interest rates, further depressing aggregate demand and output.

However, the historical record on the output costs of deflation is at odds with this widespread perception. The asserted link between deflation and subpar economic activity is actually rather weak and derives largely from the unique experience of the Great Depression. In fact, the evidence suggests that output is more closely linked to asset prices, especially property prices. Once asset prices are taken into account, the link between output and price deflation in goods and services becomes even weaker. In a review of the international experience since

Output slowdowns coincide more with asset price declines than with deflations[1]

Change in growth of output per capita after price peak, in percentage points[2] Graph IV.9



[1] Cumulative change in real per capita output growth after a peak in the respective price index (ie consumer, property and equity prices); over the indicated horizon (in years). [2] The regression method isolates the marginal impact of each type of price decline on output performance; a filled circle indicates a statistically significant coefficient (at the 10% level); an empty circle indicates an insignificant coefficient.

Source: C Borio, M Erdem, A Filardo and B Hofmann "The cost of deflations: a historical perspective", *BIS Quarterly Review*, March 2015, pp 31–54.

1870, the link is evident only in the interwar years (Graph IV.9, third panel). Moreover, further analysis indicates that the really damaging interaction has not been between deflation and debt – so-called debt deflation – but between debt and declines in property prices.

This record also suggests that the costs of deflation may depend on its drivers. Deflation may indeed be a sign of sharp and persistent declines in demand, in which case it would coincide with economic weakness. But if deflation is driven by supply-side improvements, such as globalisation, greater competition or technological forces, output would tend to rise alongside real incomes, lifting living standards. And if deflation results from one-off price adjustments, such as a fall in commodity prices, it is also likely to be transitory.

This analysis indicates that the central bank's response to deflation risks needs to consider not only the sources of price pressures, but also the policy's effectiveness. Paradoxically, an aggressive response to avert a supply side-driven or temporary deflation could prove counterproductive in the longer run. It could be conducive to financial booms whose bust could seriously damage the economy as well as induce unwelcome disinflation down the road.

The more general concern about inflation deviating from target has to do with the loss of credibility and, ultimately, with mandates. Persistent deviations of inflation from the numerical objective may indeed undermine the central bank's credibility. If so, then the policy framework should explicitly provide for tolerance of such deviations when required to achieve longer-term objectives.

Much less clear, however, is whether allowing greater tolerance would require a reconsideration of mandates, which often are general enough and subject to varying interpretations. In particular, sustainable price stability, or macroeconomic stability more broadly, can be thought of as implicitly encapsulating financial stability, given the huge economic distortions and output losses associated with financial crises. But if revisiting mandates becomes necessary in some cases, it would need

Measuring potential output using information about the financial cycle

The concept of potential output refers to the level of output produced when available resources, including labour and capital, are fully and sustainably employed. Deviations of actual output from potential – the so-called output gap – gauge the degree of slack in the economy. Potential output, which cannot be observed directly, is typically estimated with econometric techniques.

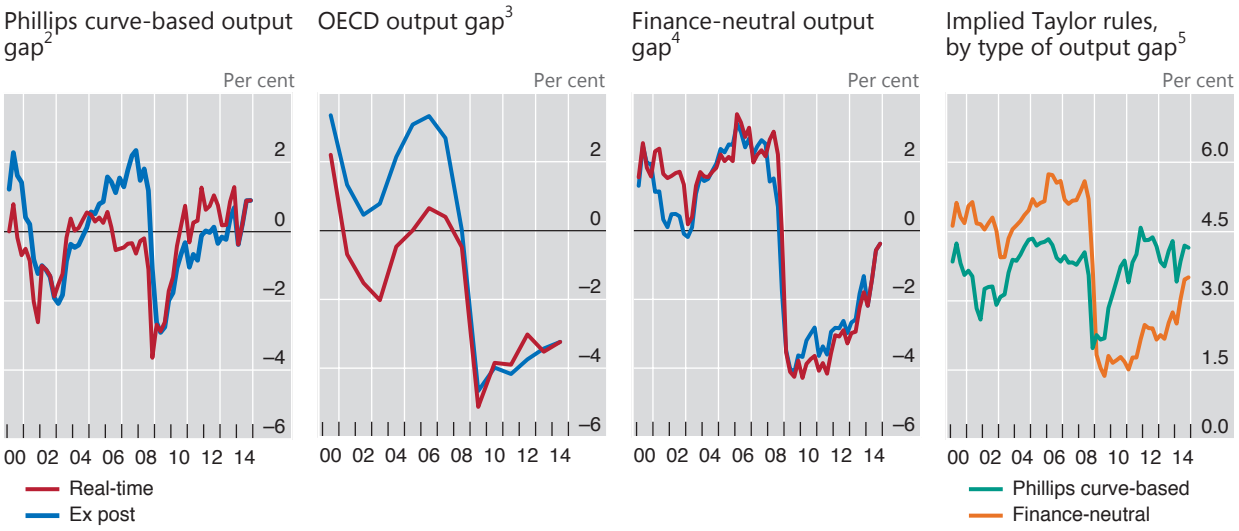
The econometric estimation techniques have traditionally relied heavily on inflation: all else equal, the level of output is seen as consistent with the full employment of labour when inflation does not have a tendency to rise or fall. Inflation is a key signal of sustainability. Even the potential output measures based on production functions, such as those calculated by the OECD or the IMF, partly rely on inflation to gauge imbalances in the labour market.

But the relationship between economic slack and inflation (the so-called Phillips curve) has weakened over recent decades (see Chapter III of the *84th Annual Report*), thereby compromising the usefulness of inflation as an indicator of potential output. Accordingly, estimates of the output gap that rely on the Phillips curve may prove to be unreliable.① That is, when the data are allowed to speak freely, the information content of inflation may indeed be quite low. In addition, traditional methods for estimating potential output are plagued by substantial uncertainty when used in real time, ie they are typically revised heavily as the future unfolds and more data become available. For example, in the mid-2000s, neither the Phillips curve approach nor the OECD's full production-function approach found that US output was at that time above potential; they reached that finding only later, when models were re-estimated with more data (Graph IV.C, first and second panels).

The pre-crisis experience suggests that measures of financial imbalances could be helpful in identifying potential output. After all, even though inflation remained generally subdued, credit and property prices grew at unusually strong rates, sowing the seeds of the subsequent crisis and recession. Indeed, BIS research has found that including information about the financial cycle can yield more reliable measures of economic overheating.② Such "finance-neutral" output gaps would, for instance, have indicated in real time that output was above potential in the

Real-time bias of output gap estimates has implications for policy benchmarks[1]

Graph IV.C



[1] For the United States; ex post estimates are based on all available data until December 2014; real-time estimates are computed by recursively estimating the models with the data available up to each point in time. [2] Obtained by augmenting a simple univariate statistical model (ie a Hodrick-Prescott filter) of the output gap with a Phillips curve. The results using a Hodrick-Prescott filter are nearly identical. For additional details, see model 1 in the publication cited in footnote ①. [3] Real-time estimate based on the June vintage in the subsequent year (eg June 2003 for 2002 estimate). [4] Based on the publication cited in footnote ②. [5] In nominal terms; for illustration purposes, the Taylor rules are computed as $\pi^* + r^* + \frac{1}{2}(y - y_p) + \frac{1}{2}(\pi - \pi^*)$, where $(y - y_p)$ is the real-time Phillips curve or the finance-neutral output gap, π is the observed inflation rate (personal consumption expenditures excluding food and energy), π^* is the inflation objective (set to 2%) and r^* is the equilibrium real interest rate consistent with output at potential and inflation at its desired level (set to 2%, roughly the historical average of the real federal funds rate).

Sources: Federal Reserve Bank of St Louis; OECD, *Economic Outlook*; BIS calculations.

mid-2000s in the United States, and such estimates would have been subject to smaller revisions as new data became available (Graph IV.C, third panel).

Reliable real-time estimates of the output gap would be useful to monetary policymakers, as economic slack plays a key role in policy setting. Consistent with its diagnosis of output being above potential, the finance-neutral output gap points to higher Taylor-implied policy rates during the run-up to the Great Financial Crisis (Graph IV.C, last panel).

① The point is further developed in C Borio, P Disyatat and M Juselius, "A parsimonious approach to incorporating economic information in measures of potential output", *BIS Working Papers*, no 442, February 2014. The analysis finds that, under various model specifications, the contribution of inflation to the output gap is low unless strong prior information is included. ② C Borio, P Disyatat and M Juselius, "Rethinking potential output: embedding information about the financial cycle", *BIS Working Papers*, no 404, February 2013.

to be done with great care, as the process could lead to political economy pressures with unwelcome results.

This suggests that the first priority should be (i) to use the existing room for manoeuvre as much as possible and (ii) to build a constituency for a more systematic incorporation along the lines described above. In time, further and more fundamental adjustments to monetary policy frameworks could be considered.

On balance, arguments against incorporating financial stability considerations more systematically into monetary policy are based on valid concerns but are not fully convincing. In particular, the arguments tend to overestimate how much is known about the inflation process and to underestimate how much has been learned about financial instability. They may also tend to put too much faith in the ability of monetary policy to influence, and even fine-tune, inflation relative to its ability to influence financial, and hence macroeconomic, stability over the medium term.

If the ultimate criterion for a successful monetary policy is to promote *sustainable* economic growth and, in the process, help avoid major macroeconomic damage, then a rebalancing of policy priorities towards greater attention to financial stability would seem justified. The rebalancing would also take monetary policy closer to its historical origin and function.[3] The challenges involved should not be underestimated. They raise tough questions. But relying exclusively on macroprudential tools to address financial instability may not be sufficiently prudent.

[3] See C Borio, "Monetary policy and financial stability: what role in prevention and recovery?", *BIS Working Papers*, no 440, January 2014.

V. The international monetary and financial system

The suitable design of international monetary and financial arrangements for the global economy is a long-standing issue in economics. Putting in place mechanisms that facilitate the achievement of sustained, non-inflationary and balanced growth has proved elusive. In the wake of the Great Financial Crisis, the issue has again gained prominence on the international policy agenda.

Just as in the past, however, there is little agreement on what the key shortcomings of the current international monetary and financial system (IMFS) are, let alone on what to do about them. A common diagnosis has been that the system is unable to prevent the build-up of unsustainable current account imbalances and that this, in turn, has induced a contractionary bias: surplus countries have no incentive to adjust, while deficit countries are forced to do so. Indeed, current account imbalances have been a focus of G20 cooperative efforts.

This chapter provides a different perspective, by arguing that the main shortcoming of existing arrangements is that they tend to compound the weaknesses of domestic monetary and financial frameworks ("regimes"). In particular, the IMFS tends to heighten the risk of financial imbalances – that is, unsustainable credit and asset price booms that overstretch balance sheets and can lead to financial crises and serious macroeconomic damage. These imbalances occur simultaneously across countries, deriving strength from global monetary ease and cross-border financing. Put differently, the system exhibits "excess financial elasticity": think of an elastic band that can be stretched out further but that, as a result, eventually snaps back all the more violently.[1]

The chapter is structured as follows. After outlining the key features of the IMFS, the first section explains and documents how the interaction of domestic monetary and financial regimes increases financial imbalances. It highlights several factors: (i) the role of monetary areas that for the key international currencies (notably the US dollar) extend well beyond national borders; (ii) the limited insulation properties of exchange rates, which induce policy responses designed to avoid large interest rate differentials vis-à-vis the main international currencies; and (iii) the powerful waves generated by freely mobile financial capital and global liquidity, which wash across currencies and borders, carrying financial conditions across the globe. The second section considers possible solutions. It highlights the need to adjust domestic policy frameworks and to strengthen international cooperation, going beyond the own-house-in-order doctrine.

The IMFS: main elements and weaknesses

Main elements

The IMFS comprises the arrangements governing transactions in goods, services and financial instruments among countries. Today, it consists of a set of domestically

[1] See C Borio, "The international monetary and financial system: its Achilles heel and what to do about it", *BIS Working Papers*, no 456, August 2014; and C Borio, H James and H S Shin, "The international monetary and financial system: a capital account historical perspective", *BIS Working Papers*, no 457, August 2014.

The international monetary and financial system, then and now Table V.1

	Bretton Woods	Current
Monetary anchor	External: ultimately gold	Internal: domestic mandates (eg price stability)
Exchange rates	Fixed but adjustable	Hybrid (floating at the centre)
Key currencies	De facto, US dollar	Dollar dominance (less exclusive)
Capital mobility	Restricted	Hybrid (unrestricted at broad centre)

oriented policies in a world of largely free capital flows. Domestic monetary regimes focus mainly on price stability, while currencies are allowed to float to varying degrees: free floating among the principal international currencies coexists with greater or lesser management of other currencies. Financial regimes generally allow funds to move freely across currencies and borders, although some countries still impose restrictions. The main restraint on financial transactions takes the form of prudential regulation and supervision, in part based on internationally agreed standards.

Current arrangements differ markedly from the previous system, Bretton Woods (1946–73). At the time, the US dollar's convertibility into gold served as an external monetary anchor, and currencies were tied together through fixed but adjustable exchange rates (Table V.1). Domestic monetary regimes in general gave less priority to price stability and more to external balance and demand growth. While the anchor ultimately did not prove that strong, the arrangements contrast with present ones, in which the aggregation of monetary policies pursued under domestic mandates acts as the only overall constraint. During the Bretton Woods era, the leading international currency was the dollar, which now shares this role to some extent with others, mainly the euro. And international capital mobility was quite limited, reflecting a myriad of restrictions on "repressed" domestic financial systems.

The performance of the two systems has differed markedly as well. Bretton Woods did not see major episodes of financial instability, but eventually proved unable to ensure lasting global monetary stability. It broke down once the United States formally abandoned gold convertibility and exchange rates were allowed to float. Current arrangements have succeeded in promoting price stability more than financial stability.

Arguably, this is no coincidence. The *84th Annual Report*, as further elaborated in other chapters of this Annual Report, explored why domestic monetary and financial regimes have so far been unable to ensure lasting financial stability. But their interaction through the IMFS has also played a role, by compounding rather than limiting the weaknesses of domestic regimes. Consider, in turn, the interaction of monetary and financial arrangements.

Interaction of domestic monetary regimes

The interaction of monetary regimes spreads easy monetary conditions from core economies to the rest of the world. The international use of reserve currencies does so directly, and the strategic conduct of monetary policy does so indirectly. Take each in turn.

The reliance on a single global currency has diminished slowly since Bretton Woods, but the US dollar continues to play a dominant role in international trade and finance, alongside the euro. As a means of exchange, the dollar is on one side

Selected indicators for the international use of key currencies

As a percentage of world total — Table V.2

	US dollar	Euro	Pound sterling	Yen	Renminbi	*Total (USD trn)*
Forex market turnover,[1] daily, April 2013	87.0	33.4	11.8	23.0	2.2	*5.3*
Foreign exchange reserves,[2] Q4 2014	62.9	22.2	3.8	4.0	1[3]	*11.6*
International bank deposits by non-banks,[4] Q4 2014	57.3	22.7	5.2	2.9	1.9[5]	*9.8*
Outstanding international debt securities,[4] Q4 2014	40.4	40.9	9.6	2.0	0.6	*21.9*
International trade invoicing/settlement, 2010–12	50.3	37.3	…	…	1.4	.

[1] The shares sum to 200% because each transaction involves two currencies. [2] Shares are based on allocated data from IMF COFER. [3] Rough BIS estimate based in part on People's Bank of China, *Report on renminbi internationalisation* (in Chinese), June 2015. [4] Broad measure, including intra-euro area outstandings. [5] Minimum share based on renminbi-denominated international bank deposits reported by a subset of BIS reporting countries.

Sources: H Ito and M Chinn, "The rise of the 'redback' and the People's Republic of China's capital account liberalization: an empirical analysis of the determinants of invoicing currencies", *ADBI Working Paper*, no 473, April 2014; IMF; BIS international banking statistics and international debt securities statistics; BIS calculations.

of no less than 87% of foreign exchange market transactions (Table V.2), with an even higher share of forward and swap transactions. Its dominance in foreign exchange markets makes the dollar the sole intervention currency outside Europe and Japan, which supports its high share in foreign exchange reserves. More than half of world trade is invoiced and settled in dollars, pointing to the greenback's pre-eminent role as a unit of account.

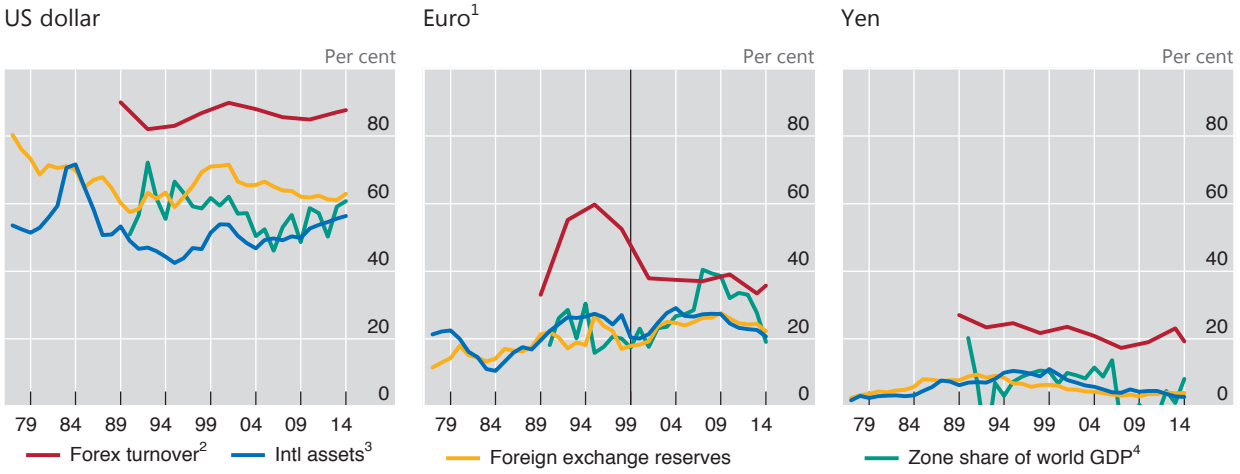
Remarkably, the advent of the euro and the dollar's trend depreciation since the 1970s have not materially challenged the dollar's role as a store of value (Graph V.1, left-hand panel). At 63%, it maintains almost three times the share of the euro in foreign exchange reserves. Its share in both official reserves and private portfolios is sustained by the scale of what can be termed the "dollar zone" of economies whose currencies move more closely with the dollar than with the euro (Box V.A). At half or more of world GDP, the dollar zone is far larger than the US economy, which is less than a quarter.

Monetary policy settings for key international currencies influence financial conditions outside these currencies' home jurisdictions directly through their impact on interest rates and the valuation of assets or liabilities denominated in these currencies but held or owed by non-residents. In particular, dollar and euro credit to non-bank borrowers outside the United States and euro area stood at $9.5 trillion and €2.3 trillion ($2.7 trillion), respectively, at end-2014. The dollar debt represents a seventh of global GDP outside the United States (Box V.B).

The large stocks of dollar- and euro-denominated credit extended to borrowers outside the United States and the euro area, respectively, mean that Federal Reserve and ECB policies are transmitted directly to other economies. The impact depends on the characteristics of the instrument in question, notably its maturity and the flexibility of the corresponding interest rate. For instance, in the case of bank loans priced off of dollar Libor or Euribor, changes in short-term policy rates pass through within weeks. Over half of dollar and euro credit to borrowers outside the United States and euro area remains in the form of bank loans.

The international roles of currencies: US dollar remains dominant

Graph V.1



[1] Before 1999, "euro" aggregates available predecessor currencies. [2] The shares sum to 200% because each transaction involves two currencies. 2014 is estimated based on CLS trading data for April. [3] Includes bank deposits of non-banks and debt securities. Bank deposits are proxied by all bank liabilities before 1995. For the euro area, bank deposits exclude deposits vis-à-vis euro area banks. Debt securities are based on BIS international debt securities statistics before 1999 and the ECB's narrow measure of euro bonds since 1999, which excludes euro area residents' euro issues. [4] Estimated as each economy's share of PPP GDP, plus the elasticity-weighted share of all other economies' PPP GDPs; see Box V.A.

Sources: ECB; IMF; CLS; Datastream; national data; BIS international debt securities statistics; BIS calculations.

The pass-through is slower for bonds, given their generally fixed rates and longer maturity, but then quantities can respond too. In particular, some stocks of dollar bonds have changed quite markedly in response to unconventional monetary policy (Chapter IV). Low yields reflecting the Federal Reserve's large-scale purchases of Treasury and agency bonds, among other factors, led US and global investors to seek yield in lower-quality bonds. The impact was especially pronounced for non-US borrowers, who between 2009 and 2014 ramped up their dollar bond issuance by $1.8 trillion (Graph V.2, left-hand panel). Investor demand for such bonds proved highly responsive to the compression of the term premium, as measured by the spread between Treasury bond yields and expected bill yields: the lower the premium, the faster the growth of dollar bonds issued by non-US borrowers (hence the negative relationship after the first quarter of 2009 seen in the right-hand panel of Graph V.2).

By the same token, the recent ECB large-scale bond purchases and compression of term premia on euro-denominated bonds raise the question of whether borrowers outside the euro area will take advantage of the funding opportunity. In fact, by the end of 2014 the stock of euro bonds issued by such borrowers was already growing as fast as its dollar counterpart.

Post-crisis, offshore dollar credit has grown fastest in those jurisdictions where it has been cheapest relative to local funding, especially emerging market economies (EMEs).[2] Authorities around the world use capital controls or macroprudential policy to raise the cost of dollar borrowing at home, but their policy reach does not extend to activities of multinational firms, which can borrow dollars (or euros) offshore to sidestep tight domestic funding conditions. This is one reason for the rapid growth in various quantitative measures of "global liquidity", which denotes the ease of financing in global financial markets (Box V.B).

[2] See R McCauley, P McGuire and V Sushko, "Global dollar credit: links to US monetary policy and leverage", *Economic Policy*, vol 30, issue 82, April 2015, pp 189–229.

Box V.A

Mapping the dollar and euro zones

This box uses simple regression methods to place currencies in three zones of influence corresponding to the main international currencies based on the currencies' degree of co-movement. The three reference currencies are the dollar, the euro (before 1999, the Deutsche mark) and the yen, consistent with their status as the three most transacted currencies in the world in the BIS Triennial Central Bank Survey. Thus defined, the dollar zone accounts for nearly 60% of world GDP, far more than the US share in world GDP, which is between 20 and 25%.

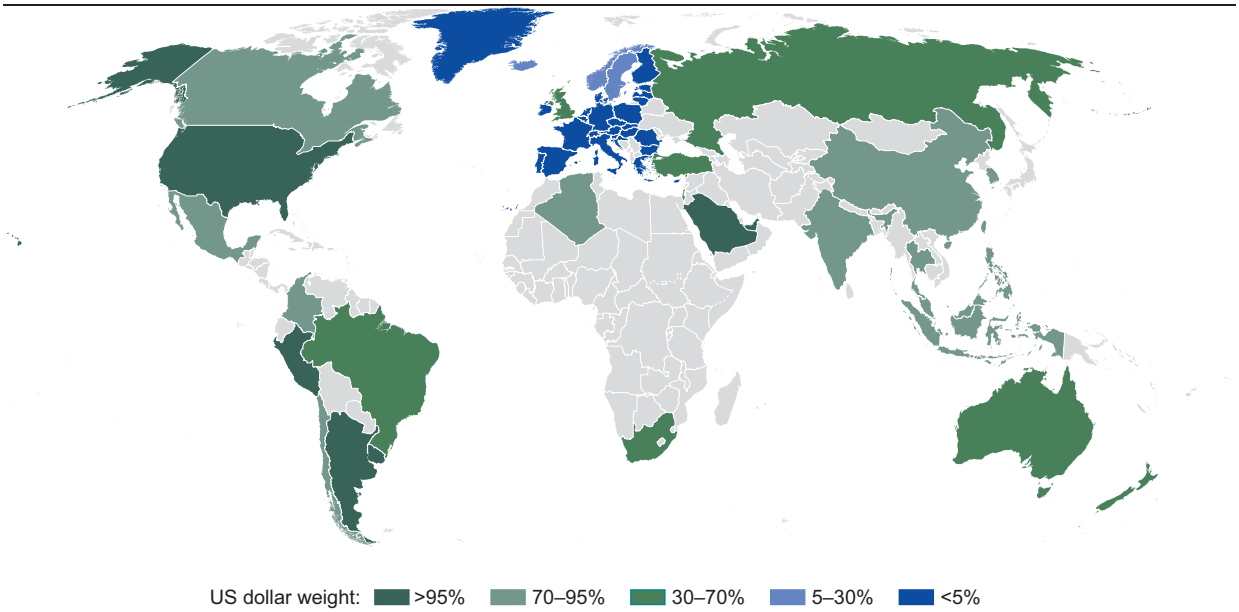
The dollar share is calculated in two steps. First, each currency is placed in or between zones. Each currency's weekly percentage change against the dollar is regressed on the weekly percentage change of the euro/dollar and yen/dollar rates. The dollar zone weight is calculated as 1 minus the corresponding regression coefficients. For example, the Hong Kong dollar is pegged to the US dollar, so the coefficients are zero and the dollar zone weight is 1. For the intermediate case of sterling, in 2013 the pound's estimated coefficient is 0.60 on the euro/dollar rate and 0.09 on the yen/dollar, making the currency's dollar weight 1 – 0.60 – 0.09, or 0.31. The results in Graph V.A show the dollar to be more global, the euro to be more regional and the yen to lack much external influence. The dollar weights can thus be read in reverse as euro weights, eg with the dark blue area representing over 95% euro weight.

Second, the dollar share is calculated across currencies using (PPP) GDP weights. The dollar zone weight for each of the 40 economies (50 before the euro) is multiplied by the respective GDP, and the product is added to the US GDP. This sum is then expressed as a share of the total GDP of the 43 major economies analysed, including those of the United States, the euro area and Japan. Graph V.1 plots these aggregate zone shares of global GDP.

There is strong cross-sectional evidence that a currency's co-movement with the dollar shapes the currency composition of its external portfolio, both official and private. For the two dozen economies that disclose the currency composition of official reserves, the dollar zone weight accounts for about two thirds of the variation in the dollar share across countries.① And in larger samples, the dollar zone weight is also strongly linked with the dollar share of cross-border bank deposits or loans and international bonds. The underlying motivation is the same for the official and private sectors: matching the portfolio weights to the co-movements of the domestic currency with major currencies serves to minimise the volatility of portfolio returns when measured in domestic currency.

Dollar zone in green larger than euro zone in blue

Graph V.A



Source: BIS calculation based on average elasticities of the national currency's dollar exchange rate with respect to euro/dollar and yen/dollar rates for 2011–14, inclusive.

① See R McCauley and T Chan, "Currency movements drive reserve composition", *BIS Quarterly Review*, December 2014, pp 23–36.

Monetary regimes also interact indirectly, through central bank responses to each other's policies. Central banks seem to set their policy rates with an eye on those of the Federal Reserve or ECB. This behaviour is sometimes explicitly noted, as in the cases of the Central Bank of Norway and the Swiss National Bank with reference to ECB policy, but appears to be widespread.

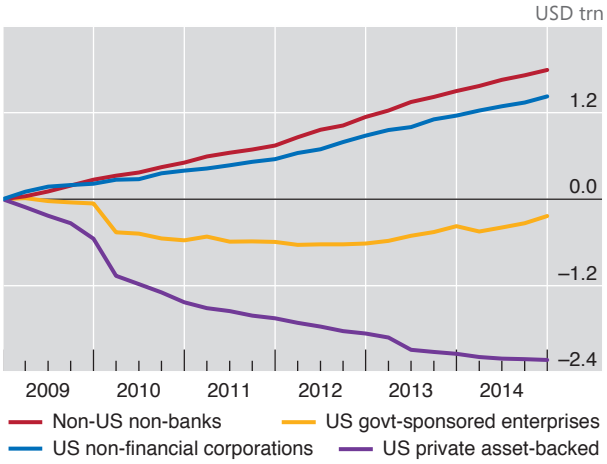
One reason is to limit exchange rate movements. Exchange rate flexibility has often been described as insulating the domestic economy from external developments, but this insulation is often overstated. In particular, appreciation can lead lenders to consider firms with debts denominated in foreign currency as better capitalised and therefore more creditworthy, reducing perceived risks associated with lending and increasing the availability of credit.[3] Through this and other mechanisms, such as carry trades and momentum trading, currencies can overshoot, shrinking the traded goods sector and leaving the economy vulnerable to a turn in the ease of global financing. Then, depreciation can lead to financial distress among firms with foreign currency debt. During the dollar's downswing from 2002 to 2011 (with an interruption in late 2008), many central banks resisted unwelcome appreciation against the dollar, in setting their own policy rates and by intervening in the currency market.

Indeed, many countries – not only EMEs but also advanced economies – appear to have kept interest rates below those that traditional domestic benchmarks would indicate, partly in response to low rates in core currencies. In the 1990s, policy rates were broadly in line with the Taylor rule, a simple interest rate rule prescribing a mechanical reaction to the output gap and the deviation of inflation from target. In

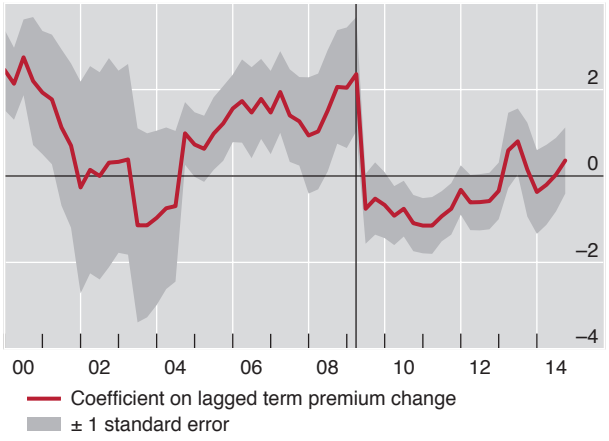
Federal Reserve spurs dollar bond issuance by non-US borrowers

Graph V.2

Change in bonds outstanding: US and non-US issuers



Offshore dollar issuance response to US term premium[1]



[1] Response of the quarterly growth in the stock of US dollar bonds issued outside the United States to the (lagged) change in the real term premium, estimated from 16-quarter rolling regressions that also include the lagged VIX to control for overall financial market conditions; see R McCauley, P McGuire and V Sushko, "Global dollar credit: links to US monetary policy and leverage", *Economic Policy*, vol 30, issue 82, April 2015, pp 189–229. The vertical line indicates end-Q1 2009. The 10-year real term premium is estimated using a joint macroeconomic and term structure model; see P Hördahl and O Tristani, "Inflation risk premia in the euro area and the United States", *International Journal of Central Banking*, September 2014, pp 1–47.

Sources: Federal Reserve; Bloomberg; BIS international debt securities statistics; BIS calculations.

[3] See V Bruno and H S Shin, "Cross-border banking and global liquidity", *Review of Economic Studies*, vol 82, issue 2, April 2015, pp 535–64.

Box V.B

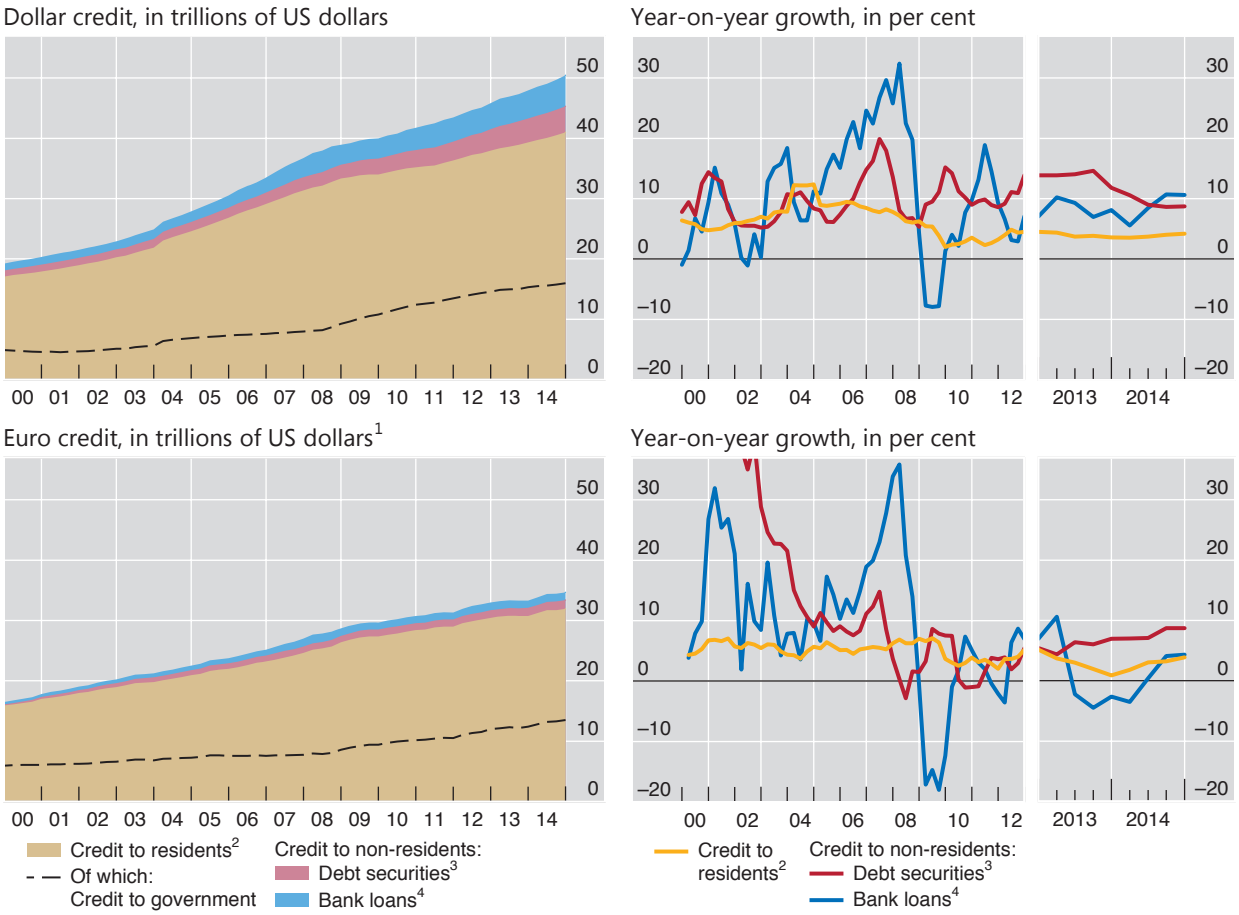
Global liquidity as global credit aggregates

Over the past several years, the BIS has developed indicators to track global liquidity conditions. The term global liquidity is used to mean the ease of financing in global financial markets. Total credit outstanding is one of its main footprints, as it shows the extent to which bond markets and banks have led to the build-up of exposures.① In covering US dollar and euro credit, this box focuses on the two largest components of global credit through which the monetary policies of the respective currency areas directly influence financial conditions in the rest of the world.

Global credit can be extended through bank loans or bonds, and each has a domestic and an international component. Graph V.B shows dollar- and euro-denominated debt, broken down by the location of the borrower. Some 80% of global non-financial dollar debt at end-2014 was incurred by US residents (top left-hand panel). Their liabilities include US public debt, US household debt and US corporate debt. But $9.5 trillion (19%) of dollar credit was extended to non-bank borrowers located *outside* the United States, and these entities are as exposed to the

Global credit in US dollars and euros extended to the non-bank sector

Graph V.B



[1] At constant end-Q4 2014 exchange rates. [2] Credit to the non-financial sector in the United States/euro area, excluding identified credit to borrowers in non-domestic currencies (ie cross-border and locally extended loans and outstanding international bonds in non-domestic currencies). [3] Outstanding debt securities issued outside the United States/euro area by non-bank issuers. [4] Cross-border and locally extended loans to non-banks outside the United States/euro area. For China, locally extended loans are derived from national data on total local lending in foreign currencies on the assumption that 80% are denominated in US dollars. For other non-BIS reporting countries, local US dollar/euro loans to non-banks are proxied by all BIS reporting banks' gross cross-border US dollar/euro loans to banks in the country, on the assumption that these funds are then extended to non-banks. See R McCauley, P McGuire and V Sushko, "Global dollar credit: links to US monetary policy and leverage", *Economic Policy*, vol 30, issue 82, April 2015, pp 189–229.

Sources: National financial accounts; Datastream; BIS international debt securities statistics and locational banking statistics.

US monetary policy stance as US residents are. At 13% of non-US GDP, the stock of offshore dollar credit exceeds its euro counterpart worth $2.7 trillion (bottom left-hand panel). Compared with borrowing in US dollars, a larger share of overall borrowing in euros takes place from inside the same currency area (92%).

The international credit component tends to be more procyclical and volatile. International bank lending in both dollars and euros outpaced domestic credit in the boom that preceded the Great Financial Crisis, and contracted once the crisis broke out (Graph V.B, right-hand panels). Bond markets partly substituted for impaired bank lending in the immediate aftermath of the crisis, and increased demand for funding went hand in hand with higher yield spreads. Since 2010, the search for yield has enabled a surge in issuance at compressed spreads that has helped to push the share of bonds in international credit to 46%. In this second phase of global liquidity, bond markets and the asset management industry have taken centre stage in shaping global liquidity conditions.

① See BIS, "Highlights of global financing flows", *BIS Quarterly Review*, March 2015, pp 13–29; and www.bis.org/statistics/gli.htm.

the early 2000s, however, actual policy rates drifted persistently below the levels implied by the Taylor rule, suggesting that monetary policy became systematically accommodative (Graph V.3). Many advanced economies apparently hesitated to raise interest rates during the boom, and have maintained them near zero since the crisis. For their part, EME authorities appear to have set policy rates low out of concern over capital flows and appreciation (Graph V.3, right-hand panel). The empirical significance of US interest rates in influencing policy rates elsewhere provides additional evidence for follow-the-leader behaviour (Box V.C). While this simple exercise has important limitations, it points to competitive easing as a way of sustaining external demand. More than 20 central banks have eased monetary policy since December 2014, some explicitly responding to external conditions (Chapter IV).

Resistance to appreciation has also taken the form of currency intervention, which itself feeds back into global monetary ease. Many central banks have intervened directly in the foreign exchange market, typically buying dollars, and then investing the proceeds in bonds issued by the major governments. Unlike major central banks' large-scale domestic bond purchases, reserve managers have not sought to lower yields in the bond markets in which they invest. Nevertheless, the secular reserve accumulation and balance sheet policies of major central banks have combined to push estimated official bond holdings to more than $12 trillion out of the $31 trillion in US, euro area, Japanese and UK government bonds (Graph II.9, left-hand panel). Such holdings account for over half of the outstanding stock of US Treasury securities and more than 40% of the combined stock of Treasury and agency securities (Graph II.9, right-hand panel).

As a result, monetary policies of advanced and emerging market economies have reinforced each other. Easy monetary conditions at the centre have led to easy monetary and financial conditions in the rest of the world: there, firms and governments have boosted dollar and euro borrowing and authorities have resisted unwelcome currency appreciation. In turn, their foreign exchange intervention has raised official investment in major bond markets, further compressing bond yields there. With central banks and reserve managers bidding for duration shoulder to shoulder with pension funds and life insurers, bond yields have declined to record lows and the term premium has turned negative (Chapter II).

Interaction of financial regimes

Financial market integration has allowed common global factors to drive capital flows and asset prices. The common factors have partly shifted between the two phases of global liquidity, pre- and post-crisis.

Box V.C

International monetary spillovers

Over recent years, interest rates in EMEs and advanced economies moved closely together with interest rates in large advanced economies, particularly the United States. This close correlation could reflect the response to common macroeconomic developments affecting all countries. But it could also reflect global interest rate spillovers from large advanced economies. Interest rate spillovers can result from explicit exchange rate policies or attempts to contain exchange rate and capital flow pressures resulting from yield differentials vis-à-vis key currencies, and from global investor arbitrage tying capital market rates together.

To shed light on this question, a panel of 30 emerging market and advanced economies over the period 2000–14 is investigated in a regression analysis.① The analysis shows a strong relationship between changes in interest rates prevailing in these economies and changes in US interest rates, even after controlling for domestic macroeconomic conditions and the global business and financial cycle. For short-term interest rates, a 100 basis point change in US rates is associated with an average 34 basis point change in emerging market and small advanced economies (Table V.C, first column). For long-term interest rates, the effect is stronger: a 100 basis point change in the US bond yield is associated with an average 59 basis point change in the yields of these economies (second column). Besides US interest rates, the degree of global investor risk aversion, as measured by the VIX, also consistently emerges as an important driver of these interest rates.

Interest rate spillovers[1]

Table V.C

	Dependent variable			
Explanatory variable	Change in 3-month rate[2]	Change in 10-year bond yield[2]	Policy rate deviation[3]	Policy rate level[4]
US rate	0.34***	0.59***	0.43***	0.70***
VIX	0.51***	0.21**	1.99***	1.54***
F-stat US output and inflation[5]	0.24	2.35*	20.80***	6.80***
F-stat domestic output and inflation[5]	17.18***	2.09	.	12.60***
R^2	0.25	0.26	0.45	0.82

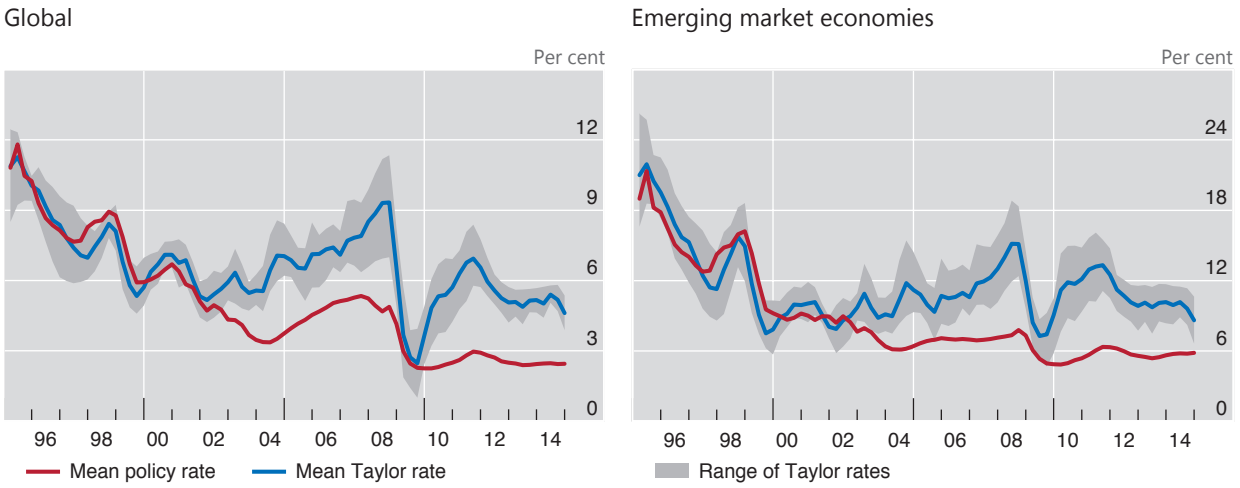
[1] Results from unbalanced fixed effects panel regressions for 30 emerging market and advanced economies (Australia, Brazil, Canada, Chile, China, Chinese Taipei, Colombia, the Czech Republic, Denmark, Hong Kong SAR, Hungary, India, Indonesia, Israel, Korea, Malaysia, Mexico, New Zealand, Norway, Peru, the Philippines, Poland, Russia, Singapore, South Africa, Sweden, Switzerland, Thailand, Turkey and the United Kingdom) for the sample period Q1 2000–Q4 2014. ***/**/* denotes results significant at the 1/5/10% level based on cluster-robust standard errors. [2] Panel estimation of $\Delta r_t^i = \beta_0 + \alpha_0^i + \beta_1 \Delta r_t^{us} + \beta_2 X_t^i + \varepsilon_t^i$ where Δr_t^i indicates the quarter-on-quarter change in economy i's three-month money market rate and 10-year bond yield and Δr_t^{us} is the change in the corresponding US rate; X includes the change in US real GDP growth and inflation, the log change in the VIX and the change in domestic real GDP growth and inflation. [3] Panel estimation of $i_t^i - Taylor_t^i = \beta_0 + \alpha_0^i + \beta_1 i_t^{us} + \beta_2 X_t^i + \varepsilon_t^i$, where i_t^i is the policy rate, $Taylor_t^i$ is the policy rate implied by a normative Taylor rule (calculated following B Hofmann and B Bogdanova, "Taylor rules and monetary policy: a global 'Great Deviation'?", *BIS Quarterly Review*, September 2012, pp 37–49), i_t^{us} is the federal funds rate and X includes US real GDP growth, US inflation and the (log) VIX. [4] Panel estimation of $i_t^i = \beta_0 + \alpha_0^i + \beta_1 i_t^{us} + \beta_2 X_t^i + \varepsilon_t^i$ where X includes US real GDP growth, US inflation and the (log) VIX as well as domestic inflation and the domestic output gap (calculated using a standard Hodrick-Prescott filter). [5] F-test of the null hypothesis that coefficients of the variables equal zero.

Furthermore, the persistently low global policy rates relative to Taylor rule-implied levels since the early 2000s (Graph V.3) reflect, at least in part, the effect of low policy rates prevailing in the United States over this period. Specifically, a 100 basis point cut in the US federal funds rate is found to lower EME and other advanced economy policy rates by 43 basis points relative to the levels implied by a standard normative Taylor rule (Table V.C, third column). When estimating a descriptive Taylor rule, the estimated impact of the US policy rate is even higher: some 70 basis points (fourth column). In sum, the results suggest an economically significant causal relationship from US interest rates to interest rates in emerging market and other advanced economies.

① See B Hofmann and E Takáts, "International monetary spillovers", *BIS Quarterly Review*, forthcoming.

Policy rates have been low compared with Taylor rates[1]

Graph V.3



The Taylor rates are calculated as $i = r^*+\pi^* + 1.5(\pi-\pi^*) + 0.5y$, where π is a measure of inflation, y is a measure of the output gap, π^* is the inflation target and r^* is the long-run real interest rate, here proxied by real trend output growth. The graph shows the mean and the range of the Taylor rates of different inflation/output gap combinations, obtained by combining four measures of inflation (headline, core, GDP deflator and consensus headline forecasts) with four measures of the output gap (obtained using Hodrick-Prescott (HP) filter, segmented linear trend and unobserved components techniques, and IMF estimates). π^* is set equal to the official inflation target/objective, and otherwise to the sample average or trend inflation estimated through a standard HP filter. See B Hofmann and B Bogdanova, "Taylor rules and monetary policy: a global 'Great Deviation'?", *BIS Quarterly Review*, September 2012, pp 37–49.

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

Sources: IMF, *International Financial Statistics* and *World Economic Outlook*; Bloomberg; CEIC; Consensus Economics; Datastream; national data; BIS calculations.

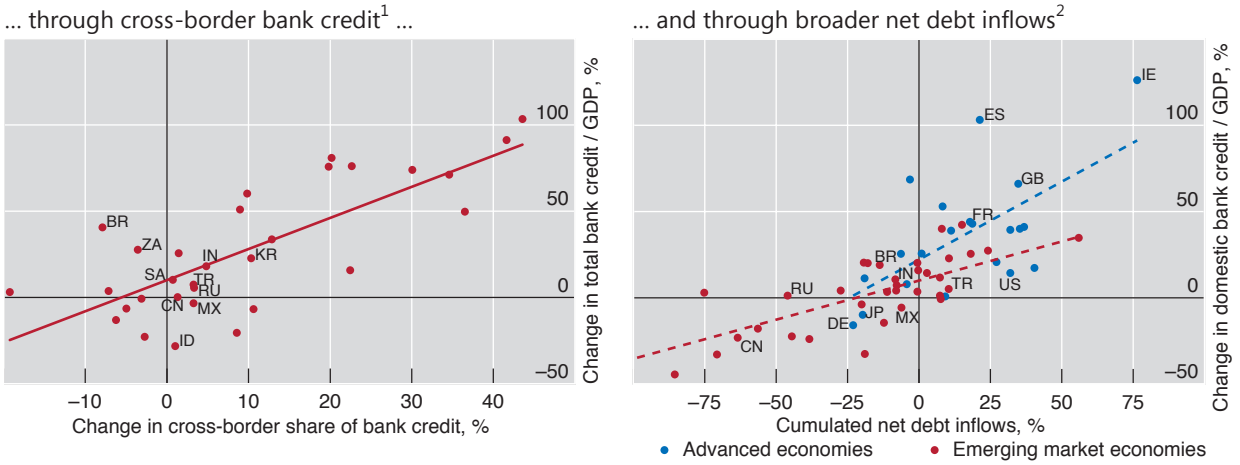
The bank flows that dominated in the first, pre-crisis, phase of global liquidity drew on easy leverage, predictable policy rates and low volatility, as proxied by the VIX.[4] These flows enabled domestic credit booms, freeing them from the constraint of the domestic funding base. In a sample of 31 EMEs between early 2002 and 2008, a rise in the share of cross-border bank funding, extended both directly to domestic non-banks and indirectly through banks, helped boost the ratio of bank credit to GDP (Graph V.4, left-hand panel). Banks found non-core liabilities abroad to fund booming credit at home.[5]

Analysis of a broader sample of 62 countries and a more inclusive measure of international capital flows points to a similar dynamic. Here, the larger the net debt inflows, including both portfolio and bank flows, the larger the increase in an economy's ratio of bank credit to GDP (Graph V.4, right-hand panel). The inclusion of Ireland, Spain and the United Kingdom shows that a domestic credit boom's reliance on external financing is not a symptom of financial underdevelopment. In

[4] See H Rey, "Dilemma not trilemma: the global financial cycle and monetary policy independence", in *Global dimensions of unconventional monetary policy*, proceedings of the Federal Reserve Bank of Kansas City Jackson Hole symposium, August 2013, pp 285–333.

[5] See J-H Hahm, H S Shin and K Shin, "Noncore bank liabilities and financial vulnerability", *Journal of Money, Credit and Banking*, vol 45, issue s1, April 2013, pp 3–36.

Capital flows contributed to domestic credit growth during the boom … Graph V.4



BR = Brazil; CN = China; DE = Germany; ES = Spain; FR = France; GB= United Kingdom; ID = Indonesia; IE = Ireland; IN = India; JP = Japan; KR = Korea; MX = Mexico; RU = Russia; SA= Saudi Arabia; TR = Turkey; US= United States; ZA = South Africa.

[1] Q1 2002–Q2 2008. "Total bank credit" adds to domestic credit (IFS line 32) the stock of cross-border bank credit to non-banks in the country (using the BIS locational banking statistics). "Cross-border share of bank credit" is the share of total bank credit to non-banks received cross-border through direct lending to non-banks and through net lending to banks in the country (if positive). Based on S Avdjiev, R McCauley and P McGuire, "Rapid credit growth and international credit: challenges for Asia", *BIS Working Papers*, no 377, April 2012. [2] Domestic credit from IFS line 32, end-2002 to end-2008. The x-axis shows balance of payments net debt inflows as a share of GDP, cumulated over 2003–08. Net debt flows are calculated by aggregating changes in net portfolio debt assets, net other investment and reserve assets, all expressed as inflows. Extends P Lane and P McQuade, "Domestic credit growth and international capital flows", *Scandinavian Journal of Economics*, vol 116(1), January 2014, pp 218–52.

Sources: IMF, *International Financial Statistics* and *World Economic Outlook*; BIS international banking statistics; BIS calculations.

fact, in the subsample of 23 advanced economies the reliance on capital inflows is greater than among EMEs, as the steeper fitted line suggests.

In the second, post-crisis, phase of global liquidity, the term premium on sovereign bonds has become a more important driver of funding conditions. Although cross-border bank credit has continued to expand strongly in EMEs, it has contracted sharply among advanced economies, while bond financing has surged across the board. Even as bond flows have gained prominence, the term premium has emerged as the salient global price of risk in integrated financial markets.

Studies of the spillovers across global bond markets around official large-scale bond purchase announcements have highlighted the strong co-movement of bond yields. If investors treat bonds denominated in different currencies as close substitutes, purchases in one market also depress yields elsewhere. Table V.3 illustrates this point, summarising several studies that estimate the basis point moves in various advanced bond markets that correspond to a 100 basis point move in the US Treasury market. In addition, local currency EME bonds have also co-moved much more closely with Treasuries than a decade ago.[6]

Heretofore, the relationship across even major bond markets appeared asymmetric, with US bond yields driving those elsewhere, but in the past year this

[6] Compare R McCauley and G Jiang, "Diversifying with Asian local currency bonds", *BIS Quarterly Review*, September 2004, pp 51–66 and the following: K Miyajima, M Mohanty and J Yetman, "Spillovers of US unconventional monetary policy to Asia: the role of long-term interest rates", *BIS Working Papers*, no 478, December 2014; Q Chen, A Filardo, D He and F Zhu, "Financial crisis, US unconventional monetary policy and international spillovers", *BIS Working Papers*, no 494, March 2015; and Box V.C.

Estimates of spillovers of US bond yields to mature bond markets

Basis points per 100 basis points on the US Treasury bond — Table V.3

Bond market	Gerlach-Kristen et al (2012): Japanese intervention, 2003–04		Neely (2015): LSAP1 events	Bauer and Neely (2014): LSAP1 events	Rogers et al (2014): intraday data	Obstfeld (2015): long-term levels, monthly data 1989–2014
	Government	Swap				
AU	…	…	67	37	…	74
CA	…	…	53	54	…	129
CH	53	45	…	…	…	88
DE	46	41	41	44	36	115
ES	50	41	…	…	…	111
FR	46	41	…	…	…	118
GB	59	45	46	…	48	137
IT	46	41	…	…	16	158
JP	44	54	19	12	20	69

AU = Australia; CA = Canada; CH = Switzerland; DE = Germany; ES = Spain; FR = France; GB = United Kingdom; IT = Italy; JP = Japan.

LSAP1 = first Federal Reserve large-scale asset (ie bond) purchase programme.

Sources: P Gerlach-Kristen, R McCauley and K Ueda, "Currency intervention and the global portfolio balance effect: Japanese lessons", *BIS Working Papers*, no 389, October 2012; C Neely, "The large-scale asset purchases had large international effects", *Journal of Banking and Finance*, vol 52, 2015, pp 101–11; M Bauer and C Neely, "International channels of the Fed's unconventional monetary policy", *Journal of International Money and Finance*, vol 44, June 2014, pp 24–46; J Rogers, C Scotti and J Wright, "Evaluating asset-market effects of unconventional monetary policy: a cross-country comparison", *Economic Policy*, vol 29, issue 80, October 2014, pp 749–99; M Obstfeld, "Trilemmas and trade-offs: living with financial globalisation", *BIS Working Papers*, no 480, January 2015; BIS calculations.

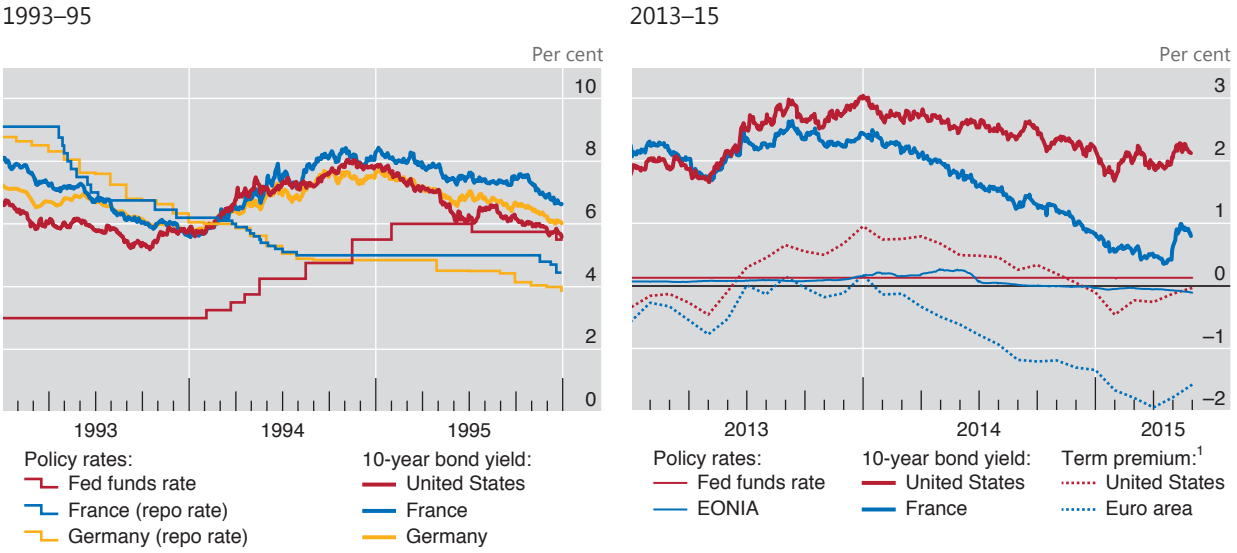
seems to have changed. In particular, there are signs that the euro area bond market has been moving its US counterpart. Anticipation of ECB large-scale bond purchases put downward pressure on French and German bond yields and, through co-movement of term premia, on US bond yields as well, despite the expected divergence in policy rates (Graph V.5, right-hand panel). This contrasts with the experience in early 1994, which epitomises previous patterns. At the time, the Federal Reserve was raising the policy rate while the Bank of France and the Deutsche Bundesbank were reducing theirs, but the backup in US bond yields was transmitted to Europe (Graph V.5, left-hand panel).[7]

Current concerns

To summarise, the workings of the IMFS post-crisis have spread easy monetary and financial conditions from the reserve currency areas to the rest of the world, just as they did pre-crisis. Global financial conditions have consequently loosened to an extent that may not prove consistent with lasting financial and macroeconomic stability. Credit booms in EMEs and some advanced economies less affected by the crisis have built up tell-tale financial imbalances. In the short run, the IMFS has tilted conditions towards expansion. But in the longer run, financial busts, were they to materialise, would tilt them towards contraction.

[7] See C Borio and R McCauley, "The economics of recent bond yield volatility", *BIS Economic Papers*, no 45, July 1996.

Transatlantic waves: from policy rates to bond yields — Graph V.5



[1] Decomposition of the 10-year nominal yield according to an estimated joint macroeconomic and term structure model; see P Hördahl and O Tristani, "Inflation risk premia in the euro area and the United States", *International Journal of Central Banking*, September 2014, pp 1–47. Yields are expressed in zero coupon terms; for the euro area, French government bond data are used.

Sources: Bloomberg; national data; BIS calculations.

Monetary policy divergence across key currencies and renewed dollar appreciation pose risks. Ease in the euro area might prolong global ease, if firms and governments around the world can substitute euro funding for dollar funding. However, the large stock of dollar debt outstanding means that a tightening of dollar credit is likely to prove consequential. Thus, renewed dollar strength could expose vulnerabilities (Chapter III), especially in those firms that have collectively borrowed trillions of dollars. Admittedly, it is well known that the US economy has a short position in the dollar that funds a long position in other currencies. And by the same token, the rest of the world must hold more dollar assets than dollar liabilities and thus enjoy valuation gains in aggregate when the dollar appreciates. But even in a country with a long dollar position, the distribution of currency positions across sectors matters greatly for the outcome. For example, in many EMEs the official sector has a long dollar position whereas the corporate sector carries a short one (Box V.D). Absent transfers from the (gaining) official sector to the (losing) corporate sector, the economy may well be hurt by dollar strength.

Dollar strength, monetary policy divergence and heavy official holdings in the global bond market could lead to volatility. Were EMEs to draw down reserves substantially, their selling bonds in the key currencies could create unprecedented cross-currents in global bond markets. ECB and Bank of Japan bond purchases, EME selling and, eventually, the Federal Reserve's not rolling over maturing bonds could confront the remaining private investors with a difficult and shifting problem of bond pricing.

Limits and prospects in international policy coordination

Policies to address the issues raised in this chapter require more than each country managing its inflation and business cycle. A broader notion of keeping one's house

Box V.D

Valuation effects of dollar appreciation

This box uses the example of Korea to illustrate that dollar appreciation can deliver wealth gains to non-US residents as a whole, while still representing a tightening of financial conditions for non-US firms that have funded themselves in the dollar. The Korean official sector can gain from dollar appreciation but need not adjust its spending, while the Korean corporate sector can lose net worth and face tighter credit.

It is by now well known that dollar appreciation boosts US net international liabilities.① This is because US residents have dollar-denominated liabilities to the rest of the world that exceed their corresponding assets to the tune of 39% of GDP. With the appreciation of the dollar in 2014, the US net international investment position declined from –$5.4 trillion to –$6.9 trillion, as US assets stopped growing in dollar terms despite rising local currency valuations. This $1.5 trillion difference was more than three times the current account of $410 billion. Accordingly, the rest of the world's wealth increased.

Typical of the rest of the world, Korea's net international investment position as a whole gained from dollar appreciation. Still, Korean firms that have borrowed dollars can still see their net worth fall. Overall, the country's modestly positive ($82 billion in Table V.D) external position shows net foreign currency assets of $719 billion, with over half held by the official sector (official reserve assets of $364 billion) and substantial holdings by institutional investors (portfolio assets of $204 billion). A substantial fraction of portfolio and other foreign currency liabilities ($348 billion), and $65 billion of foreign currency loans booked by banks in Korea, are owed by the corporate sector. Moreover, BIS data show an additional $7 billion of mostly dollar bonds issued by offshore affiliates of Korean non-financial firms, and there is also offshore bank credit. Dollar appreciation leads to official gains that are not conveyed to firms that lose net worth.

Much analysis of international balance sheets, in general, and the insurance afforded by foreign exchange reserve holdings, in particular, implicitly suffers from a fallacy of division, according to which what is true of the whole is true of the parts. In the absence of transfers made when the domestic currency depreciates – which would themselves be fraught with moral hazard – the gains in the public sector do not offset corporate losses. Firms need to adjust their spending and hiring. And if the authorities eventually deploy international reserves to provide dollar liquidity to banks and firms, the intervention may follow disruptions that have already exacted a price.

Korea's external assets and liabilities, end-2014[1]

Table V.D

	Assets	Liabilities	Net assets
Domestic currency	13	650	–637
Direct investment	.	182	–182
Portfolio	2	441	–439
Other[1]	10	27	–17
Foreign currency	1,068	348	719
Direct investment	259	.	259
Portfolio	204	149	55
Other[1]	242	199	42
Official reserve assets	364	.	364
Total	1,080	998	82

[1] Includes financial derivatives.

Source: Bank of Korea.

① See C Tille, "The impact of exchange rate movements on US foreign debt", Federal Reserve Bank of New York, *Current Issues in Economics and Finance*, vol 9, no 1, January 2003.

in order suggests policymakers deploy monetary, prudential and fiscal policies to manage financial cycles to ensure lasting monetary, financial and macroeconomic stability (Chapters I and IV). The resulting reduction in the frequency and depth of credit booms and busts would greatly reduce negative cross-country spillovers.

In addition, policymakers could give more weight to international interactions, including shared exposures, spillovers and feedbacks, with a view to keeping the global village in order. Policies could either seek to prevent crises, through measures to restrain the build-up of financial imbalances, or to strengthen crisis management, including through safety nets. An ounce of crisis prevention is worth a pound of crisis management: there are clear welfare benefits from reducing the incidence and severity of crises and clear limits of foresight and moral hazard in designing effective safety nets.

International policy coordination can occur at various depths. Enlightened self-interest takes international spillovers into account to the extent that they spill back on one's own economy. However, even if countries did their best individually, this would still fall short of the mark if there were significant international spillovers, as in today's era of global liquidity. Moving towards a more efficient outcome would require greater cooperation, including ad hoc joint action, and possibly even agreement on rules of the game that constrain domestic policies.

Obstacles present themselves in terms of both analysis and cooperation. There is the difficulty of agreeing on a diagnosis of what ails the IMFS. And even if a common understanding of international spillovers and their causes emerged, it would remain challenging to forge and to maintain a common approach among multiple actors of varying sizes subject to differing domestic constraints.

Such possibilities and obstacles are evident in the discussion concerning crisis management. During the Great Financial Crisis, central banks proved able to make swift joint adjustments to their policy stances and to coordinate closely in extending foreign exchange swaps to each other. Funding extended under dollar swaps reached almost $600 billion (and, under euro swaps, €6 billion). The dollar swap lines supported financial stability by allowing the funding of foreign banks with limited access to Federal Reserve facilities. In turn, they also restored the monetary transmission mechanism after banks had been bidding up dollar Libor relative to the federal funds rate.

Today, proposals to modify and extend safety nets face obstacles. One reason is deep analytical disagreement. Is reserve accumulation a by-product of exchange rate management, or a form of self-insurance against domestic and external crises? Should international liquidity facilities, including currency swap lines between central banks, be broadened, and what is their best design? Would enhanced safety nets lead to smaller foreign exchange reserves? And, even if agreement were reached, many aspects of international risk-sharing would remain problematic. Despite the room for improvement, the status quo may well persist.

All this reinforces the case for crisis prevention. Here, central banks could seek to internalise the effects of their own policies. An improved exchange of information would help authorities to reach a better understanding of international spillovers and spillbacks. For instance, if the major central banks' monetary policies have indeed induced competitive easing among EMEs, the resulting financial imbalances may ultimately hurt the advanced economies. What is more, such spillbacks may be stronger than in the past, in line with EMEs' growing weight in the world economy (Chapter III). Similarly, the outsize official role in major bond markets points to the need for policymakers to pay attention to global effects. However, while global reserve managers might collectively benefit from taking into account the effect of their investment behaviour on global bond yields, their individual incentive is to ignore international spillovers.

Box V.E

Consolidating the US external balance sheet

Much of international macroeconomics assumes that national borders delimit currency zones and decision-making units. Just as the national accounts do, it assumes that those borders define the relevant economic territory: different currencies do not compete within a given country and firms operate exclusively within national borders. In reality, neither is the case. Not only does the domain of major currencies extend outside their country of issue (Boxes V.A and V.B), but multinational firms, be they financial or non-financial, operate across borders. Management focuses on group-wide profits and risks, and balance sheets span national boundaries. A consolidated perspective better reflects the reach of multinational firms and the extent of global integration.

This box uses the US example to illustrate how such a consolidated view of foreign assets and liabilities differs from the official international investment position (IIP) recorded on a residence basis – the defining criterion of the national accounts and balance of payment statistics. These are denoted "locational" in the first two columns of Table V.E. The process of consolidation aligns balance sheets with the nationality of ownership rather than with the location where the assets and liabilities are booked. This amounts to redrawing the US border to include the foreign balance sheets of US-owned firms, and to exclude the US balance sheets of foreign firms. This consolidation is performed here for the banking sector and the non-bank business sector (multinational companies).

US international investment position: from locational to consolidated

In billions of dollars at end-2012 Table V.E

	Locational		Consolidated	
	Assets	Liabilities	Assets	Liabilities
Bank-reported				
Cross-border positions	3,898	3,633	.	.
Consolidated US banks[1]	.	.	3,330	2,958
Foreign banks[2]	.	.	2,465	3,150
Direct investment				
Cross-border positions	5,078	3,057	.	.
US multinational companies[3]	.	.	20,250	15,173
Foreign multinationals[4]	.	.	6,863	9,920
Portfolio investment	7,531	8,446	7,531	8,446
Non-bank reported[5]	845	657	1,491	782
US currency	.	454	.	454
Official assets and liabilities	666	5,692	666	5,692
Total[6]	18,018	21,940	42,596	46,575
Memo: Sum of assets and liabilities	*39,957*		*89,171*	

[1] US banks' foreign claims are from the BIS consolidated banking statistics on an ultimate risk basis (Table 9D); their foreign liabilities are estimated as the sum of US banks' local liabilities in all currencies booked outside the United States, and their cross-border liabilities to unaffiliated parties, excluding those to US residents, and excluding liabilities to official monetary institutions booked in the US (which are already included in "official liabilities"). [2] The local liabilities of foreign-owned banks operating in the United States appear on the asset side, being owed to US residents. Conversely, their claims on US residents are US liabilities. Thus, consolidated US assets are foreign banks' local liabilities in local currency to US residents. And consolidated US liabilities are foreign banks' local claims in local currency on US residents. [3] Total assets of US foreign affiliates abroad, all industries excluding banking. Imputed liabilities equal total assets less direct investment position. [4] Total assets of foreign-owned US affiliates, all industries excluding banking. Imputed liabilities equal total assets less direct investment position. The affiliates' assets appear as a US foreign liability, and vice versa. [5] Financial assets and liabilities reported by non-banks, including trade credit. "Consolidated" columns also contain assets and liabilities banks in the United States hold in custody for domestic non-bank entities. [6] Excludes financial derivatives.

Sources: US Bureau of Economic Analysis; BIS international banking statistics; BIS calculations.

The first step replaces the banks' external positions with consolidated BIS data (three rows under "bank-reported" in Table V.E). This removes all cross-border claims of, say, BNP Paribas New York on the rest of the world (these being French assets), and adds JPMorgan's consolidated foreign claims, yielding a total of $3.330 trillion for reporting US banks combined. Similarly, on the liabilities side, out goes any cross-border liability of BNP Paribas New York, and in comes JPMorgan's global foreign liabilities, to give an estimated $2.958 trillion for US banks. Moreover, foreign banks' local operations in the United States, which are not part of the US external position, further add to US consolidated assets and liabilities, respectively, to the extent that US residents provide funding ($2.465 trillion) to, or receive credit ($3.150 trillion) from, the US offices of foreign banks. Consolidating banks raises the sum of US foreign assets and liabilities from $40 trillion (IIP) to $45 trillion.

The second step consolidates foreign-owned multinational companies (excluding banks) in an analogous, though coarser, way (owing to data limitations). The cross-border direct investment positions of non-banks, assets and liabilities, are replaced by the (larger) total assets of US multinationals outside the United States and by those of foreign multinationals in the United States, respectively (rows under "direct investment" in Table V.E). Out goes General Electric's equity position in its French subsidiary, and in comes that subsidiary's total assets, resulting in $20,250 billion for all US-owned multinationals combined. These assets exceed the corresponding ownership claims (consisting of $5,078 billion worth of equity and equity-like inter-affiliate debt in the IIP) because US multinationals also borrow abroad; these liabilities (an estimated $15,173 billion) in turn add to US foreign liabilities. As for foreign multinationals, French firm Total's stake in its US subsidiary is removed, and its US assets are added – yielding $9,920 billion for foreign multinationals. Foreign multinationals' liabilities ($6,863 billion) count as a US foreign asset. This step sextuples directly held corporate assets and liabilities, but leaves US net assets unchanged.

Together, consolidating banks and multinational companies more than doubles the gross foreign position of the United States. US external assets and liabilities combined jump from $40 trillion on a residence basis (IIP) to an estimated $89 trillion when measured on a consolidated basis. The example reveals that the US economy is more open, and its foreign balance sheet larger, than is apparent from the external position derived from the balance of payments. The calculation of the US current account, on the other hand, should not be affected by consolidation, since foreign earnings are included in net investment income whether they are repatriated or not.

It may be difficult to go beyond enlightened self-interest and to revisit rules of the game more broadly.[8] Many reject a global perspective in the realm of monetary policy. Accordingly, domestic mandates ask major reserve-issuing central banks to set policy for a smaller economic domain than that occupied by their currencies.

This interpretation of domestic mandates contrasts sharply with successful international cooperation in the realm of financial regulation and supervision. There, national mandates have not precluded extensive international cooperation and the development of global rules.

A better understanding of the shortcomings of the current IMFS would already be a big step forward. A widely held view is that the main problem is the IMFS's apparent inability to prevent large current account imbalances. This view of imbalances is the prevailing one in international forums and implies specific adjustment policies, such as those associated with the G20 Mutual Assessment Process.[9]

[8] The case for change has been put forward by R Rajan, "Competitive monetary easing: is it yesterday once more?", remarks at the Brookings Institution, 10 April 2014. For more sceptical views on policy coordination, see eg S Fischer, "The Federal Reserve and the global economy", Per Jacobsson Foundation Lecture at the IMF/World Bank Annual Meetings, 11 October 2014; and B Cœuré, "Domestic and cross-border spillovers of unconventional monetary policies", remarks at the Swiss National Bank-IMF conference "Monetary policy challenges in a changing world", 12 May 2015. See also J Caruana, "The international monetary and financial system: eliminating the blind spot", remarks at the IMF conference "Rethinking macro policy III: progress or confusion?", 16 April 2015; and W Dudley, "US monetary policy and emerging market economies", remarks at the Federal Reserve Bank of New York roundtable discussion "Three decades of crises: what have we learned?", 27 March 2014.

[9] The European Commission's Macroeconomic Imbalance Procedure goes further in complementing its surveillance of external imbalances with indicators on internal financial imbalances.

The focus on current accounts and the corresponding net resource flows, however, arguably glosses over the IMFS's fundamental weakness. The aim of rebalancing global demand reduces the notion of imbalances to net flows in goods and services between countries, and neglects the greater risk of *financial* imbalances building up within and across countries. To be sure, large current account deficits often point to underlying problems, but financial booms and busts can and do develop in surplus countries as well. An aggregate surplus position may well conceal such vulnerabilities. Financial imbalances are more closely linked to domestic and international gross positions, and need not leave a mark on cross-border net flows – what current accounts represent.[10] Indeed, financial imbalances may not show up in a country's balance of payments at all if multinationals issue debt offshore for their use abroad, for instance. This, in turn, raises the question of the appropriate unit of analysis in international finance, with consequences for how one should measure the risks (Box V.E). Making progress on the design of the IMFS thus calls for a new diagnosis that accounts for financial imbalances as a basis for broad adjustments to domestic policy regimes and their international interaction.

[10] See C Borio and P Disyatat, "Global imbalances and the global crisis: link or no link?", *BIS Working Papers*, no 346, May 2011.

VI. Old and new risks in the financial landscape

Changes to risk perceptions, new regulatory frameworks and persistently low interest rates in advanced economies have shaped the post-crisis behaviour and business models of financial institutions. Banks are still adapting to new regulation and striving to regain market confidence, while institutional investors shed traditional exposures. In parallel, the growing influence of asset managers is altering the contours of systemic risk.

Advanced economy banks are still underperforming their emerging market economy (EME) peers. Banks have ploughed a good part of their profits into regulatory capital, which bodes well for the future. But, despite these improvements, markets remain sceptical about firms operating in a difficult environment amid low interest rates and subdued economic activity. If they persist, these conditions will erode profits and further increase banks' exposure to interest rate risk, calling their resilience into question. By contrast, EME banks still enjoy market confidence, as buoyant domestic conditions continue to mask growing financial imbalances (Chapter III).

The prolonged period of low interest rates has been particularly challenging for institutional investors. In the face of ballooning liability values and muted asset returns, insurance companies have explored new investment strategies and have increasingly offloaded risks onto their customers. Even though these measures have paid off so far, they may not be enough to counter future headwinds stemming from plateauing equity valuations and the erosion of fixed income returns. Confronted by similar difficulties, pension funds are posting large and widening deficits that could take a toll on the real economy.

Market-based intermediation has filled the gap left by strained banks. In particular, the asset management sector has grown rapidly, supporting economic activity but also raising new risks. Even when asset managers operate with low leverage, their investment mandates can give rise to leverage-like behaviour that amplifies and propagates financial stress. In recent years, asset managers have catered to the needs of yield-hungry investors by directing funds to emerging market economies. This has added fuel to financial booms there, possibly exacerbating vulnerabilities. More generally, the potential impact of asset managers on financial stability has placed them on regulators' radar screen.

This chapter is organised as follows. After reviewing banks' recent performance and progress in building up their resilience, the first section discusses their medium-term challenges. The following two sections perform a similar analysis, focusing on insurance companies and pension funds. The last section outlines new types of risk raised by the asset management sector and discusses possible policy responses.

Banks: market perceptions drive or mask challenges

Divergent conditions have determined banks' performance in advanced and emerging market economies. Even as subdued economic growth, low interest rates and substantial litigation costs were sapping their profits, advanced economy banks responded to the regulatory overhaul by strengthening their balance sheets. However, persistent market scepticism undermined these institutions' funding cost advantage – the very basis for their intermediation function. By contrast, EME

institutions retained market confidence and benefited from domestic financial booms, some of which are now in their late stages.

Recent performance and efforts to rebuild financial strength

The banking sector has posted mixed results over the past six years. While the profits of US banks have been high and robust, those of many European institutions were much lower in 2014 than immediately after the crisis (Table VI.1). In the background, net interest income – banks' main source of revenue – has declined slightly on both sides of the Atlantic (Graph VI.1, left-hand and centre panels). As these banks did not counter subdued revenues by cutting operating expenses, cost-to-income ratios rose steadily between 2009 and 2014 (blue lines). By contrast, EME banks have posted falling cost-to-income ratios and – with the exception of Russian institutions – have kept their profits high.

Profits have been the main driver of steady improvements in the regulatory capital positions of both advanced economy and EME banks. Retained earnings underpinned the bulk of the 45% increase in large banks' Core Equity Tier 1 (CET1) capital between mid-2011 and mid-2014 (Graph VI.2, red line). On the back of slightly declining risk-weighted assets, the corresponding CET1 regulatory ratios rose from roughly 7% to 11% over the same period. For this to represent an unequivocal improvement in banks' resilience, the decline in average risk weights – indicated by the widening gap between the blue and yellow lines – should reflect a conservative approach that favours less risky borrowers.

Profitability of major banks

As a percentage of total assets — Table VI.1

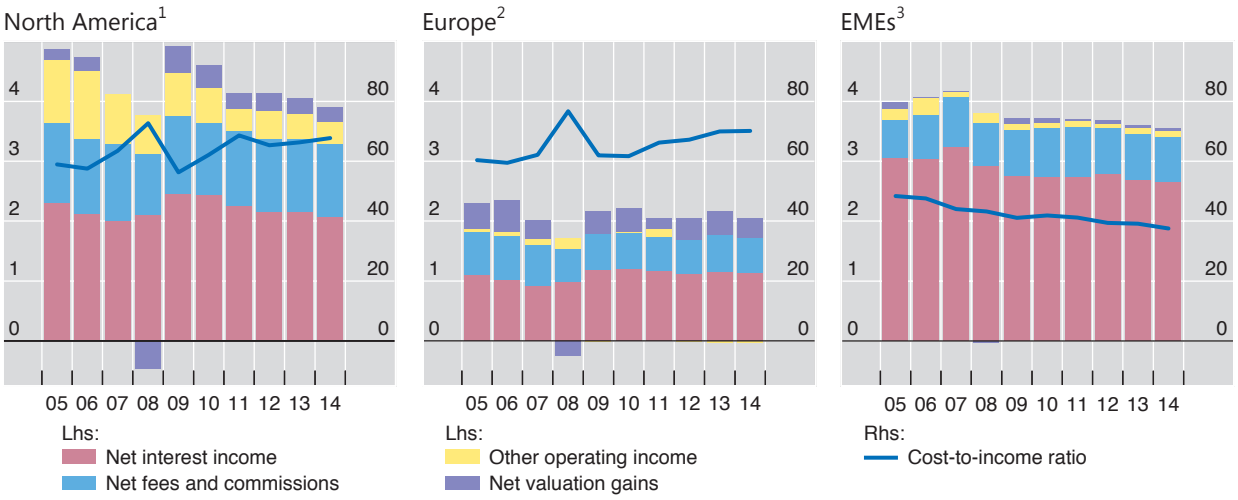
	Pre-tax profits				Net interest margin				Loan loss provisions			
	2009–10	2011–12	2013	2014	2009–10	2011–12	2013	2014	2009–10	2011–12	2013	2014
Australia (4)	1.04	1.18	1.27	1.28	1.89	1.82	1.78	1.75	0.43	0.20	0.17	0.11
Canada (6)	0.84	1.05	1.05	1.06	1.63	1.63	1.65	1.60	0.34	0.20	0.17	0.16
France (4)	0.31	0.23	0.32	0.22	1.02	0.98	0.89	0.82	0.30	0.21	0.20	0.15
Germany (4)	0.11	0.14	0.10	0.18	0.85	0.87	0.99	0.91	0.22	0.13	0.17	0.10
Italy (3)	0.36	–0.61	–1.32	–0.06	1.84	1.71	1.59	1.57	0.70	0.79	1.48	1.06
Japan (5)	0.14	0.55	0.59	0.70	1.01	0.89	0.83	0.81	0.37	0.10	0.08	0.02
Spain (3)	1.00	0.35	0.47	0.73	2.44	2.36	2.32	2.29	0.92	1.15	0.96	0.80
Sweden (4)	0.48	0.64	0.74	0.75	0.96	0.87	0.95	0.88	0.29	0.06	0.07	0.06
Switzerland (3)	0.41	0.18	0.38	0.29	0.55	0.57	0.73	0.78	0.05	0.01	0.01	0.01
United Kingdom (6)	0.27	0.26	0.22	0.39	1.15	1.10	1.08	1.14	0.74	0.38	0.35	0.11
United States (9)	0.58	0.95	1.24	1.11	2.69	2.41	2.32	2.23	1.52	0.47	0.21	0.20
Brazil (3)	2.29	1.66	1.38	1.66	5.37	4.51	3.84	3.76	1.54	1.29	1.20	0.98
China (4)	1.51	1.78	1.86	1.83	2.12	2.37	2.38	2.45	0.26	0.27	0.25	0.33
India (3)	1.37	1.41	1.41	1.15	2.28	2.78	2.82	2.81	0.46	0.60	0.57	0.68
Russia (3)	1.22	2.60	2.04	0.96	5.12	4.16	4.15	3.49	2.98	0.28	0.79	1.58

Values in multi-year columns are simple averages; in parentheses, number of banks included.

Sources: Bankscope; BIS calculations.

Subdued revenues in the banking sector

In per cent — Graph VI.1



For the number of banks in each group, see Table VI.1. Revenues reported relative to total assets.

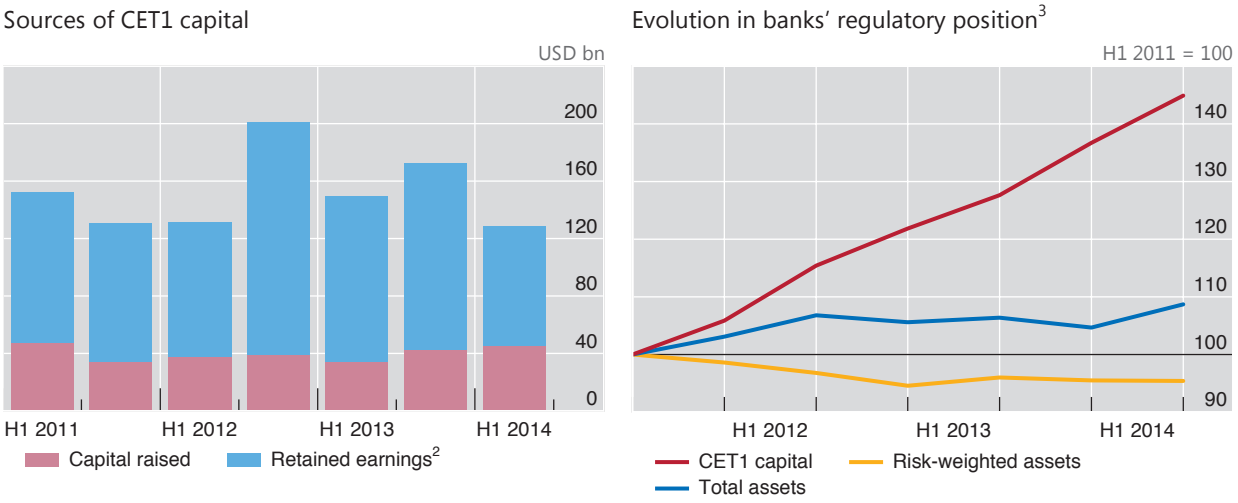
[1] Canada and the United States. [2] France, Germany, Italy, Spain, Sweden, Switzerland and the United Kingdom. [3] Brazil, China, India and Russia.

Sources: Bankscope; BIS calculations.

Certain strategic choices do reveal banks' increased conservatism. For instance, post-crisis reassessments of cost and benefit trade-offs have induced many banks to scale down or to announce a downsizing of their investment banking units. This recalibration of business models has contributed to a cutback in market-making activities (Box VI.A). Likewise, lessons from the crisis and a recent regulatory

Banks build capital buffers[1]

Graph VI.2

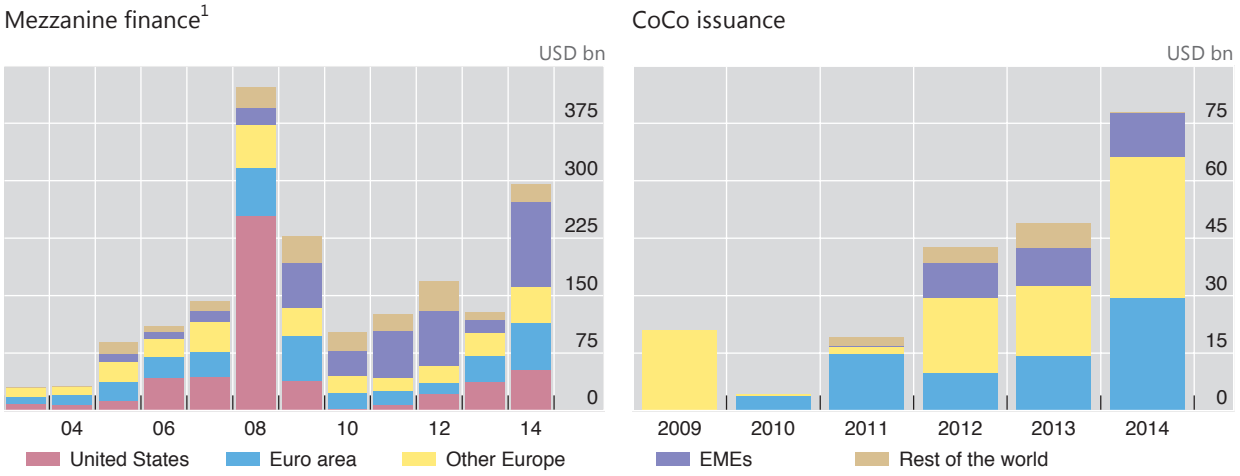


[1] Internationally active banks with Tier 1 capital of more than €3 billion; CET1 = Core Equity Tier 1. [2] Profits after tax minus common share dividends. [3] Reflects Basel III definitions.

Sources: Basel Committee on Banking Supervision, *Basel III Monitoring Report*, March 2015; BIS calculations.

Banks build loss-absorbing capacity

Graph VI.3



[1] Includes investment grade bonds and preferred shares.

Sources: Bloomberg; Dealogic; BIS calculations.

overhaul have led banks to tread carefully in securitisation markets (see also Box VI.B).

That said, concerns remain that the general decline in risk weights is partly the result of opportunistic reporting. To economise on equity capital, banks have an incentive to bias their risk estimates downwards. To reassure investors and observers that banks do not succumb to this incentive, supervisors need to be in a position to regularly, transparently and convincingly validate risk estimates.

On the liabilities side, banks have taken advantage of low interest rates to issue securities that are in the middle of the capital structure and can thus absorb losses (Graph VI.3, left-hand panel). Net issuance of subordinated debt and preferred shares – or mezzanine finance instruments – spiked in 2008, largely due to US government-sponsored recapitalisations. Subsequently, the bulk of net issuance stemmed from European and EME banks, with a temporary drop in 2013 reflecting the anticipation of new regulatory standards in China. Part of the global activity in mezzanine finance is in contingent convertible bonds (CoCos) that could qualify as regulatory capital (Graph VI.3, right-hand panel). So far, CoCo issuance has been limited to a small number of banks in specific countries.

Even though much of banks' mezzanine funding will not count towards regulatory capital, the recent increase in issuance is in line with new policy initiatives to streamline the resolution of failing banks. A Financial Stability Board consultative document outlines ways in which global systemically important banks (G-SIBs) should build their loss-absorbing capacity for resolution. These proposals aim to secure self-contained bank restructurings that reduce the system-wide repercussions of failures as well as the burden on taxpayers (Box VI.C).

Challenges and risks ahead

The sustained low interest rate environment in advanced economies clouds banks' outlook. Since the cost of deposits and other funding quickly hits a lower bound in such an environment, declining returns on newly acquired securities, compressed term premia, and falling lending rates in competitive loan markets steadily erode net interest income (Box VI.D). The resulting squeeze on profitability

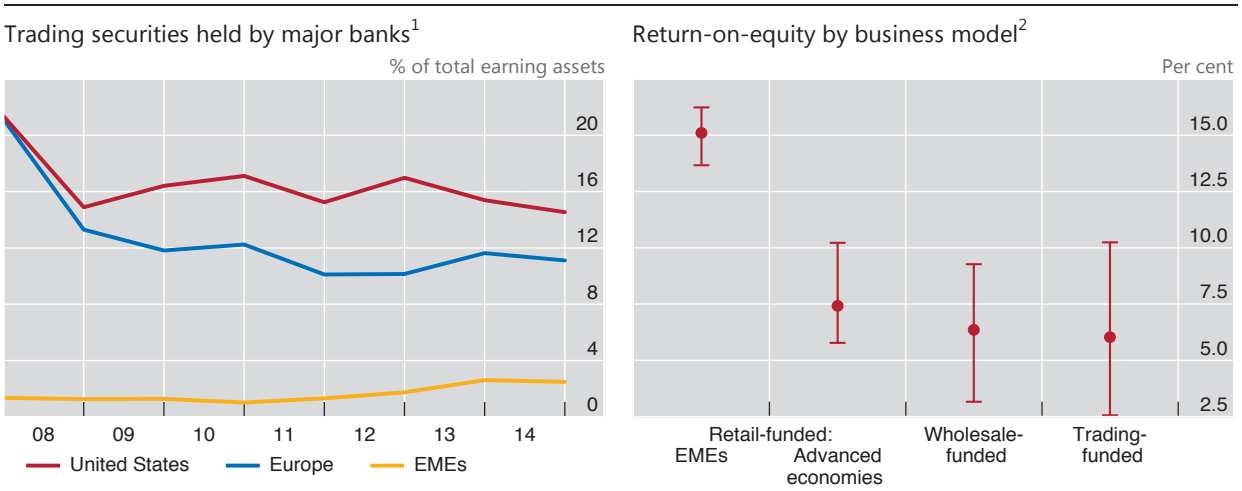
Market-making in retreat: drivers and implications

Recent indications of reduced market liquidity (Chapter II) have drawn policymakers' and analysts' attention to important providers of such liquidity: specialised dealers, also known as *market-makers*. There are various drivers of market-makers' perceived retrenchment. Some relate to dealers reassessing their own risk-taking behaviour and the viability of their business models post-crisis. Others have to do with new regulations, which aim to bring the costs of market-making and other trading-related activities more closely in line with the underlying risks and with the risks that these activities generate for the financial system. Attaining this policy goal would ensure a transition to an environment with possibly lower, but more robust, market liquidity.

Market-makers are important providers of liquidity services. By committing their own balance sheets, they stand ready to act as buyers or sellers to complete client-initiated trades in the presence of transitory supply-demand imbalances. It is generally acknowledged that underpriced market-making activities contributed pre-crisis to "liquidity illusion", ie the misleading impression that liquidity would always be abundantly available. After the subsequent bust, market liquidity was eroded by the decline in banks' inventories of corporate bonds and other trading securities (Graph VI.A, left-hand panel; see also Graph II.11, left-hand panel). Understanding the drivers of this recent development is necessary for assessing the robustness of market liquidity going forward.

Dealer inventories evolve as trading model stutters

Graph VI.A



[1] Sample of 18 European banks, seven US banks and eight EME banks. [2] Range of yearly returns-on-equity from 2008 to 2013 (dashes) and the corresponding mean (dot). See R Roengpitya, N Tarashev and K Tsatsaronis, "Bank business models", *BIS Quarterly Review*, December 2014, pp 55–65.

Sources: Bankscope; BIS calculations.

For one, market-making lost steam post-crisis partly as a result of dealers' waning tolerance for the valuation and funding risks of warehoused assets.① In many jurisdictions, dealers have raised the risk premia they demand and have overhauled their risk management to better account for the cost-benefit trade-offs of alternative business lines. This has increased the price of market-making services – especially in less liquid markets, such as those for corporate bonds – although to varying degrees across countries and client types.

In addition, post-crisis strains have pushed banks to reassess their business models. The findings of such assessments do not flatter market-makers. In recent years, institutions engaging mostly in commercial banking activities have been more efficient and have produced generally higher and less volatile profits than those employing a trading- and investment banking-based strategy – the business model most closely associated with market-making services (Graph VI.A, right-hand panel).② In response, some banks have abandoned or significantly scaled back their trading activities, while others – recently, German and UK institutions – have announced major restructurings of their investment banking units.

According to a recent survey, major dealers see regulatory reforms as another driver of market-making activities.③ In particular, they point to the restraining effect that leverage and capital requirements have on low-

margin and balance sheet-intensive businesses, such as repo-funded trading activities. They also refer to the increasing cost of warehousing fixed income inventories.

However, the net impact on market liquidity depends on a number of additional factors. One is the capacity of market-makers to reap the cost-saving benefits of new trading technologies. Another is the ability of other market participants to fill any gap left by traditional market-makers. This also determines to what extent increased market-making costs are passed through to clients and, ultimately, to the broader investor community.

From a policy perspective, a key question is whether the trends under way in market-making will help avert liquidity crises. For this to be the case, these trends should align the price of market-making services in normal times with the high costs of evaporating liquidity in bad times. Admittedly, price realignments are unlikely to prevent an exceptionally large shock from bringing financial markets to a halt. But they should discourage financial behaviour that takes market liquidity for granted and naively rules out an eventual price collapse, even as excesses are building up. By reducing market participants' vulnerability to ordinary liquidity shocks, this would make it less likely that such shocks could feed on themselves and undermine system-wide liquidity.

① See Committee on the Global Financial System, "Market-making and proprietary trading: industry trends, drivers and policy implications", *CGFS Papers*, no 52, November 2014. ② See R Roengpitya, N Tarashev and K Tsatsaronis, "Bank business models", *BIS Quarterly Review*, December 2014, pp 55–65. ③ See Appendix 4 of the publication cited in footnote ①.

would weaken the main source of capital, ie retained earnings, and hence banks' resilience.

Persistently low interest rates also increase banks' exposure to the risk of interest rate increases. Just as falling yields have supported asset valuation gains in recent years, an eventual normalisation would generate losses. Banks' equity capital would shrink, as the value of their short-duration liabilities is largely insensitive to interest rate changes. This stands in contrast with the benefits of interest rate rises for life insurers and pension funds, whose assets are typically of much shorter duration than their liabilities (see below). It also underscores the importance of policy initiatives to build regulatory safeguards against interest rate risk in the banking book.

Recent loan losses suggest that the challenges of some advanced economy banks extend beyond profit margins and interest rate risk. In particular, large Italian and Spanish banks have repeatedly posted loan losses well above those of their peers (Table VI.1). Industry analysis has attributed the 2014 losses only partly to the balance sheet clean-up triggered by the ECB's asset quality review, emphasising instead that the losses may need to rise further before declining.

Price-based indicators suggest that markets have a less favourable view of advanced economy banks than of their EME counterparts. Against the background of general optimism, evident in high price-to-book ratios in the non-financial sector (Graph VI.4, left-hand panel), equity investors appear lukewarm about US, Swiss and Nordic banks and rather pessimistic about UK and euro area banks (right-hand panel). Rating agencies take a similar view: stand-alone ratings – which measure resilience in the absence of external support – deteriorated markedly during the subprime and sovereign crises for both European and US banks and have not rebounded since (Graph VI.5, left-hand panel). By contrast, EME institutions boast on average high price-to-book ratios and improving stand-alone ratings. It remains to be seen, however, whether this vote of confidence will persist should local conditions weaken (Chapter III).

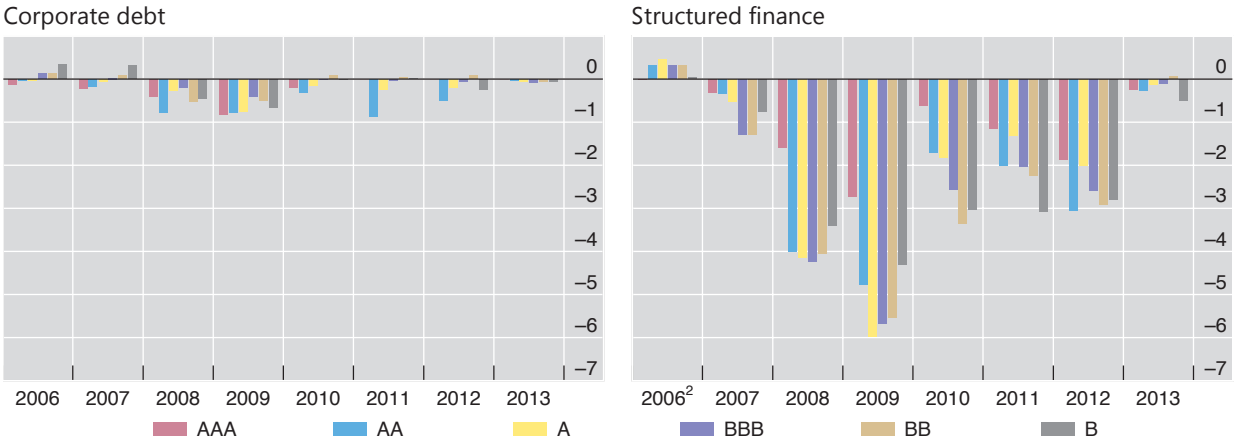
By failing to reassure markets in recent years, advanced economy banks have lost much of their funding advantage, so crucial for their success. Two self-reinforcing drivers are responsible for this loss of ground. First, greater uncertainty about advanced economy banks both during the financial crisis and post-crisis led credit market participants to charge them substantially more than similarly rated non-financial corporates (NFCs) up to 2012 (Graph VI.5, centre panel). This markup

The risks of structured finance: regulatory responses

The crisis exposed serious flaws in the securitisation market. Abrupt downgrades of fixed income securities in 2008–09 forced banks to quickly raise capital to cover unshed exposures. While corporate bonds were marked down by less than one notch on average, the corresponding downward revision for similarly rated securitisation tranches was as high as three to six notches (Graph VI.B). And while downgrades for corporate bonds slowed after 2009, they extended into 2012 for securitisation tranches. This disparity revealed that faulty risk models had inflated the ratings of certain senior tranches, thus artificially reducing regulatory risk weights. Furthermore, the unwarranted assumption that risks could be estimated with a high degree of precision raised the likelihood that tranches in the middle of securitisations' capital structure were severely undercapitalised.

Swings in credit risk assessments[1]

Average one-year rating migrations, in rating notches — Graph VI.B



[1] Based on Fitch's entire rating universe. A bar's colour corresponds to the rating at the start of the year, and its height to the average migration over the year. A positive (negative) number indicates an upgrade (downgrade). [2] US instruments only.

Sources: Fitch Ratings; BIS calculations.

Recent revisions to the securitisation framework take these lessons into account.① The new framework includes "comply or explain" provisions to incentivise banks to reduce their reliance on external ratings. It also limits the number of available approaches to computing bank regulatory capital and simplifies their hierarchy. Importantly, the revised framework introduces regulatory safeguards against undercapitalisation while maintaining risk sensitivity, ie while requiring higher capital for riskier securitisation exposures.

Consistent with the spirit of risk-sensitive regulation, less complex and more transparent securitisations should be subject to lower capital requirements. Accordingly, the Basel Committee on Banking Supervision and the International Organization of Securities Commissions have jointly proposed a list of criteria to help develop simple and transparent asset pools.②

That said, risk assessments for such pools will still be surrounded by considerable uncertainty. Ignoring this would materially raise the likelihood that tranches are severely undercapitalised.

What makes securitisation tranches special is that they can concentrate uncertainty. Focusing on simple and transparent securitisations, Antoniades and Tarashev show that irreducible uncertainty about the true default probabilities in the underlying asset pool would surface predominantly in tranches of intermediate seniority, the so-called mezzanine tranches.③ Ignoring this, the Basel II framework gave rise to cliff effects, whereby small estimation errors led to disproportionately large swings in the capital requirements for these tranches. This opened the door to severe undercapitalisation and mispricing of risks. The introduction of capital safeguards for mezzanine

tranches in the revised framework is thus a welcome step towards addressing an important source of fragility in the financial system.

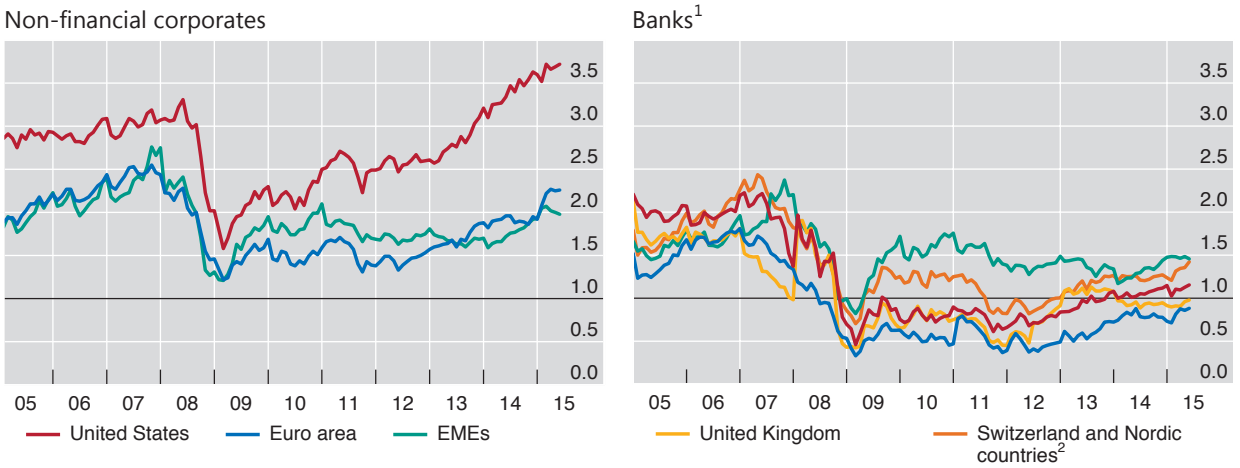
① Basel Committee on Banking Supervision, *Basel III: Revisions to the securitisation framework*, December 2014. ② Basel Committee on Banking Supervision and Board of the International Organization of Securities Commissions, *Criteria for identifying simple, transparent and comparable securitisations*, consultative document, December 2014. ③ A Antoniades and N Tarashev, "Securitisations: tranching concentrates uncertainty", *BIS Quarterly Review*, December 2014, pp 37–53.

narrowed subsequently, but it still affects euro area and, especially, UK banks. Second, while NFC ratings have remained largely stable since the crisis, banks have seen a sustained deterioration of their all-in ratings, which capture both inherent financial strength and external support (Graph VI.5, right-hand panel). The resulting loss of funding advantage could partly explain the decline in banks' traditional intermediation activities and the concurrent ascent of market-based funding sources (see below).

The recent sovereign debt crisis – together with national authorities' treatment of sovereign exposures – has contributed to a decline in European banks' corporate lending.[1] Against the basic philosophy of global regulatory standards, home authorities have permitted requirements on banks' sovereign exposures to be less stringent than on corporate exposures with similar risk characteristics (Box VI.E). Thus, when risk premia on government bonds shot up during the sovereign debt crisis, the associated capital and liquidity charges barely moved. Euro area banks in particular took advantage of the resulting profit opportunities and substituted sovereign bonds for corporate lending. Entities without access to market-based

Equity markets reflect scepticism about banks

Price-to-book ratios — Graph VI.4



[1] Aggregates are calculated as the total market capitalisation across institutions domiciled in a particular region, divided by the corresponding total book value of liabilities. [2] Denmark, Norway and Sweden.

Sources: Bank of America Merrill Lynch; Datastream; BIS calculations.

[1] See B Becker and V Ivashina, "Financial repression in the European sovereign debt crisis", Swedish House of Finance, *Research Paper*, no 14-13, 2014.

Box VI.C

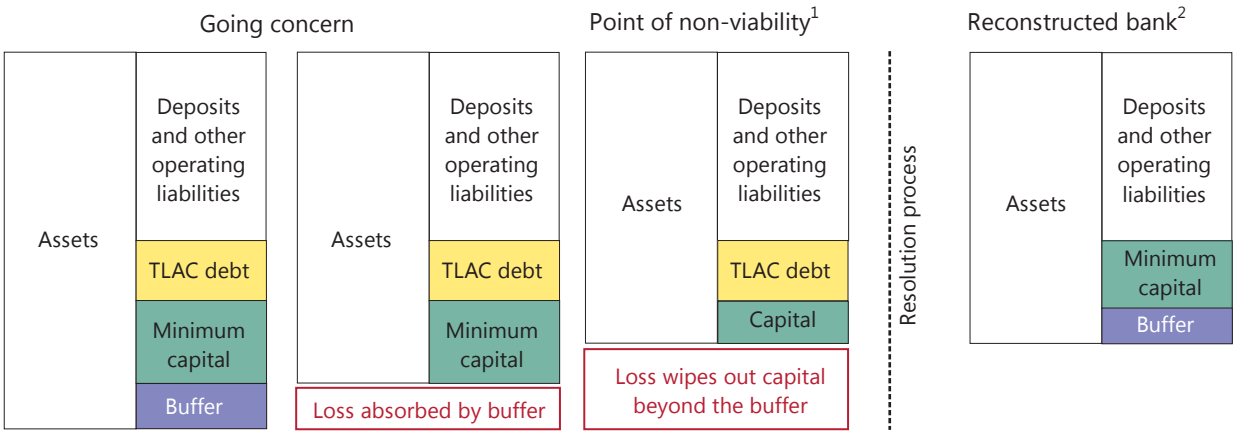
Loss-absorbing capacity for banks in resolution

Post-crisis regulatory reforms seek to reduce the economy's exposure to financial system strains. They have two complementary objectives: ensuring minimum standards of resilience, so that financial firms are less likely to fail, and diminishing the impact on the system and the economy in case they do fail. The first objective is embedded in the more stringent Basel III capital and liquidity standards for going-concern banks; the second in measures to improve the efficiency of resolution when a bank reaches the point of non-viability. In the light of the second objective, the Financial Stability Board has issued a list of key principles for efficient resolution and has proposed new standards on the adequacy of the loss-absorbing capacity of global systemically important banks (G-SIBs) in resolution: Total Loss-Absorbing Capacity (TLAC).①

The TLAC requirements would supplement the loss-absorbing capacity of Basel III regulatory capital. In general terms, a normally functioning bank would have enough capital to meet its regulatory minimum and buffer requirements and sufficient TLAC liabilities (Graph VI.C, first panel). Capital buffers are the bank's first line of defence: they absorb initial losses and allow the institution to provide uninterrupted intermediation services (second panel). A going-concern bank meets its minimum capital requirements and is judged able to respond to adverse shocks by replenishing its capital buffers – for instance, through retained earnings. However, large and persistent losses can cause the bank to breach its minimum requirements, at which point it is likely to be judged unable to recover and hence non-viable (third panel). A non-viable bank would enter the process of resolution, during which TLAC debt is "bailed in", ie converted into equity or written down. This allows authorities to recapitalise the troubled institution – or a successor entity that assumes its operations – in a manner that commands market confidence and provides key services (fourth panel). Ultimately, TLAC is a prefunded source of capital, available to facilitate a non-disruptive resolution process.

Role of TLAC in resolution: an illustrative example

Graph VI.C



Segment heights are chosen with the graph's readability in mind. They need not refer to any real-world bank or to the relative sizes of different liabilities under Basel III rules and the TLAC proposal.

[1] Non-TLAC liabilities are also exposed to loss in resolution, in accordance with the applicable creditor hierarchy under the applicable resolution regime. [2] A bank in resolution or its successor entity would have one to two years to comply with the minimum TLAC requirements (if it is still a G-SIB).

The TLAC proposal specifies how banks should build this additional loss-absorbing capacity. While resources eligible for Tier 1 or Tier 2 regulatory capital would help meet the TLAC requirement for resolution, there is an expectation that at least one third of the requirement would be met with debt liabilities. To be readily bailed in, these liabilities should satisfy a number of criteria. Key among them is that legal arrangements clearly specify the subordinated status of TLAC debt to other liabilities of a more operational nature – such as deposits and derivative and other trading exposures of counterparties. This would reduce the risk of legal challenge or compensation claims. Other criteria state that TLAC debt should be unsecured and have a remaining maturity of more than one year in order to ensure that sufficient amounts remain available as the bank approaches the point of non-viability. The goal

of the TLAC proposal is that a failing bank's resolution does not draw on taxpayer funds and is smooth, whether it takes the form of a recapitalisation and restructuring or of an orderly wind-down.

The level of TLAC requirements would be determined with reference to existing regulatory metrics. TLAC securities would need to be at least equal to the greater of (i) 16–20% of the bank's risk-weighted assets;② and (ii) twice the level of capital that satisfies the bank's Basel III leverage ratio requirement. The amount would be a minimum, with national authorities free to impose additional requirements on institutions in their jurisdiction. The implementation date for TLAC requirements is not yet fixed and will not be before January 2019.

Critically, the effectiveness of TLAC depends on it being complementary to other elements of the prudential framework and resolution regime. The proposed design is compatible with Basel III rules. It preserves the integrity of capital and liquidity standards and supports their objective of boosting the resilience of banks as going concerns. TLAC resources will be used after the firm has crossed the point of non-viability and will help resolution authorities restore Basel III buffers in a restructured institution. In addition, TLAC will need to work well with existing and emerging resolution regimes as well as with various organisational structures. As the rules are finalised and target quantities calibrated, it will be important to maintain sufficient flexibility in the framework to accommodate resolution regimes and strategies that differ across jurisdictions and firms.

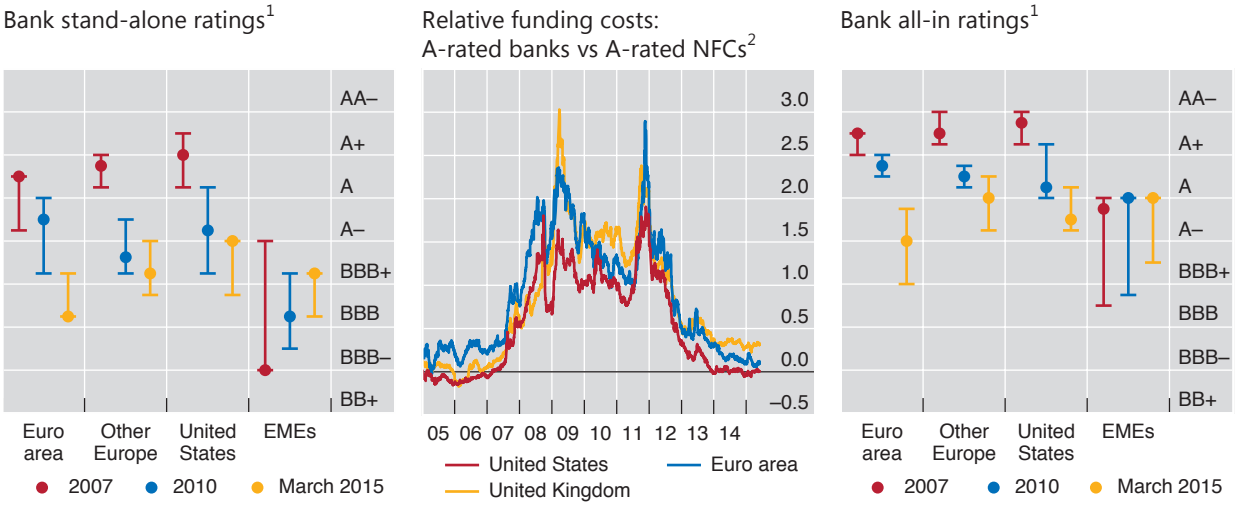
① Financial Stability Board, *Adequacy of loss-absorbing capacity of global systemically important banks in resolution*, consultative document, November 2014. ② The final rules will specify an exact number in this range.

funding, such as small and medium-sized enterprises, have borne the brunt of this credit displacement.

Insurance companies: tackling low interest rate headwinds

While the impact of low interest rates has not played out fully in the banking sector, it has already generated important headwinds for insurance companies. For one, the persistence of low rates has taken a toll on companies' profitability by depressing

Weak ratings erode banks' funding advantage — Graph VI.5



[1] The dashes represent the 20th and 80th asset-weighted percentile, respectively; the dot represents the asset-weighted median. Based on Moody's bank financial strength ratings (left-hand panel) and long-term issuer ratings (right-hand panel). [2] Option-adjusted spread on a bank sub-index minus that on a non-financial corporate sub-index, divided by the spread on the non-financial corporate sub-index. Sub-indices comprise local currency assets.

Sources: Bank of America Merrill Lynch; Fitch Ratings; Moody's; BIS calculations.

Box VI.D

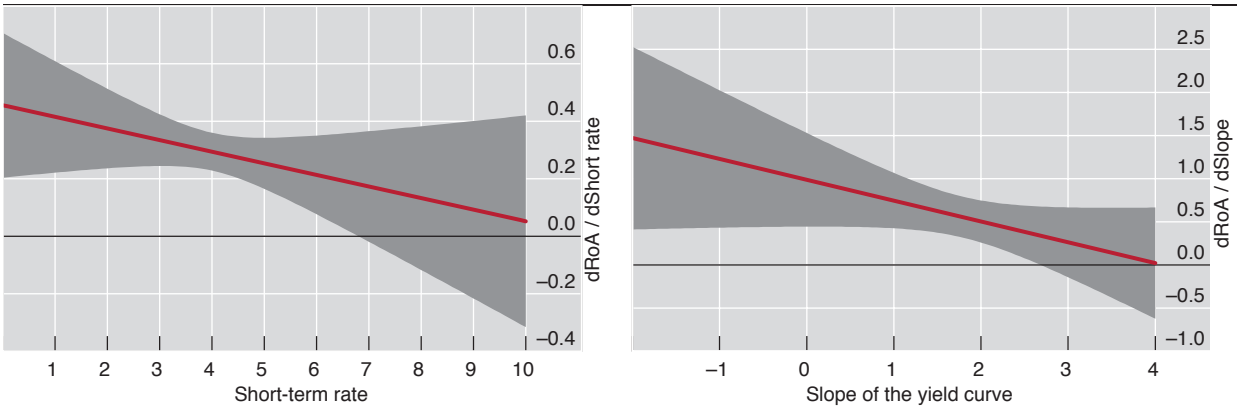
Monetary policy and bank profitability

Prolonged monetary accommodation may harm bank profitability. This is because lower short-term interest rates and a flatter yield curve squeeze net interest income, as they respectively sap banks' margins and returns from maturity transformation. And this is not offset by the beneficial effect of lower interest rates on loan loss provisions, through lower debt service costs and default probabilities. Nor is it offset by increased non-interest income, stemming from lower rates' positive impact on securities valuations. Indeed, Demirgüç-Kunt and Huizinga,① using aggregate banking sector data from 80 industrial and developing countries, find that a reduction in interest rates generally reduces bank profitability. Alessandri and Nelson obtain similar results for UK banks.②

Using data for 109 large international banks headquartered in 14 major advanced economies, recent BIS research has confirmed this result.③ However, the BIS study also finds that the effect on bank profitability of changes in the interest rate structure – ie the short-term rate and the slope of the yield curve – becomes stronger as interest rates fall and yield curves flatten. For the short-term rate, this non-linear effect reflects, among other things, a reduction of the "deposit endowment effect" on bank profitability at low interest rates: as the deposit rate cannot fall below zero, at least to any significant extent, the mark-down (the difference between the market rate and the deposit rate) is compressed at very low policy rates. For the slope of the yield curve, the non-linearity may stem from the demand for long-term loans and bank services, and from provisions. Graph VI.D shows that the lower the short-term interest rate and slope of the yield curve, the greater their effect on the return-on-assets (RoA). For example, a cut in the short-term policy rate from 1% to 0% is estimated to cause the RoA to fall by 0.4 percentage points over one year, twice the reduction associated with a decrease in the short-term rate from 7% to 6% (left-hand panel). Similarly, a reduction in the slope of the yield curve from –1 to –2 percentage points erodes the RoA by 1.2 percentage points over one year, while the effect is only half that size if the slope goes from 2 percentage points to 1 percentage point (right-hand panel).

Effects of changes in the interest rate structure on banks' return-on-assets (RoA)

Graph VI.D



RoA = profit before taxes divided by total assets; short-term rate = three-month interbank rate, in per cent; slope of the yield curve = spread between the 10-year government bond and three-month interbank rate, in percentage points. The vertical axis reports the derivative of RoA with respect to the short-term rate (left-hand panel) and the slope of the yield curve (right-hand panel), in percentage points. The shaded area indicates 95% confidence bands.

Source: BIS calculations.

According to these estimates, the negative effect on bank profitability caused by the decrease in the short-term rate was more than compensated for by the increase in the slope of the yield curve in the first two years after the outbreak of the Great Financial Crisis (2009–10). Overall, these changes, other things equal, contributed to an increase in the RoA of 0.3 percentage points on average for the 109 banks in the sample. In the next four years (2011–14), the further fall in short-term rates and the flattening of the yield curve contributed to a cumulative reduction in the RoA of 0.6 percentage points. These results hold after controlling for different business

cycle conditions and bank-specific characteristics such as size, liquidity, capitalisation and incidence of market funding.

① A Demirgüç-Kunt and H Huizinga, "Determinants of commercial bank interest margins and profitability: some international evidence", *World Bank Economic Review*, no 13(2), 1999, pp 379–408. ② P Alessandri and B Nelson, "Simple banking: profitability and the yield curve", *Journal of Money Credit and Banking*, no 47(1), 2015, pp 143–75. ③ C Borio, L Gambacorta and B Hofmann, "The influence of monetary policy on bank profitability", *BIS Working Papers*, 2015 (forthcoming).

the yield on new investments. In parallel, new accounting rules for the discounting of future obligations have replaced the higher interest rates of the past – prevailing when contracts were signed – with the lower current rates, thus boosting the value of liabilities. Against this backdrop and despite favourable investor sentiment in equity markets, credit ratings signal concerns about insurers.

Property-and-casualty firms' subdued performance in 2014 was the outcome of opposing forces. For instance, strong premium growth supported profitability in a number of countries (Table VI.2). Between mid-2013 and mid-2014, it contributed to a slight drop – to 94% – of European non-life insurers' combined ratio, ie the sum of underwriting losses, expenses and policyholders' dividends divided by premium income. However, elevated expenses and catastrophe losses at US companies wiped out much of their gains from premium growth, leading to a 99% combined ratio. Meanwhile, steady and widespread declines in investment returns have depressed non-life insurers' profitability in nearly all major centres.

Despite challenges stemming from their heavy reliance on investment income, life insurers have reported improving performance. Cost-cutting and a greater contribution from new business lines, notably the sale of asset management products, have been instrumental. According to industry estimates, the sector's return-on-equity has risen, from below 10% in 2012 to roughly 12% in 2014.

Some trends in the life insurance sector have been consistent with more conservative risk management. For instance, the growing share of asset management

Profitability of the insurance sector

In per cent — Table VI.2

	Non-life						*Life*					
	Premium growth			Investment return			Premium growth			Investment return		
	2010–11	2012–13	2014	2010–11	2012–13	2014	2010–11	2012–13	2014	2010–11	2012–13	2014
Australia	3.4	8.0	1.6	7.2	6.2	6.0	5.8	4.9	29.7	…	…	…
France	3.9	0.9	1.7	2.4	2.1	1.7	–5.4	–1.0	…	3.2	4.9	…
Germany	–0.4	3.8	4.0	3.4	3.3	3.0	1.3	2.5	…	4.0	5.0	…
Japan	1.0	4.7	3.7	1.5	1.8	1.2	5.3	0.2	6.3	…	…	…
Netherlands	3.4	0.2	…	2.0	2.0	…	1.1	–8.4	–12.1	5.4	4.8	…
United Kingdom	2.3	3.5	3.9	3.6	3.6	2.7	–0.8	–0.2	2.0	…	…	…
United States	1.5	3.1	5.9	3.7	3.4	2.9	10.3	–3.1	11.0	4.8	4.6	4.6

Values in multi-year columns are simple averages.

Sources: Swiss Re, sigma database; national supervisory authorities.

Box VI.E

Regulatory treatment of sovereign exposures: towards greater risk sensitivity

The Basel framework calls for minimum regulatory requirements commensurate with the underlying risks.① This is the basic philosophy of the framework. That said, a number of national jurisdictions implement preferential treatment of sovereign exposures, notably in relation to non-financial corporate exposures. This weakens the risk sensitivity of regulatory requirements.② As the resulting distortions can undermine financial stability, they have prompted policy initiatives to reassess the approach to sovereign exposures in bank regulation.

In its clearest form, the preferential treatment applies to exposures that are in the borrowing sovereign's domestic currency and are funded by the bank in the same currency. National authorities have the option – but not the obligation – to allow for much lower risk weights on such exposures than on exposures to private corporations with similar risk characteristics. Often, and regardless of the sovereign's rating, the reduced risk weight is zero. This is currently the case under the standardised approach to credit risk in the banking book, as well as under both the current and proposed approaches to specific risk in the trading book.③

When it comes to the treatment of liquidity risk, sovereigns are and are likely to remain attractive investments. One example relates to the regulatory approach to zero-risk-weight sovereign exposures: they qualify without limitations as high-quality liquid assets for banks' liquidity requirements. Or, take the proposed trading book rules, which require banks to evaluate the risk of their exposures over specific horizons. While the estimated risk increases mechanically with the evaluation horizon, this horizon is lower for more liquid securities that are easier to sell at times of stress. Given the high historical liquidity of sovereign securities, the associated evaluation horizons are proposed to be two to three times shorter than those required for equally rated corporate securities.

In addition, sovereign exposures have been exempt from concentration limits in regulatory rules on large exposures. It is thus hardly surprising that they have played an important role in banks' balance sheets. In a worldwide sample of 30 large banks, the share of sovereign exposures in the banking book expanded from roughly 12% in 2004 to 20% at end-2013.④ And in the euro area's geographical periphery, banks' holdings of their own sovereign's debt have increased steadily as a share of total assets: from 3% in 2008 to above 8% at end-2014.⑤

This has strengthened the interdependence of banks and sovereigns. For decades, banks have relied on implicit and explicit sovereign support to improve their ratings and lower their funding costs. More recently, the preferential regulatory treatment of sovereign exposures has allowed banks that were themselves under strain to extend lifelines to troubled governments. The destabilising effect of the two-way links came to the fore during the 2010–11 sovereign debt crisis, which took financial distress to new heights.

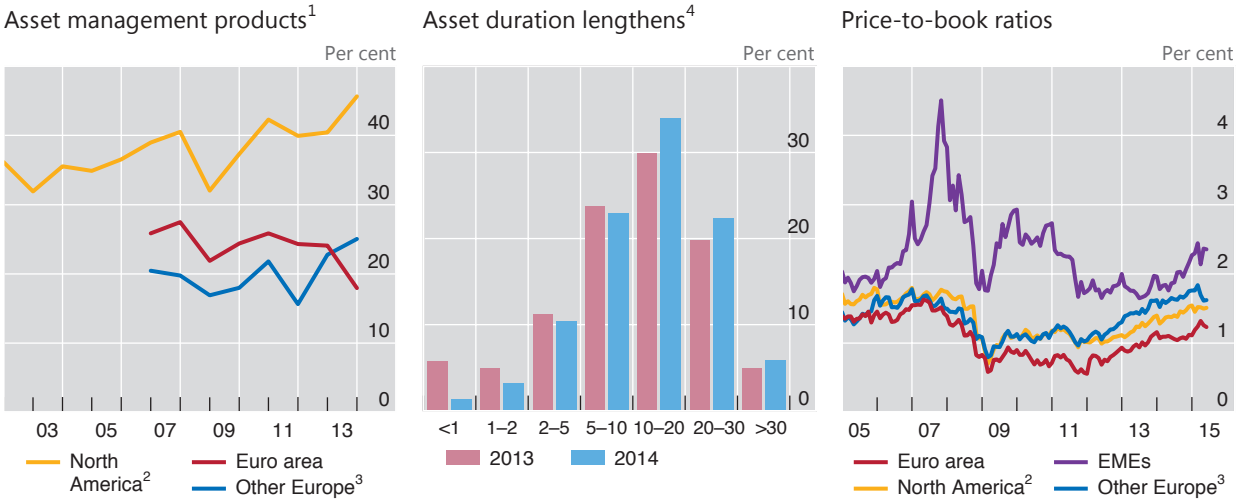
Such experiences have prompted a reassessment of the regulatory treatment of sovereigns. Initial steps in this direction relate to the treatment of sovereign support for banks in the standardised approach to credit risk. Proposed changes to this approach would not allow a lending bank to reduce the risk weight on its interbank exposure by referring to the rating of the borrowing bank's sovereign. If implemented, these changes would align the lending bank's capital charge – and ultimately the lending rate – more closely with the borrowing bank's riskiness.⑥ In addition, forthcoming leverage ratio requirements will provide, inter alia, a backstop for the size of sovereign exposures for a given level of bank capital. But further work is needed on the regulatory treatment of sovereign exposures themselves.

It is important to recognise that sovereigns' preferential status rests on a misleading argument. The argument hinges on central banks standing ready to monetise domestic currency sovereign debt in order to prevent defaults on this debt. As recent events in the euro area show, however, such a solution cannot apply in a currency zone subject to macroeconomic conditions that do not happen to be aligned with the needs of a particular sovereign under stress. The argument is also weakened by a number of historical defaults on local currency sovereign debt, mostly in emerging market economies. And, even when monetisation does prevent a sovereign default, it undermines central bank independence and market confidence in the domestic currency. This, in turn, could lead to high inflation and a currency crisis, which would also adversely affect the banking system. All these considerations underscore the merits of seeking a closer alignment between regulatory requirements for sovereign exposures and the likelihood of sovereign distress.

① Basel Committee on Banking Supervision, *Basel II: International convergence of capital measurement and capital standards: A revised framework – Comprehensive version*, June 2006. ② See Bank for International Settlements, "Treatment of sovereign risk in the Basel capital framework", *BIS Quarterly Review*, December 2013, p 10. ③ Basel Committee on Banking Supervision, *Fundamental review of the trading book: outstanding issues*, consultative document, December 2014. ④ Based on BCBS data. ⑤ See European Systemic Risk Board, *Report on the regulatory treatment of sovereign exposures*, 2015. ⑥ Basel Committee on Banking Supervision, *Revisions to the standardised approach for credit risk*, consultative document, December 2014.

Insurance companies: evolving market perceptions and business models

Graph VI.6



[1] As a share of life and health liabilities. Asset management products refer to separate account liabilities (US companies) or unit-linked liabilities (European companies). [2] Canada and the United States. [3] Switzerland and the United Kingdom. [4] Book value of holdings of OECD government bonds by German insurance companies, shares in total, by maturity bucket.

Sources: Deutsche Bundesbank; Datastream; SNL; BIS calculations.

products in the liabilities of North American, Swiss and UK life insurers (Graph VI.6, left-hand panel) indicates offloading of financial risk to customers. On the assets side, European companies have been increasing the duration of their bond portfolios (centre panel), thus narrowing duration gap estimates.[2] While such estimates suggest an improvement in balance sheet strength, they should be interpreted with caution given their sensitivity to assumptions about discount rates and policyholder behaviour.

At the same time, the risk profile of insurance companies' assets has deteriorated in recent years, albeit from a conservative starting point. Pressed by regulation and institutional mandates to hold predominantly investment grade securities, insurance companies have seen their asset distribution shift from the best to the worst ratings in this range (Graph VI.7). The shift could be partly due to a slide in the credit quality of outstanding securities. But it is also consistent with active search for yield. And while US firms have operated mainly in the corporate and mortgage markets, their European peers have searched for yield in sovereign bonds. National authorities have in fact encouraged this behaviour to the extent that they have allowed insurance companies – as they have banks – to apply zero risk weights even to sovereigns with low and deteriorating ratings.

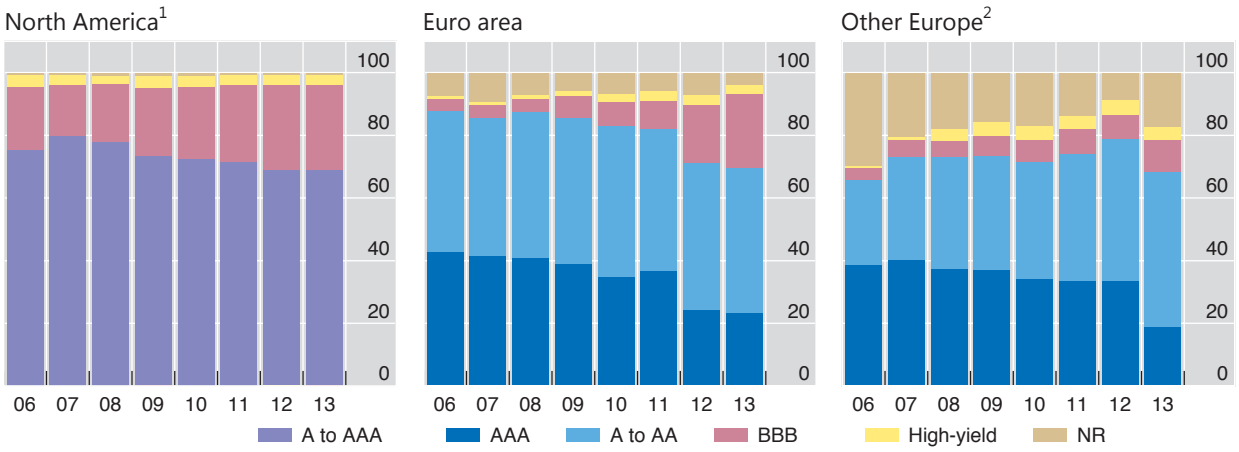
Equity markets and rating agencies point to different perceptions of the insurance sector. Price-to-book ratios have been on the rise in major advanced economies since 2011 and have increased from an already high level in EMEs since mid-2014 (Graph VI.6, right-hand panel). This could reflect improving financial strength but also general market euphoria (Chapter II). By contrast, insurers' ratings deteriorated substantially during the financial crisis and have hardly recovered since. A likely driver is a concern that the growth of fees and premia – quite important in supporting insurers' recent profits – will eventually run its course.

[2] See European Insurance and Occupational Pensions Authority, *Financial Stability Report*, December 2014, p 37.

Insurance companies move towards lower-rated investments

As percentages of securities bearing credit risk

Graph VI.7



[1] Canada and the United States. [2] Denmark, Norway, Switzerland and the United Kingdom.

Sources: SNL; BIS calculations.

Pension funds: growing deficits

Financial market conditions, added to demographic changes, have put a heavy strain on pension funds. Central to the funds' woes are persistently low interest rates, which depress both investment returns and discount rates. Lower discount rates, in turn, raise the present value of funds' liabilities more sharply than that of their assets, which are typically of much shorter duration. This widens pension fund deficits and may ultimately affect the economy at large.

Discount rates vary substantially across countries. According to industry reports on company-sponsored pension funds in advanced economies, they ranged from 4% in North America to 1.5% in Japan in 2013. This reflects differences in local market conditions and in accounting standards. Most accounting approaches pin the discount rate to either the expected long-term return on the fund's assets or the prevailing market yields on low-risk securities, such as highly rated bonds. Either way, the discount rate typically drops with bond yields but to an extent that varies across jurisdictions and between sectors in the same jurisdiction.

US funds provide a good example of the impact of accounting standards. For instance, according to national sources, the average return-based discount rate of US public pension funds can be 300 basis points higher than the rate reported by some of their private sector counterparts. To put this in perspective, a 400 basis point reduction in the discount rate would increase the value of the liabilities of a typical US pension fund by more than 80%. That said, recent and pending changes to US accounting standards are expected to narrow the gap.

In the face of ultra-low interest rates, policy measures have offered temporary relief. For instance, regulators allowed discount rate increases in 2012, partly in response to industry concerns that the prevailing rates had decoupled reported funding ratios from pension plans' intrinsic funding conditions. This measure was either direct – eg discount rate floors in Sweden and higher long-term discount rates in Denmark – or indirect – eg the use of longer, 25-year horizons for the computation of rate corridors in the United States. Likewise, US regulatory

amendments in 2012 made it advantageous for funds to offload contracts to insurance companies and to make lump sum payments to plan participants.

Such shifts in contractual obligations are part of a long-standing risk management strategy in the sector. In a trend seen in most major markets, defined contribution (DC) plans, under which members bear the investment risks, have grown more than defined benefit (DB) plans, which guarantee a certain income to members. Concretely, DC plans saw their share in aggregate pension fund liabilities increase from an estimated 39% in 2004 to 47% in 2014. This trend is likely to continue as pension funds address increases in life expectancy estimates that raise the present value of their obligations.

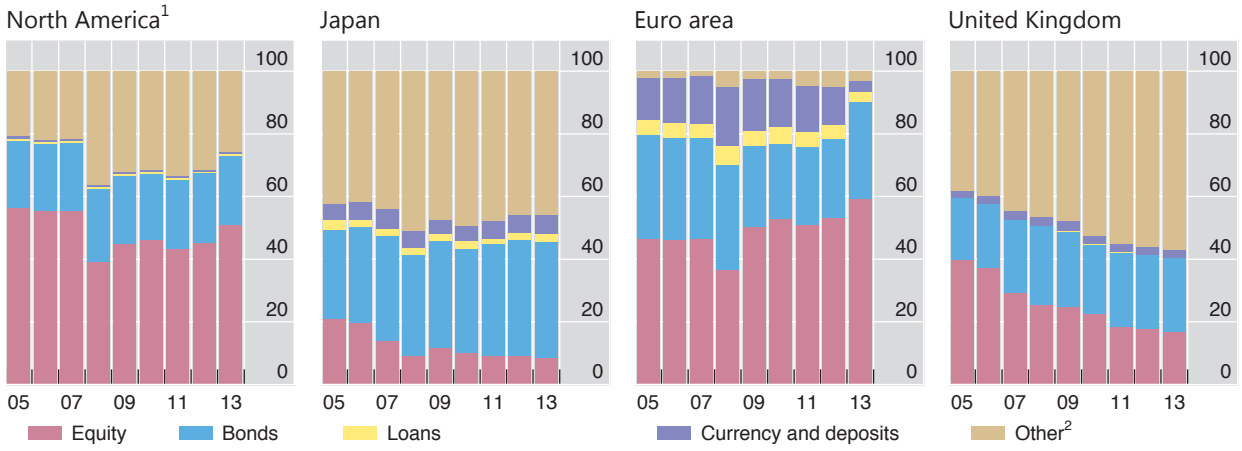
In parallel, pension funds have responded to declining asset returns by shedding their exposure to traditional risks and loading up on so-called alternative investments. These include real estate, hedge funds, private equity and commodities. Industry estimates reveal that the share of such investments in pension fund asset portfolios has risen – from 5% in 2001 to 15% in 2007 and 25% in 2014 – mirrored by a 20 percentage point drop in the equity share. UK pension funds are important drivers of this shift (Graph VI.8, right-hand panel), as are US funds, whose disposal of equities has reportedly been masked by strong valuation gains.

Despite official support and their own efforts, pension funds are facing growing problems. For instance, funding ratios at end-2014 were below pre-crisis levels in both the United States and Europe. And the situation is set to worsen if low interest rates persist, further depressing both asset returns and the discount rates applied to liability valuations. For the US sector, industry research has found that a 35 followed by a 60 basis point decline in the discount rate and correspondingly low asset returns would lower the average funding ratio by roughly 10 percentage points, to about 70%, in two years.

Funding strains at pension funds could have broader repercussions. In the case of DB plans, the fund's liabilities are a contractual obligation of the fund's sponsor, eg a manufacturing corporation or a services firm. Thus, since unsustainable deficits translate sooner or later into expenses for the sponsor, they would hurt companies' profits and possibly undermine their solvency. For their part, DC plans can have

Pension funds show signs of shifting away from equities

As percentages of total financial assets — Graph VI.8



[1] Canada and the United States. [2] Includes investment in mutual funds.

Sources: OECD; BIS calculations.

similar effects but through different channels. A drop in the value of a DC plan's assets means a decline in the future income stream of its members. If such an outcome is widespread, it would lead to an increase in the saving rate and hence a decline in aggregate demand.

Risks morph post-crisis in the financial system

The financial landscape has evolved substantially post-crisis. While banks have lost ground as intermediaries, asset managers – which run mutual, private equity and hedge funds, among others – have increasingly catered to the needs of yield-hungry investors. As a result, new types of risk have gained prominence.

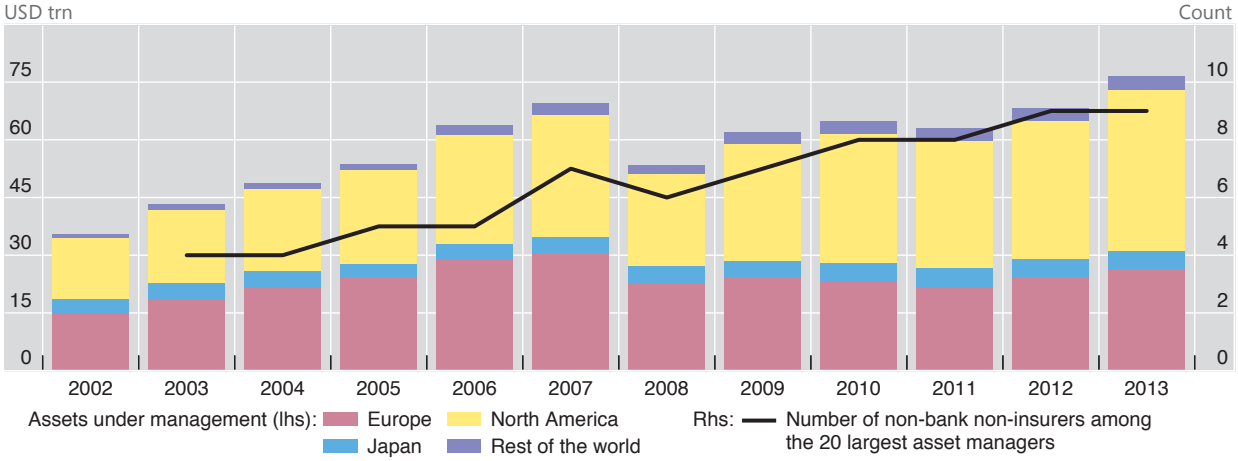
The asset management sector has grown considerably over the past decade. Despite a mid-crisis hiatus, which mirrored mainly valuation losses, global assets under management (AUM) rose from roughly $35 trillion in 2002 to $75 trillion in 2013 (Graph VI.9). The sector remains highly concentrated, with the top 20 managers accounting for 40% of total assets.

The sector's composition has changed over time. By region, North American asset managers have increased their market share by 11 percentage points over the last decade. They now account for more than half of total AUM and approximately two thirds of the assets managed by the top 20 managers. By type, independent managers have been rapidly displacing bank- and insurer-owned managers at the top (Graph VI.9, black line).

As risk-taking migrates away from the banking sector, asset managers have played a pivotal role together with their customers and these customers' investment consultants. In their recommendations, investment consultants reportedly attribute substantial weight to assets' latest performance. Thus, as the returns on EME assets were higher than those on advanced economy assets in the crisis aftermath, investment consultants' recommendations are likely to have contributed to the strong flows into EME funds in recent years (Chapter II).

Abundant bond financing has substantially reduced EME companies' capitalisation ratio, ie market capitalisation divided by the sum of market capitalisation and the book value of liabilities. Despite buoyant equity markets, massive borrowing by EME banks and non-financial corporates between 2010 and 2014 lowered significantly

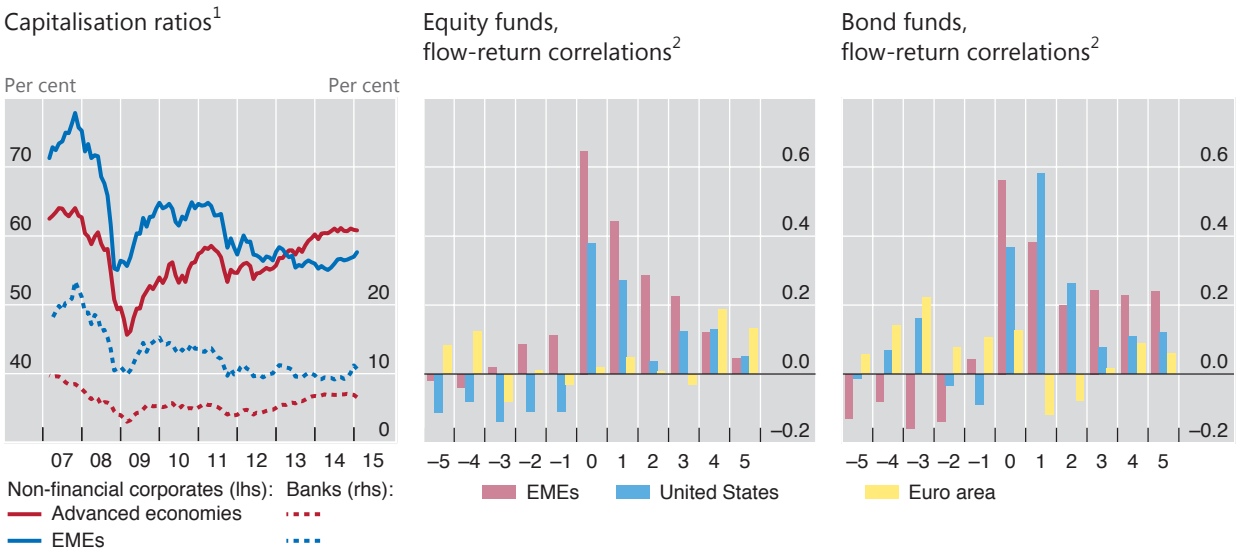
New types of asset managers drive the sector's growth — Graph VI.9



Sources: Towers Watson, *The World's 500 Largest Asset Managers*, 2014; BIS calculations.

EMEs' growing vulnerability to volatile fund flows

Graph VI.10



[1] Region-wide market capitalisation divided by the sum of region-wide market capitalisation and region-wide book value of liabilities; averages over the previous three months; based on the Moody's KMV sample of listed entities. [2] Correlation between fund flows and returns on a broad index between January 1998 (euro area equity) / mid-2000 (US and EME equity) / mid-2003 (US and EME bonds) / January 2009 (euro area bonds) and January 2015. The labelling of the horizontal axis indicates by how many months flows lead (negative numbers) or lag (positive numbers) returns for the calculation of correlations.

Sources: Bank of America Merrill Lynch; Bloomberg; EPFR; Moody's; BIS calculations.

their capitalisation ratios to levels last seen at end-2008, in the midst of the global financial turmoil (Graph VI.10, left-hand panel). Even though this trend reversed partly at the start of 2015, it has undermined firms' loss-absorbing capacity, leaving EMEs vulnerable to funding reversals.

This vulnerability has evolved alongside the growing reliance of EMEs on market-based financing channelled through internationally active asset managers (Chapter III). In general, asset managers' business models – eg benchmarking to market indices and attributing great importance to relative performance – and the investment structures that they offer – eg collective investment vehicles – incentivise short-sighted behaviour that can be destabilising in the face of adverse shocks. In the case of managers investing in EME assets, this issue is all the more pronounced.[3] EME funds rely on significantly fewer and more correlated benchmarks than their advanced economy counterparts. As a result, financial shocks are more likely to simultaneously affect a wide range of investors in EME funds, leading to concerted in- and outflows.

Fund flows that amplify price swings would be destabilising. The potential for such dynamics transpires from the historical relationship between returns on broad indices and fund flows (Graph VI.10, centre and right-hand panels). In the case of US and EME funds, inflows follow in the footsteps of high returns (bars to the right of zero) and are likely to strengthen the rise in contemporaneous returns (bars at zero). In such a scenario, fund inflows support persistent equity or bond booms. However, this mechanism would work in the opposite direction as well. In a downturn, outflows would exacerbate sub-par returns and persistently depress markets.

[3] See K Miyajima and I Shim, "Asset managers in emerging market economies", *BIS Quarterly Review*, September 2014, pp 19–34.

Looking forward, the fundamental question is whether asset managers can take over intermediation functions that banks have shed. Financial institutions' success in performing such functions depends on their capacity to take temporary losses in their stride. But this capacity has recently declined in the asset management sector, where retail investors have been replacing institutional investors as the ultimate risk bearers. Retail investors have smaller balance sheets, shorter investment horizons and lower risk tolerance, and hence a smaller loss-absorbing capacity. The investment behaviour of UK households during the recent financial crisis is consistent with this.[4]

These issues become more important as the assets managed by an individual company grow in size. The decisions taken by a single large asset manager can potentially trigger fund flows with significant system-wide repercussions. To delve into this issue, the Financial Stability Board and the International Organization of Securities Commissions have published a proposal on how to identify non-bank non-insurer global systemically important financial institutions.[5]

More recently, the policy debate has considered asset management companies (AMCs) as a distinctive group that gives rise to new financial risks. AMCs' incentive structures have received particular attention, as they can generate concerted behaviour and thus amplify financial market fluctuations. Restrictions on investment portfolio shifts could limit incentive-driven swings and, by effectively lengthening asset managers' investment horizons, could stabilise their behaviour in the face of temporary adverse shocks. Similarly, caps on leverage could contain the amplification of shocks. Furthermore, redemption risk can be addressed by liquidity buffers and – in the spirit of recent amendments to US money market fund rules – by restrictions on rapid redemptions from managed funds. This could insulate asset managers from hasty swings in retail investor sentiment, thus boosting the sector's loss-absorbing capacity.

A complementary policy response would aim to restore the vibrancy of institutions that were successful intermediaries in the past. Banks are the prime example. Regulatory initiatives under way that aim to increase banks' resilience and transparency would improve their intermediation capacity, not least by helping them regain market confidence. And as resilience depends critically on the ability to generate sustainable profits, it would be supported by growth-enhancing reforms and a timely normalisation of monetary policy in advanced economies as well as by further initiatives to restrain financial imbalances in emerging market economies.

[4] See A Haldane, "The age of asset management?", speech given at the London Business School, April 2014.

[5] Financial Stability Board and International Organization of Securities Commissions, *Assessment methodologies for identifying non-bank non-insurer global systemically important financial institutions*, consultative document, March 2015.