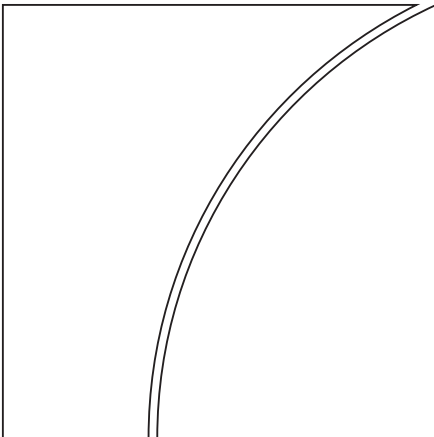BANK FOR INTERNATIONAL SETTLEMENTS

87th Annual Report
1 April 2016–31 March 2017

Basel, 25 June 2017

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Graphs

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The economic chapters of this Report went to press on 14–16 June 2017 using data available up to 26 May 2017.

Conventions used in the Annual Report

$	US dollar unless specified otherwise
mn	million
bn	billion (thousand million)
trn	trillion (thousand billion)
% pts	percentage points
bp	basis points
lhs, rhs	left-hand scale, right-hand scale
sa	seasonally adjusted
yoy	year on year
qoq	quarter on quarter
...	not available
.	not applicable
–	nil or negligible

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.

Country codes

AO	Angola	GB	United Kingdom	NO	Norway
AR	Argentina	GR	Greece	NZ	New Zealand
AT	Austria	HK	Hong Kong SAR	PA	Panama
AU	Australia	HR	Croatia	PE	Peru
BA	Bosnia and	HU	Hungary	PH	Philippines
	Herzegovina	ID	Indonesia	PK	Pakistan
BE	Belgium	IE	Ireland	PL	Poland
BG	Bulgaria	IL	Israel	PT	Portugal
BR	Brazil	IN	India	QA	Qatar
CA	Canada	IS	Iceland	RO	Romania
CH	Switzerland	IT	Italy	RU	Russia
CL	Chile	JP	Japan	SA	Saudi Arabia
CN	China	KR	Korea	SE	Sweden
CO	Colombia	KW	Kuwait	SG	Singapore
CY	Cyprus	KZ	Kazakhstan	SI	Slovenia
CZ	Czech Republic	LT	Lithuania	SK	Slovakia
DE	Germany	LU	Luxembourg	TH	Thailand
DK	Denmark	LV	Latvia	TR	Turkey
DZ	Algeria	LY	Libya	TW	Chinese Taipei
EA	euro area	MK	Macedonia, FYR	US	United States
EE	Estonia	MT	Malta	VE	Venezuela
ES	Spain	MX	Mexico	VN	Vietnam
EU	European Union	MY	Malaysia	ZA	South Africa
FI	Finland	NG	Nigeria		
FR	France	NL	Netherlands		

Currency codes

AUD	Australian dollar	EUR	euro	JPY	Japanese yen
CHF	Swiss franc	GBP	pound sterling	USD	US dollar

Advanced economies (AEs): Australia, Canada, Denmark, the euro area, Japan, New Zealand, Norway, Sweden, Switzerland, the United Kingdom and the United States.

Major AEs (G3): The euro area, Japan and the United States.

Other AEs: Australia, Canada, Denmark, New Zealand, Norway, Sweden, Switzerland and the United Kingdom.

Emerging market economies (EMEs): 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.

Global: All AEs and EMEs, as listed.

Commodity exporters (countries whose average share of commodities in export revenues in 2005–14 exceeded 40%): Argentina, Australia, Brazil, Canada, Chile, Colombia, Indonesia, New Zealand, Norway, Peru, Russia, Saudi Arabia and South Africa.

Country aggregates used in graphs and tables may not cover all the countries listed, depending on data availability.

87th Annual Report

submitted to the Annual General Meeting
of the Bank for International Settlements
held in Basel on 25 June 2017

Ladies and Gentlemen,

It is my pleasure to submit to you the 87th Annual Report of the Bank for International Settlements for the financial year which ended on 31 March 2017.

The net profit for the year amounted to SDR 827.6 million, compared with SDR 412.9 million for the preceding year. Details of the results for the financial year 2016/17 may be found on pages 171–2 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 167.4 million in payment of a dividend of SDR 300 per share. This would comprise a normal dividend of SDR 225 per share and a supplementary dividend of SDR 75 per share, and be payable in any constituent currency of the SDR, or in Swiss francs.

The Board further recommends that SDR 33.0 million be transferred to the general reserve fund and the remainder – amounting to SDR 627.2 million – to the free reserve fund.

If these proposals are approved, the Bank's dividend for the financial year 2016/17 will be payable to shareholders on 29 June 2017.

Basel, 16 June 2017

JAIME CARUANA
General Manager

Overview of the economic chapters

Chapter I: Towards resilient growth

Over the past year, the global economy has strengthened further. Growth has approached long-term averages, unemployment rates have fallen towards pre-crisis levels and inflation rates have edged closer to central bank objectives. With near-term prospects the best in a long time, this year's Annual Report examines four risks that could threaten the sustainability of the expansion in the medium term: a rise in inflation; financial stress as financial cycles mature; weaker consumption and investment, mainly under the weight of debt; and a rise in protectionism. To a large extent, these risks are rooted in the "risky trinity" highlighted in last year's Annual Report: unusually low productivity growth, unusually high debt levels, and unusually limited room for policy manoeuvre. Thus, the most promising policy strategy is to take advantage of the prevailing tailwinds to build greater economic resilience, nationally and globally. Raising the economy's growth potential is critical. At the national level, this means rebalancing policy towards structural reforms, relieving an overburdened monetary policy, and implementing holistic frameworks that tackle the financial cycle more systematically. At the global level, it means reinforcing the multilateral approach to policy – the only one capable of addressing the common challenges the world is facing.

Chapter II: Political shocks reorient markets

Financial markets were confronted by a changing political environment as the economic background brightened. Political events surprised market participants, who quickly needed to take views on the shifting policy direction and its economic implications. Attention shifted away from monetary policy, and political events took centre stage. A natural consequence of this reorientation was a change to long-established patterns of correlation and risk. Instead of broad-based swings between "risk-on" and "risk-off" positions, investors began to differentiate more across sectors and countries. Bond yields diverged across the major economies, with knock-on effects on foreign exchange markets. At the same time, a gap opened up between surging measures of policy uncertainty and record-low financial market volatility, while a number of indicators pointed to increased tail risks. Pricing anomalies that emerged in the aftermath of the Great Financial Crisis (GFC) retreated but did not disappear, suggesting that such anomalies may have become a more permanent feature of markets.

Chapter III: The global economy: maturing recoveries, turning financial cycles?

The global cyclical upswing strengthened considerably during the year under review, with virtually all major economies expanding by early 2017. Consumption was a key factor driving aggregate demand, but business investment also showed signs of a rebound. At the same time, shrinking measures of economic slack

suggested that the expansion was maturing. Financial cycles were in the expansion phase in many countries, supporting the economic upswing. In part related to the financial cycle, there are a number of medium-term risks to a sustainable economic expansion. Leading indicators of financial distress signal risks from high private debt and house prices in several economies that were not at the epicentre of the GFC. High household debt might become a drag on demand in some countries, especially if rising interest rates were to boost debt service burdens. Elevated corporate debt, coupled with weak productivity growth, could weigh on investment. And rising protectionist sentiment could hurt economic prospects. Yet the cyclical tailwinds open a window of opportunity to pursue policies that enhance resilience and reduce risks to sustainable growth.

Chapter IV: Monetary policy: inching towards normalisation

Monetary policy remained generally highly accommodative, with nominal and real interest rates kept very low and central bank balance sheets remaining large or growing further. Against the backdrop of strengthening growth, inflation developments took centre stage in central bank decisions. While inflation rates for the most part became better aligned with central bank price stability mandates, the significant reduction in labour market slack raised questions about upside inflation risks. That said, an evaluation of those risks based on historical labour market developments suggests that they are unlikely to be the primary risk to the global expansion under way. Policy normalisation presents unprecedented challenges, given the current high debt levels and unusual uncertainty. A strategy of gradualism and transparency has clear benefits but is no panacea, as it may also encourage further risk-taking and slow down the build-up of policymakers' room for manoeuvre.

Chapter V: The financial sector – preparing for the future

The financial sector faces an improving but still challenging environment. The near-term economic outlook has brightened substantially. At the same time, intermediation margins remain compressed across the major economies and the sector is grappling with structural forces such as technological innovation and consolidation pressures. With the main chapters of regulatory reform about to be closed, space is opening up for banks and other financial institutions to further increase resilience. One area of attention is global US dollar funding markets, which are likely to remain a key pressure point during episodes of market stress. Banks' continued heavy reliance on short-term US dollar funding, paired with a high degree of market concentration and interconnectedness, underscores the importance of supervisory cooperation and effective backstops. The ultimate aim is a stronger financial system that helps support the resilience of the global economy.

Chapter VI: Understanding globalisation

Economic globalisation has contributed to a substantial rise in living standards and falling poverty over the past half-century. Tighter trade and financial integration are deeply intertwined: international trade not only relies on, but also generates, financial linkages. Together, international trade and finance have enhanced competition and spread technology, driving efficiency gains and aggregate productivity. Like any other form of far-reaching economic change, globalisation

poses challenges. For example, globalisation has coincided with rising within-country income inequality in some countries, although the evidence indicates that technology has been the main driver. Moreover, financial openness exposes economies to destabilising external influences. Properly designed domestic policies can enhance the gains from globalisation and mitigate the adjustment costs. And international cooperation must supplement such policies in order to address global linkages. Completing international financial reforms is one priority. Global currencies call for international cooperation, effective crisis management and more systematic consideration of cross-border spillovers and spillbacks.

I. Towards resilient growth

What a difference a year can make in the global economy, in terms of both facts and, above all, sentiment. The facts paint a brighter picture. There are clear signs that growth has gathered momentum. Economic slack in the major economies has diminished further; indeed, in some of them unemployment rates have fallen back to levels consistent with full employment. Inflation readings have moved closer to central bank objectives, and deflation risks no longer figure in economic projections. But sentiment has swung even more than facts. Gloom has given way to confidence. We noted last year that conditions were not as dire as typically portrayed. Now, concerns about secular stagnation have receded: all the talk has been about a revival of animal spirits and reflation on the back of buoyant financial markets. And with the outcome of the US presidential election as a turning point, political events have taken over from central bank pronouncements as the main financial market driver.

Yet, despite the best near-term prospects for a long time, paradoxes and tensions abound. Financial market volatility has plummeted even as indicators of policy uncertainty have surged. Stock markets have been buoyant, but bond yields have not risen commensurately. And globalisation, a powerful engine of world growth, has slowed and come under a protectionist threat.

Against this backdrop, the main theme of this year's Annual Report is the sustainability of the current expansion. What are the medium-term risks? What should policy do about them? And, can we take advantage of the opportunities that a stronger economy offers?

The Report evaluates four risks – geopolitical ones aside – that could undermine the sustainability of the upswing. First, a significant rise in inflation could choke the expansion by forcing central banks to tighten policy more than expected. This typical postwar scenario moved into focus last year, even in the absence of any evidence of a resurgence of inflation. Second, and less appreciated, serious financial stress could materialise as financial cycles mature if their contraction phase were to turn into a more serious bust. This is what happened most spectacularly with the Great Financial Crisis (GFC). Third, short of serious financial stress, consumption might weaken under the weight of debt, and investment might fail to take over as the main growth engine. There is evidence that consumption-led growth is less durable, not least because it fails to generate sufficient increases in productive capital. Finally, a rise in protectionism could challenge the open global economic order. History shows that trade tensions can sap the global economy's strength.

These risks may appear independent, but they are not. For instance, policy tightening to contain an inflation spurt could trigger, or amplify, a financial bust in the more vulnerable countries. This would be especially true if higher policy rates coincided with a snapback in bond yields and US dollar appreciation: the strong post-crisis expansion of dollar-denominated debt has raised vulnerabilities, particularly in some emerging market economies (EMEs). Indeed, an overarching issue is the global economy's sensitivity to higher interest rates given the continued accumulation of debt in relation to GDP, complicating the policy normalisation process (Graph I.1). As another example, a withdrawal into trade protectionism could spark financial strains and make higher inflation more likely. And the emergence of systemic financial strains yet again, or simply much slower growth, could heighten the protectionist threat beyond critical levels.
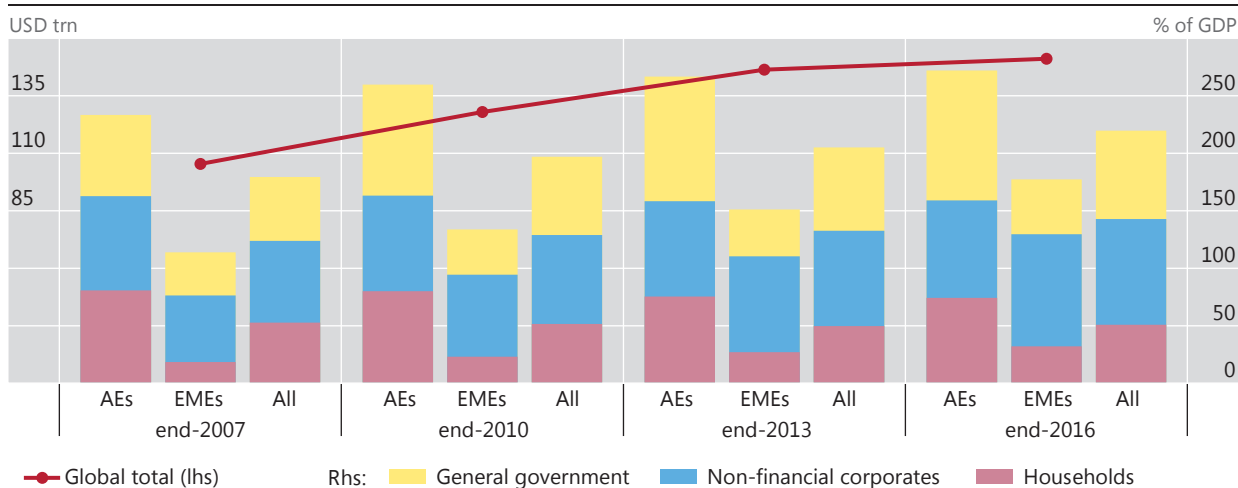
Global debt continues to rise

Graph I.1

USD trn
% of GDP

AEs	EMEs	All	AEs	EMEs	All	AEs	EMEs	All	AEs	EMEs	All
	end-2007			end-2010			end-2013			end-2016	

━●━ Global total (lhs)   Rhs: ▨ General government   ▨ Non-financial corporates   ▨ Households

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

Some of these risks have roots in developments that have unfolded over decades, but they have all been profoundly shaped by the GFC and the unbalanced policy response. Hence the "risky trinity" highlighted in last year's Annual Report: unusually low productivity growth, unusually high debt levels, and unusually limited room for policy manoeuvre.[1]

Given the risks ahead, the most promising policy strategy is to take advantage of the prevailing tailwinds to build greater economic resilience, nationally and globally. At the national level, this means rebalancing policy towards structural reforms, relieving an overburdened monetary policy, and implementing holistic policy frameworks that tackle more systematically the financial cycle – a medium-term phenomenon that has been a key source of vulnerabilities. Raising the economy's growth potential is critical. At the global level, it means reinforcing the multilateral approach to policy – the only one capable of addressing the common challenges the world is facing.

In the rest of this introductory chapter, we briefly review the year in retrospect before analysing the medium-term risks to the sustainability of the expansion. We conclude with an exploration of policy options.

The year in retrospect

Global growth has strengthened considerably since the release of last year's Annual Report, beating expectations (Chapter III and Graph I.2, left-hand panel). Growth is now projected to reach 3.5% in 2017 (consensus forecast). This rate would be in line with the long-term historical average, although below the close to 4% experienced during the pre-crisis "golden decade". The pickup was especially marked in advanced economies, where, going into 2017, confidence indicators had reached readings not seen in years. Growth was more mixed in EMEs, although there too performance improved, buoyed by higher commodity prices. In particular, the feared sharp slowdown in China did not materialise, as the authorities stepped in once more to support the economy, albeit at the cost of a further expansion in debt.

The maturing economic recovery absorbed economic slack further, especially in labour markets (Chapter III and Graph I.2, centre panel). Unemployment rates in

The global economy strengthens further as inflation converges

Graph I.2

GDP growth[1]
yoy changes, per cent; sa

Unemployment rates[2]
Per cent; sa

Inflation[1, 3]
Per cent

— Global — AEs — EMEs
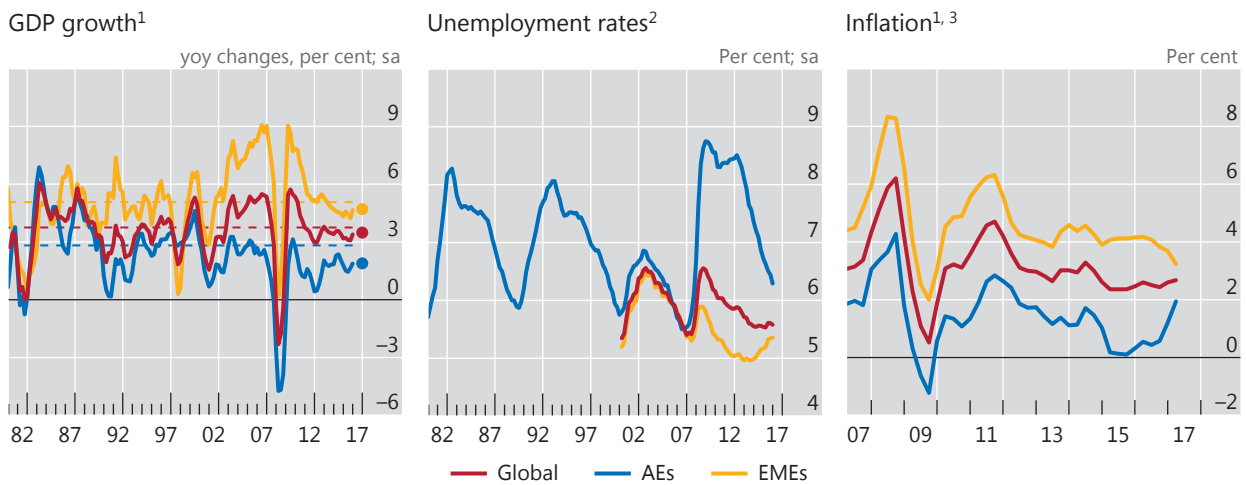
In the left-hand panel, the dots indicate Consensus Economics forecasts for 2017; the dashed lines indicate 1982–2007 averages.

[1] Weighted averages based on GDP and PPP exchange rates.   [2] Weighted averages based on labour force levels; definitions may vary across countries.   [3] Consumer prices.

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

major advanced economies continued to decline. In some that had been at the core of the GFC, such as the United States and the United Kingdom, unemployment returned to pre-crisis levels; in others, such as Japan, it was well below. While still comparatively high, unemployment also ebbed further in the euro area, reaching levels last seen some eight years ago.

Inflation, on balance, moved closer to central bank objectives (Chapter IV and Graph I.2, right-hand panel). Boosted to a considerable extent by higher oil prices, headline rates in several advanced economies rose somewhat; core rates remained more subdued. Inflation actually decreased in some EMEs where it had been above target, not least as a result of exchange rate movements. Consensus forecasts for 2017 point to a moderate increase globally.

The change in financial market sentiment was remarkable (Chapter II). In the wake of the US election, after a short-lived fall, markets rebounded, as concerns about a future of slow growth gave way to renewed optimism. Subsequently comforted by better data releases, the "reflation trade" lingered on in the following months. Equity markets soared and volatilities sank to very low levels, indicative of high risk appetite. The increase in bond yields that had started in July accelerated. On balance, however, bond yields still hovered within historically low ranges, and by May 2017 they had reversed a significant part of the increase, when the reflation trade faded. The US dollar followed an even more see-saw pattern, surging until early 2017 and then retracing its gains.

Equally remarkable was the shift in the main forces driving markets (Chapter II). Politics, notably the UK vote to leave the European Union (Brexit) and above all the US election, took over from central banks. Correspondingly, the "risk-on"/"risk-off" phases so common post-crisis in response to central banks' words and actions gave way to a more differentiated pattern in sync with political statements and events. Hence, in particular, the more heterogeneous movements of financial prices across asset classes, sectors and regions in the wake of the US election and in light of evolving prospects for fiscal expansion, tax cuts, deregulation and protectionism.

This shift went hand in hand with the opening-up of an unprecedented wedge between indices of policy uncertainty, which soared, and of financial market volatility, which sank.

That said, central banks continued to exert a significant influence on markets. Largely reflecting the monetary policy outlook and central bank asset purchases, an unusually wide gap opened up between the US dollar yield curve, on the one hand, and its yen and euro equivalents, on the other. This contributed to sizeable cross-currency portfolio flows, often on a currency-hedged basis, helping to explain a puzzling market anomaly: the breakdown of covered interest parity (Chapter II). The corresponding premium on dollar funding through the FX market relative to the money market also signalled a more constrained use of banks' balance sheet capacity. Banks were less willing than pre-crisis to engage in balance sheet-intensive arbitrage (Chapter V).

The condition and near-term prospects of the financial industry improved but remained challenging (Chapter V). The outlook for higher interest rates and a stronger economy helped bank equity prices to outperform the market. Profits in crisis-hit countries increased somewhat, supporting banks' efforts to further replenish their capital cushions. And profitability was generally higher in countries experiencing strong financial cycle expansions. Even so, market scepticism lingered, as reflected in comparatively low price-to-book ratios or credit ratings for many banks. Euro area banks were especially affected as they struggled with excess capacity and high non-performing loans in some member countries. Profitability in the insurance sector of the main advanced economies changed little, weighed down even more than that of the banking sector by persistently low interest rates.

Sustainability

This brief review of the past year indicates that the global economy's performance has improved considerably and that its near-term prospects appear the best in a long time. Moreover, the central scenario delineated by private and official sector forecasts points to further gradual improvement: headwinds abate, the global economy gathers steam, monetary policy is gradually normalised, and the expansion becomes entrenched and sustainable. Indeed, the financial market sentiment is broadly consistent with this scenario.

As always, however, such outcomes cannot be taken for granted. Market and official expectations have been repeatedly disappointed since the GFC. And there is generally not much of value in macroeconomic forecasts beyond the near term. By construction, they assume a return to long-term trends, which is one reason why they do not anticipate recessions. Moreover, while its pace has been moderate overall, the current expansion is already one of the longest on record.

Against this backdrop, it is worth examining key medium-term risks to the outlook. We next consider, sequentially, an inflation spurt, financial cycle risks, a failure of investment to take over the lead from potentially weaker consumption, and the protectionist threat that could hit trade and roll back globalisation.

Inflation

A rise in inflation, forcing central banks to tighten substantially, has been the typical trigger of postwar recessions. The latest one was an exception: while monetary policy did tighten somewhat, it was the collapse of a financial boom under its own weight that played the main role. Could the more typical postwar pattern reassert itself (Chapter IV)?

There are prima facie reasons to believe inflation could increase significantly (Graph I.3, left-hand panel). It has already been edging up. More importantly, economic slack is vanishing, as suggested by estimates of the relationship between output and its potential ("output gaps") and, even more so, by labour market indicators. And this is happening in several countries simultaneously – a development not to be underestimated given evidence that global measures of slack help predict inflation over and above domestic ones. These signs suggest that it would be unwise to take much comfort from the fact that higher inflation has recently mirrored mainly a higher oil price: they could point to greater inflation momentum going forward.

At the same time, a substantial and lasting flare-up of inflation does not seem likely (Chapter IV). The link between economic slack and price inflation has proved rather elusive for quite some time now (Graph I.3, right-hand panel). To be sure, the corresponding link between labour market slack and *wage* inflation appears to be more reliable. Even so, there is evidence that its strength has declined over time, consistent with the loss of labour's "pricing" power captured by labour market indicators (same panel). And, in turn, the link between increases in unit labour costs and price inflation has been surprisingly weak.

The deeper reasons for these developments are not well understood. One possibility is that they reflect central banks' greater inflation-fighting credibility. Another is that they mainly mirror more secular disinflationary pressures associated with globalisation and the entry of low-cost producers into the global trading system, not least China and former communist countries. Alongside technological pressures, these developments have arguably sapped both the bargaining power of labour and the pricing power of firms, making the wage-price spirals of the past less likely.

These arguments suggest that, while an inflation spurt cannot be excluded, it may not be the main factor threatening the expansion, at least in the near term. Judging from what is priced in financial assets, also financial market participants appear to hold this view.

Tighter labour markets pointing to upside inflation risks? Graph I.3

As unemployment falls, wage pressures rise[1] | While wages remain sensitive to unemployment, prices are not[4]

yoy changes, per cent | Percentage points | Coefficient

ULC growth (lhs)[2] Unemployment gap (rhs)[3]

Time-varying Phillips curve slopes: Prices Wages
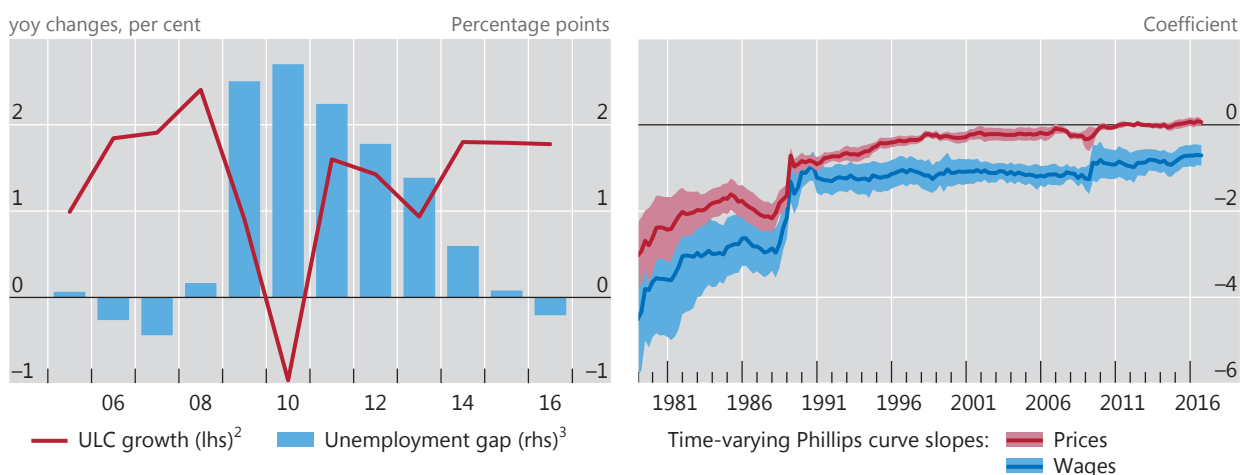
[1] For CA, DE, GB, JP and US; forecasts after 2015. [2] ULC = unit labour cost. Weighted average based on rolling GDP and PPP weights. [3] Unemployment rate less non-accelerating inflation rate of unemployment; weighted average based on labour force levels. [4] Rolling 15-year window estimates and confidence bands from a panel of G7 economies. See Chapter IV for details.

Sources: IMF, *World Economic Outlook*; OECD, *Economic Outlook*; BIS estimations.

Financial cycle risks

In light of the above, the potential role of financial cycle risks comes to the fore. The main cause of the next recession will perhaps resemble more closely that of the latest one – a financial cycle bust. In fact, the recessions in the early 1990s in a number of advanced economies, without approaching the depth and breadth of the latest one, had already begun to exhibit similar features: they had been preceded by outsize increases in credit and property prices, which collapsed once monetary policy started to tighten, leading to financial and banking strains. And for EMEs, financial crises linked to financial cycle busts have been quite prominent, often triggered or amplified by the loss of external funding; recall, for instance, the Asian crisis some 20 years ago.

Leading indicators of financial distress constructed along the above lines do point to potential risks (Chapter III). Admittedly, such risks are not apparent in the countries at the core of the GFC, where domestic financial booms collapsed, such as the United States, the United Kingdom or Spain. There, some private sector deleveraging has taken place and financial cycle expansions are still comparatively young. The main source of near-term concerns in crisis-hit economies is the failure to fully repair banks' balance sheets in some countries, notably in parts of the euro area, especially where the public sector's own balance sheet looks fragile (Chapter V). Political uncertainties compound these concerns.

Rather, the classical signs of financial cycle risks are apparent in several countries largely spared by the GFC, which saw financial expansions gather pace in its aftermath. This group comprises several EMEs, including the largest, as well as a number of advanced economies, notably some commodity exporters buoyed by the long post-crisis commodity boom. In all of these economies, of course, interest rates have been very low, or even negative, as inflation has stayed low, or even given way to deflation, despite strong economic performance. Financial cycles in this group are at different stages. In some cases, such as China, the booms are continuing and maturing; in others, such as Brazil, they have already turned to bust and recessions have occurred, although without ushering in a full-blown financial crisis.

EMEs face an additional challenge: the comparatively large amount of FX debt, mainly in US dollars (Chapters III, V and VI). Dollar debt has typically played a critical role in EME financial crises in the past, either as a trigger, such as when gross dollar-denominated capital flows reversed, or as an amplifier. The conjunction of a domestic currency depreciation and higher US dollar interest rates can be poisonous in the presence of large currency mismatches. From 2009 to end-2016, US dollar credit to non-banks located outside the United States – a bellwether BIS indicator of global liquidity – soared by around 50% to some $10.5 trillion; for those in EMEs alone, it more than doubled, to $3.6 trillion.

Compared with the past, several factors mitigate the risk linked to FX debt. Countries have adopted more flexible exchange rate regimes: while no panacea, these should make currency crashes less likely and induce less FX risk-taking ex ante. Countries have also built up foreign currency war chests, which should cushion the blow if strains emerge. And the amounts of FX debt in relation to GDP are, on balance, still not as high as before previous financial crises. Indeed, several countries have absorbed large exchange rate adjustments in recent years. Even so, vulnerabilities should not be taken lightly, at least where large amounts of FX debt coincide with outsize domestic financial booms. This is one reason why a tightening of US monetary policy and a US dollar appreciation may signal global financial market retrenchment and higher risk aversion, with the dollar acting as a kind of "fear gauge".[2]

More generally, while leading indicators of financial distress provide a general sense of a build-up of risk, they have a number of limitations. In particular, they tell us little about the precise timing of its materialisation, the intensity of strains or their precise dynamics. After all, policymakers have taken major steps post-crisis to improve the strength of regulatory and supervisory frameworks, which could alter the statistical relationships found in the data. For instance, many EMEs have had recourse to a wide array of macroprudential measures to tame the financial cycle. While these have not succeeded in avoiding the build-up of outsize financial booms, they can make the financial system more resilient to the subsequent bust. As the experience of Brazil indicates, this may not prevent a recession, but it may limit the risk of a financial crisis. These limitations suggest that the indicators need to be treated with caution.

Consumption and investment

Short of any serious financial strains, the expansion could end because of weakness in domestic aggregate demand (Chapter III). In many countries, the recent expansion has been consumption-led, with consumption growth outpacing that of GDP. By contrast, investment has been comparatively subdued until recently. Could consumption weaken? And what are the prospects for a sustained strengthening of investment? Naturally, the expansion would be more sustainable if investment became the main growth engine. This would boost productivity and help keep medium-term inflationary pressures in check. Empirical evidence indicating that consumption-led growth is less sustainable is consistent with this view.

While consumption could weaken as a result of smaller employment gains as capacity constraints are hit, the more serious vulnerabilities reflect the continued accumulation of debt, sometimes on the back of historically high asset prices. Asset price declines could put pressure on balance sheets, especially if they coincided with higher interest rates. Indeed, BIS research has uncovered an important but underappreciated role of debt service burdens in driving expenditures (Chapter III).

An analysis of the debt service burden-induced interest rate sensitivity of consumption points to vulnerabilities (Chapter III and Graph I.4). These are apparent in economies that have experienced household credit booms post-crisis, often alongside strong property price increases, including several small open economies and some EMEs. Increases in interest rates beyond what is currently priced in markets could weaken consumption considerably. By contrast, in some crisis-hit countries, such as the United States, the safety cushion is considerably larger following the deleveraging that has already taken place.

Investment has been rather weak post-crisis in relation to GDP, at least in advanced economies (Chapter III). The drop has reflected in part a correction in residential investment after the pre-crisis boom, but also a decline in the non-residential component. In EMEs, investment has proved generally more resilient, notably reflecting the surge in China and the associated boost to commodity prices. Post-crisis investment weakness, coupled with resource misallocations, has no doubt contributed to the further deceleration of productivity growth. Could the recent welcome pickup in investment fail to strengthen enough?

While interest rates matter for investment, a bigger role is played by profits, uncertainty and cash flows. From this perspective, while the very high readings of policy uncertainty indicators may be a reason for concern, they have not sapped the recent pickup so far. In EMEs, a cause for concern has been the sharp increase in corporate debt in several economies, sometimes in foreign currency. Indeed, empirical evidence points to a link between US dollar appreciation and investment weakness in many EMEs (Chapter III). China stands out, given the combination of

Interest rate sensitivity of household debt service ratios

Deviations from country-specific long-run averages   Graph I.4

Percentage points

Debt service ratio: ● Q4 2007 ● Latest[1] ▮ Forecast range[2]
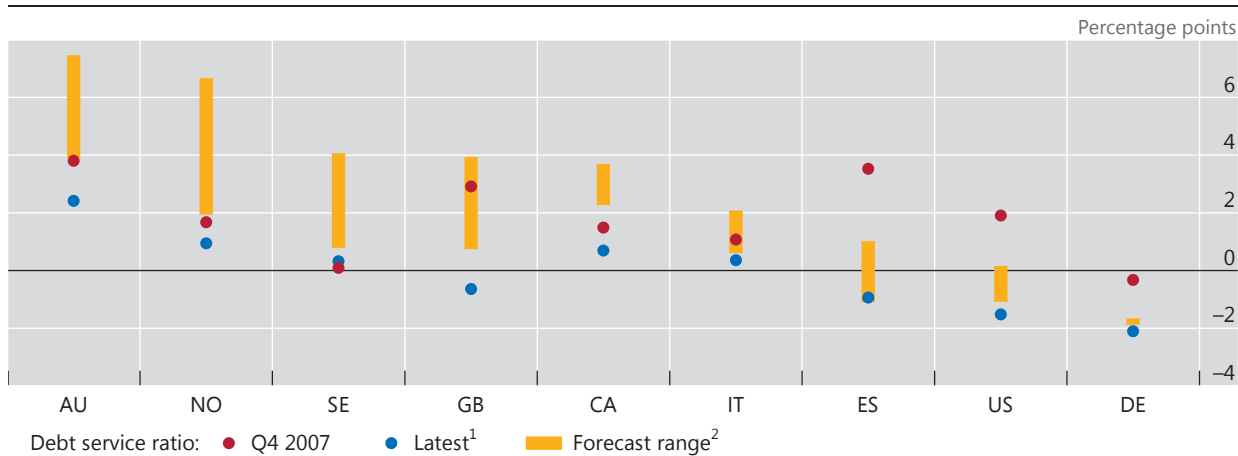
[1] Q4 2016; for AU, IT, NO and US, Q3 2016.   [2] Three-year-ahead projections of debt service ratios for the household sector under different interest rate scenarios. Based on country-specific vector autoregressions that include the household credit-to-income ratio, interest rates on the stock of household debt, real residential property prices, real GDP and the three-month money market rate. See Chapter III for details.

Sources: National data; BIS calculations.

unprecedented debt-financed investment rates and signs of excess capacity and unprofitable businesses. A sharp slowdown there could cause much broader ripples in EMEs, including through a slump in commodity prices.

Deglobalisation

Since the GFC, protectionist arguments have been gaining ground. They have been part of a broader social and political backlash against globalisation. Rolling back globalisation would strike a major blow against the prospects for a sustained and robust expansion. Investment would be the first casualty, given its tight link with trade. But the seismic change in institutional frameworks and policy regimes would have a broader and longer-lasting impact. It is worth exploring these issues in more detail, which is why we devote a whole chapter to them in this year's Report (Chapter VI).

As is well known, the gradual process of tighter integration that the global economy has witnessed since World War II – and which took a quantum leap following the end of the cold war era – is not unprecedented (Graph I.5, left-hand panel). A first globalisation wave took place starting in the second half of the 19th century, became entrenched during the gold standard period, and took a big blow with World War I before collapsing a decade later in the wake of the Great Depression.

There are similarities but also important differences between the two waves. Both periods saw a major rise in real and financial integration, driven by political decisions and supported by technological innovation. But, economically, the more recent wave has been both broader and deeper, even as it has relied less on migration flows. Hence the unprecedented growth in global value chains (GVCs) and cross-border financial claims.

While there is a natural tendency to discuss real and financial globalisation separately, the two are intertwined. Exports and imports rely heavily on international financing. Transnational ownership of companies through foreign direct investment

Financial and trade openness

Graph I.5

Financial and trade openness over time
1865 (1865–1935), 1960 (1960–2015) = 100
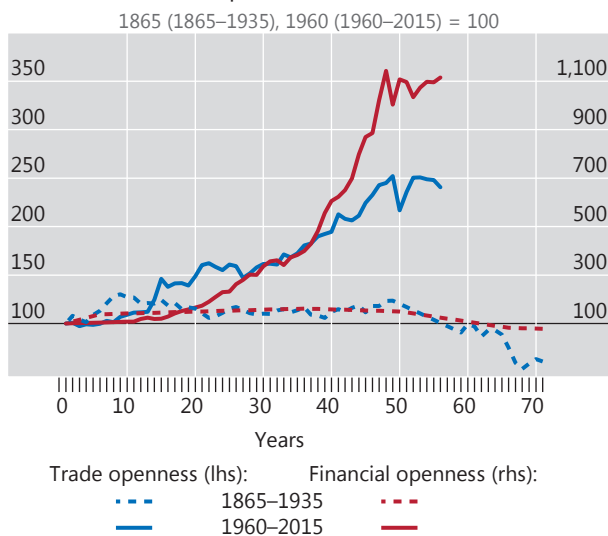
Financial and trade openness across countries, 2015

Trade openness (lhs):   Financial openness (rhs):
- - - -   1865–1935   - - - -
————   1960–2015   ————
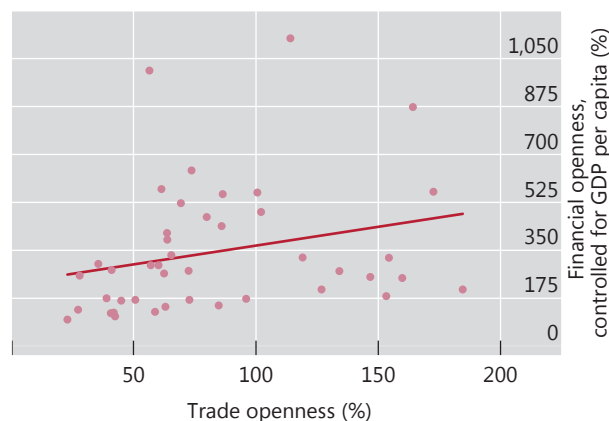
Sources: See Chapter VI for details.

(FDI) boosts trade, spreads organisational and technological know-how, and gives rise to global players. Banks and other service providers tend to follow their customers across the world. Financial services are themselves an increasing portion of economic activity and trade. And the relevance of national borders is further blurred by the overwhelming use of a handful of international currencies, mostly the US dollar, as settlement medium and unit of account for trade and financial contracts.

A look at the data confirms the close relationship between real and financial globalisation. Across countries, the pattern of financial linkages mirrors rather well that of trade (Chapter VI and Graph I.5, right-hand panel). Historically, there have been periods, such as the Bretton Woods era, in which policymakers sought greater trade integration while at the same time deliberately limiting financial integration, so as to retain more policy autonomy. But, over time, the regimes proved unsustainable, and financial integration grew apace.

That said, the financial side has also developed a life of its own. Across countries, this reflects in particular the benefits of agglomeration, which cause financial activity to concentrate in financial centres, and tax arbitrage, which encourages companies to locate headquarters in specific countries. Since the early 1990s financial linkages have far outstripped trade, in contrast to what available data suggest about the first globalisation wave.

There is some evidence that globalisation has slowed post-crisis, but it is not in retreat. Trade in relation to world GDP and GVCs have plateaued. And while financial integration broadly defined seems to have moderated, bank lending has pulled back. However, a closer look at the BIS statistics indicates that the contraction largely reflects a pullback by euro area banks and is regional in nature. Banks from Asia and elsewhere have taken over, and integration has not flagged. Moreover, securities issuance has outpaced bank lending, in line with the rise of institutional investors and asset managers.

From a policy perspective, the reasons for the slowdown matter. The slowdown would be less of an issue if it simply reflected cyclical factors and unconstrained

economic decisions. Much of the decline in trade and financial linkages seems to have that character. It would be more of a concern if it reflected national biases. In both trade and finance, there are signs that this too may have started to occur. Hence the increase in trade restrictions and in ring-fencing in the financial sector. No doubt some of those decisions may be justified, but they could herald a broader and more damaging backlash.

Formal statistical evidence, casual observation and plain logic indicate that globalisation has been a major force supporting world growth and higher living standards. Globalisation has helped lift large parts of the world population out of poverty and reduce inequality between countries. It is simply unimaginable that EMEs could have grown so much without being integrated in the global economy. Conceptually, integration spreads knowledge, fosters specialisation and allows production to take place where costs are lower. It is akin to what economists would call a series of major positive supply side shocks that, in turn, promote demand.

At the same time, it is also well known that globalisation poses challenges. First, its benefits may be unevenly distributed, especially if economies are not ready or able to adapt. Trade displaces workers and capital in those sectors that are more exposed to international competition. And it may also increase income inequality in some countries. Opening up trade with countries where labour is abundant and cheap puts pressure on wages in those where it is scarcer and more expensive. It can thus erode labour's pricing power, tilt the income distribution towards capital, and widen the skilled/unskilled labour wedge. Second, opening up the capital account without sufficient safeguards can expose the country to greater financial risks.

The empirical evidence confirms, but also qualifies, the impact on labour markets and income distribution (Chapter VI). Low-skill jobs have migrated to low-cost producers as large industrial segments have been displaced in the less competitive economies. And while studies have found an impact on income inequality, they have generally concluded that technology has been much more important: the mechanisms are similar and naturally interact, but the spread of technology across the whole economy has made its influence more pervasive.

It is also well recognised by now that greater financial openness can channel financial instability. Just as with domestic financial liberalisation, unless sufficient safeguards are in place, it can increase the amplitude of financial booms and busts – the so-called "procyclicality" of the financial system. In the *85th Annual Report*, we devoted a whole chapter to this issue, exploring weaknesses in the international monetary and financial system.[3] The free flow of financial capital across borders and currencies can encourage exchange rate overshooting, exacerbate the build-up of risks and magnify financial distress – that is, increase the system's "excess elasticity". The dominant role of the US dollar as international currency adds to this weakness, by amplifying the divergence between the interests of the country of issue and the rest of the world.[4] Hence the outsize influence of US monetary policy on monetary and financial conditions globally.

These side effects of globalisation do not imply that it should be rolled back; rather, they indicate that it should be properly governed and managed (see below). A roll-back would have harmful short-term and long-term consequences. In the short term, greater protectionism would weaken global demand and jeopardise the durability and strength of the expansion, by damaging trade and raising the spectre of a sudden stop in both investment and FDI. In the longer term, it would endanger the productivity gains induced by greater openness and threaten a revival of inflation. In more closed, possibly financially repressed economies, the temptation would be to inflate debts away, and wage-price spirals could again become more likely, raising the risk of a return of the stagflation of yesteryear.

Policy

Given the risks ahead, how can policymakers best turn the current upswing into sustainable and robust global growth? Over the past year, a broad consensus has been emerging about the need to rebalance the policy mix, lightening the burden on monetary policy and relying more on fiscal measures and structural reforms. Still, views differ about policy priorities. If we are to understand how to adjudicate among them, we need to take a step back and consider some broader questions underlying current analytical frameworks.

Much of the current policy discourse revolves around two propositions. The first is that policymakers are able to fine-tune the economy, by operating levers that influence aggregate demand, output and inflation in a powerful and predictable way. The second is that there is a neat distinction between the short run, the preserve of aggregate demand, and the long run, the preserve of aggregate supply.

While there is clearly some truth in both propositions, reality is much more nuanced. As history has repeatedly indicated, it is all too easy to overestimate policymakers' ability to steer the economy. Moreover, aggregate demand and supply interact so that the short and long run blend into each other.

The post-crisis experience is a sobering illustration of these nuances. It has proved much harder than expected to boost growth and inflation despite unprecedented measures. And the recession, itself the legacy of the previous unsustainable financial boom, appears to have left profound scars: output losses have been huge and productivity growth persistently weakened.

This experience highlights the need to evaluate policy in a long-term context. Policy actions taken at a given point in time, regardless of whether they target demand or supply, have long-lasting influences. And by affecting, for instance, the cumulative stock of debt or the room for policy manoeuvre, they help shape the economic environment that policymakers take as given, or "exogenous", when the future becomes today.[5] Unless these effects are properly taken into account, policy options can narrow substantially over time, as appears to have happened over the past decade.

This perspective suggests that, rather than seeking to fine-tune the economy, a more promising approach would be to take advantage of the current strong tailwinds to strengthen the economy's resilience, at both the domestic and global level. The notion of resilience helps avoid the trap of overestimating policymakers' economic steering powers. And it fosters the longer-term horizons so essential to place policy in its proper intertemporal context.

Resilience, broadly defined, means more than just the capacity to withstand unforeseen developments or "shocks". It also means reducing the likelihood that shocks will materialise in the first place, by limiting policy uncertainty and the build-up of vulnerabilities, such as those stemming from financial imbalances.[6] And it means increasing the economy's adaptability to long-term trends, such as those linked to ageing populations, slowing productivity, technology or globalisation. We next discuss how strengthening resilience can help address the current domestic and global challenges.

Building resilience: the domestic challenge

Building resilience domestically is a multifaceted challenge. Consider, in turn, monetary, fiscal and structural policies as well as their role in tackling the financial cycle.

There is a broad consensus now that monetary policy has been overburdened for far too long. It has become, in that popular phrase, "the only game in town". In

the process, central bank balance sheets have become bloated, policy interest rates have been ultra-low for a long time, and central banks have extended their direct influence way out along the sovereign yield curve as well as to other asset classes, such as private sector debt and even equity.

Building resilience would suggest attaching particular importance to enhancing policy space, so as to be better prepared to tackle the next recession. This, in turn, would suggest taking advantage of the economy's tailwinds to pursue normalisation with a steady hand as domestic circumstances permit. "As domestic circumstances permit" is an essential qualifier, since how far normalisation is possible depends on country-specific factors, involving both the economy and monetary frameworks. The scope differs substantially across countries. Even so, the broad *strategy* could be common.

Normalisation presents a number of tough challenges (Chapter IV). Many of them stem from the journey's starting point – the unprecedented monetary conditions that have prevailed post-crisis. As markets have grown used to central banks' helping crutch, debt levels have continued to rise globally and the valuation of a broad range of assets looks rich and predicated on the continuation of very low interest rates and bond yields (Chapter II). On the one hand, heightened uncertainty naturally induces central banks to move very gradually with interest rates, and even more so with their balance sheets, with changes that are well telegraphed. On the other hand, that very gradualism implies a slower build-up of policy space. And it may also induce further risk-taking and promote the conditions that make a smooth exit harder. The risk of a snapback in bond yields, for instance, looms large.[7] Trade-offs are further complicated by the spillovers that domestic actions may have globally, especially in the case of the US dollar.

As a result, the road is bound to be bumpy. Normalisation may well not proceed linearly, but in fits and starts, as central banks test the waters in light of evolving conditions. And yet it is essential for financial markets and the broader economy to shake off their unusual dependence on central banks' unprecedented policies.

Building resilience through fiscal policy has two dimensions. The first is to prioritise the use of any available fiscal space. Several areas spring to mind. One is to support growth-friendly structural reforms (see below). Another is to reinforce support for globalisation by addressing the dislocations it can cause. Here, more general approaches appear superior to targeted ones, since the specific firms and individuals affected may be hard to identify. The basic principle is to save people, not jobs, by promoting retraining and the flexible reallocation of resources. Last but not least, public support for balance sheet repair remains a priority where private sources have been exhausted. Resolving non-performing loans is paramount for unlocking the financing of productive investments (Chapter V). What would be unwise at the current juncture would be simply to resort to deficit spending where the economy is close to full employment. This does not rule out the streamlining of tax systems or judicious and well executed public investments. But, as always, implementation is of the essence and far from straightforward, as the historical record suggests.

The second dimension concerns enhancing fiscal space over time. A precondition is its prudent measurement. As discussed extensively in last year's Annual Report, this requires incorporating in current methodologies a number of factors that tend to be underplayed or excluded – the need for a buffer for potential financial risks, realistic financial market responses to higher sovereign risks, and the burden of ageing populations. It also requires considering the impact that the combination of snapback risk and central bank large-scale asset purchases might have on the interest sensitivity of government deficits (Chapter IV). More generally, a prudent

assessment of fiscal space could anchor the needed medium-term consolidation of public finances.

Building resilience through structural policies is essential. Structural policies are the only ones that hold the promise of raising the long-term growth potential and fostering an environment conducive to long-term investment. Unfortunately, far from speeding up, implementation has been slowing down. This has occurred even though the empirical evidence indicates that, contrary to a widespread belief, many measures do not depress aggregate demand even in the short run.[8] Ostensibly, the political costs of reform exceed the economic ones. Here, just as with the globalisation-induced challenges, it is the concentration of the costs on specific groups that matters most.

The needed structural reforms are largely country-specific. Their common denominator is fostering entrepreneurship and the rapid take-up of innovation, limiting rent-seeking behaviour. In addition, an underappreciated aspect – one which only now has begun to receive attention – is to ensure the flexible reallocation of resources, given the debilitating impact rigidities can have on the economy's shock-absorbing capacity and on productivity growth. Steps in that direction would also go a considerable way towards addressing the dislocations from globalisation. Especially worrisome is the high percentage of firms unable to cover interest costs with profits – "zombie firms" – despite historically low interest rates (Chapter III). This points to considerable obstacles in redeploying resources to their more productive uses.

From a medium-term perspective, it would be important that monetary, fiscal and even structural measures be part of a shift towards policy frameworks designed to address a critical source of vulnerabilities – the financial cycle. Indeed, the inability to come to grips with the financial cycle has been a key reason for the unsatisfactory performance of the global economy and limited room for policy manoeuvre.[9] And, as discussed in detail in previous Annual Reports, it would be unwise to rely exclusively on prudential policy, let alone on macroprudential measures, to tame it.[10] The recent experience of EMEs, where these measures have been deployed aggressively, confirms that they cannot *by themselves* prevent the build-up of imbalances.

Interest rates sink as debt soars   Graph I.6

Lhs: ⸺ Long-term index-linked bond yield[1]   Rhs: ▬ Global debt (public and private non-financial sector)[3]
     ⸺ Real policy rate[2, 3]
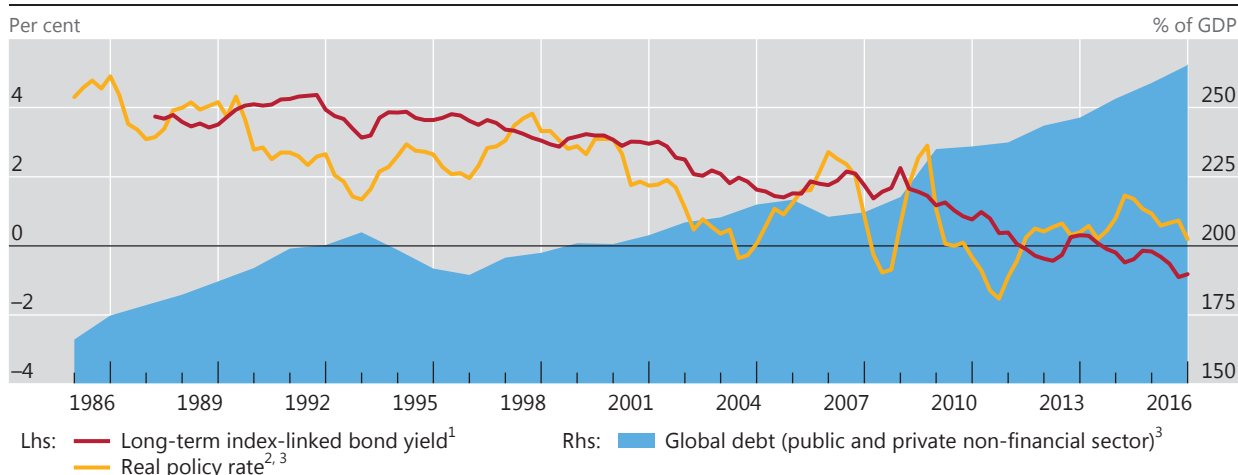
[1] From 1998, simple average of FR, GB and US; otherwise only GB.   [2] Nominal policy rate less consumer price inflation.   [3] Weighted average of G7 economies plus CN based on rolling GDP and PPP exchange rates.

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

Tackling the financial cycle would call for more symmetrical policies. Otherwise, over long horizons, failing to constrain financial booms but easing aggressively and persistently during busts could lead to successive episodes of serious financial stress, a progressive loss of policy ammunition and a debt trap. Along this path, for instance, interest rates would decline and debt continue to increase, eventually making it hard to raise interest rates without damaging the economy (Graph I.6). From this perspective, there are some uncomfortable signs: monetary policy has been hitting its limits; fiscal positions in a number of economies look unsustainable, especially if one considers the burden of ageing populations; and global debt-to-GDP ratios have kept rising.

Building resilience: the global challenge

While there is a lot that domestic policy can do to build resilience, certain challenges call for a global response. The goal is to set out a clear and consistent multilateral framework – the rules of the game – for actions to be taken either at the national level or jointly internationally. Those rules would naturally vary in terms of specificity and tightness depending on the area, ranging from broad principles to common standards. Consider, in turn, five key areas: prudential standards, crisis management mechanisms, trade, taxation and monetary policy.

A first priority is to finalise the financial (prudential) reforms under way (Chapters V and VI). A core of common minimum standards in the financial sphere is a precondition for global resilience in an integrated financial world. Such standards avoid a perilous race to the bottom. The reforms under way are not perfect, but this is no time to weaken safeguards or add another source of uncertainty that would hinder the necessary adjustments in the financial industry (Chapter V).

Among the reforms, completing the agreement on minimum capital and liquidity standards – Basel III – is especially important, given the role banks play in the financial system. The task is to achieve agreement without, in the process, diluting the standards in the false belief that this can support growth. There is ample empirical evidence indicating that stronger institutions can lend more and are better able to support the economy in difficult times.[11] A sound international agreement, supported by additional measures at the national level, combined with the deployment of effective macroprudential frameworks, would also reduce the incentive to roll back financial integration.

A second priority is to ensure that adequate crisis management mechanisms are in place. After all, regardless of the strength of preventive measures, international financial stress cannot be ruled out. A critical element is the ability to provide liquidity to contain the propagation of strains. And that liquidity can only be denominated in an international currency, first and foremost the US dollar, given its dominant global role (Chapters V and VI). At a minimum, this means retaining the option of activating, when circumstances require, the inter-central bank swap arrangements implemented post-crisis.

A third priority is to ensure that open trade does not become a casualty of protectionism. A key to postwar economic success has been increased trade openness built around the multilateral institutions that support it. Here again, the arrangements are by no means perfect. It is well known, for instance, that the World Trade Organization's global trading rounds have ground to a halt and that its dispute settlement mechanism is overburdened. Even so, it would be a mistake to abandon multilateralism: the risk of tit-for-tat actions is simply too great. While open trade creates serious challenges, rolling it back would be just as foolhardy as rolling back technological innovation.

A fourth, complementary, priority is to seek a more level playing field in taxation. Tax arbitrage across jurisdictions is one factor that has fuelled resentment of globalisation and has no doubt contributed to income and wealth inequality within countries, including by encouraging a race to the bottom in corporate taxation. Several initiatives have been under way under the aegis of the G20. But efforts in this area could be stepped up.

Beyond these priorities, it is worth exploring further the room for greater monetary policy cooperation – the fifth area. As discussed in detail in previous Annual Reports, its desirability is due to the conjunction of large spillovers from international-currency jurisdictions with the limited insulation properties of exchange rates. Cooperation would help limit the disruptive build-up and unwinding of financial imbalances. In increasing degree of ambition, options include enlightened self-interest, joint decisions to prevent the build-up of vulnerabilities, and the design of new rules of the game to instil more discipline in national policies. While the conditions for tighter forms of cooperation are not fulfilled at present, deepening the dialogue to reach a better agreement on diagnosis and remedies is a precondition for further progress.

These courses of action share a thread. They recognise that, just like technology, globalisation is an invaluable common resource that offers tremendous opportunities. The challenge is to make sure that it is perceived as such rather than as an obstacle, and that those opportunities are turned into reality. It is dangerous for governments to make globalisation a scapegoat for the shortcomings of their own policies. But it is equally dangerous not to recognise the adjustment costs that globalisation entails. Moreover, managing globalisation cannot be done just at national level; it requires robust multilateral governance. For lasting global prosperity, there is no alternative to the sometimes tiring and frustrating give-and-take of close international cooperation.

Endnotes

[1] See Chapter I of the 86th Annual Report.

[2] For a discussion of this fear gauge as an alternative to the popular VIX, see H S Shin, "The bank/ capital markets nexus goes global", speech at the London School of Economics and Political Science, 15 November 2016.

[3] See Chapter V of the *85th Annual Report*.

[4] For an elaboration on the role of the US dollar in the system, see C Borio, "More pluralism, more stability?", presentation at the Seventh High-level Swiss National Bank–International Monetary Fund Conference on the International Monetary System, Zurich, 10 May 2016.

[5] See Chapter I of the *86th Annual Report*.

[6] See "Economic resilience: a financial perspective", BIS note submitted to the G20 on 7 November 2016.

[7] For a description and documentation of one of the mechanisms involved, see D Domanski, H S Shin and V Sushko, "The hunt for duration: not waving but drowning?", *BIS Working Papers*, no 519, October 2015.

[8] For a detailed analysis of this question, see R Bouis, O Causa, L Demmou, R Duval and A Zdzienicka, "The short-term effects of structural reforms: an empirical analysis", *OECD Economics Department Working Papers*, no 949, March 2012.

[9] See C Borio, "Secular stagnation or financial cycle drag?", keynote speech at the National Association for Business Economics, 33rd Economic Policy Conference, Washington DC, 5–7 March 2017. The issue is also discussed in Chapter I of the *84th*, *85th* and *86th Annual Reports*.

[10] For an elaboration on such a macro-financial stability framework, see Chapter I of the *84th* and *85th Annual Reports*.

[11] See Chapter V of the *86th Annual Report*.

II. Political shocks reorient markets

Financial markets in the second half of 2016 and the first half of 2017 were confronted by a changing political environment as the economic background brightened. Political events surprised markets, notably the June 2016 vote in the United Kingdom to leave the European Union (Brexit) and, most of all, the US presidential election in November. Market participants needed to rapidly take views on the shifting policy direction in several areas, including trade, taxation and regulation, and to evaluate the consequences for likely "winners" and "losers". At the same time, both growth and inflation picked up in the large economies, supporting equity and credit markets and pushing up bond yields.

Attention moved away from monetary policy as a driver of markets. One result was a change to long-established patterns of correlation and risk. Instead of broad-based swings between "risk-on" and "risk-off" positions, investors began to differentiate more across sectors and countries. Bond yields diverged across the major economies, with knock-on effects on foreign exchange markets. At the same time, a gap opened up between surging measures of policy uncertainty and sinking financial market volatility. That said, until mid-March some indicators suggested that the perceived risk of large equity market declines had actually increased.

Markets adjust to a new environment

From mid-2016 onwards, the improving growth outlook contributed to rising stock prices and narrowing credit spreads in major advanced and emerging economies (Graph II.1, left-hand and centre panels). As growth gathered steam, market volatility remained very subdued (Graph II.1, right-hand panel), even as policy uncertainty soared (Box II.B).

Within this broad picture, three phases defined market developments. From July to October 2016, initial signs of recovery and rising inflation started to boost advanced economy bond yields, while equity markets were subdued. In November and December, expectations of shifts in US economic policy sparked a rally in advanced economy (AE) equities and sharply higher bond yields, while weighing on some emerging market economy (EME) assets. Finally, in the first half of 2017, continued good news on growth supported AE and EME equity markets, even as long bond yields stayed range-bound, against a backdrop of quiescent inflation indicators and growing doubts about the prospects for large-scale US fiscal stimulus.

The three phases were demarcated by a series of political tremors. The first was the outcome of the UK Brexit referendum on 23 June 2016. Major stock indices in advanced economies fell more than 5% the day after the vote, and the pound sterling depreciated by 8% against the US dollar. Bond yields also fell initially, as investors reassessed growth prospects and the near-term monetary policy course for the United Kingdom and worldwide. But stock prices soon recovered globally. An initial widening of corporate credit spreads also reversed.

Benchmark bond yields started creeping up in the third quarter. Inflation indicators in the large advanced economies edged up, and major central banks were seen as moving closer to the long-anticipated monetary policy normalisation (Chapter IV). The result was a reversal of the trend towards lower yields that had

Stocks and corporate bonds rally as growth revives

Graph II.1

Stock prices

5 Jan 2015 = 100

- S&P 500
- EURO STOXX 50
- Nikkei 225
- MSCI Emerging Markets index

Corporate credit spreads[1]

Basis points · Basis points

Investment grade (lhs): High-yield (rhs):
- United States ····
- Euro area ····
- EMEs ····

Implied volatility

Percentage points · Percentage points

Lhs:
- FX[2]
- Bonds[3]

Rhs:
- Equities[4]
- Commodities[5]

[1] Option-adjusted spreads over treasuries. [2] JPMorgan VXY Global index, a turnover-weighted index of implied volatility (IV) of three-month at-the-money options on 23 US dollar currency pairs. [3] IV 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] IV of S&P 500, EURO STOXX 50, FTSE 100 and Nikkei 225 indices; weighted average based on market capitalisation. [5] IV of at-the-money options on commodity futures contracts on oil, gold and copper; simple average.

Sources: IMF, *World Economic Outlook*; Bank of America Merrill Lynch; Bloomberg; Datastream; BIS calculations.

been in place since late 2014 (Graph II.2, left-hand panel). The US 10-year yield reached a low of 1.4% on 8 July, the day data releases showed strong hiring in June. From then on, it rose steadily, reaching 1.9% on the eve of the presidential election. The 10-year German bund yield also rebounded, after marking a trough of –0.2% on 8 July. The corresponding Japanese government bond yield, by contrast, did not rise much after reaching a low point of –0.3% on 27 July. The Bank of Japan's policy of maintaining bond yields around zero, introduced in September, kept downward pressure on long yields even as expected growth and inflation rose. The global stock of bonds trading at negative yields remained quite high (Graph II.2, centre panel).

Politics delivered another shock to financial markets in November, with the unexpected US presidential election outcome. Stocks initially plunged on the results, but in a matter of hours began to rally on expectations of lower corporate taxes, higher government spending and deregulation. The S&P 500 index gained 5% from 8 November to the end of December, while the STOXX Europe 600 rose 8%. At the same time, returns diverged across sectors, as market participants sought to identify winners and losers from the incoming administration's policies (Graph II.3).

Bond yields rose sharply after the election in anticipation of fiscal stimulus and a more rapid removal of monetary policy accommodation. The US 10-year yield rose from 1.9% on 8 November to 2.5% by year-end. The 10-year German bund reached 0.4% in December. Japanese yields did not increase much, however, turning slightly positive in November. Market commentary began to centre on a "reflation trade", betting on an acceleration of growth and rising inflation in the advanced economies.

Higher yields reflected both higher expected short-term interest rates and rising term premia. Estimated term premia began to rise in the second half of 2016. While the US 10-year term premium turned positive in December, that for the euro area remained negative, at about –1 percentage point (Graph II.2, right-hand panel, and Box II.A).

Graph II.2

Long-term government bond yields

Stock of government bonds with negative yields[3]

Components of bond yields[4]
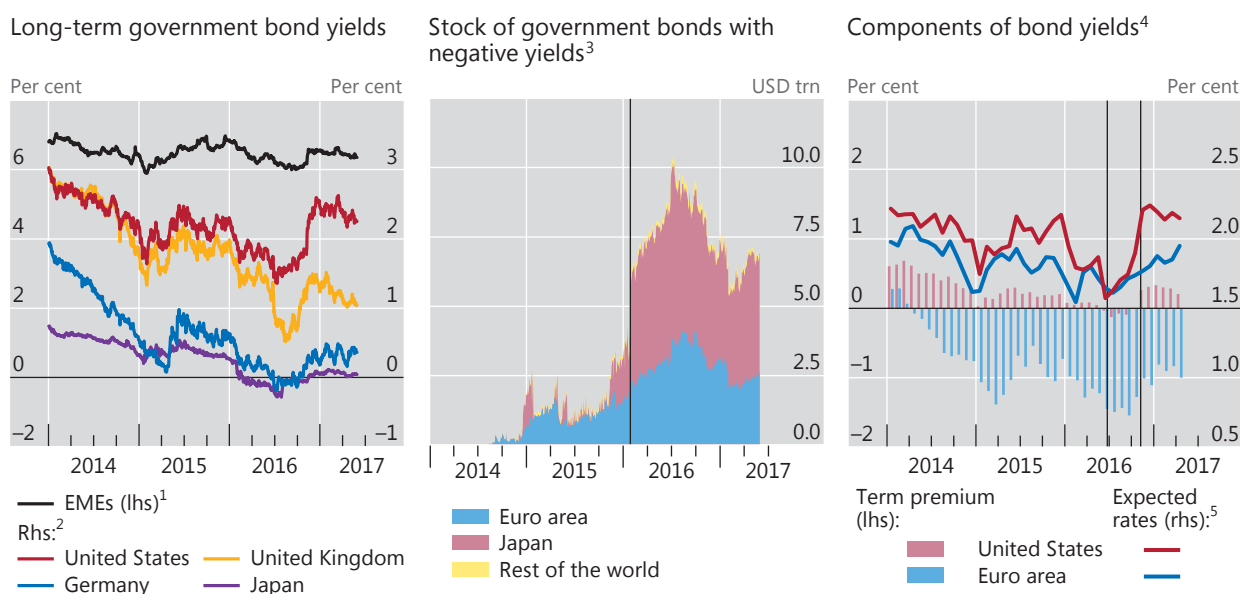
The vertical line in the centre panel indicates 29 January 2016 (the date on which the Bank of Japan announced its move to negative interest rates on reserves); the vertical lines in the right-hand panel indicate 23 June 2016 (UK referendum on EU membership) and 8 November 2016 (US presidential election).

[1] JPMorgan GBI-EM Broad Diversified index, yield to maturity in local currency.   [2] Ten-year government bond yields.   [3] Analysis based on the constituents of the Bank of America Merrill Lynch World Sovereign index.   [4] 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.   [5] Difference between the 10-year nominal zero coupon yield and the 10-year estimated term premium.

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

The rapid rise of US yields – the spread of US over German two-year yields widened to more than 2 percentage points, the highest since 2000 – supported the dollar against the euro and other currencies (Graph II.4). The dollar had started to rise against the euro and yen in July and August 2016, roughly in coincidence with the turn in bond yields. The rise quickened after the US election, when it looked as if trade policies favouring US exports might be implemented. The strong dollar, in turn, may have boosted yields further, as authorities in some EMEs sold dollar bonds to support their currencies.

Asset prices in EMEs diverged after the US election, as markets strove to assess the implications for individual countries. Countries with closer trade links with the United States tended to see their exchange rates depreciate and stock markets decline, while others looked poised to benefit from the expected uptick in global growth (Graph II.5, left-hand and centre panels). Some EME sovereign spreads widened. Chinese markets experienced a bout of turbulence in December and early January, as problems at a mid-range stock brokerage pointed to broader fragility in funding markets and led to sharp rises in bond yields and volatile exchange rates (Graph II.5, right-hand panel).

Global markets entered a third phase in the new year. Bond yields plateaued as the rise in inflation came to a halt and political developments in the United States raised doubts about an imminent fiscal expansion. Policy remained accommodative in the euro area and Japan, and long bond yields remained range-bound. The US 10-year yield fluctuated between 2.3 and 2.5% in the early months of 2017, before falling to 2.2% by end-May. The German bund stayed within a 0.2–0.5% range, and

The new environment has an unequal impact across sectors

Sectoral stock returns, in per cent

Graph II.3

United States

Europe

Legend: ■ 8 Nov–30 Dec 2016   ■ 1 Jan–26 May 2017
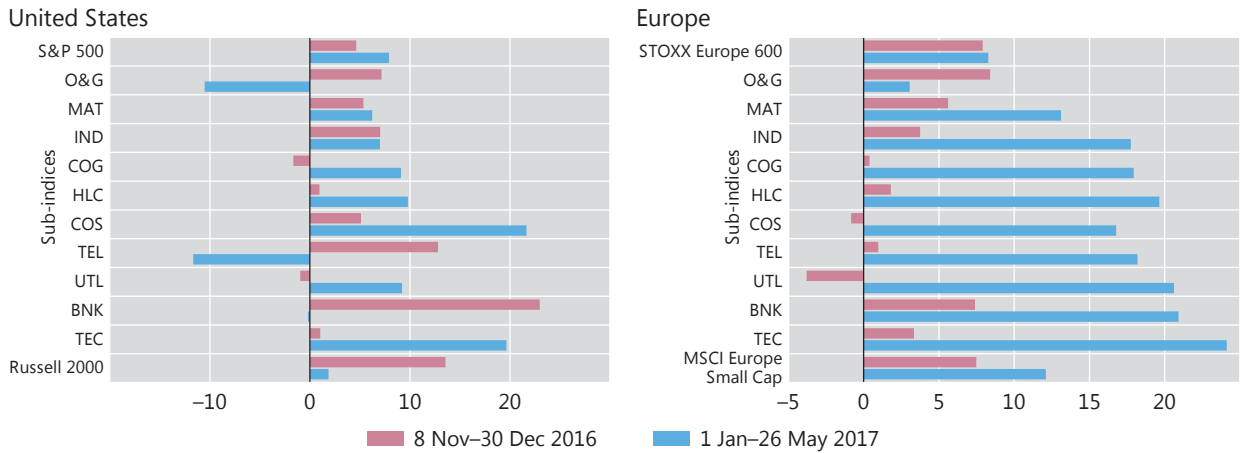
BNK = banks; COG = consumer goods; COS = consumer services; HLC = health care; IND = industrials; MAT = basic materials; O&G = oil and gas; TEC = technology; TEL = telecommunications; UTL = utilities.

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

the corresponding 10-year yield in Japan remained below 10 basis points. The dollar lost ground, as yield differentials narrowed and the debate over fiscal and trade proposals continued.

Equities, in contrast, continued to advance, raising questions about potential overvaluation. The S&P 500 and STOXX Europe 600 both rose 8% in the first five months of the year. While equity prices in part tracked stronger corporate earnings, price/earnings ratios based on forward earnings stayed well above historical averages in the United States and Europe (as they had been since late 2013), and close to average in Japan (Graph II.6). Valuation indicators based on past earnings

Divergence in bond yields supports the dollar

Graph II.4

Euro area

Japan

United Kingdom

Legend: —— Yield differential (lhs)[1]   —— Exchange rate (rhs)[2]
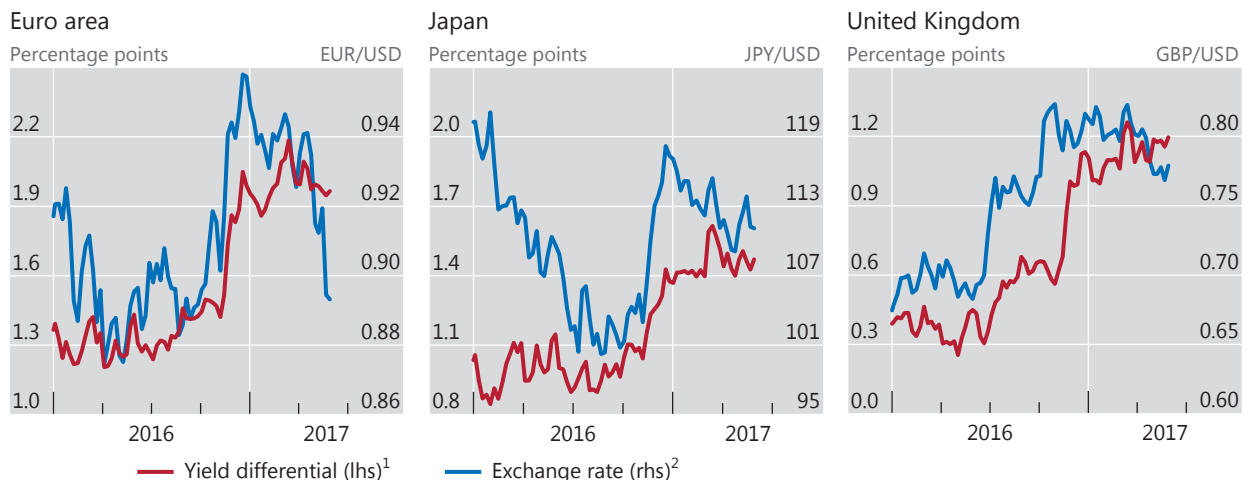
[1] Two-year US Treasury yield spread over the comparable government bond yield (for the euro area, German bund yield).   [2] An increase indicates a depreciation against the US dollar.

Sources: Bloomberg; national data; BIS calculations.
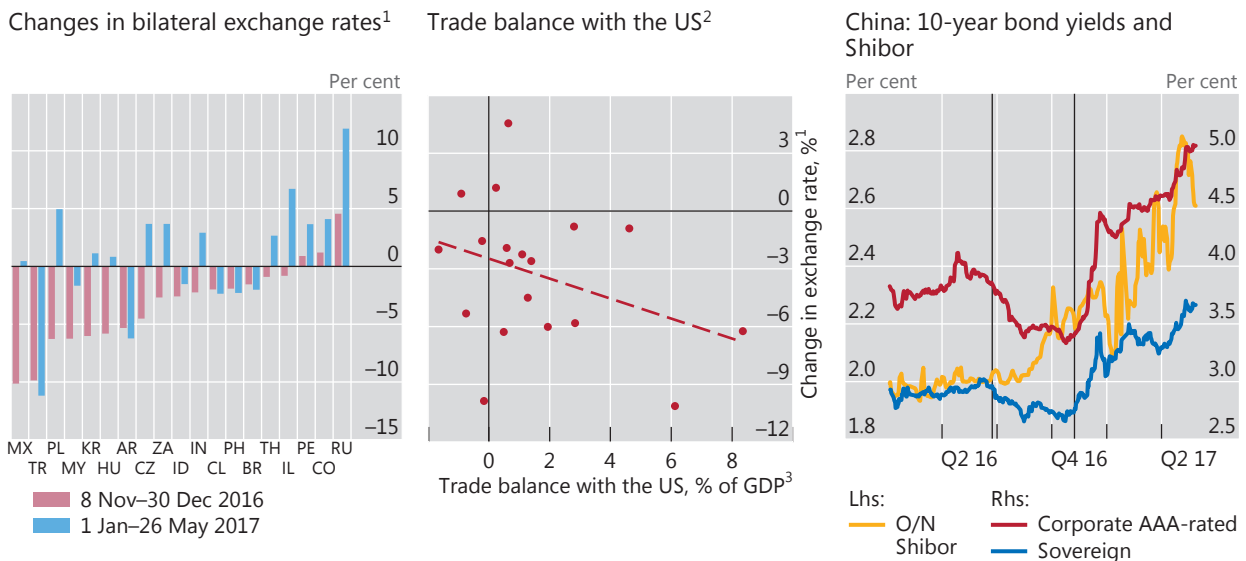
Some EMEs face trade and financial concerns in the closing months of 2016

Graph II.5

Changes in bilateral exchange rates[1]

Per cent

MX PL KR AR ZA IN PH TH PE RU
TR MY HU CZ ID CL BR IL CO

■ 8 Nov–30 Dec 2016
■ 1 Jan–26 May 2017

Trade balance with the US[2]

Change in exchange rate, %[1]

Trade balance with the US, % of GDP[3]

China: 10-year bond yields and Shibor

Per cent   Per cent

Q2 16   Q4 16   Q2 17

Lhs: Rhs:
O/N   Corporate AAA-rated
Shibor   Sovereign

The vertical lines in the right-hand panel indicate 23 June 2016 (UK referendum on EU membership) and 8 November 2016 (US presidential election).

[1] A negative value indicates a depreciation of the local currency against the US dollar.   [2] The slope coefficient of the fitted line has a p-value of 0.1397. When Turkey is excluded, the p-value falls to 0.0465. A p-value greater than 0.1 means that the coefficient is not statistically significant at the 10% level. Change in exchange rate over the period 8 November–30 December 2016.   [3] For each country, defined as the trade balance with the United States divided by its own GDP; as of Q4 2016. A negative (positive) value indicates a deficit (surplus).

Sources: IMF, *Direction of Trade, International Financial Statistics* and *World Economic Outlook*; China State Administration of Foreign Exchange; Bloomberg; CEIC; Datastream; national data; BIS calculations.

Equity valuations in advanced economies approach or exceed historical norms

Ratio   Graph II.6

United States

12 13 14 15 16 17

Europe[2]

12 13 14 15 16 17

Japan

12 13 14 15 16 17

── Cyclically adjusted P/E (CAPE)[1]   ── Forward price/earnings (P/E)[3]
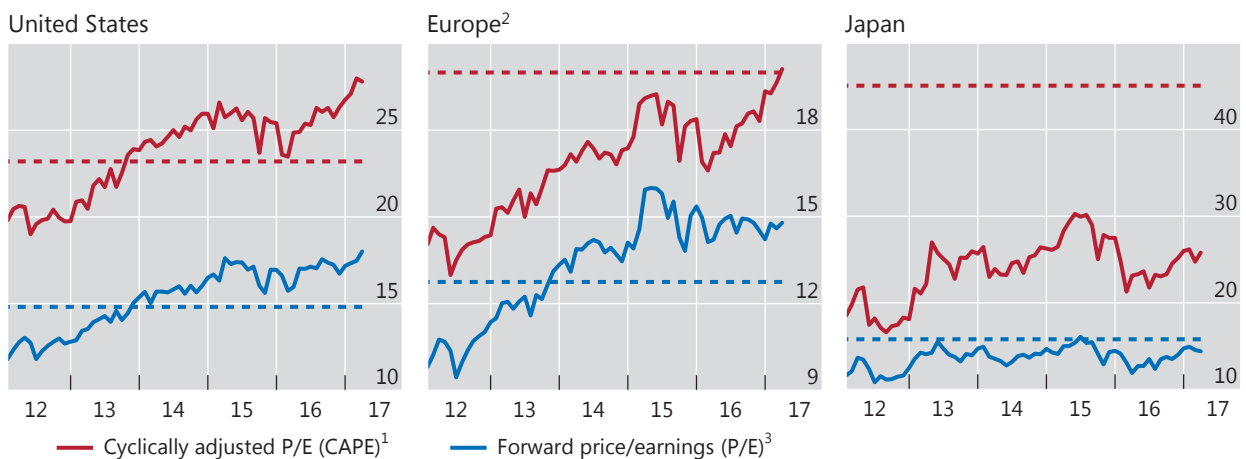
The dashed lines indicate the long-term averages of the CAPE ratio (December 1982–latest) and the forward P/E ratio (July 2003–latest).

[1] For each country/region, the CAPE ratio is calculated as the inflation-adjusted MSCI equity price index (in local currency) divided by the 10-year moving average of inflation-adjusted reported earnings.   [2] European advanced economies included in the MSCI Europe index.   [3] Defined as the price to 12-month forward earnings.

Sources: Barclays; Datastream.

Emerging market assets overcome doubts, strengthen in new year

1 January 2014 = 100   Graph II.7

Equities   Exchange rates[1]   Credit default swaps[2]

Brazil — Russia — India — China — South Africa — Korea — Mexico
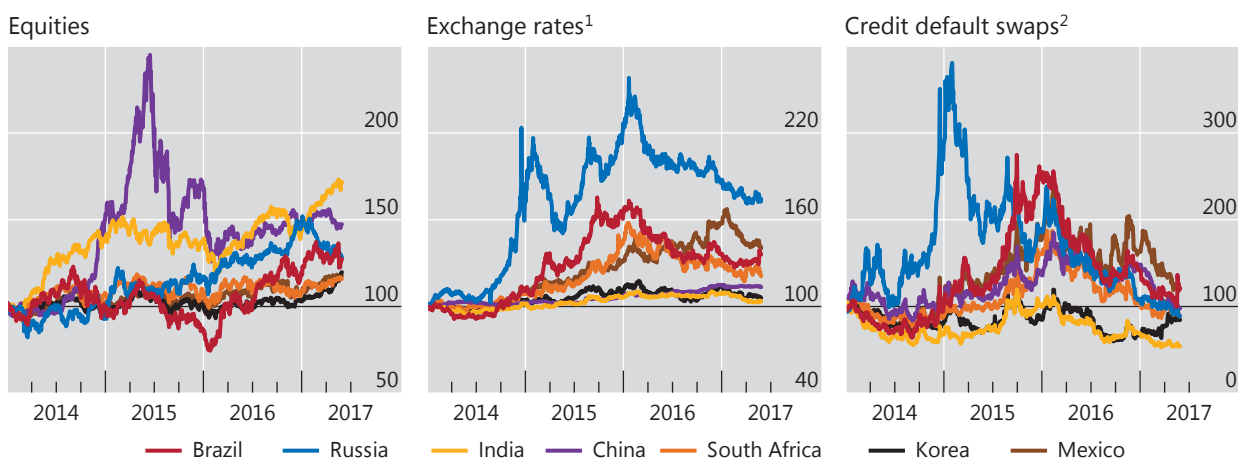
[1] An increase indicates a depreciation of the local currency against the US dollar. For Russia, 2 January 2014 = 100.   [2] CDS on senior unsecured debt, five-year maturity.

Sources: Datastream; national data; BIS calculations.

measured over a longer horizon, such as the 10-year cyclically adjusted price/earnings ratio (CAPE), were also historically high in the United States.

For EME assets, many of the initial negative reactions to the US election were reversed in December 2016 and early 2017, as fears of heightened trade tension receded and stronger global growth came to the fore. Equity valuations in most EMEs rallied, currencies soared and credit spreads receded (Graph II.7). Still, divergences across countries remained, with markets focused on areas of continuing uncertainty, such as geopolitical risks in the case of Korea.

A series of electoral results in Europe reassured markets in the first half of 2017. European stocks outperformed the S&P 500 in the days following the defeat of Eurosceptic parties in the Dutch elections in mid-March. In late April and early May a similar outcome in the French presidential election sparked a rally in equity markets and a broad-based strengthening of the euro. The French election result also reversed part of the previous widening in intra-European sovereign spreads that had stemmed from political worries and concerns about non-performing loans in some national banking systems (Graph II.8, left-hand panel, and Chapter V). The outcome of the UK parliamentary elections on 8 June, however, added another note of uncertainty to markets.

By May 2017, global equity markets were again at or close to record highs and volatility indicators at historical lows. True, markets experienced occasional shocks, including geopolitical concerns in the Middle East and the Korean peninsula and a swirl of legal issues confronting the US presidency. But they proved resilient as growth remained strong. At the same time, moderate inflation data kept a lid on bond yields.

The changing nature of market risk

The past year saw shifts in a number of risk relationships that had characterised financial markets in recent years. One such shift was the fall in correlations of asset returns across sectors and regions. Another was the growing divergence between

Box II.A

Term premia: concepts, models and estimates

Unconventional monetary policy measures, in particular large-scale government bond purchases, have put the spotlight on the impact of monetary policy on the term structure of interest rates. One question is how big the monetary policy impact on long-term bond yields has been, and through which channels. Another, closely related question concerns the potential magnitude of a correction in bond yields.

One standard way of approaching these questions is to decompose long-term interest rates into an expectations component and a term premium. Conceptually, the former captures the path of short-term interest rates as priced in bond markets, while the latter measures the excess return over short-term bonds that risk-averse investors demand for holding long-term bonds.[1] More recently, the evolution of term premia on long-term government bonds has received particular attention, both as a proxy measure of the impact of central bank bond purchases (and balance sheet policies more generally), and as an indicator of snapback risk: to the extent that central bank bond purchases have compressed term premia, market participants might revert to demanding a "normal" compensation for holding long-term bonds once they expect such policies to end.

Neither term premia nor the expected path of future short-term interest rates – the two assumed components of bond yields – are directly observable. Thus, estimates depend crucially on the approach followed and the additional assumptions made.

One approach is to proxy the expected short rate path with survey measures. A limitation is that surveys are infrequent and cover only a restricted set of forecast horizons. Nor is it clear that surveys reliably represent market participants' actual expectations. More sophisticated techniques model the term structure of interest rates with a small set of explanatory factors, and then interpret the model forecasts as agents' expectations of future short-term rates. In this framework, term premia ensure that the dynamics of the factors driving the yields are consistent with the pricing of bonds of various maturities prevailing at each point in time, assuming a specific way of pricing the associated risks.[2] While the most common approach in the literature is to extract the factors exclusively from bond yields themselves,[3] some researchers have also included survey data on interest rate expectations.[4] Others have

Term premium estimates and their drivers

In percentage points

Graph II.A

Ten-year term premium

Average expected short rate over 10 years

Cumulative changes in yields
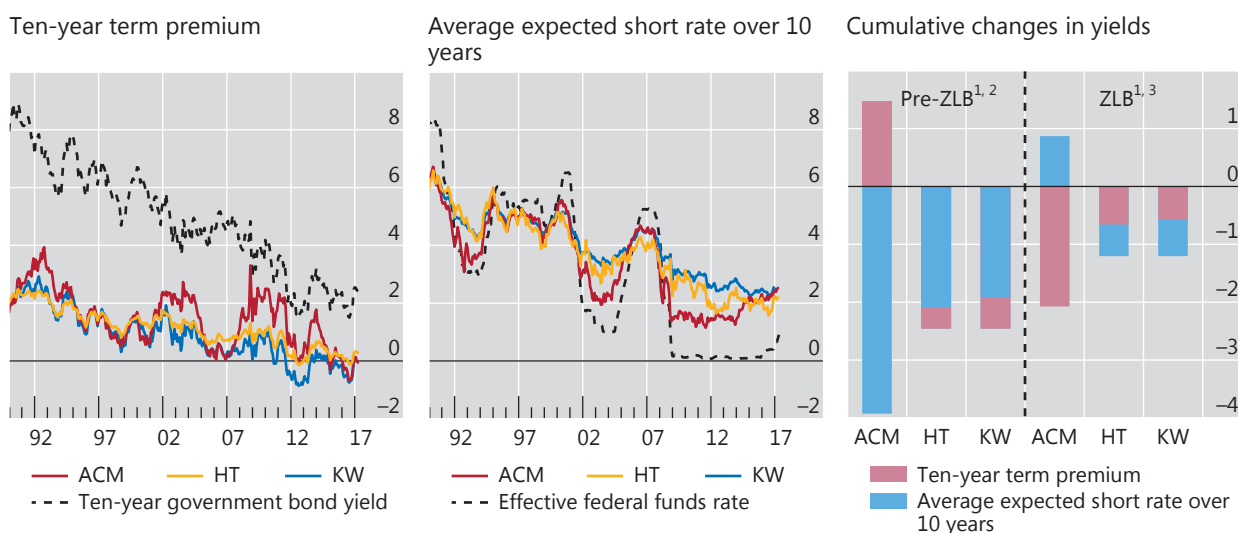
ACM = Adrian, Crump and Moench; HT = Hördahl and Tristani; KW = Kim and Wright.

[1] ZLB = zero lower bound.   [2] Difference between 2000 average and November 2008.   [3] Difference between January 2009 and December 2015.

Sources: T Adrian, R Crump and E Moench, "Pricing the term structure with linear regressions", *Journal of Financial Economics*, October 2013, pp 110–38; 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; D Kim and J Wright, "An arbitrage-free three-factor term structure model and the recent behavior of long-term yields and distant-horizon forward rates", *FEDS Working Papers*, August 2005; Survey of Professional Forecasters.

proposed the use of macroeconomic factors, such as measures of inflation and economic activity, in addition to (or instead of) yield factors, to enable a deeper understanding of the economic drivers of bond yields.[5] Typically, these macro factors are then linked to the short-term interest rate via an assumed monetary policy rule.

Different modelling choices naturally yield different term premia. This is illustrated in the left-hand panel of Graph II.A, which plots various estimates of US 10-year term premia together with the 10-year yield itself. These estimates come from dynamic term structure models: the yield-factor-only model used by the Federal Reserve Bank of New York (Adrian, Crump and Moench (2013; ACM)); a yield-factor model with additional survey information used by the Federal Reserve Board (Kim and Wright (2005; KW)); and a macro factor model that also includes survey information used by the BIS and the ECB (Hördahl and Tristani (2014; HT)).[6] Despite the large uncertainty that surrounds specific model estimates and the greater variability in the ACM model estimates, the various methods broadly agree on some key features: a gradual decline in premia over the past 25 years or so, which parallels the decline in observed yields; very low (and even negative) premia post-crisis; and near zero premia at the current juncture.

The differences in the term premium estimates across models can be sizeable at times and appear to exhibit systematic patterns, largely driven by the way the expectations component is constructed (Graph II.A, centre panel). Overall, this component tends to broadly follow movements at the very short-term end of the yield curve, as measured by the effective federal funds rate. This co-movement is stronger for the ACM yield-only model, since the use of survey information by the KW and HT approaches provides a separate anchor for expectations. For example, following the Lehman collapse in late 2008, the ACM model produces a drop in the average expected US short-term interest rate of more than 100 basis points, to around 1.5%, and a corresponding surge in the term premium to more than 3%. In the KW model, the drop is considerably smaller, around 50 basis points, and since the average expected short-term rate is then stable at around 3% – very close to the level indicated by the survey data – the plunge in the 10-year yields in late 2010 leads to a sharp drop in the term premium, which turns negative. The HT model estimate is somewhere in between, arguably owing to the inclusion of macroeconomic information.

Such differences become starker if one compares the cumulative change in yields in the pre- and post-zero lower bound (ZLB) period (right-hand panel of Graph II.A).[7] Pre-ZLB, the ACM model attributes all the decline in US 10-year yields to lower expected short rates, resulting in an actual increase in the term premium. While the KW and HT models also point to a relatively large role for changes in expectations, they instead indicate a decline in the premium. At the ZLB, the role of changes in term premia increases in all models, but more so in the ACM yield-only approach.

An additional difference across models relates to their real-time performance. Are the estimates revised as more observations become available and the parameter estimates updated? Here, the models that include more parameters or data inputs that are themselves heavily revised, such as estimates of the output gap, are at a disadvantage.[8]

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[1] A prerequisite of this decomposition is that agents' portfolio decisions are based on long-range predictions, rather than on considerations such as risk management or shorter-horizon expectations. On the conceptual pitfalls in treating the "market" as a "person" with such attributes, see H S Shin, "How much should we read into shifts in long-dated yields?", speech at the US Monetary Policy Forum, New York, March 2017.　[2] The factor dynamics are typically modelled as a low-order vector autoregressive (VAR) process; in addition, it is assumed that the risks that investors are concerned about are priced in such a way that they depend linearly on the factors. This type of risk-price assumption gives rise to implied adjusted factor dynamics (so-called "risk-neutral dynamics", as opposed to the real-world "objective dynamics") that are consistent with how bonds are priced in the market.　[3] See eg D Duffie and R Kan, "A yield-factor model of interest rates", *Mathematical Finance*, vol 6, no 4, October 1996, pp 379–406.　[4] See eg D Kim and A Orphanides, "Term structure estimation with survey data on interest rate forecasts", *Journal of Financial and Quantitative Analysis*, vol 47, 2012, pp 241–72.　[5] Examples include A Ang and M Piazzesi, "A no-arbitrage vector autoregression of term structure dynamics with macroeconomic and latent variables", *Journal of Monetary Economics*, vol 50, no 4, May 2003, pp 745–87; P Hördahl, O Tristani and D Vestin, "A joint econometric model of macroeconomic and term structure dynamics", *Journal of Econometrics*, vol 131, March-April 2006, pp 405–44; and G Rudebusch and T Wu, "A macro-finance model of the term structure, monetary policy and the economy", *The Economic Journal*, vol 118, July 2008, pp 906–26.　[6] Detailed references are given in the sources to Graph II.A.　[7] A related issue is how the zero lower bound affects the near-term end of the yield curve and hence estimates of expected short-term rates and the term premium. While a number of models have been suggested to deal with the lower bound issue – see eg J Wu and F Xia, "Measuring the macroeconomic impact of monetary policy at the zero lower bound", *Journal of Money, Credit and Banking*, vol 48, pp 253–91 – the term premia implications have not been fully investigated.　[8] This is the case, in particular, of the HT model, which therefore trades off a richer interpretation of the yield curve determinants, more consistent with the architecture of macroeconomic models, with poorer real-time performance.

measures of market risk and of policy uncertainty. Finally, the expected distribution of asset returns became increasingly skewed. These changes may point towards an increased risk of a snapback in key asset prices.
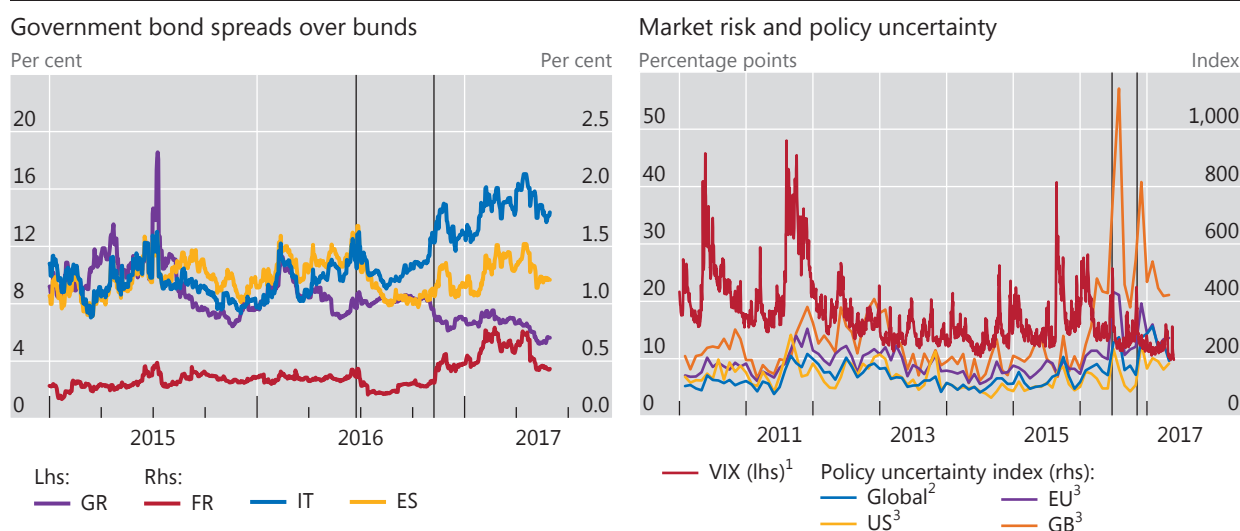
European sovereign spreads widen as policy uncertainty rises

Graph II.8

Government bond spreads over bunds

Per cent (lhs) / Per cent (rhs)

Lhs: GR
Rhs: FR — IT — ES

Market risk and policy uncertainty

Percentage points / Index

VIX (lhs)[1] Policy uncertainty index (rhs):
Global[2]   EU[3]
US[3]   GB[3]

The vertical lines indicate 23 June 2016 (UK referendum on EU membership) and 8 November 2016 (US presidential election).

[1] Chicago Board Options Exchange S&P 500 implied volatility index; standard deviation, in percentage points per annum. [2] Global economic policy uncertainty index using PPP-adjusted GDP weights. [3] News-based policy uncertainty index.

Sources: S Davis, *An index of global economic policy uncertainty*, www.PolicyUncertainty.com; Bloomberg; BIS calculations.

Underlying a number of these changes was a shift of market participants' attention away from monetary policy and towards political events. During much of the post-crisis period, markets had focused on central bank policies as the key driver of asset returns. In the past year, however, the impact of monetary policy decisions and announcements on bond yields (as well as other asset prices) was relatively modest (Graph II.9, left-hand and centre panels). Instead, election and referendum outcomes led to sharp market adjustments (Graph II.9, right-hand panel).

A greater focus on politics also influenced return correlations across asset classes – the first indication of a shift in the pricing of risk in financial markets (Graph II.10). This was particularly visible in equity markets. For instance, in the weeks following the US presidential election, market participants saw the financial sector as a winner from less regulation and higher interest rates, and import-intensive sectors as losers from a more aggressive trade policy. These sectoral patterns shifted over the subsequent months, as priorities changed and markets reconsidered the prospects of success of various initiatives (Graph II.3). Overall, however, a notable dispersion of sectoral returns translated into a decline in correlations. Asset return correlations across regions also saw significant shifts, for much the same reasons.

The sudden decrease in correlations reversed long-standing market patterns. For much of the post-crisis period, in times of increasing confidence, prices of "risk-on" assets (stocks, corporate debt, commodities, and EM debt and currencies) had tended to rise and those of "risk-off" assets (sovereign debt of the large economies) to fall, with the opposite occurring when market participants became less confident. In the course of 2016 and the early part of 2017, such uniform behaviour gave way to more heterogeneous responses.

One important factor in the "risk-on"/"risk-off" dynamics had been the influence of large advanced economies' monetary policy on investors' risk appetite worldwide. Market participants frequently engaged in parallel trades, buying and selling risk across industries and regions on the basis of perceived central bank intentions and expectations of continuing highly accommodative monetary conditions. In the

Political events move markets, monetary policy meetings much less

In basis points

Graph II.9

FOMC[1] meetings

ECB Governing Council meetings

Political events[2]

Days

Ten-year US Treasury yield relative to:
— 14 Dec 2016
— 1 Feb 2017
— 15 Mar 2017

Ten-year German bund yield relative to:
— 8 Dec 2016
— 19 Jan 2017
— 9 Mar 2017

Ten-year government yield relative to:
— 23 Jun 2016 (GB)
— 8 Nov 2016 (US)
— 24 Apr 2017 (FR)
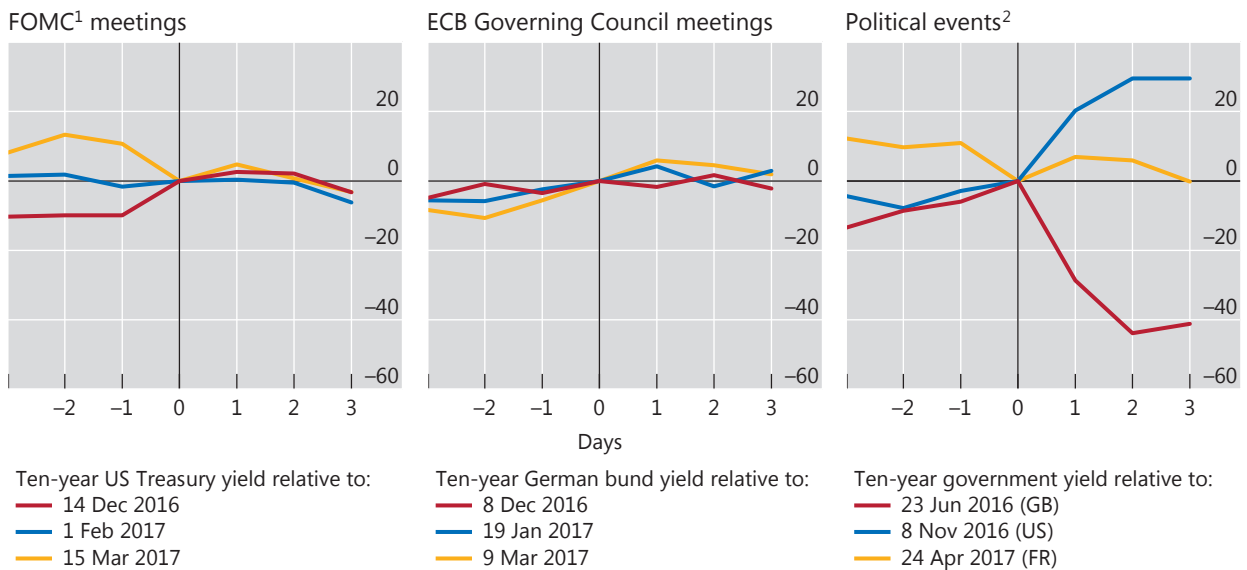
[1] Federal Open Market Committee.   [2] 23 June 2016: UK referendum on EU membership; 8 November 2016: US presidential election; 24 April 2017: first round of French presidential election.

Sources: Bloomberg; BIS calculations.

Correlation patterns break down

Correlation coefficient

Graph II.10

Cross-correlations[1]

— Sectoral   — Regional

Asset return correlations[2]

Indices:[3]
■ AE and EME stock
■ AE stock index and VIX[4]
■ AE stock and investment grade bond[4]
■ AE high-yield and EME government bond
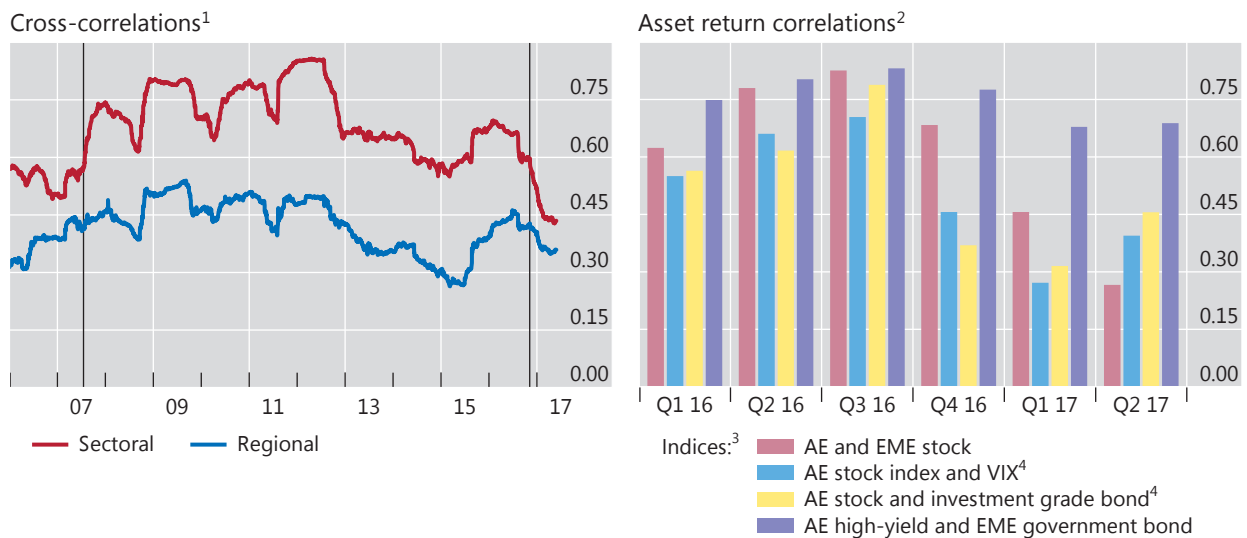
The vertical lines in the left-hand panel indicate 17 July 2007 (Bear Stearns discloses the virtual demise of two of its mortgage-backed security funds) and 8 November 2016 (US presidential election).

[1] Average of one-year rolling bilateral correlation coefficients of daily changes in the corresponding indices/assets included in each category; the sign of negative correlations is inverted. For "cross-sectoral", the S&P 500 level 1 sectoral sub-indices (11 sub-indices); for "cross-regional", main stock indices for BR, CN, GB, HK, JP, KR, MX, PL, RU, TR, US and Europe.   [2] Intra-quarter correlation coefficients of daily changes in the corresponding indices included in each category.   [3] AE and EME Bank of America Merrill Lynch aggregates.   [4] The sign has been flipped to facilitate comparability.

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

period under review, politically driven developments in other policies played a greater role, contributing to the fall in correlations.

The second sign of a change in risk relationships was the growing divergence between historically low market indicators of risk and rising indices of policy uncertainty (Graph II.8, right-hand panel). There are a number of explanations for this widening gap (Box II.B). One is that rising political uncertainty contrasted with greater confidence in the sustainability of the economic upswing. Another, related explanation is that the prospect of growth- and profit-boosting policy measures outweighed the uncertainty surrounding them: market participants viewed manifestations of political risks that would damage growth and profits as tail events.

Indeed, a third development pointing to changes in risk dynamics was indications that markets did price in tail events. Despite the low level of the VIX, indicators of risks of large asset price changes trended up from the beginning of 2017. The most popular of these, the CBOE SKEW index, uses out-of-the-money option prices to measure the risk of large declines in the S&P 500. This index rose sharply from January until March 2017, then retreated. The RXM, an index that traces the willingness to profit from large increases in the S&P, rose steadily through the first five months of 2017 (Graph II.11, left-hand panel).

The expectations of extreme returns have also been reflected in the cost of buying protection against large moves in exchange rates. Prices of risk reversals on the US dollar against other currencies suggest that investors were willing to pay more to protect themselves against a large dollar appreciation against the euro in the immediate aftermath of the US election (Graph II.11, right-hand panel). As the dollar weakened in 2017, these indicators retreated.

Evidence for the pricing of tail risks in fixed income markets is less definitive. Most options trading activity takes place over the counter, so price information is harder to come by. Nevertheless, some factors may point to a heightened risk of an unexpectedly large rise – a snapback – in core bond yields, whether priced in or not.

Markets price in tail moves

Index   Graph II.11

Skew indices | FX risk reversals (12-month)[3]
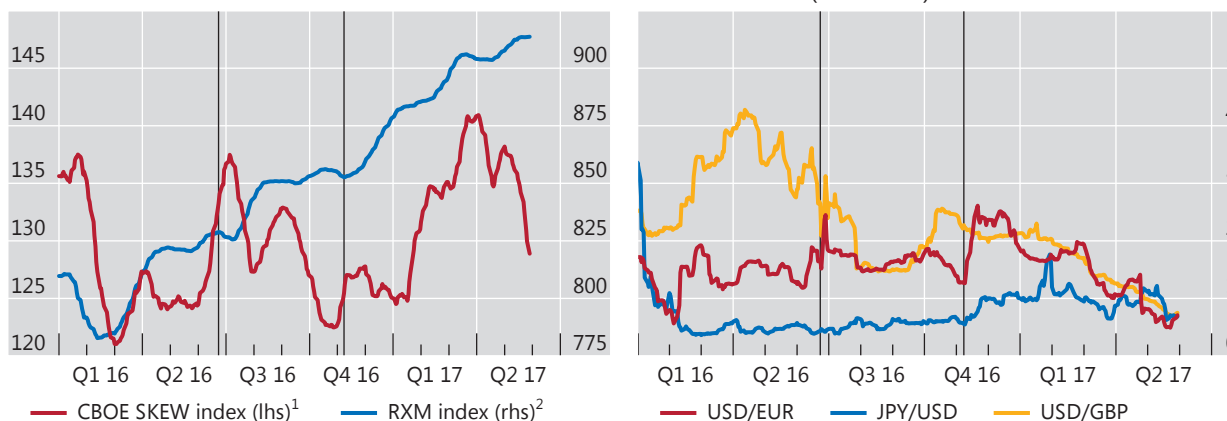
— CBOE SKEW index (lhs)[1]   — RXM index (rhs)[2]   — USD/EUR   — JPY/USD   — USD/GBP

The vertical lines indicate 23 June 2016 (UK referendum on EU membership) and 8 November 2016 (US presidential election).

[1] The CBOE SKEW index is a global, strike-independent measure of the slope of the implied volatility curve.   [2] The CBOE S&P 500 Risk Reversal index tracks the performance of a hypothetical risk reversal strategy that buys a rolling out-of-the-money monthly SPX call option, sells a rolling out-of-the-money monthly SPX put option and holds a rolling money market account.   [3] An increase indicates that market participants are willing to pay more to hedge against an appreciation of the US dollar.

Source: Bloomberg.

Box II.B

Risk or uncertainty?

The divergence between measures of financial risk and of policy uncertainty featured prominently in the period under review. The two phenomena are conceptually related. Financial risk traditionally refers to the distribution of future returns as implied by financial market prices, in particular those of options. Financial risk is higher, the greater the potential for large price movements, in either direction. By contrast, measures of policy uncertainty typically try to capture the general degree to which observers are unsure about policy-related economic events.

While implied volatility (as derived from option prices) has become the most prominent measure of financial risk, policy uncertainty is, by its very nature, more challenging to quantify. Among the various indicators, the Baker, Bloom and Davis (2016) policy uncertainty index has become quite popular.① The US-focused version of the index has three components: newspaper coverage of uncertainty about economic policy matters; the number of federal tax code provisions set to expire in future years; and the degree of disagreement among economic forecasters about future government spending and inflation. Indices that have been compiled for other large economies are based only on the first of these components.

One possible explanation for the divergence between implied volatility and news-based measures of policy uncertainty is an amplification mechanism in media reporting: the proliferation of uncertainty-related articles may have triggered a broader coverage of the topic. Indeed, the rise in the policy uncertainty index since mid-2016 has coincided with a surge in newspaper articles covering uncertainty (Graph II.B, left-hand panel). By contrast, the index component that focuses on forecast disagreements has been trending downwards, more closely tracking market volatility.

Other, complementary explanations have to do with financial market prices. Market volatility could be low because of factors unrelated to risk: prices could be stable, for example, because of abundant liquidity related to

Policy uncertainty and financial market risk diverge

Graph II.B
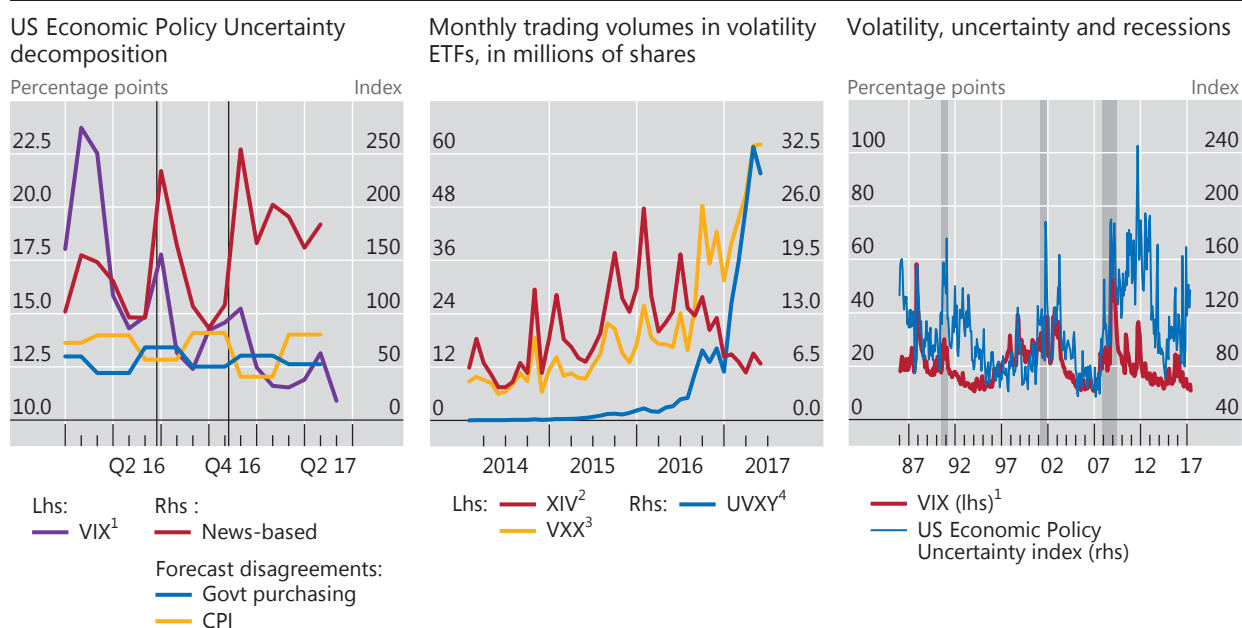
US Economic Policy Uncertainty decomposition

Lhs:
— VIX[1]

Rhs:
— News-based

Forecast disagreements:
— Govt purchasing
— CPI

Monthly trading volumes in volatility ETFs, in millions of shares

Lhs: — XIV[2]
— VXX[3]

Rhs: — UVXY[4]

Volatility, uncertainty and recessions

— VIX (lhs)[1]
— US Economic Policy Uncertainty index (rhs)

The vertical lines in the left-hand panel indicate 23 June 2016 (UK referendum on EU membership) and 8 November 2016 (US presidential election). The shaded areas in the right-hand panel indicate economic contraction periods as defined by the US National Bureau of Economic Research.

[1] Chicago Board Options Exchange S&P 500 implied volatility index; standard deviation, in percentage points per annum.   [2] VelocityShares Daily Inverse VIX Short-Term exchange-traded note (ETN). Payments are based on the inverse performance of the underlying index and the S&P 500 VIX Short-Term Futures index.   [3] iPath S&P 500 VIX Short-Term Futures ETN. Payments are based on the performance of the underlying index and the S&P 500 Short-Term VIX Futures TR index.   [4] ProShares Ultra VIX Short-Term Futures exchange-traded fund (ETF). The fund seeks daily investment results that correspond to twice (200%) the performance of the S&P 500 VIX Short-Term Futures index.

Sources: S Davis, *An index of global economic policy uncertainty*, www.PolicyUncertainty.com; www.nber.org/cycles.html; Bloomberg; BIS calculations.

First, market participants have so far been rather sanguine about higher inflation risks. In particular, bond yields did not rise alongside rallying equity markets in the first half of 2017. Bond yields could snap back if inflation risks unexpectedly materialised and participants reconsidered the timing and pace of monetary policy normalisation, including unwinding central bank balance sheets (Chapter IV).

Second, a number of structural factors may potentially play a role in amplifying price movements in fixed income markets. One set of drivers relates to the investment and hedging behaviour of large institutional investors.[1] Falling yields in the post-crisis period led some pension funds and insurers to buy more long-maturity bonds to match the increased duration of their liabilities. This in turn drove long-term yields down further.

More generally, low market volatility can foster risk-taking. Some popular market strategies, such as "risk parity", implement leveraged portfolio allocations based on the historical risk profiles of different asset classes. In some cases, a shift in volatility patterns could mechanically induce asset sales, which would in turn amplify the volatility spike and drive the market down further.

Perhaps reflecting these or similar mechanisms, there is evidence that in recent years long-term interest rates have tended to react more sharply to high-frequency movements in short-term interest rates than before.[2] The "taper tantrum" and "bund tantrum" – when government yields rose unexpectedly sharply in mid-2013 and the first half of 2015, respectively – showed that an aggregate rotation out of fixed income assets can produce significant temporary dislocations in asset prices, particularly following a lengthy period of relative market calm.

Pricing anomalies retreat but do not disappear

Even as they reacted to policy shifts and political shocks, financial markets continued to reflect the impact of longer-term structural changes in technology, regulatory frameworks and bank business models (Chapter V). Foreign exchange markets have seen significant shifts in the role of different market players in recent years, with implications for market depth and resilience (Box II.C). Other markets have also seen changes to liquidity and pricing dynamics. Some of these changes have produced persistent pricing anomalies.

International banks' US dollar funding is one area where structural change has had an impact on markets. In October 2016, a new set of rules for US prime money market mutual funds (MMMFs) designed to mitigate systemic risks came into effect (Chapter V). Starting in late 2015, as banks began to shift their dollar funding

sources in anticipation of the revised rules, these changes affected short-term US dollar money markets. For example, the spread between US dollar Libor and overnight index swap (OIS) rates widened throughout 2016 (Graph II.12, left-hand panel). This spread narrowed once the October deadline passed, but did not return to its 2015 levels until the second quarter of 2017.

The MMMF reform also contributed to a wider cross-currency basis (Graph II.12, centre panel). The cross-currency basis indicates the amount by which the interest paid to borrow one currency by swapping it against another in the FX market differs from the cost of directly borrowing it in the cash market. A non-zero basis implies a violation of covered interest parity (CIP) – one of the most reliable pricing relationships in financial markets pre-crisis. Since then, dollar borrowers have paid a premium for funding through the FX swap market (negative basis) against most currencies, notably the euro and the yen, while against others, including the Australian dollar, they have enjoyed a discount.

A number of factors determine the persistence of the cross-currency basis.[3] During the Great Financial Crisis (GFC), CIP violations reflected crisis-induced tensions in the interbank markets, in particular non-US banks' difficulties in obtaining dollar funding. More recently, a combination of unprecedented hedging demand and more stringent limits to arbitrage has been at work. Among other things, in recent years, the low-rate environment has led non-US institutional investors to buy dollar-denominated securities as part of their search for yield, increasing the demand for FX-hedged investments in US dollar assets. At the same time, banks now face higher costs for using their balance sheet to close arbitrage opportunities, as a result of tighter management of balance sheet risks and more binding regulatory constraints. A stronger dollar can also increase the cost of bank balance sheet capacity. Thus, the post-crisis behaviour of the cross-currency basis has also been tightly related to US dollar strength.[4] The basis narrowed in most currency pairs in late 2016 and the first half of 2017, but did not disappear.

Another persistent market anomaly has emerged in the single currency interest rate swap market (Graph II.12, right-hand panel). Spreads between the fixed rate

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Financial market anomalies narrow, but persist

Graph II.12

Three-month Libor-OIS spread

Three-month cross-currency basis swaps vs US dollar

Ten-year interest rate swap spreads[1]
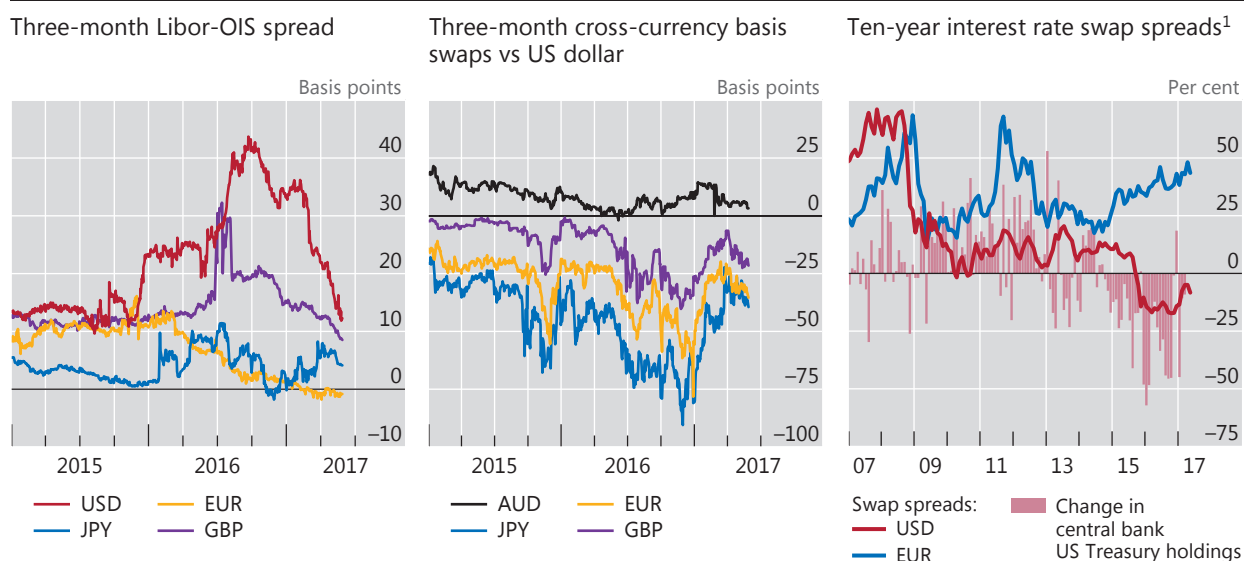
[1] Monthly averages of daily data.

Sources: Bloomberg; Datastream; BIS calculations.

Box II.C

Changes in the FX market ecosystem

Daily trading in foreign exchange markets amounted to $5.1 trillion in 2016, according to the BIS Triennial Central Bank Survey of foreign exchange market activity.① For the first time, activity fell relative to the previous survey three years earlier. Trading by hedge funds and principal trading firms declined, while that by institutional investors increased significantly. Subdued trade and capital flows, shifts in major central banks' monetary policies and the decline in FX prime brokerage were behind many of these trends. These shifts in market players and drivers have gone hand in hand with a further evolution in FX liquidity provision and changes in FX trade execution (see Chapter V for a broader discussion of changes to large dealer banks' business models).

Among dealer banks, there has been a growing bifurcation between the few large institutions still willing to take risks onto their balance sheets as principals and those that have primarily moved to an agency model of market-making. Indeed, the 2016 Triennial Survey found that the number of banks accounting for 75% of FX turnover resumed its trend decline (Graph II.C.1, left-hand panel), while the share of inter-dealer trading picked up for the first time since the 1995 survey.

As a result, FX market liquidity now flows from a handful of top-tier "core" FX dealer banks to the other "periphery" banks. This inter-dealer trading pattern marks a change from the classic "hot potato" trading of inventory imbalances, the main driver of previous trading growth among dealers.② Only a small number of bank dealers have retained a strong position as so-called "flow internalisers". Internalisation refers to the process whereby dealers seek to match staggered offsetting client flows on their own books instead of immediately hedging them in the inter-dealer market. The 2016 Triennial Survey found that internalisation ratios of FX dealer banks intermediating large flows and of banks located in the top trading centres are much higher compared with those of other FX dealers (Graph II.C.1, centre panel).

Dealer banks appear to have focused more on retaining a relationship-driven market structure, where bilateral OTC transactions dominate, albeit in electronic form. Bilateral trading takes place primarily via proprietary single-bank trading platforms operated by FX dealing banks (Graph II.C.2, left-hand panel), or electronic price streams. This

Changing patterns of inter-dealer trading and the entry of non-bank market-makers

In per cent

Graph II.C.1

Bifurcation among FX dealers
- Mean number of banks covering 75% of FX turnover (lhs)[1, 2]
- Inter-dealer trading, share of total FX turnover (rhs)[3]

Internalisation ratios by trading centre size
- / / 25th–75th percentiles
- Volume-weighted median[6]
- Simple median

Share of trading by top dealers[7]
- Top five banks
- Top 12 banks

Top 10 trading centres[4]   Others[5]
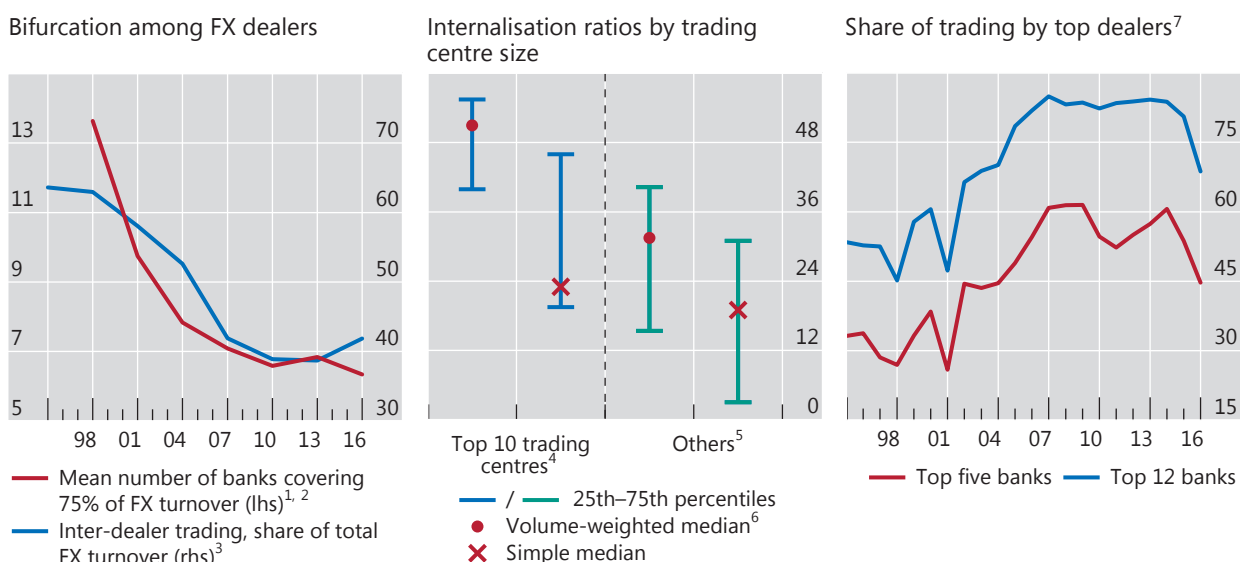
[1] Across the following jurisdictions: AU, BR, CH, DE, DK, FR, GB, HK, JP, SE, SG and US.   [2] Spot, outright forwards and FX swaps.   [3] Adjusted for local and cross-border inter-dealer double-counting, ie "net-net" basis; daily averages in April.   [4] AU, CH, DE, DK, FR, GB, HK, JP, SG and US.   [5] Remaining 40 jurisdictions that supplied internalisation ratios.   [6] Weighted by each reporting dealer's trading volumes, excluding zeros and non-reporting.   [7] Based on Euromoney rankings.

Sources: Euromoney Foreign Exchange Survey 2016; BIS Triennial Central Bank Survey; BIS calculations.

Shifts in electronic trading and trading on primary inter-dealer venues

Graph II.C.2

Electronic execution methods[1]

Per cent

	2013	2016
Other electronic indirect		
Other ECNs[4]	16%	19%
Reuters matching/EBS	24%	19%
Electronic direct, other[3]	31%	26%
Single-bank platforms[2]	23%	33%

Electronic direct:
- Single-bank platforms[2]
- Electronic direct, other[3]

Electronic indirect:
- Reuters matching/EBS
- Other ECNs[4]
- Other electronic indirect, including dark pools

Share of algorithmic trading on EBS

Per cent

- Algorithmic trading
- Manual trading

FX illiquidity and trading on EBS[5]

z-score / USD trn

- Systemic FX illiquidity (lhs)
- EBS turnover (rhs)

[1] Adjusted for local and cross-border inter-dealer double-counting.   [2] Single-bank trading systems operated by a single dealer.   [3] Other electronic direct execution methods, eg direct electronic price streams.   [4] Electronic communication networks.   [5] The systematic (market) FX illiquidity measure is from Karnaukh et al (2015) and is a standardised indicator based on a composite measure of relative bid-ask spreads and bid-ask spreads adjusted for the currency variance, covering 30 currency pairs.

Sources: N Karnaukh, A Ranaldo and P Söderlind, "Understanding FX liquidity", *Review of Financial Studies*, vol 28, no 11, 2015, pp 3073–108; EBS; BIS Triennial Central Bank Survey; BIS calculations.

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small set of top global FX dealer banks has faced competition from sophisticated technology-driven non-bank liquidity providers (Graph II.C.2, centre panel). Some of these have also morphed from pure high-frequency traders into flow internalisers and have started pricing directly to clients.

While the relationship-driven, direct dealer-customer trading on heterogeneous electronic trading venues delivers lower spreads in stable market conditions, its resilience to stress is as yet unproven. To be sure, dealers can internalise large FX flows and quote narrow spreads to their customers in good times. But their need to hedge inventory risk on an anonymous basis in the inter-dealer market rises sharply in stress episodes (Graph II.C.2, right-hand panel). In this sense, anonymous trading venues, such as EBS and Reuters, can be seen as public good providers. Furthermore, while technology-driven players have also emerged as market-makers and liquidity providers, the majority of non-bank market-makers often do not bring much risk-absorption capacity to the market.

① Bank for International Settlements, "Foreign exchange turnover in April 2016", *Triennial Central Bank Survey*, September 2016; see also M Moore, A Schrimpf and V Sushko, "Downsized FX markets: causes and implications", *BIS Quarterly Review*, December 2016, pp 35–51. ② See M Evans and R Lyons, "Order flow and exchange rate dynamics", *Journal of Political Economy*, vol 110, no 1, 2002, pp 170–80; and W Killeen, R Lyons and M Moore, "Fixed versus flexible: lessons from EMS order flow", *Journal of International Money and Finance*, vol 25, no 4, 2006, pp 551–79.

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leg of these instruments and government bond yields, normally positive to reflect counterparty credit risk, dropped below zero for US dollar contracts in 2015. This may in part have reflected sales of US Treasuries by EME reserve managers, which would have pushed Treasury yields upwards. In addition, a supply-demand imbalance appears to have pushed the rate on the fixed rate leg of the swaps downwards. On the one hand, the demand to receive fixed rates has risen along with the volume of fixed income US dollar instruments issued worldwide. On the other, the large US government-sponsored entities, which before the GFC tended

to pay the fixed rate leg and receive floating rates in dollar swap markets in order to hedge their portfolios of long-term fixed rate mortgages, are no longer active participants now that the Federal Reserve has taken over a large share of these portfolios through its asset purchase programmes. And, as with the CIP anomaly, large dealer banks are less willing to use their balance sheets to exploit the arbitrage opportunities created by this imbalance. Spreads on euro-denominated swaps, which were not subject to these pressures, have widened in the past few years, perhaps because of pressure on euro government bond yields from the ECB's asset purchase programme.[5]

The interest rate swap anomaly, too, diminished over the period under review but has not disappeared. The US dollar spread became less negative from mid-2016, while the euro spread widened further. On the dollar side, rising yields may have reduced investors' demand for receive-fixed positions; on the euro side, the ECB's asset purchases continued to keep benchmark government yields low.

Endnotes

1   See D Domanski, H S Shin and V Sushko, "The hunt for duration: not waving but drowning?", *IMF Economic Review*, vol 65, no 1, April 2017, pp 113–53.

2   See S Hanson, D Lucca and J Wright, "Interest rate conundrums in the twenty-first century", *Federal Reserve Bank of New York Staff Reports*, no 810, March 2017.

3   See C Borio, R McCauley, P McGuire and V Sushko, "Covered interest parity lost: understanding the cross-currency basis", *BIS Quarterly Review*, September 2016, pp 45–64.

4   See S Avdjiev, W Du, C Koch and H S Shin, "The dollar, bank leverage and the deviation from covered interest parity", *BIS Working Papers*, no 592, November 2016.

5   See S Sundaresan and V Sushko, "Recent dislocations in fixed income derivatives markets", *BIS Quarterly Review,* December 2015, pp 8–9; and T Ehlers and E Eren, "The changing shape of interest rate derivatives markets", *BIS Quarterly Review*, December 2016, pp 53–65.

III. The global economy: maturing recoveries, turning financial cycles?

The global economy's cyclical upswing strengthened considerably during the year under review. By early 2017, virtually all major economies were expanding, and survey data confirmed the favourable short-term outlook. Slack in advanced economies shrank, especially in the labour market, and many emerging market economies (EMEs) benefited from higher commodity prices. Consumption growth was a key driver of demand, but business investment also showed signs of a rebound. Financial cycles were in an expansionary phase in many countries, supporting economic activity. In crisis-hit advanced economies, deleveraging gave way to financial cycle upswings, while in a number of smaller advanced economies and EMEs financial booms moderated or, in some cases, turned into downswings.

Despite the brighter near-term outlook, there are medium-term risks to a sustainable economic expansion. First, leading indicators of financial distress signal risks from high private debt and house prices in several economies that were not at the epicentre of the Great Financial Crisis (GFC). Second, in some countries, high household debt might become a significant drag on demand, especially if rising interest rates boost debt service burdens. Third, persistent weak productivity growth and high corporate debt could weigh on investment. Fourth, the rise in protectionist sentiment could hurt the economic prospects of small open advanced economies and EMEs in particular.

This chapter first provides an overview of global developments in business and financial cycles over the past year. Next, it assesses medium-term risks to the outlook, evaluating aggregate financial cycle risks, the sustainability of consumption and investment growth, and rising protectionist risks. Finally, it highlights the window of opportunity that cyclical tailwinds provide to pursue policies that enhance resilience and sustainable growth.

Macro-financial developments – at inflection points?

The global economy picked up briskly in the second half of 2016, and by early 2017 virtually all major economies were expanding. While, at 3.1%, global growth was actually slightly lower in 2016 than in 2015, it is expected to rebound to 3.5% in 2017 (Annex Table A1).

Growth in many advanced economies surprised on the upside in the third quarter of 2016 and remained vigorous well into 2017 (Graph III.1, left-hand panel). The US economy grew by 1.6% in 2016, but is forecast to expand by 2.1% in 2017. Euro area GDP increased by 1.7% in 2016, and Japan's by 1.0%. Despite Brexit-related uncertainties, the UK economy rolled ahead by 1.8%. The cyclical upswing continued to push down advanced economies' unemployment rates, in some cases to below pre-crisis levels (centre panel).

The growth momentum in EMEs was somewhat weaker than in advanced economies, but the recovery in energy prices improved the outlook for commodity exporters. China's growth edged up from 6.7% in mid-2016 to 6.9% in the first quarter of 2017, supported by accommodative fiscal policy. India's growth softened in the second half of 2016, to 7.0% in the fourth quarter. Higher oil prices contributed to the growth rebound in oil-exporting countries. Russia's growth

Broad-based upswing

Graph III.1

Real GDP growth[1]

Unemployment rate[2]

Real consumption and investment growth[1]
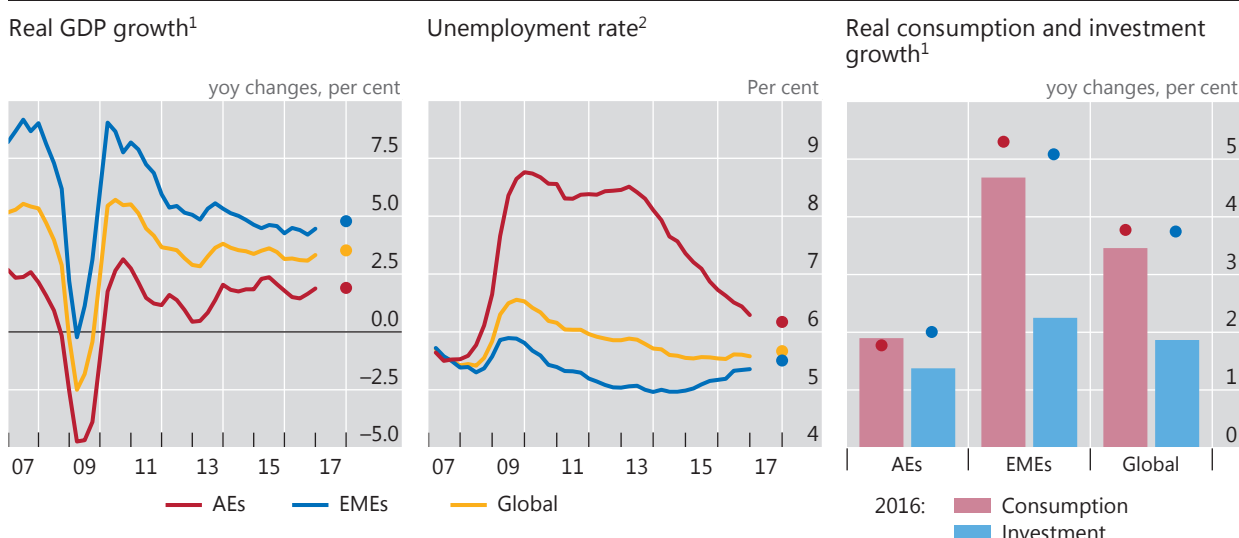
The dots indicate the forecasts for 2017.

[1] Weighted averages based on rolling GDP and PPP exchange rates.   [2] Weighted averages based on rolling labour force levels; definitions may vary across countries. Excluding IN owing to a lack of data.

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

turned positive in the last quarter of 2016, while Brazil's downturn seemed to be bottoming out (Annex Table A1).

Consumption was the key factor driving demand in both advanced economies and EMEs during 2016. Consumption growth exceeded investment growth by around half a percentage point in advanced economies and by over 2 percentage points in EMEs (Graph III.1, right-hand panel). For 2017, investment is forecast to rebound in both advanced and emerging market economies, alongside continued consumption growth (right-hand panel, dots). In advanced economies, investment growth is forecast to overtake consumption growth, while higher commodity prices should boost capital formation in commodity-exporting countries.

Survey data confirmed the favourable short-term outlook. By early 2017, consumer confidence in advanced economies had risen further above its historical average, supporting the consumption-led expansion (Graph III.2, left-hand panel). Business surveys responded strongly to the favourable macro news in the second half of 2016. In the United States, expectations of corporate tax cuts and deregulation played a role. By early 2017, purchasing managers' indices for manufacturing in the euro area and Japan were at six- and three-year highs, respectively.

Various factors affecting the investment outlook also turned supportive. Non-financial corporations' profitability picked up in both advanced economies and EMEs, reversing the declines of previous years (Graph III.2, centre panel). This is likely to have reinforced the boost from rising equity valuations and reduced demand uncertainty (right-hand panel). However, policy uncertainty increased further (Chapter II), probably exerting a dampening effect on investment (Graph III.2, right-hand panel).

Expectations of shifts in the macroeconomic policy mix also affected the outlook. Policy announcements pointed to fiscal expansion in the United States just as the fiscal policy stance was eased elsewhere. In August, the Japanese government unveiled a fiscal package, including infrastructure spending and transfers. UK

Graph III.2

PMIs and consumer confidence[1]

Profitability of non-financial firms[5]

Factors driving investment since 2014[6]

Points of std dev / Diffusion index

2.25	56
1.50	54
0.75	52
0.00	50
−0.75	48
−1.50	46

2013 2014 2015 2016 2017

Consumer confidence (lhs)[2, 3]

Manufacturing PMIs (rhs):
Major AEs[2]
EMEs[4]

Per cent

13
12
11
10
9
8

2013 2014 2015 2016 2017

Major AEs[1, 2]
EMEs

Percentage points

3.0
1.5
0.0
−1.5
−3.0
−4.5

Higher policy uncertainty | Lower economic uncertainty | Excess equity returns | Other variables

[1] Weighted averages based on rolling GDP and PPP exchange rates. [2] EA, GB, JP and US. [3] Normalised data, measured as the difference between the indicator and its historical average. [4] BR, CN, HU, IN, MX, RU, SG, TR and ZA. [5] Return on equity. For EMEs, the aggregate is provided by Datastream Worldscope. [6] Median impact of the factors on non-residential investment growth across the G7 economies. Based on R Banerjee, J Kearns and M Lombardi, "(Why) Is investment weak?", *BIS Quarterly Review*, March 2015, pp 67–82; amended with additional control variables and updated to cover the most recent time period.

Sources: Bloomberg; Datastream; Datastream Worldscope; BIS calculations and estimates.

authorities abandoned previous plans to close the budget deficit by 2020. In late November, the European Commission recommended a fiscal expansion for the euro area of 0.5% of GDP for 2017. And in mid-December, China's authorities included active fiscal policy among the economic priorities for 2017.

Shrinking measures of economic slack suggested that the expansion was maturing (Graph III.3). To be sure, such estimates should be taken with great caution, not least because they are frequently subject to large revisions. That said, capacity constraints appeared increasingly tight, especially based on labour market indicators, such as the unemployment gap (right-hand panel). By this measure, most major advanced economies had reached full employment by 2016, and a further tightening of labour markets was expected in many countries. However, significant slack seemed to remain in a number of euro area countries, notably Italy and Spain.

Financial cycles, as represented by credit and property prices, were in the expansionary phase in many countries, supporting the economic upswing (Graph III.4).[1] The major advanced economies at the epicentre of the GFC continued on a moderate financial cycle upswing. After several years of growth in real residential property prices, the ratio of non-financial private credit to GDP edged up modestly in 2016. This reflected a moderate increase in corporate debt ratios, while household debt ratios remained flat, following years of decline (Annex Table A2). Between 2007 and 2016, household debt as a ratio to GDP fell by 18 percentage points in the United States, 6 percentage points in the United Kingdom and 17 percentage points in Spain, providing room for the consumption-led expansion.

In other advanced economies that were less affected by the GFC, financial booms moderated. The growth in the private credit ratio slowed by around 6 percentage points from the previous year, even as property prices continued to rise. The slowdown mainly reflected weaker corporate debt growth, while household debt

Shrinking economic slack

Output gaps[1]

Percentage of potential GDP
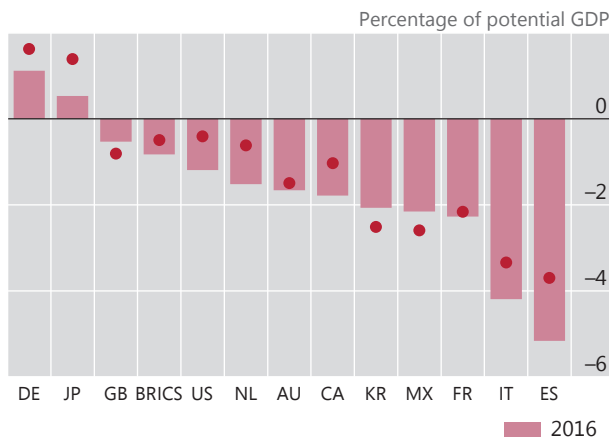
Unemployment gaps[2]

Percentage points
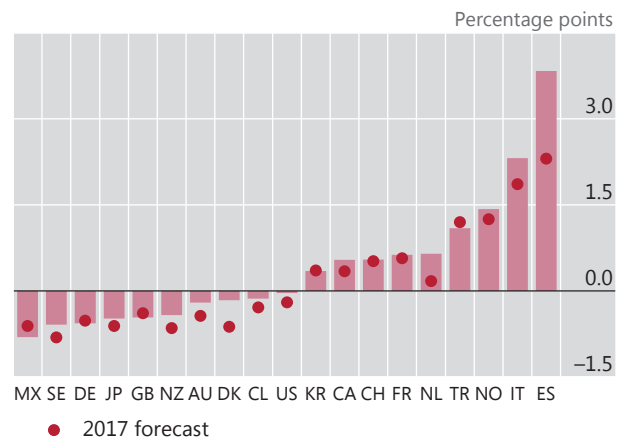
1 Difference between actual and potential GDP, as a percentage of potential GDP; IMF and OECD estimates. For BRICS, weighted average based on rolling GDP and PPP exchange rates of BR, CN, IN, RU and ZA.   2 Difference between the actual unemployment rate and the non-accelerating inflation rate of unemployment (NAIRU); OECD estimates.

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

rose further. In Australia, Canada, Sweden and Switzerland, household debt rose by 2–3 percentage points in 2016, to 86–128% of GDP.

Many EMEs experienced slowing financial booms and some outright downturns in 2016. In aggregate terms, both real house prices and credit relative to output flattened out. Excluding China, EMEs even experienced a small reduction in their credit-to-GDP ratio. This reflected, in particular, downturns in Brazil and Russia, with sustained house price and credit declines (Annex Tables A2 and A3). The corporate debt ratio fell by 3–5 percentage points in Brazil, India, Korea and Russia, but increased further in China. These changes followed rapidly rising corporate debt

Credit and house price trends[1]

Private non-financial credit to GDP
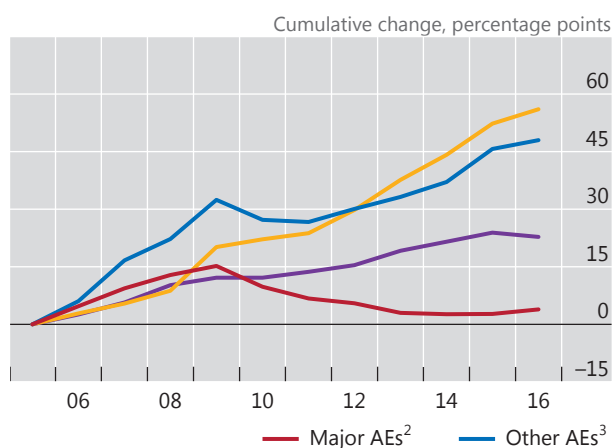
Cumulative change, percentage points

Real property prices[4]

Cumulative growth, per cent
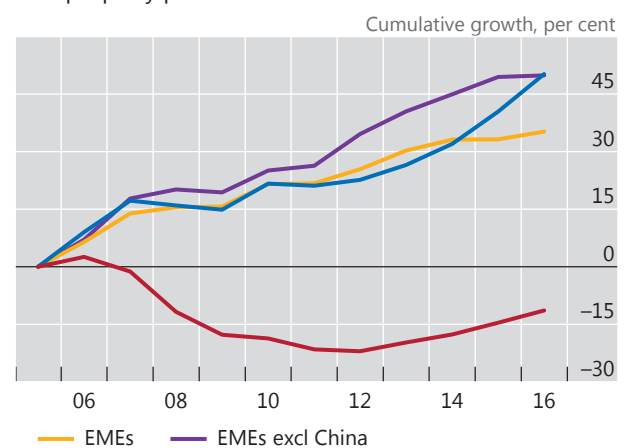
1 Weighted averages based on rolling GDP and PPP exchange rates.   2 EA, GB, JP and US.   3 AU, CA, CH, DK, NO, NZ and SE.   4 Deflated by CPI. Excluding AR, SA and TW, owing to a lack of data.

Sources: IMF, *International Financial Statistics*; Datastream; national data; BIS; BIS calculations.

post-crisis in many EMEs. Between 2007 and 2016, the EME corporate debt ratio rose on average by 19 percentage points, most prominently in China (by 70 percentage points to 166% of GDP). Household debt ratios also rose in some EMEs over the past year, particularly in China and Korea, to 44% and 93% of GDP, respectively.

Risks to the outlook

While the short-term cyclical outlook is increasingly favourable, there are also a number of medium-term risks. This section considers four such risks: (i) financial cycle risks for financial stability; (ii) risks to consumption growth from household debt; (iii) risks to investment from weak productivity growth and high corporate debt; and (iv) risks from rising protectionism.

Financial cycle risks

Financial cycles have been a key determinant of macroeconomic dynamics and financial stability. Peaks in the financial cycle have tended to signal subsequent periods of banking or financial stress. From this perspective, ongoing or prospective financial cycle downturns in some EMEs and smaller advanced economies pose a risk to the outlook.

Such risks can be assessed through early warning indicators of financial distress (Table III.1). One such indicator is the credit-to-GDP gap, defined as the deviation of the private non-financial sector credit-to-GDP ratio from its long-term trend. Another is the debt service ratio (DSR), ie the same sector's principal and interest payments in relation to income, measured as deviation from the historical average. These indicators have often successfully captured financial overheating and signalled banking distress over medium-term horizons in the past. Since the late 1970s, the critical thresholds (red cells) were breached at some point in the three years preceding banking distress in more than two thirds of cases, while providing few false alarms. Lower thresholds (beige cells) captured a larger number of banking distress episodes but triggered more false alarms.[2]

Credit-to-GDP gaps have reached levels signalling elevated risks in a number of EMEs and smaller advanced economies (Table III.1, first column). In particular, the sizeable credit gaps in several Asian EMEs stand out. In some other EMEs and advanced economies, credit gaps were also large. Moreover, in most cases large credit gaps coincided with sizeable (contemporaneous or recent) property price gaps (asterisks), so that both gap indicators gave a warning signal.

By contrast, DSRs – which can give a better sense of near-term risks over horizons of one year or so – generally remained below levels that would trigger a warning signal. Exceptions were a small number of EMEs where debt service burdens were above their historical norms, even under the assumption of constant interest rates (Table III.1, second column). However, under more stressed conditions – an all-else-equal 250 basis point increase in rates with 100% pass-through – DSRs would rise into risky territory for quite a number of economies (third column).

For EMEs with a heavy foreign currency debt burden, the exchange rate can amplify financial cycle risks. A large depreciation against major funding currencies, in particular the US dollar, would inflate debt burdens and could trigger or amplify financial distress. At 12% of GDP, EME external foreign currency debt was on average below levels seen before previous financial crises (Graph III.5, left-hand panel).[3] Thus, in general, vulnerabilities arising from foreign currency debt appeared

Early warning indicators for stress in domestic banking systems

Table III.1

	Credit-to-GDP gap[1]	Debt service ratio (DSR)[2]	DSR if interest rates rise by 250 bp[3]
Australia	−0.5	1.3	5.2
Brazil	−3.0	2.9	4.5
Canada	14.1*	3.3	7.6
Central and eastern Europe[4]	−10.1	−1.6	−0.2
China	24.6	5.4	8.8
France	1.8	1.1	4.3
Germany	−4.3	−1.8	0.0
Hong Kong SAR	30.3*	6.6	11.1
India	−7.8	0.8	1.9
Indonesia	9.3*	0.8	1.5
Italy	−14.9	−0.7	1.4
Japan	5.4*	−2.1	0.6
Korea	0.2	0.0	3.7
Malaysia	9.7*	0.9	3.3
Mexico	9.0	0.9	1.7
Nordic countries[5]	−4.3	−0.1	3.8
South Africa	−2.5	−0.2	1.1
Spain	−46.9	−3.2	−0.4
Switzerland	7.6*	0.0	3.1
Russia	−2.8	2.3	3.6
Thailand	11.3*	−0.3	1.6
Turkey	7.2	4.0	5.6
United Kingdom	−19.6	−1.4	1.5
United States	−7.7	−1.4	1.2
Legend	*Credit/GDP gap>10*	*DSR>6*	*DSR>6*
	2≤Credit/GDP gap≤10	*4≤DSR≤6*	*4≤DSR≤6*

Data up to Q4 2016. Thresholds for red cells are chosen by minimising false alarms conditional on capturing at least two thirds of the crises over a cumulative three-year horizon. Thresholds for beige cells for the credit-to-GDP gap are based on guidelines for countercyclical capital buffers under Basel III; those for the DSR are chosen by minimising false alarms conditional on capturing at least two thirds of the crises over a two-year horizon.

[1] For those economies where the credit-to-GDP gap is above a critical threshold, asterisks indicate a property price gap also above a critical threshold in at least one of the last five years. For a derivation of critical thresholds for credit-to-GDP and property price gaps, and their measurement, 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, 2011, pp 189–240.   [2] Difference between DSRs for the private non-financial sector and country-specific long-run averages. For the calculation of DSRs, see http://www.bis.org/statistics/dsr.htm; for the derivation of critical thresholds, see M Drehmann and M Juselius, "Do debt service costs affect macroeconomic and financial stability?", *BIS Quarterly Review*, September 2012, pp 21–35.   [3] Assuming that interest rates increase by 250 basis points and that all other DSR components stay fixed.   [4] Simple average of CZ, HU and PL.   [5] Simple average of FI, NO and SE.

Sources: National data; BIS; BIS calculations.

relatively contained. But at the same time, EMEs have become more integrated into global financial markets, as reflected, for instance, in greater foreign holdings of local currency government debt (left-hand panel). As a result, they continue to be significantly exposed to changes in global investor sentiment.

EME foreign currency debt and international assets

Graph III.5

External foreign currency debt

Gross international assets

Lhs:
— Share of foreign ownership in local currency government debt[1]

Rhs:
■ Cross-border bank loans and deposits[2, 3]
■ International debt securities[2]

Lhs:
— Reserves to short-term debt[4]

Rhs:
■ Official reserves
■ FDI
■ Portfolio
■ Other assets
■ Financial derivatives

The vertical line in the left-hand panel indicates end-1996 (pre-Asian crisis).

[1] Simple averages of foreign investors' share in the local currency government debt market for BR, CO, CZ, HU, ID, IN, KR, MX, MY, PE, PL, RU, TH, TR and ZA.   [2] Amounts outstanding by residence; weighted averages based on rolling GDP and PPP exchange rates of AR, BR, CL, CN, CO, CZ, HU, ID, IN, KR, MX, MY, PE, PH, PL, RU, SA, TH, TR and ZA.   [3] To/with bank and non-bank sectors, denominated in CHF, EUR, GBP, JPY and USD. Prior to Q4 1995, cross-border bank claims denominated in the foreign currencies listed.   [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: Updated and extended version of data set constructed in P Lane and G Milesi-Ferretti, "The external wealth of nations mark II: revised and extended estimates of foreign assets and liabilities, 1970–2004", *Journal of International Economics*, vol 73, November 2007, pp 223–50; IMF, *International Financial Statistics* and *World Economic Outlook*; Institute of International Finance; Dealogic; Euroclear; Thomson Reuters; Xtrakter Ltd; BIS debt securities statistics, consolidated banking statistics and locational banking statistics; BIS calculations.

However, early warning indicators are subject to a number of caveats. On the one hand, they are not comprehensive: they omit other potential sources of financial distress, such as sovereign risk. On the other hand, they need to be interpreted with caution. First, by construction, they balance the risk of issuing false alarms with that of failing to identify future distress: false positives are inevitable. Second, although they can capture the general build-up of financial risks, they cannot identify precisely when the risks will materialise, let alone the intensity of potential strains. Third, their link with financial crisis risks can change over time. Importantly, many countries have developed and implemented macroprudential frameworks to improve financial sector resilience. And, in the wake of the GFC, major steps have been undertaken globally to enhance regulatory and supervisory frameworks more generally (Chapter V).

In addition, EMEs have taken steps to reduce their vulnerability to large and abrupt exchange rate depreciations. They have adopted more flexible exchange rate regimes and accumulated large FX reserves (Graph III.5, right-hand panel). As a ratio to GDP, FX reserves have more than tripled since the mid-1990s, reflecting in particular developments in Asian EMEs (Annex Table A5). Moreover, EME private foreign asset holdings have risen, providing an additional potential line of defence.

On balance, the analysis suggests that financial cycle risks are material in a number of economies. Even if, owing to steps to strengthen financial system resilience, outright financial distress did not emerge, financial cycle downturns could weaken demand and growth, not least by dampening consumption and investment.

Box III.A

Excessive household debt and medium-term growth

Excessive indebtedness has been one of the root causes of financial crises and the ensuing deep recessions. In recent years, the focus has been on household debt, as excessive leverage by the household sector was at the heart of the Great Financial Crisis.

It is well recognised that household borrowing is an important aspect of financial inclusion and can play useful economic roles, including smoothing consumption over time. At the same time, rapid household credit growth has featured prominently in financial cycle booms and busts. For one, household debt – or debt more generally – outpacing GDP growth over prolonged periods is a robust early warning indicator of financial stress.[①] Furthermore, there is growing evidence that household indebtedness affects not only the depth of recessions but growth more generally. In an influential paper, Mian et al (forthcoming) find that an increase in the household debt-to-GDP ratio acts as a drag on consumption with a lag of several years.[②] BIS research reinforces this conclusion. For instance, based on a panel of 54 advanced and emerging market economies over the period 1990–2015, Lombardi et al (2017) find that rising household indebtedness boosts consumption and GDP growth in the short run, but not in the longer run. Specifically, a 1 percentage point increase in the household debt-to-GDP ratio is associated with growth that is 0.1 percentage point lower in the long run.[③]

Drehmann et al (2017) shed light on a possible mechanism behind these empirical regularities. When households take on long-term debt, they increase current spending power but commit to a pre-specified path of future debt service (interest payments and amortisations).[④] A simple framework captures this accounting relationship. It highlights two key features. First, if borrowing rises persistently over several years and debt is long-term, as is typically the case, the debt service burden reaches its maximum only after the peak in new borrowing. The lag can be of several years and increase with the maturity of debt and the degree of persistence in borrowing. Second, cash flows from lenders to borrowers reach their maximum before new borrowing peaks. They turn negative before the end of a credit boom, since the positive cash flow from new borrowing is increasingly offset by the negative cash flow from rising debt service.

Empirically, these simple accounting relationships suggest a transmission channel whereby excessive credit expansions lead to future output losses. In particular, using a panel of 17 mainly advanced economies from 1980 to

Debt service can explain the negative effect of household debt on growth

In percentage points

Graph III.A

Impact of excessive new borrowing on GDP growth[1]

Disentangling the effects of excessive new borrowing[2]

— Change in GDP growth   - - - 95% confidence interval   ▮ Debt service effect   ▮ Credit effect   — Net effect
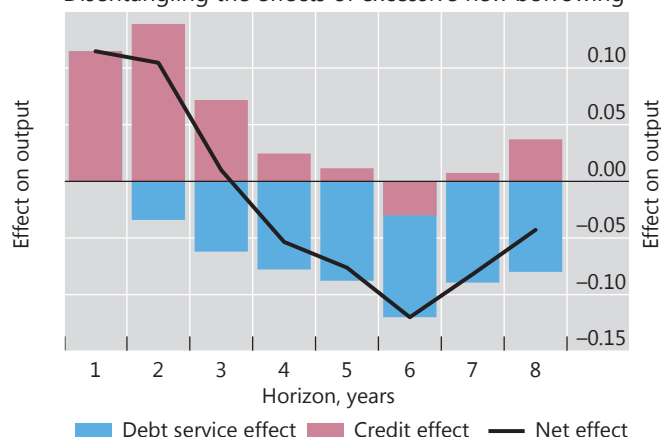
[1] Local projections for a 1 percentage point increase in new household borrowing relative to GDP. The model controls for the lag of real GDP growth, the real money market rate, the change in the average interest rate households pay on the stock of debt, the spread between the prime lending rate and the short-term money market rate, real residential property prices, dummy variables for financial crises, a dummy variable for the Great Financial Crisis in 2009 and country fixed effects.   [2] The net effect is the local projection as in the left-hand panel. The debt service effect is calculated by projecting household borrowing on future debt service and then calculating how this projected level of debt service affects future GDP. The credit effect is simply the difference between both (see Drehmann et al (2017) for a detailed discussion of the methodological approach).

Source: M Drehmann, M Juselius and A Korinek, "Accounting for debt service: the painful legacy of credit booms", *BIS Working Papers*, no 645, June 2017.

2016, Drehmann et al (2017) show that an increase in new debt relative to GDP beyond historical norms provides on average a boost to GDP growth in the short run but depresses output growth in the medium term (Graph III.A, left-hand panel and black line in the right-hand panel). As the accounting framework suggests, the increase in new debt feeds into higher debt service burdens. As higher debt service burdens have a strong negative effect on output going forward, this channel explains almost fully the medium-term growth decline (blue bars, right-hand panel). However, the negative effects of high credit growth in the medium term are not unconditional. If households initially have low debt service burdens, additional borrowing continues to be beneficial in the short run without significant adverse effects later on. This suggests, for instance, that there can be room for benign financial deepening in countries where households are not yet constrained.

The adverse effects of excessive credit growth can also be magnified by the economy's supply side response. For example, banks' stronger willingness to extend mortgages may feed an unsustainable housing boom and overinvestment in the construction sector, which may crowd out investment opportunities in higher-productivity sectors. Borio et al (2016), for example, report evidence that credit booms tend to go hand in hand with a misallocation of resources – most notably towards the construction sector – and a slowdown in productivity growth, with long-lasting adverse effects on the real economy.[5]

[1] See eg C Borio and P Lowe, "Assessing the risk of banking crises", *BIS Quarterly Review*, December 2002, pp 43–54; or M Schularick and A Taylor, "Credit booms gone bust: monetary policy, leverage cycles, and financial crises, 1870–2008", *American Economic Review,* vol 102, no 2, April 2012, pp 1029–61.   [2] See A Mian, A Sufi and E Verner, "Household debt and business cycles worldwide", *Quarterly Journal of Economics*, forthcoming.   [3] See M Lombardi, M Mohanty and I Shim, "The real effects of household debt in the short and long run", *BIS Working Papers*, no 607, January 2017.   [4] See M Drehmann, M Juselius and A Korinek, "Accounting for debt service: the painful legacy of credit booms", *BIS Working Papers*, no 645, June 2017.   [5] See C Borio, E Kharroubi, C Upper and F Zampolli, "Labour reallocation and productivity dynamics: financial causes, real consequences", *BIS Working Papers*, no 534, January 2016.

Risks to consumption

Private consumption has been a key contributor to global demand in the past few years. However, the main factors that supported consumption growth could weaken going forward. Given the evidence of diminishing labour market slack, employment dynamics could turn less supportive. Rising wages might partly compensate for slower employment growth, but the associated upward pressure on inflation could lead to tighter monetary policy. At the same time, the consumption boost from buoyant household credit and asset prices could weaken, especially in countries with indications of turning financial cycles.

Additional risks to consumption arise from elevated levels of household debt, in particular given the prospect of higher interest rates. Recent evidence from a sample of advanced economies suggests that increasing household debt in relation to GDP has boosted consumption in the short term, but this has tended to be followed by sub-par medium-term macroeconomic performance (Box III.A). The main channel appears to be the weight of debt service burdens, which increases alongside the accumulation of debt and higher interest rates.

It is possible to assess the effect of higher interest rates on debt service burdens through illustrative simulations. These capture the dynamic relationships between the two components of the DSR (the credit-to-income ratio and the nominal interest rate on debt), real residential property prices, real GDP and the three-month money market interest rate (Graph III.6). Crisis-hit countries, where households have deleveraged post-crisis, appear relatively resilient to rising interest rates. In most cases considered, debt service burdens remain close to long-run averages even in a scenario in which short-term interest rates increase rapidly to end-2007 levels. By contrast, in countries that experienced rapid rises in household debt over recent years, DSRs are already above their historical average and would be pushed up further by higher interest rates. This could act as a significant drag on consumption and output (Box III.A).[4]

Household debt servicing burdens under different interest rate scenarios[1]

In percentage points   Graph III.6

United States | United Kingdom | Spain

Australia | Canada | Norway

Legend:
- Actual debt service ratio
- 2004 tightening
- Constant rates
- Market-implied rates
- Rapid tightening
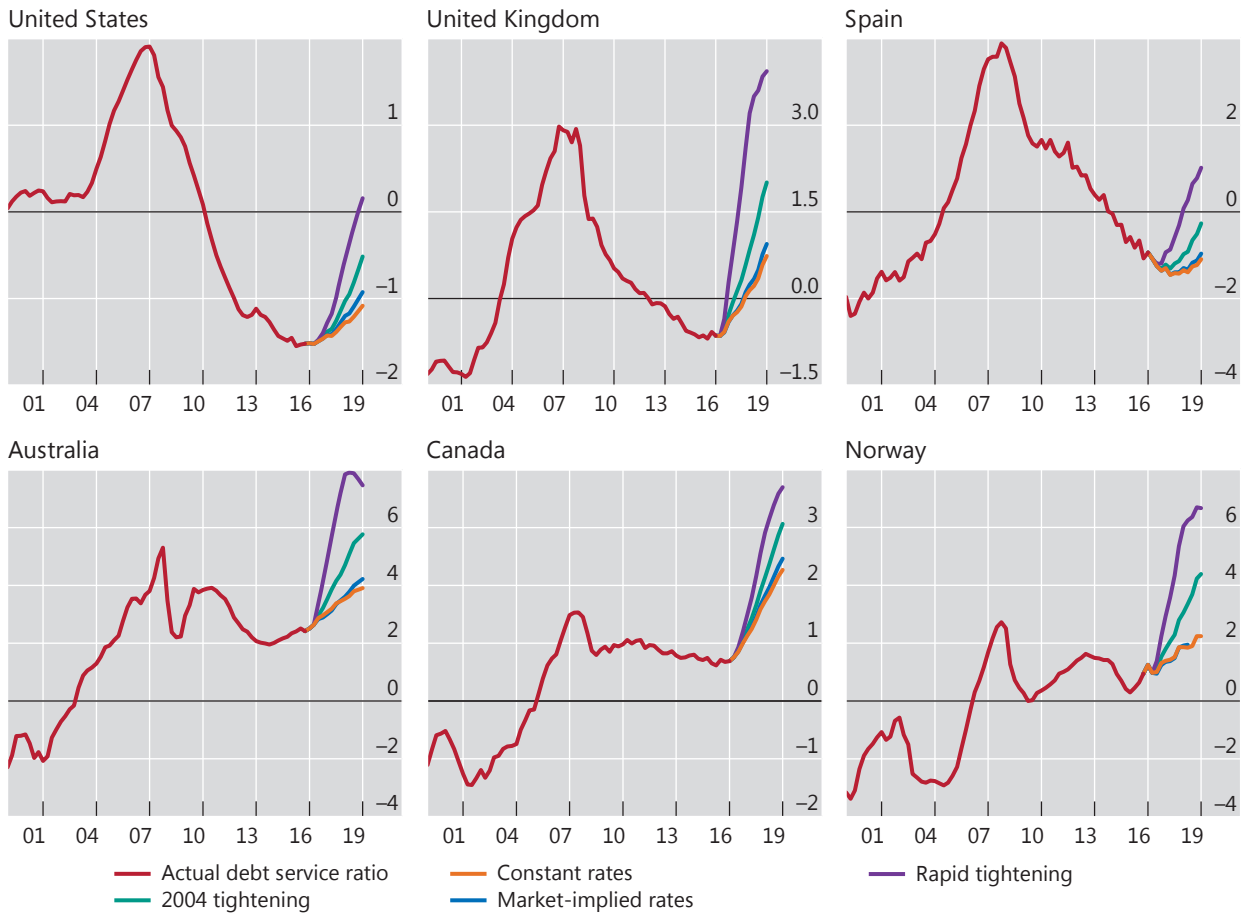
[1] Deviations from country-specific long-run averages. Projections for debt service ratios for the household sector given four interest rate scenarios: market-implied (three-month money market rates evolve in line with market-implied rates); constant rates (three-month money market rates remain constant); 2004 tightening (absolute changes in three-month money market rates follow the 2004 tightening episode); rapid tightening (three-month money market rates rise to end-2007 levels within eight quarters and remain fixed thereafter). Projections are based on a country-specific VAR containing as endogenous variables the credit-to-income ratio for the household sector, interest rates on the stock of household debt, real residential property prices and real GDP. The three-month money market rate is included as an exogenous variable. The VAR is estimated on quarterly data for the period 1990–2016; projections start in Q4 2016 for AU, NO and US, and in Q1 2017 otherwise.

Sources: National data; BIS calculations.

To be sure, as the simulations embed the historical interactions since 1990 in reduced form, they provide only an initial gauge of the underlying dynamics. For instance, a long period of unconventional monetary policy could have altered the interactions between the variables. Moreover, the rapid tightening scenario is probably not very likely and might trigger macroeconomic dynamics different from those captured by historical relationships. That said, the results point to headwinds in some economies were interest rates to rise significantly.

Risks to investment

A rotation from consumption- to investment-led growth would support the medium-term sustainability of the current upswing. A higher stock of productive capital enhances growth potential and alleviates capacity constraints, helping to prevent a

build-up of inflationary pressures. Indeed, consumption-led expansions – defined as private consumption growing more rapidly than output – appear to be less durable than those driven by other components of demand. Evidence for advanced economies indicates that consumption-led growth heralds below-average output growth down the road (Graph III.7, left-hand panel). One potential factor is excessive accumulation of household debt, as discussed above.[5] Another is weak investment activity and thus a slow accumulation of productive capacity (right-hand panel).

Recent signs of an investment rebound have followed protracted weakness post-crisis in the advanced economies and a slowdown of investment growth in the EMEs more recently. In advanced economies, the ratio of real investment to real GDP, which accounts for changes in the relative price of investment goods, fell by around 3 percentage points to just below 20% in the immediate aftermath of the crisis (Graph III.8, left-hand panel). This drop reflected in part the correction observed in residential investment after the pre-crisis boom, but also a decline of the non-residential component. In EMEs, investment ratios rose throughout the crisis, driven in particular by strong expansion in China, but started to level off after 2013. Several factors were at work, including adverse terms-of-trade changes for commodity exporters, a slowdown in FDI flows to non-commodity exporters and an investment slowdown in China.[6]

Weaker investment in recent years has coincided with a slowdown in productivity growth. Since 2007, productivity growth has slowed in both advanced economies and EMEs (Graph III.8, centre panel). One potential factor behind this decline is a persistent misallocation of capital and labour, as reflected by the growing share of unprofitable firms. Indeed, the share of zombie firms – whose interest expenses exceed earnings before interest and taxes – has increased significantly despite unusually low levels of interest rates (right-hand panel).[7]

Consumption-led expansions are less durable   Graph III.7

Reduction in GDP growth after consumption-led growth[1]

Composition of GDP growth under consumption- and non-consumption-led growth, three-year window
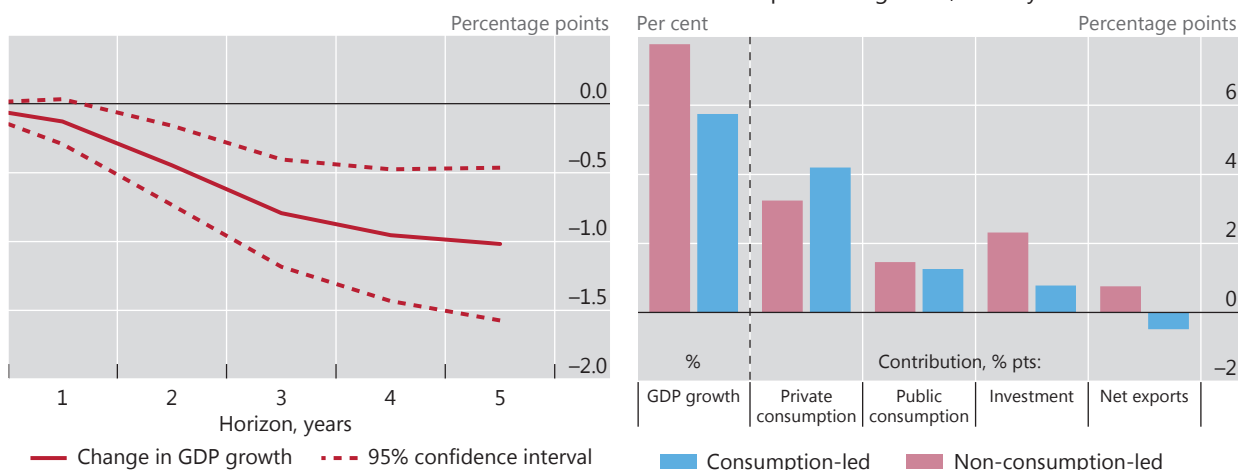
The sample covers 18 major advanced economies over the period 1991–2016. Consumption-led expansions are defined as periods of increasing private consumption-to-GDP ratios. Periods with negative real GDP growth are excluded.

[1] The impact on subsequent GDP growth of adding one more year of consumption-led growth over the three preceding years. It is based on a set of local projection regressions where GDP growth at different horizons is estimated as a function of GDP growth over the past three years and a variable counting the number of consumption-led growth years over the past three years. All estimates include country and time fixed effects.

Sources: E Kharroubi and E Kohlscheen, "Consumption-led expansions", *BIS Quarterly Review*, March 2017, pp 25–37; OECD; BIS; BIS calculations.

Investment, productivity and resource misallocation

Graph III.8

Real gross investment[1]
Percentage of real GDP

Labour productivity growth[1, 2]
Five-year moving average, per cent

Share of zombie firms[3]
Per cent

Legend: AEs — EMEs — EMEs excl China — Global
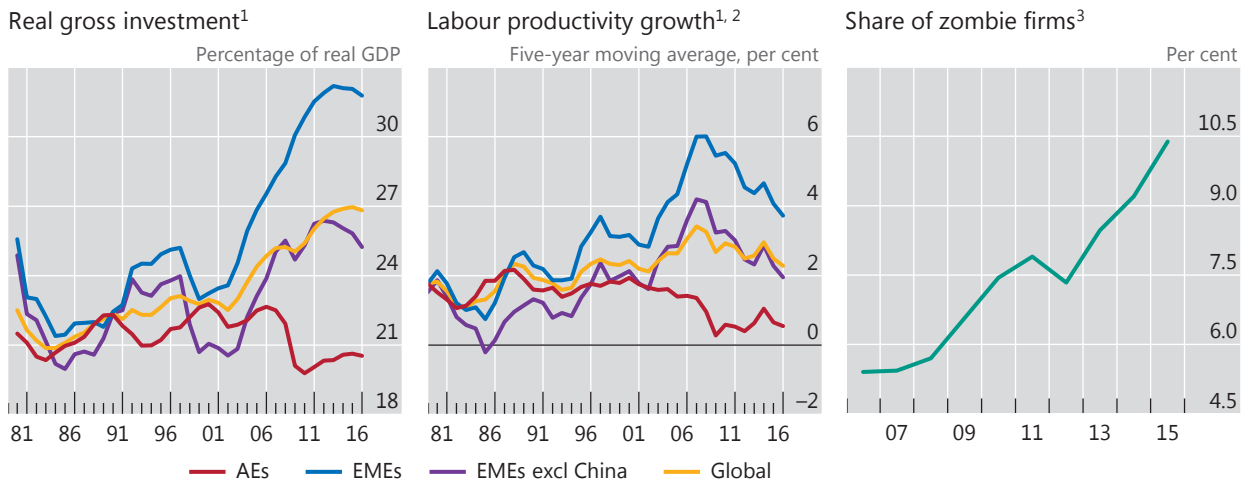
[1] Weighted averages based on rolling GDP and PPP exchange rates.　[2] Per person employed.　[3] Zombie firms are defined as listed firms with a ratio of earnings before interest and taxes to interest expenses below one, with the firm aged 10 years or more. Shown is the median share across AU, BE, CA, CH, DE, DK, ES, FR, GB, IT, JP, NL, SE and US.

Sources: European Commission, AMECO database; IMF, *World Economic Outlook*; Datastream Worldscope; The Conference Board; BIS calculations.

Investment, corporate debt and the exchange rate

Graph III.9

Corporate credit and investment growth[1]

$y = -0.33 + 0.65x$
where $R^2 = 0.64$

Growth in real private investment, %

Growth in credit to non-financial corporates, %[2]

Impact of a 1% depreciation against the US dollar in EMEs[3]
Percentage points

GDP growth　Consumption growth　Investment growth

Legend: ● Long-run impact　├──┤ 95% confidence interval

[1] Country averages for 2007–16. The slope coefficient is significant at the 1% level.　[2] Total real credit (excluding trade credit; deflated by CPI) to private non-financial corporations. For PE, PH and TW, similar data are used.　[3] The figure plots the long-run impact of a 1% depreciation of the bilateral exchange rate against the US dollar estimated from a modified version of the panel model in Kearns and Patel (2016): $\Delta y_{i,t} = \alpha_i + \sum_{j=1}^{4} \gamma_j \Delta y_{i,t-j} + \sum_{j=0}^{4} \zeta_j \Delta USD_{i,t-j} + \theta X_{i,t} + \varepsilon_{i,t}$, where Δy is the log change of quarterly GDP (or its components: consumption and investment) and ΔUSD is the log change in the bilateral exchange rate against the US dollar. The set of control variables X includes the log change in the nominal effective exchange rate, the log change in US real GDP, the change in the federal funds rate and domestic variables. The estimations are done on an unbalanced panel of 21 EMEs with quarterly data for the period 1990–2016.

Sources: J Kearns and N Patel, "Does the financial channel of exchange rates offset the trade channel?", *BIS Quarterly Review*, December 2016, pp 95–113; IMF, *World Economic Outlook*; OECD, *Economic Outlook*; CEIC; national data; BIS calculations.

Another factor holding back productivity appears to be a stagnant diffusion of new technology.[8] At the same time, low investment and weak productivity growth are likely to reinforce each other: investment can raise productivity through capital deepening and embedded technological progress, while higher productivity can boost the returns on investment. Persistent weak productivity growth could therefore cloud the medium-term investment outlook.

Looking ahead, several other factors could weigh on investment. One, as already noted, is policy uncertainty, should it persist. Another is demographic change. Slower population growth should weaken aggregate demand, although it could also reinforce the need for labour-saving capital investment to compensate for a shrinking labour force. A third factor is high corporate debt.

Over the past 10 years, there has been a close positive correlation between the growth of corporate credit and investment (Graph III.9, left-hand panel). A build-up of corporate debt has financed investment in many economies, particularly in EMEs, including high investment rates in China. Turning financial cycles in these economies could therefore weigh on investment.

As with consumption, the level of debt can affect investment. Rising interest rates would push up debt service burdens in countries with high corporate debt. Moreover, in EMEs with large shares of such debt in foreign currency, domestic currency depreciation could hurt investment. As mentioned before, an appreciation of funding currencies, mainly the US dollar, increases debt burdens where currency mismatches are present and tightens financial conditions (the exchange rate risk-taking channel).[9] Empirical evidence suggests that a depreciation of EME currencies against the US dollar dampens investment significantly (Graph III.9, right-hand panel), offsetting to a large extent the positive impact of higher net exports.[10]

Risks from rising protectionism

A broader risk for the current expansion is protectionism. The reduction in overall trade tariffs has slowed over the past decade (Graph III.10, left-hand panel).

Protectionist risks on the rise   Graph III.10

| Effectively applied trade tariffs | Trade-restrictive measures[3] | World trade[4] |
| Simple average, per cent | Number of measures | yoy growth rate, per cent |

AEs[1]   Measures in place
EMEs[2]   Measures removed
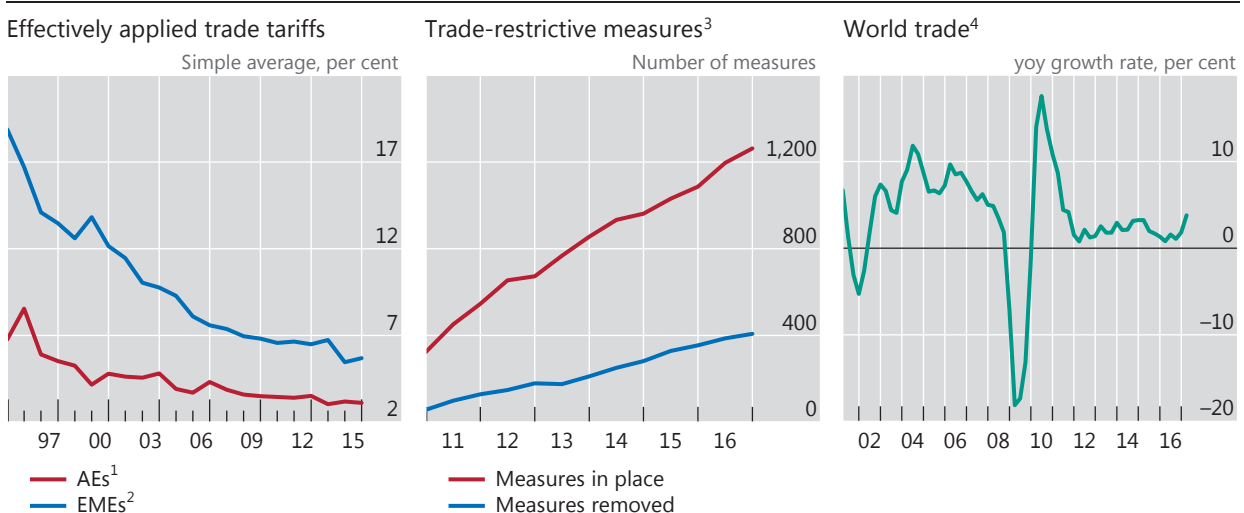
[1] AU, CA, CH, JP, NO, NZ and US.   [2] BR, CL, CN, CO, ID, IN, KR, MX, MY, PE, PH, RU, SA, SG, TH, TR and ZA.   [3] Total number of trade-restrictive measures introduced by G20 economies since 2008. The monitoring of the accumulation and removal of restrictions started at the end of 2010.   [4] Merchandise trade.

Sources: World Bank; World Trade Organization; CPB Netherlands Bureau for Economic Policy Analysis; Datastream; BIS calculations.

Box III.B

How sensitive are US production costs to tariffs on imports from China and Mexico?

Barriers to trade can reduce the competitiveness of domestic industries as internationally sourced inputs become more expensive and firms cannot substitute away easily. Moreover, in the global network of input-output trade, tariffs targeted at specific trade partners also inevitably affect other economies that supply inputs to them.

It is possible to illustrate the propagation of protectionist measures via global value chains (Graph III.B, left-hand panel). The hypothetical example is a shock to US sectoral production costs resulting from a hypothetical tariff of 10% on imports originating from China and Mexico.

Both direct and indirect effects are at play. The direct effects result from bilateral links (Graph III.B, red and blue bars in the left-hand panel). If, say, 10% of the cost of a given industry were due to inputs sourced from Mexico, a 10% import duty would increase total production costs by 1%. The indirect effects capture the impact on the rest of the production network, as US sectors source from each other and the rest of the world (yellow bars). For example, if a tariff increases the cost of oil imports from Mexico, US production costs of goods, such as chemicals or plastics that use oil as an input, increase. And the tariff would also have higher-round effects via subsequent nodes of the production chain, as chemicals and plastics are, in turn, used as inputs into production.

Overall, this simulation reveals a comparatively large sensitivity of US production costs to tariffs on imports from Mexico or China. To put the resulting cost shocks in context, the centre panel of Graph III.B displays the reduction in US wages that would be required to fully compensate for the increasing costs of imported inputs. For example, such tariffs would lead to a 0.86% cost increase in the US transportation industry. To fully offset this increase, US labour costs would have to decrease by around 6%, satisfying 0.86% – 6% * 0.14 ≈ 0, where 0.14 is the labour cost share in the US transportation equipment industry.

Impact of a 10% tariff on US imports from China and Mexico

In per cent

Graph III.B

Cost shock to US industry of a tariff[1]
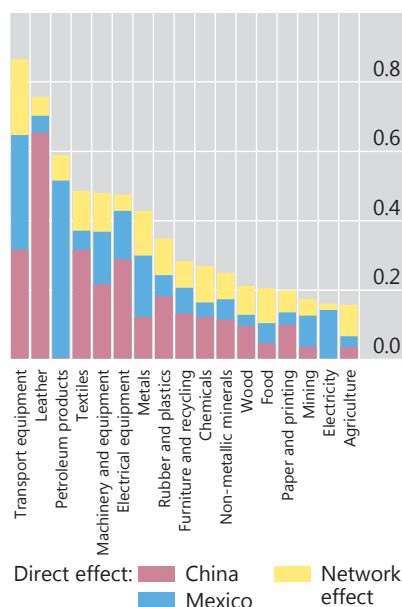
Decline in sectoral US labour costs required to compensate for higher input prices[2]
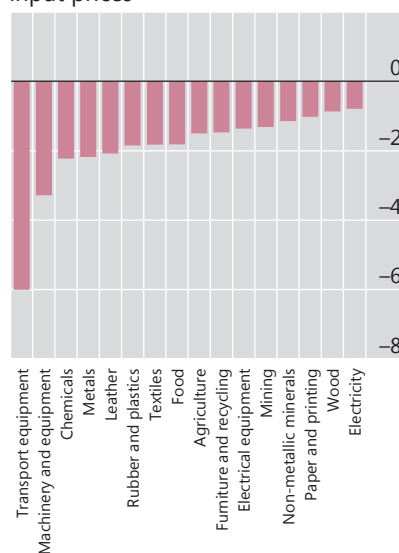
Origin of value added embodied in exports[3]

Direct effect: China / Mexico / Network effect

From: Mexico / China

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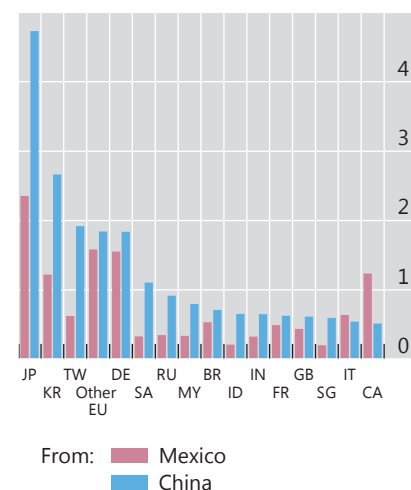
[1] Direct impact and higher-order effects on US sectoral production costs of a 10% import tariff on imports from China and Mexico. [2] Equal to the negative of total impact (see left-hand panel) divided by the US sectoral labour share. [3] Origin of value added as calculated in OECD TiVA database.

Sources: R Auer, A Levchenko and P Sauré, "International inflation spillovers through input linkages", *BIS Working Papers*, no 623, April 2017; World Input-Output database, Socio-economic Accounts; OECD TiVA database; BIS calculations.

Third countries would also be affected. Mexico and China are important entry points for intermediate goods, which are further processed and then shipped to the United States. The right-hand panel of Graph III.B shows the share of foreign value added that is embodied in exports from Mexico (red bars) and China (blue bars) by origin. For example, intermediate goods and services sourced from Japan account for 2.4% of the value of Mexican exports and for 4.7% of the value of Chinese exports. If exports from China and Mexico decrease by $1 billion, demand for Japanese inputs decreases by $47 million and $24 million, respectively.

Moreover, trade-restrictive measures, such as regulations and targeted tariff hikes, have risen substantially since end-2010 (centre panel). And a greater emphasis on measures that would hinder free trade in national policy agendas suggests that the risk of protectionism may be growing further.

A rise in protectionism would add to the cyclical and structural factors that have held back global trade post-crisis (Graph III.10, right-hand panel and Chapter VI). These have included: aggregate demand weakness, especially in trade-intensive business investment; income-driven demand shifts, notably from manufacturing goods to less traded services; and the maturing of the Chinese economy, which has boosted domestically produced intermediate inputs at the expense of imported ones.

Protectionism could hurt growth and welfare through various channels (Chapter VI). One is slower productivity growth due to reduced competition and a more constrained international division of labour. Another is weaker competitiveness of domestic industries: internationally sourced inputs would become more expensive and would not be easily substituted with domestic ones. And global value chains (GVCs) represent a potentially powerful amplification mechanism. Costs from trade barriers would propagate both nationally and internationally through production chains (Box III.B).

Rising protectionism could also exacerbate the risks to the medium-term outlook discussed earlier. To the extent that it reduced profits and incomes, it would weaken corporate and household balance sheets, sap debt servicing capacity and heighten financial cycle risks. The balance sheet effects, in turn, could be a drag on global demand, amplified by policy and economic uncertainty. Protectionism could hit import-intensive business investment and FDI particularly hard, further retarding technological diffusion. Such effects are also relevant for economies where a high degree of competitiveness has fostered rapid export growth and rising incomes in the recent past.

Cyclical tailwinds open a window of opportunity

The favourable short-term outlook presents a valuable opportunity to pursue policies conducive to sustainable long-term growth. The general goal of such policies would be to lift the economy's growth path and counter the trend towards weaker productivity growth. One precondition for achieving this goal is strengthening the economy's resilience, including its capacity to cope with shocks, to contain the build-up of financial cycle risks and other financial imbalances, and to adapt to structural changes in the global economy.

A policy mix rebalancing towards structural policies would help revive productivity and sustain the investment recovery. Indeed, the pace of labour productivity-enhancing reforms appears to have slowed notably during 2015–16.[11] This contrasts with somewhat better progress in reforms aimed at boosting labour utilisation, as reflected in the favourable employment performance during the recent upturn.

One relevant set of structural policies includes measures to increase business dynamism. More efficient bankruptcy procedures can reduce the strain on resources and productivity caused by unviable enterprises. And removing administrative red tape can encourage the entry of productive firms.

Fiscal policy can also play an important role. It can generally support structural adjustment, notably measures to increase the labour and product markets' ability to reallocate resources. Moreover, the composition of fiscal expenditures could be adjusted to favour investment in both human (eg education) and physical (eg infrastructure) capital. And tax systems could be streamlined and made more growth-friendly and resilience-enhancing. One example is shifting from direct to consumption-based taxation. Another is reducing the widespread debt bias in tax codes. In evaluating such policies, it is important to recognise that in many countries the fiscal room for manoeuvre is rather limited due to high debt burdens (Annex Table A4), pointing to the need for long-term fiscal consolidation.[12] Moreover, interest rate normalisation could further reduce fiscal space. This suggests that changes in the composition of expenditures and taxes are superior to deficit-boosting measures, especially in countries where economic slack is limited.

Endnotes

1   Financial cycles are best measured by the co-movement of a broad set of financial variables. But the most parsimonious representation is in terms of credit and property prices, with the latter typically leading the former around financial cycle turning points. See Chapter IV in the *84th Annual Report* for further elaboration.

2   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, 2011, pp 189–240; and M Drehmann and M Juselius, "Do debt service costs affect macroeconomic and financial stability?", *BIS Quarterly Review*, September 2012, pp 21–35.

3   The median level of FX debt to GDP prior to financial crises in major EMEs since the 1990s was about 21%, with an interquartile range of 14–26%.

4   The long-run average is used as a benchmark here because DSRs are stationary, or mean-reverting. See M Juselius and M Drehmann, "Leverage dynamics and the real burden of debt", *BIS Working Papers*, no 501, May 2015.

5   See also A Mian, A Sufi and E Verner, "Household debt and business cycles worldwide", *Quarterly Journal of Economics*, forthcoming.

6   For a detailed analysis of the investment slowdown in EMEs and its implications, see World Bank, "Weak investment in uncertain times", *Global Economic Prospects*, January 2017.

7   See also M Adalet McGowan, D Andrews and V Millot, "The walking dead? Zombie firms and productivity performance in OECD countries", *OECD Economics Department Working Papers*, no 1372, January 2017. For more evidence on the effect of post-crisis resource misallocation on productivity growth, see C Borio, E Kharroubi, C Upper and F Zampolli, "Labour reallocation and productivity dynamics: financial causes, real consequences", *BIS Working Papers*, no 534, January 2016; and G Adler, R Duval, D Furceri, S Kiliç Çelik, K Koloskova and M Poplawski-Ribeiro, "Gone with the headwinds: global productivity", *IMF Staff Discussion Note*, no 17/04, April 2017.

8   For evidence relating to stagnant technology diffusion, see D Andrews, C Criscuolo and P Gal, "Frontier firms, technology diffusion and public policy: micro evidence from OECD countries", *OECD Productivity Working Papers*, no 2, November 2015.

9   For an overview of the mechanisms operating through banking flows and capital market financing, respectively, see V Bruno and H S Shin, "Global dollar credit and carry trades: a firm level analysis", *BIS Working Papers*, no 510, August 2015; and B Hofmann, I Shim and H S Shin, "Sovereign yields and the risk-taking channel of currency appreciation", *BIS Working Papers*, no 538, January 2016, revised May 2017.

10   For a more detailed analysis of the impact of currency movements on economic activity, see J Kearns and N Patel, "Does the financial channel of exchange rates offset the trade channel?", *BIS Quarterly Review*, December 2016, pp 95–113.

11   See OECD, *Economic policy reforms 2017: going for growth*, March 2017.

12   See BIS, *86th Annual Report*, June 2016, pp 96–8.

IV. Monetary policy: inching towards normalisation

Monetary policy continued to be generally very accommodative in the year under review. The Federal Reserve quickened its pace of policy rate normalisation while the Bank of Japan and ECB maintained their expansionary stances. Many other advanced economy and emerging market economies (EME) central banks kept policy rates range-bound near historical lows. Even so, the prospects for a gradual withdrawal of accommodation grew against the backdrop of a strengthening global recovery, firming global labour markets and maturing financial cycles.

Monetary policy normalisation assumed greater prominence as the US policy rate edged further upwards and other central banks, notably the ECB, began to consider the issue more actively. The pace is generally expected to be even more gradual and predictable than in the past. But calibrating it is not without challenges. Normalising too slowly would raise the perennial concern of central banks that they will fall behind the curve and have to catch up in a disruptive fashion. Normalising too quickly would raise the risk of short-circuiting the recovery. Either way, policy normalisation in the major advanced economies will have far-reaching implications domestically and internationally. Compounding the challenge are the asynchronous nature of the normalisation across economies and high debt levels globally.

After reviewing monetary policy decisions over the past year, this chapter examines the evolving inflation outlook, with a special focus on global labour markets. It then discusses normalisation challenges, highlighting price and financial stability trade-offs and the policy options available to address them.

Recent developments

Nearly a decade after the outbreak of the Great Financial Crisis (GFC), policy rates continued to sit near historical lows, with geopolitical events prompting some additional easing in mid-2016 (Graph IV.1, left-hand panel). While the total size of central bank balance sheets reached new heights (Graph IV.1, centre panel), the trajectories followed by individual central banks were quite diverse. All this occurred as the global recovery gained traction, financial market conditions tightened somewhat, and inflation picked up in advanced economies while edging down on average in EMEs (Graph IV.1, right-hand panel).

Global monetary policy in transition

Monetary policy divergence among the major advanced economies widened during the year while real policy rates stayed at or near historical lows (Graph IV.2).

In the United States, the withdrawal of monetary accommodation resumed after a year-long pause, with two 25-basis point increases in the federal funds rate target range. The increases reflected improved labour market conditions, greater optimism about the recovery's strength and confidence that inflation was moving back to its 2% target over the medium term. The Federal Reserve continued to anticipate a gradual policy rate normalisation over the next few years, along with a drawdown of its enlarged balance sheet once policy rate normalisation is "well under way". US policymakers also revised down the (median) projection for the

Very accommodative global monetary policy persists, inflation outlook improves

Graph IV.1

Nominal policy rate[1]

Per cent

Total central bank assets

USD trn

Global inflation[2]

yoy changes, per cent
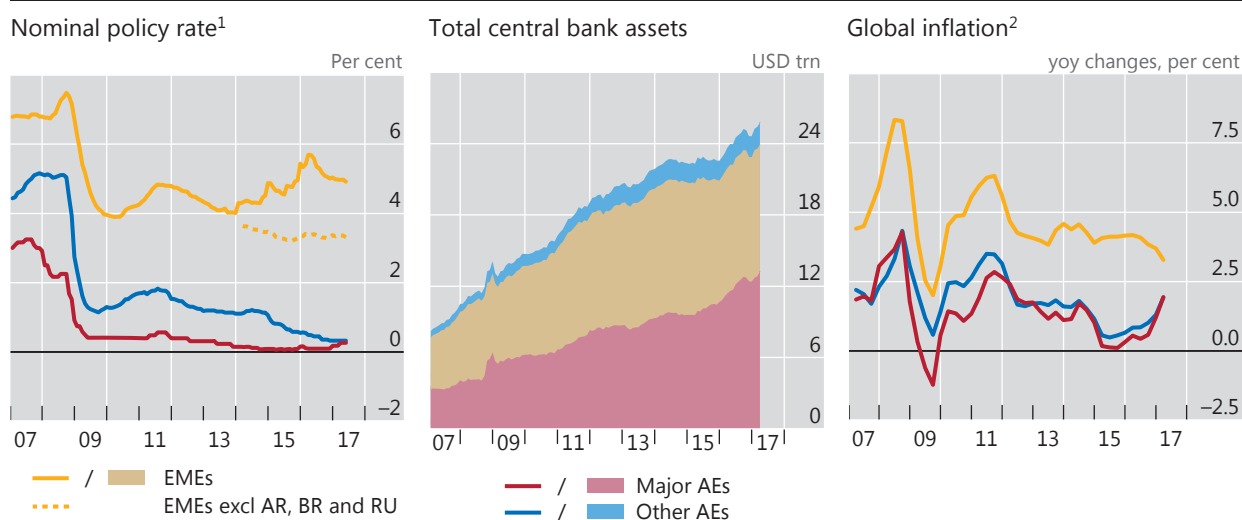
Major AEs = EA, JP and US; other AEs = AU, CA, CH, DK, GB, NO, NZ and SE.

[1] Policy rate or closest alternative; simple averages.   [2] Consumer prices; weighted averages based on rolling GDP and PPP exchange rates.

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

long-run level of the federal funds rate to 3%, down after many revisions from 4.25% in 2012, reflecting views about a decline in the "natural" rate (see below).

The ECB kept its key policy rates unchanged – with the main refinancing rate at 0% and the deposit facility rate at –0.4% – so as to sustain a very substantial degree of accommodation. The ECB cited subdued inflationary pressures and mixed economic and financial prospects as its key reasons for keeping rates low for long. It also announced an extension of its asset purchase programme through at least December 2017. However, with deflation risks receding and economic growth prospects improving, it ratcheted down the pace of asset purchases in April from €80 billion to €60 billion per month.

The Bank of Japan modified its large-scale monetary easing programme, labelled QQE (quantitative and qualitative monetary easing), with yield curve control. The new features included targeting the 10-year Japanese government bond yield, currently set at about 0%, and a commitment to overshoot the inflation target for a while. The –0.1% rate on policy rate balances remained unchanged. The new approach addressed concerns that the prospect of higher global long-term yields could put unwelcome upward pressure on Japanese bond yields. The Bank of Japan coupled the approach with an expansion of its US dollar-supplying programme and purchases of exchange-traded funds.

Central banks outside the major advanced economies faced a diverse set of challenges. Overall, policy rate moves were few. Inflation developments dominated decisions, as inflation generally became better aligned with targets.

Many central banks held policy rates unchanged as they balanced competing risks (Graph IV.3, left-hand panel). On the one hand, the strengthening global recovery and, in particular, tightening labour markets in many economies suggested a need for higher rates in the near term. With respect to financial stability, high and growing credit-to-GDP ratios and housing prices continued to weigh on decisions in some economies. And inflation deviations from target shrank as the effects of past commodity price declines and exchange rate swings largely ran their course. On the other hand, a rise in geopolitical risks and uncertainties argued for patience

Policy rates and balance sheets diverge as inflation edges up in the major AEs

Graph IV.2

Nominal policy rate[1]

Per cent

Total central bank assets

Percentage of GDP

Inflation[2]

Per cent

Real policy rate[3]

Per cent

—— Euro area   —— Japan   —— United States
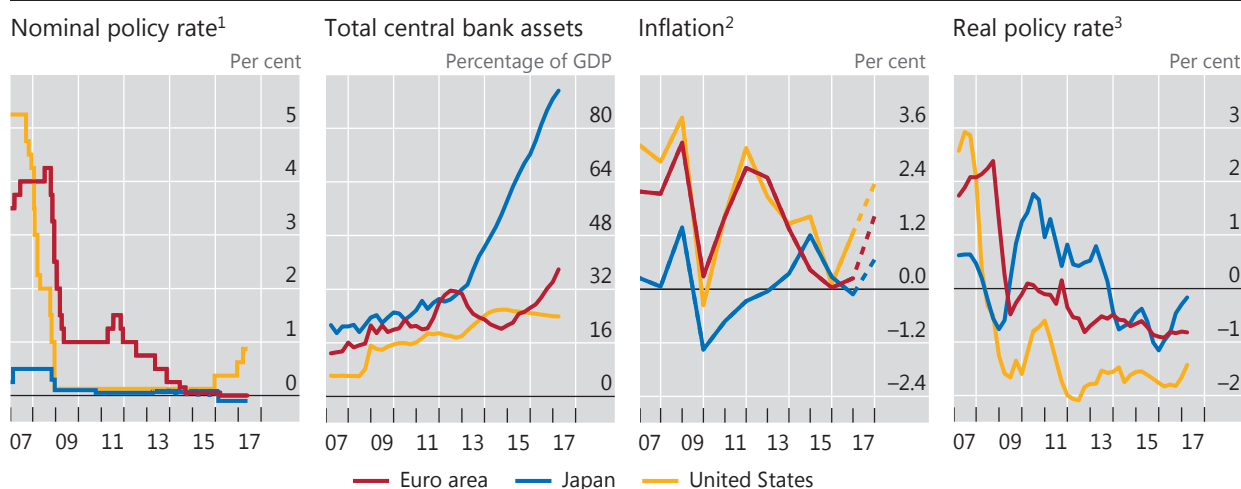
[1] Policy rate or closest alternative.   [2] For 2017 (dashed lines), forecasts; for Japan, includes a consumption tax hike adjustment for 2014 and 2015.   [3] Nominal policy rate less inflation excluding food and energy; for Japan, also adjusted for the consumption tax hike.

Sources: OECD, *Main Economic Indicators*; Consensus Economics; Datastream; national data; BIS calculations.

or somewhat lower rates. While the People's Bank of China cited several of these factors as it kept the official benchmark deposit and lending rates unchanged, it did nudge up rates on its open market operations and medium-term liquidity facilities. The Czech National Bank, while leaving policy rates unchanged, discontinued its exchange rate floor in April as inflation turned upwards and gained momentum.

For central banks that reduced rates, the cuts took place largely in response to inflation news. Brazil and Indonesia slashed rates by 3.0 and 1.75 percentage points, respectively, after significant declines in inflation towards target alongside a

Policy rate developments elsewhere largely reflect inflation running near targets

Graph IV.3

Change in policy rate[1]

Percentage points

Since: June 2016   December 2016

Inflation converging to targets[2]

Per cent

●/● Inflation   —— Target   × 2017 forecast
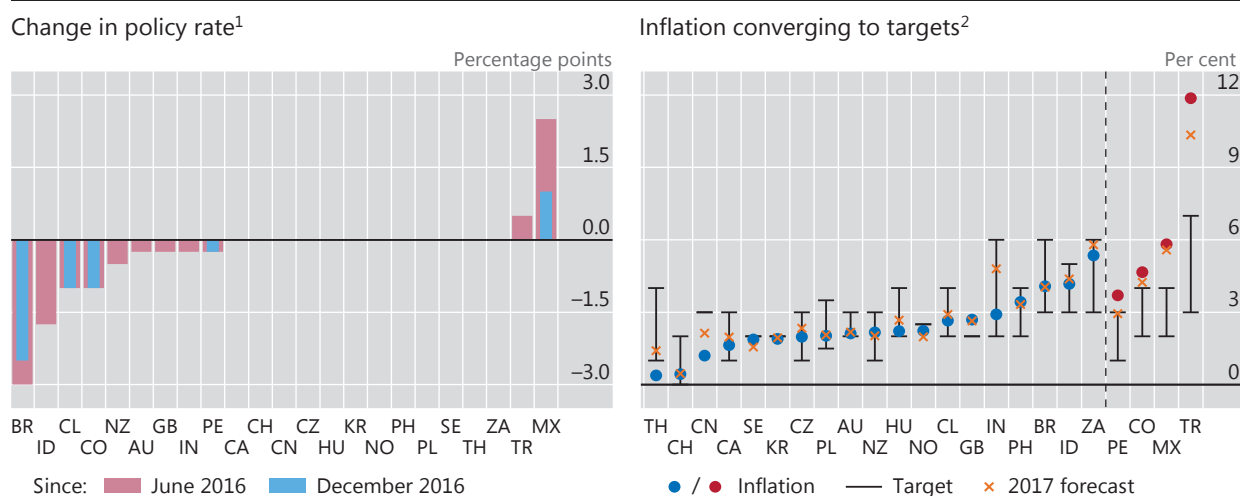
[1] Change in nominal policy rate from date indicated to 26 May 2017.   [2] Consumer prices, latest available data; red dots indicate inflation above target range.

Sources: Consensus Economics; national data; BIS calculations.

relatively stable exchange rate. Colombia and Chile also experienced some relief from above-target inflation, which fell faster than expected as financial conditions tightened in late 2016. The Reserve Banks of Australia and New Zealand lowered policy rates to historical lows on subdued inflation, continued lacklustre growth and exchange rate concerns, despite long-standing financial stability risks.

The Bank of England and Reserve Bank of India eased policy in response to significant domestic political decisions. In the aftermath of the UK referendum on EU membership, the Bank of England cut its policy rate by 25 basis points, the first move in over seven years. It cited potential adverse economic and financial effects from Brexit. At the same time, the bank introduced a new round of bond purchases, raising the size of its asset purchase programme from £375 billion to £435 billion. The Reserve Bank of India also lowered its policy rate by 25 basis points, although inflation remained comfortably within the target range. Demonetisation of large-denomination rupee bills raised the risk that economic activity might be affected.

Central banks that raised rates did so in large part to address exchange rate developments. The Bank of Mexico and the Central Bank of the Republic of Turkey lifted rates as sharp currency depreciations increased the likelihood that inflation would run substantially above target, unanchoring expectations.

The evolving inflation outlook

One major theme during the year was the evolving inflation outlook. Inflation headwinds from past commodity price declines eased appreciably. Tighter labour markets showed signs of exerting upward pressure on wages and prices, raising questions about whether further tightening could lead to a stronger effect on inflation.

Inflation edged higher globally

Global inflation edged up to 2.5% (Graph IV.4, left-hand panel). Both near-term and cyclical inflation drivers played significant roles. Commodity prices ticked up. Exchange rates stabilised. Shrinking output gaps and generally tighter labour markets reflected the cumulative effect of the long-lived moderate global recovery. For many central banks, inflation objectives appeared increasingly within reach, as reflation pressures helped close the gap between actual and target inflation.

Among the near-term, proximate inflation determinants, commodity prices supported a pickup. For example, the oil price headwinds of the previous two years eased significantly (Graph IV.4, centre panel). As a result, headline inflation drew closer to core inflation, and deflation risks fell (Graph IV.4, right-hand panel). Near-term inflation expectations also increased, notably those reflected in professional forecaster surveys in a number of economies.

The smaller deviations of inflation from target also reflected continued improvements in cyclical demand. Measures of slack shrank further. While output slack estimates still suggest modest spare capacity in some economies, unemployment rates fell close to, if not below, rates previously deemed consistent with long-run price stability (Chapter III).[1] In addition, central banks and private forecasters expected additional tightening of labour markets (Graph IV.5, left-hand panel), pointing to possible further increases in underlying inflation ahead (see below). Reinforcing these developments, producer price inflation rose considerably (Graph IV.5, centre panel).

Transitory inflation headwinds ease and deflation risks fade

In per cent

Graph IV.4

Global headline-core gap closes[1]

yoy changes

Inflation: — Headline — Core

Oil price and FX effects moderate[2]

AEs   EMEs

■ CPI   ■ Oil price
■ Exchange rate   ■ Other[3]

Deflation risks fall sharply[4]

CH EA SE US GB CA JP

■ 2015   ■ 2016   ■ 2017
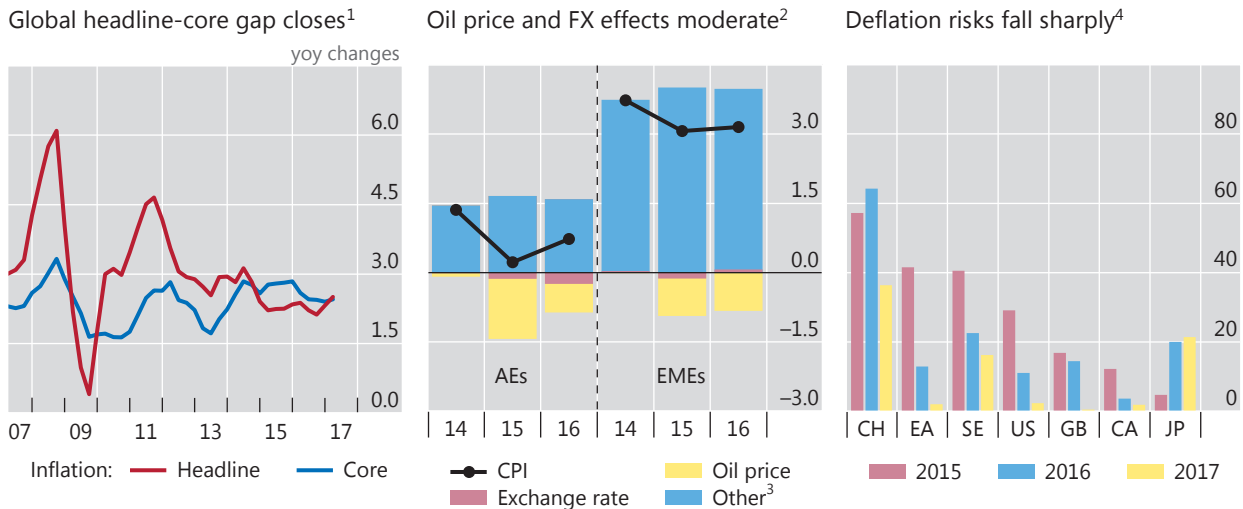
[1] Consumer prices; weighted averages based on rolling GDP and PPP exchange rates.   [2] Based on the model in M Jašová, R Moessner and E Takáts, "Exchange rate pass-through: what has changed since the crisis?", *BIS Working Papers*, no 583, September 2016, using an unbalanced panel of nine AEs and 16 EMEs.   [3] Inflation developments not explained by the oil price or exchange rate.   [4] Deflation tail probabilities estimated from the distribution of historical forecast errors collected from up to 20 years of survey data.

Sources: IMF, *World Economic Outlook*; OECD, *Economic Outlook* and *Main Economic Indicators*; CEIC; Consensus Economics; Datastream; national data; BIS calculations.

In spite of the reflation, long-run inflation expectations remained well anchored. As in earlier years, survey-based measures ran well within most central banks' target ranges (Graph IV.5, right-hand panel). In addition, market-based measures of long-run inflation expectations recovered somewhat from lows in the previous year, suggesting that concerns about deflation risks have faded. As discussed in the *86th Annual Report*, questions were raised about the reliability of these market measures, owing to significant time-varying liquidity and term premia as well as an undue sensitivity to short-term oil price fluctuations (Chapter II). Nevertheless, central banks took some comfort in seeing these measures turn upwards.

Despite the moderate near-term and cyclical reflationary forces at work, secular factors, such as globalisation and technology, seemingly continued to work in the opposite direction. The *86th Annual Report* raised the possibility that improvements in technology and expanding global value chains (GVCs) have held down price pressures in past decades. These supply side forces generate "good" disinflationary headwinds. The levelling-off of globalisation in recent years, as documented in Chapter VI, has raised the question whether the headwinds have moderated, possibly contributing to the upward tilt in the inflation outlook.

Are labour markets signalling rising inflationary pressures?

Global labour markets have seen profound changes over the past decades, with significant implications for wage and price formation. As labour market slack diminishes, wage growth is expected to rise. But wage demands have lagged the cycle more than in the past. Rather than a purely cyclical phenomenon, this wage behaviour appears to reflect long-term forces that are reshaping the global

Labour markets tighten, producer prices pick up as long-term inflation expectations remain well anchored

In per cent   Graph IV.5

Unemployment[1]   Producer prices[2]   Inflation expectations
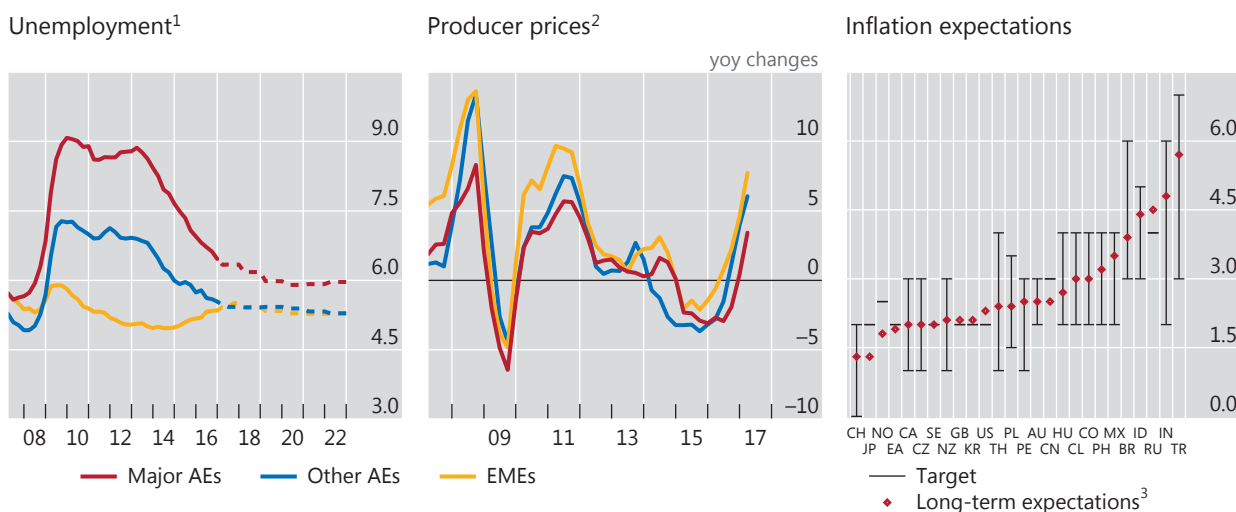
Major AEs = EA, JP and US; other AEs = AU, CA, CH, DK, GB, NO, NZ and SE.

[1] Weighted averages based on rolling labour force levels; definitions may vary across countries; EMEs excluding IN. After 2016 (dashed lines), forecasts.   [2] Weighted averages based on rolling GDP and PPP exchange rates.   [3] Forecasts for six- to 10-year-ahead inflation.

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

economy. The question for many central banks is whether these developments have so weakened the relationship between inflation and labour market slack that the recent tightening of labour markets poses little threat of an inflation overshoot.

Long-term forces behind labour's declining pricing power

Subdued wage growth is a sign of labour's declining "pricing" power. While a number of factors have contributed to this development, two deserve special attention.

One factor has been the dramatic expansion of the global labour force. In the 1990s and early 2000s, the opening-up of Asia and the former Soviet bloc roughly doubled the *effective* labour force involved in world trade.[1] More recently, further economic integration and increasing participation in GVCs have boosted international competition in labour markets.

A second factor has been industrial automation. New technologies have long been a significant influence on production processes and demand for skilled labour in advanced economies. With the quickening pace and growing versatility of current robotic technologies, manufacturing labour pools face new challenges. At the same time, service sector employment, traditionally less exposed to the increased efficiency of robotics, has also become more vulnerable. Automating knowledge work through software advances and new information technologies has continued to boost the size and scope of *global* service providers, broadening the range of service jobs that are threatened with obsolescence.[2]

Labour's lower pricing power is consistent with the decline in labour's income share in many advanced economies (Graph IV.6, left-hand panel). And it may also help explain why wages have not always kept up with productivity trends

Labour share has declined...[2]   ...as wages have lagged productivity gains

Manufacturing sector   Total economy

Manufacturing sector: —— Labour productivity[3]
                       —— Real compensation/hours worked
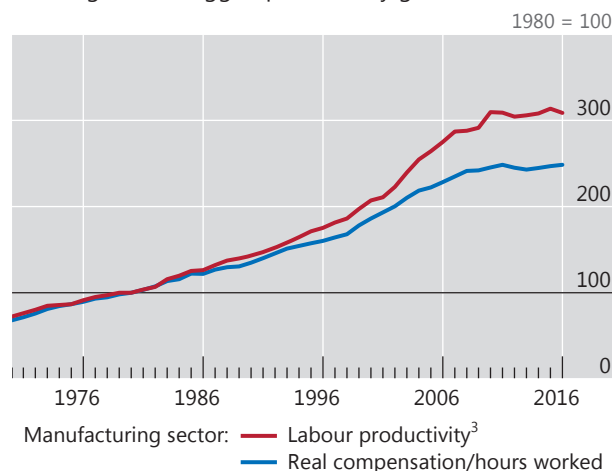
[1] G7 economies; weighted averages based on rolling GDP and PPP exchange rates. For total economy, forecasts after 2015. Manufacturing sector data for Japan up to 2015.   [2] Ratio of compensation of employees to nominal output; measured by GDP and gross value added for the total economy and manufacturing sector, respectively.   [3] Real gross value added per total number of hours worked.

Sources: European Commission, AMECO database; Eurostat; IMF, *World Economic Outlook*; OECD, *Economic Outlook*, *National Accounts Statistics* and STAN database; Datastream; national data; BIS calculations.

(Graph IV.6, right-hand panel). At the same time, of course, these trends have not affected all sectors equally, and reflect a multiplicity of other factors, too.[3]

Implications for wage growth and inflation

These profound changes in labour markets may also have far-reaching implications for inflation. One reason why labour markets have traditionally been regarded as key for inflation is that wage increases lead to rising production costs and hence higher prices, which may in turn reinforce wage demands – so-called second-round effects. After all, wage costs account for the bulk of production costs, especially in the service sector. The more workers can strengthen their pricing power, the more likely it is that wage demands will be accommodated. Thus, a secular decline in pricing power can shed light on the question of how far the recent tightening of global labour markets points to a build-up in inflation momentum.

Analysing this question requires a number of links to be considered: the relationship between wage pressures and production costs, ie unit labour costs (ULCs); that between labour costs and measures of economic slack; and finally that between ULCs and inflation. The picture that emerges is a mixed one.

Wage growth is not necessarily inflationary: whenever it is supported by productivity gains, it will not lead to rising production costs. This is why ULC growth is a better, if still imperfect, measure of incipient inflationary pressures. At the current juncture, advanced economy ULCs are expected be held in check by somewhat faster productivity growth, despite stronger earnings growth (Graph IV.7, left-hand panel).

There is also some evidence that the link between ULC growth and *domestic* labour market slack has weakened over the years (centre panel in Graph IV.7), but remains significant. The secular decline in labour's pricing power appears to have played a role (Box IV.A). Other evidence points to the real economy's globalisation as a force behind this decline: a country's ULC growth has become more correlated with global ULC growth, weighted by the country's value added trade (Box IV.B).

This also suggests that an exclusive focus on domestic developments could underestimate inflationary pressures, now that ULCs are rising globally.

The consequences of ULC developments for prices are somewhat less clear. To be sure, ULC growth and inflation appear to co-move closely in the long run.[4] In addition, there is evidence of a link at cyclical frequencies (Graph IV.7, right-hand panel). That said, the link has become weaker and has been, at times, unstable and elusive. Given the predictive content of ULC growth for future price inflation, the empirical evidence points to a weak pass-through of labour costs to inflation.[5] This impression is reinforced by the difficulties in finding a significant response of inflation to domestic output or labour slack – the price Philips curve looks rather flat.[6]

Since the GFC, a number of factors may have clouded the picture further. Some of them suggest that underlying wage cost pressures may have been overestimated. For instance, previously discouraged workers may have re-entered the labour force and hence expanded the ranks of job-seekers (officially unemployed), suggesting that more slack may exist in the labour market than headline figures indicate. Indeed, over the past decade not all of the decline in the participation rate in some countries can be attributed to secular demographic trends, such as ageing.[7]

Other factors may have weakened the relationship between slack and wage growth only temporarily. Wage gains may have been unusually weak simply because of the depth of the recession and nominal wage rigidities.[8] With inflation having eroded real wage gains since then, wage pressure might revive if inflation continues to increase as slack diminishes. For instance, wage norms, which provide an orientation for such demands, fell to roughly 2% post-crisis, well below the 3–4% that was typical pre-crisis.[9] Indeed, early signs of such a return are visible in the more cyclically sensitive sectors, eg the rise in part-time wage growth.

Cyclical ULC developments around the globe may pose upside risk to inflation   Graph IV.7

ULC growth in AEs[1]
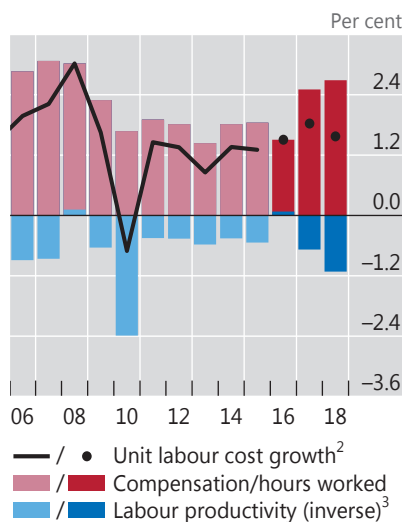
Falling unemployment rates point to a further pickup in ULC growth[4]
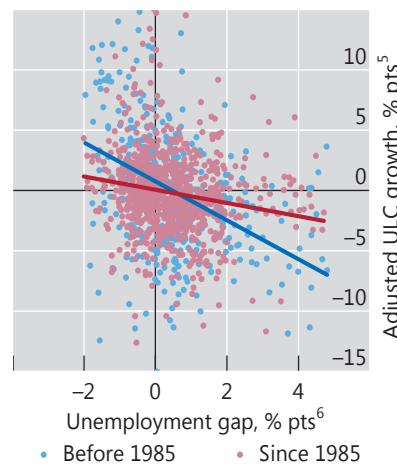
Rising ULC growth historically correlated with higher inflation[7]

— / • Unit labour cost growth[2]
▬ / ▬ Compensation/hours worked
▬ / ▬ Labour productivity (inverse)[3]

• Before 1985   • Since 1985
▬ Since 1985   ▬ 1985–2006
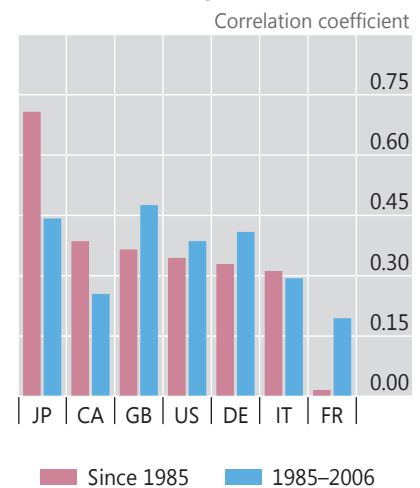
[1] Weighted averages based on rolling GDP and PPP exchange rates; forecasts after 2015.   [2] Compensation of employees per real GDP.   [3] Total number of hours worked per real GDP.   [4] G7 economies; quarterly data from Q1 1970 to Q3 2016. A few outliers exceeding 15% in absolute value were omitted from the graph but included in the regression analysis. Estimated slopes are equal to –1.6119 and –0.5471 with robust p-values of 0.008 and 0.003, respectively.   [5] See Box IV.A for details.   [6] Unemployment rate less NAIRU.   [7] Contemporaneous cross-correlations of quarterly ULC growth and inflation (measured by the GDP price deflator), less four-quarter moving average of changes in the GDP price deflator, aggregated at annual frequency.

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

Box IV.A

Exploring the wage Phillips curve

Ever since William Phillips published his seminal paper in 1958,[①] a wide body of research has emphasised the role of economic slack in driving inflation in prices and wages. However, recent evidence suggests that the ability of price Phillips curves to explain inflation has declined (see Chapter III of the *84th Annual Report*). What about the impact of economic slack on wages?

A conventional wage Phillips curve specification embodies the view that unit labour cost (ULC) growth (wage inflation, $\Delta w_{i,t}$, adjusted for labour productivity growth, $\Delta lp_{i,t}$) is driven by labour market slack, $x_{i,t}$ with a sensitivity β:[②]

$$\left(\Delta w_{i,t} - \Delta lp_{i,t}\right) = k + c_i + \bar{\pi}_{i,t-1} + \beta x_{i,t} + e_{i,t}.$$

For a G7 panel from 1960 to 2016, the relationship between ULC growth and slack (proxied by the unemployment gap (Graph IV.A, right-hand panel)) is found to be negative and statistically significant. The estimate of β indicates that a 1 percentage point decline in slack increases ULC growth by roughly 0.9 percentage points (red line, Graph IV.A, left-hand panel).

One possible driver of a changing sensitivity of ULCs to slack conditions is the increased contestability of markets associated with the trend decline in workers' pricing power. To explore this possibility, a measure of pricing power (denoted $z_{i,t}$) is constructed by applying the method of principal components to changes in three indicators of relevant labour market conditions: employment protection, union coverage and union density (Graph IV.A, centre panel). An augmented Phillips curve model is then estimated, where the sensitivity of ULC growth to slack conditions, $\beta_{i,t}$ depends on each country's $z_{i,t}$:

$$\left(\Delta w_{i,t} - \Delta lp_{i,t}\right) = k + c_i + \bar{\pi}_{i,t-1} + \beta_{i,t} x_{i,t} + e_{i,t}, \text{ with } \beta_{i,t} = \beta\left(1 + \gamma z_{i,t}\right).$$

The estimated parameter γ is positive and significant, indicating that the lower pricing power has indeed reduced the sensitivity of ULCs to domestic labour slack – the average slope of the wage Phillips curve has become flatter across countries (blue line, Graph IV.A, left-hand panel). Even so, the time-varying Phillips curve slope has

Wage Phillips curves still relevant

Graph IV.A

Slope of wage Phillips curve[1]

Fall in labour's pricing power[2]

Unemployment gap[6]

- Constant slope estimate (β)
- Time-varying slope estimate (β_t)

Lhs: — Employment protection[3]
Rhs: — Union coverage[4]
— Union density[5]

— / • G7
— / • Euro area countries in G7[7]
— / • Japan
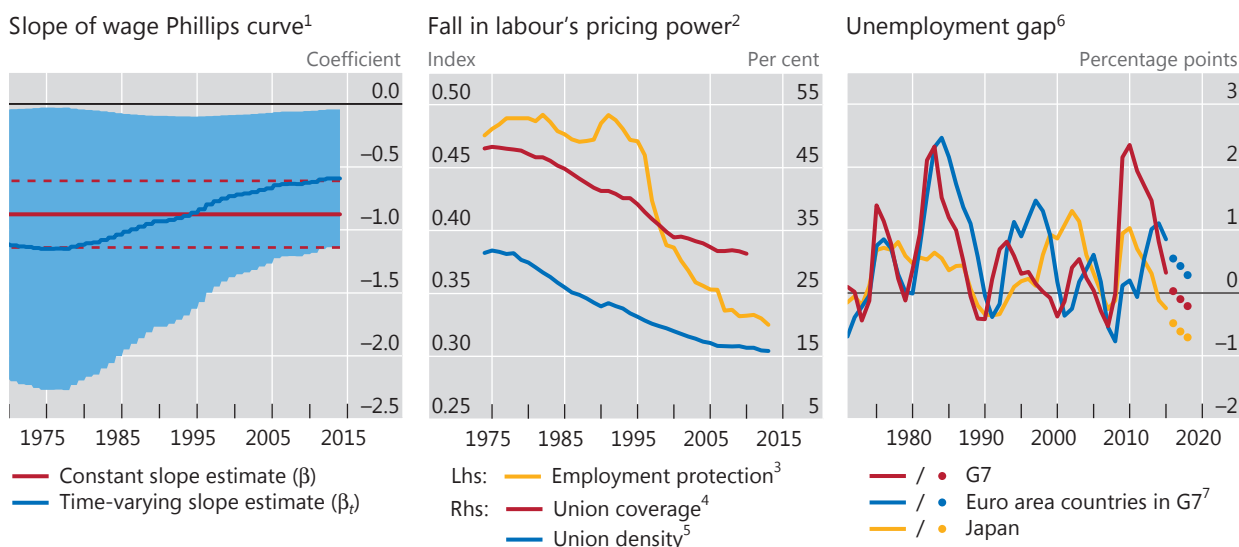
[1] G7 average; the blue area and red dashed lines indicate 90% confidence interval. [2] Weighted averages based on rolling GDP PPP weights for G7 economies. [3] Strictness of employment protection legislation; higher values indicate more strictness. [4] Number of workers covered by collective agreements normalised on employment. [5] Ratio of union membership to employment. [6] Unemployment rate less NAIRU; weighted averages based on rolling labour force levels; forecasts after 2015. [7] France, Germany and Italy.

Sources: W Nickell, "The CEP-OECD institutions data set (1960–2004)", *CEP Discussion Papers*, no 759, November 2006; J Visser, ICTWSS database version 5.1, Amsterdam Institute for Advanced Labour Studies, September 2016; IMF, *World Economic Outlook*; OECD, *Economic Outlook* and *Employment and Labour Market Statistics*; BIS estimates.

remained statistically significant, indicating that tighter labour markets continue to lift ULC growth, albeit by somewhat less than in the past. Taken at face value, the slope flattened from around 1.1 in 1974 to 0.6 in 2014.

① A Phillips, "The relationship between unemployment and the rate of change of money wages in the United Kingdom, 1861–1957", *Economica*, vol 25, no 100, November 1958. ② Each country's unemployment rate less its NAIRU (non-accelerating inflation rate of unemployment); in the panel regression, k is a constant, c_i is a country fixed effect, $e_{i,t}$ is an error term and $\bar{\pi}_{i,t-1}$ is an inflation expectation proxy (measured by a four-quarter change in the GDP price deflator; see eg A Atkeson and L Ohanian, "Are Phillips curves useful for forecasting inflation?", *Federal Reserve Bank of Minneapolis Quarterly Review*, Winter 2001).

All told, these considerations point to some reflationary tilt in the inflation outlook but not to major inflationary risks. At the same time, domestic *and* global labour market conditions deserve close monitoring, as purely domestic indicators of slack, be it in the labour or goods markets, do not appear to be fully adequate in gauging inflationary pressures.[10]

Start of the Great Unwinding?

Policy normalisation has never been a question of "if" but rather of "when, how fast and to what level". These questions gained prominence in the past year, as the case for prolonged accommodation weakened and several central banks turned their attention to the process of normalisation. Currently, markets expect rates to rise very gradually (Graph IV.8, left-hand panel), as bloated central bank balance sheets are trimmed. Yet such expectations contrast sharply with past episodes of rising rates, which were typically much less gradual (Graph IV.8, second panel).

In determining the pace of normalisation, central banks must indeed strike a delicate balance. On the one hand, there is a risk of acting too early and too rapidly. After a series of false dawns in the global economy, questions linger about the durability of this upswing. And the unprecedented period of ultra-low rates heightens uncertainty about reactions in financial markets and the economy. On the other hand, there is a risk of acting too late and too gradually. If central banks fall behind the curve, they may at some point need to tighten more abruptly and intensively to keep the economy from overheating and inflation from overshooting. And even if inflation does not rise, keeping interest rates too low for long could raise financial stability and macroeconomic risks further down the road, as debt continues to pile up and risk-taking in financial markets gathers steam. How policymakers address these trade-offs will be critical for the prospects of a sustainable expansion.

Views about the end-point and initial economic conditions will naturally influence the shape and pace of the normalisation process. It is worth considering in more detail the issues that each of these aspects raises.

A key question about the end-point is the level towards which the policy rate should be expected to gravitate. Central banks use a number of approaches to form a judgment about this, rather than simply extrapolating the decline in rates over time (Graph IV.8, third panel). One approach is to interpret what financial markets are pricing in, by deriving from bond yields what "markets think" the appropriate rate will be in the future (Chapter II). Another is to use modelling tools to estimate the end-point, defined as the "equilibrium" interest rate that balances the economy – sometimes also known as the "natural rate".[11] Both approaches would generally point to real (inflation-adjusted) short-term rates in the region of 0 to 2%. With the addition of target inflation of around 2%, this results in nominal rates of between 2 and 4%.[12] Alternative yardsticks, for example, based on the trend in *global* per

Box IV.B

The increasing international co-movement of labour costs

Labour cost developments have become increasingly synchronised across countries over the past two decades. This general trend is reflected in the growing statistical power of global ULC growth in explaining domestic ULC growth – measured by the R^2 in a rolling-window regression for 15 countries from Q2 1995 to Q4 2016 (Graph IV.B, left-hand panel). The R^2 values are measured using a stacked country regression approach. From roughly 12% at the start of the sample, the R^2 almost doubles to about 22% by the end of the sample period. The only pause in this trend occurred shortly after the GFC, which had varied effects on labour markets across the globe.

The growing importance of *global* ULC growth can be inferred by looking at the country-specific R^2 values for the two subsamples Q2 1995–Q4 2005 and Q1 2006–Q4 2016 (centre panel). The explanatory power of the statistical relationship has increased for all countries, quite substantially in some cases.

The increasing global co-movement of ULCs is likely to have resulted from greater economic integration. Economic globalisation has fostered greater substitutability not only of intermediate and final goods and services but also of labour across countries. In particular, the rapid expansion of global value chains in past decades has resulted in greater competitiveness in price and wage setting across countries (right-hand panel).[1] For labour, this has meant more exposure to global competition, directly through trade and indirectly through the threat that production might be shifted elsewhere within global supply chains.

Labour costs increasingly influenced by global developments

In per cent

Graph IV.B

Global ULC growth explains greater share of domestic ULC growth[1]

Increased co-movement across countries[1,2]

Value added in global gross exports[3]

Explanatory power (R^2) of global ULC growth

R^2 during: Q2 1995–Q4 2005   Q1 2006–Q4 2016
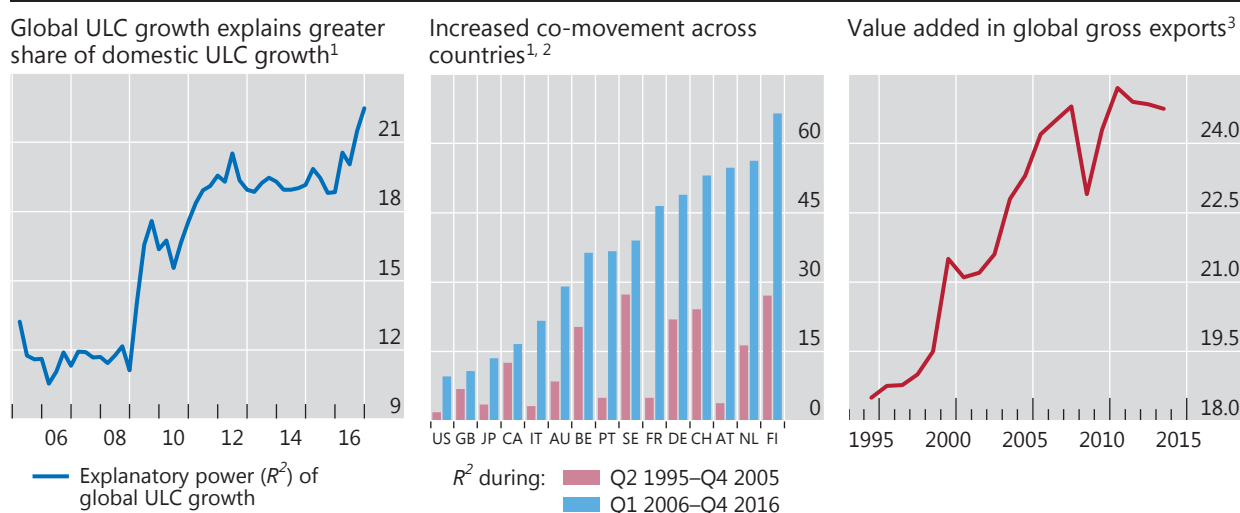
[1] R^2 from the estimated stacked country regression $\widehat{ulc}_{i,t} = \alpha_i + \beta_i\,\widehat{ulc}_{f,t} + \varepsilon_{i,t}$, where $\widehat{ulc}_{i,t}$ is quarterly real ULC growth in country i and $\widehat{ulc}_{f,t}$ is the global measure defined as average real ULC growth in the other countries weighted by value added trade; the time variation reflects the use of a 10-year moving estimation window. The sample includes the 15 countries listed in the centre panel.   [2] Country-specific R^2 for the subsamples shown.   [3] Based on World Input-Output Database, 2013 and 2016.

Sources: R Johnson and G Noguera, "A portrait of trade in value added over four decades", *The Review of Economics and Statistics* (forthcoming); J Powell, "The global trade slowdown and its implications for Emerging Asia", speech at the CPBS 2016 Pacific Basin Research Conference, San Francisco, 18 November 2016; OECD, *Economic Outlook*; BIS estimates.

[1] For an overview of the literature, see D Acemoğlu and D Autor, "Skills, tasks and technologies: implications for employment and earnings", *Handbook of Labor Economics*, Chapter 4 (Part B), Elsevier, November 2011.

Policy rate normalisation: will this time be different?

Graph IV.8

Current normalisation expected to be gradual[1]	Pace of past normalisations steeper[2]	Real interest rates trending down[3, 4]	Global GDP per capita growth stable[3, 5]
Per cent	Percentage points	Per cent	yoy changes, per cent

Legend (left two panels):
— United States   — Japan
— Euro area   — United Kingdom

Legend (third panel): — Long-term interest rate

Legend (fourth panel): / — Global   / — G10

Normalisation episodes: for the euro area, 1999–2000 and 2005–08; for Japan, 1989–90; for the United Kingdom, 1988–89, 2003–04 and 2006–07; for the United States, 1987–89, 1994–95, 2004–06 and 2015–17.

[1] As of 26 May 2017. Fed funds 30-day future (US); three-month Euribor (EA); three-month euroyen Tibor (JP); 90-day pound sterling (GB).   [2] From start of monetary policy tightening.   [3] Weighted averages based on rolling GDP and PPP exchange rates.   [4] Ten-year government bond yield less consumer price inflation, annual averages, advanced economies.   [5] Forecasts after 2016.

Sources: IMF, *World Economic Outlook*; Bloomberg; Global Financial Data; national data; BIS calculations.

capita growth to estimate the real rate, would suggest somewhat higher figures, of about 5% in nominal terms (Graph IV.8, right-hand panel).

Unfortunately, none of these approaches is very reliable. Market prices can at best act as a sounding board, given the technical pitfalls in extracting information from them (Chapter II). Prices are strongly influenced by central banks, and the views of market participants embedded in them may well be wrong, as has often been the case in the past. In addition, since the equilibrium rate is unobservable, the outcome of model-based approaches hinges crucially on the assumptions made. Moreover, just as with estimates of economic slack, estimates of the natural rate are subject to significant revisions as time passes. Thus, it is not obvious how much guidance central banks can find in these highly uncertain estimates.

In practice, therefore, central banks have little alternative but to move without a firm end-point in mind, guided purely by the evolution of the economy and perceived trade-offs. Perceived trade-offs are indeed critical. Users of analytical frameworks that place more emphasis on inflation and short-term output will tend to put more weight on the risk of doing too much too early; those that place more emphasis on financial stability and the financial cycle will be more concerned about the risk of doing too little too late, as they would focus more on the potential side effects of keeping interest rates low for too long.[13]

The economic conditions at the start of the normalisation journey naturally encourage caution, as they will greatly heighten uncertainty about how financial markets and the economy will react. In particular, financial markets will need to adjust after an exceptionally long period of dependence on ultra-easy monetary conditions. And the global economy is threatened by a global debt overhang, as the ratio of debt to GDP has continued to rise post-crisis. Normalisation will test the economy's ability to tolerate higher rates: private sector expenditures may falter and fiscal positions prove more vulnerable than anticipated.

Caution is normally interpreted to mean gradualism and transparency. Gradualism allows central banks to test the waters, seeking to avoid abrupt market adjustments and policy reversals. Transparency about the future policy path aims to remove one important source of uncertainty. Transparency may also go hand in hand with the gradual release of information about that path, in order to avoid sudden asset price adjustments, given the markets' tendency to telescope the future into today's prices.

But gradualism and transparency are no panacea. Gradualism naturally increases the risk of falling behind the curve, be it in terms of the build-up of inflationary pressures or of debt globally. And transparency about the path of central bank measures may unintentionally encourage greater risk-taking in markets. By reducing the uncertainty surrounding the announced path and hence compressing risk premia, transparency may induce market participants to leverage up in their search for yield.[14] The experience of the 2004–06 episode of raising the federal funds rate "at a measured pace" seems consistent with this possibility. In addition, risk-taking would be strengthened by any perception that the central bank would step in to calm short-term volatility and adverse market moves. Nor is there much the central bank can do to avoid the shock-amplifying mechanisms that stem from individual firms' risk management strategies, such as duration matching by long-term investors (Chapter II).[15]

Thus, the combination of gradualism and transparency raises a dilemma. It can certainly dampen volatility in the short run. But, if pushed too far, it may raise the risk of a larger adjustment and unwinding in the longer run. Obvious examples include a snapback in bond yields (Chapter II) and broader debt- or inflation-related macroeconomic strains (Chapter III). More specifically, market dynamics may take on the attributes of a binary outcome, where the "risk-on" phases are punctuated by "risk-off" phases, rather than evolving smoothly. In the worst case, the central bank's choice may be between a sharper snapback after a longer lull and a smaller snapback after a shorter lull, rather than between a smooth and a turbulent exit.

This dilemma is especially visible in the context of balance sheet policies – how central banks decide to normalise the size and composition of their balance sheets (Box IV.C and Table IV.1).[16] Central banks have generally communicated that they do not regard interest rate and balance sheet adjustments as equivalent. Interest rates are naturally seen as more agile, easier to calibrate and more predictable in terms of market and economic impact. So far, the emerging consensus seems to favour starting to normalise rates before trimming the balance sheet. Moreover, changes to the balance sheet could, in principle, be used as a complementary tool, altering the shape of the yield curve by influencing long-term yields through active sales: empirical evidence indicates that large-scale asset purchases had a considerable impact on long-term rates in the GFC's aftermath.[17] Indeed, central banks have not ruled out this possibility. But so far the central bank that has communicated most about the normalisation path, the Federal Reserve, has opted for a more passive, very gradual and predictable approach, reducing the balance sheet primarily by ceasing reinvestments at the rate regarded as appropriate. The 2013 taper tantrum, and the associated communication difficulties, are still very much on policymakers' minds.

Normalising the balance sheet raises other challenges too. Some are technical and not new. For instance, because the central bank has no monopoly over the outstanding supply of government securities available to investors at various maturities, it cannot influence bond yields entirely on its own: what the government does also matters. Thus, the impact of a reduction in balance sheets will depend on how governments replace the maturing securities.

Other, novel challenges have more of a political economy nature. Large central bank government bond purchases when rates are unusually low will entail losses precisely when the policy succeeds; that is, when the economy and inflation recover

so that rates and yields rise again. The corresponding losses can lead to unwarranted public criticism and even threaten the central bank's autonomy. Similarly, large-scale central bank government bond purchases, financed mainly with excess reserves, amount to a sizeable quasi-debt management operation: they equate effectively to replacing long-term debt with very short-term claims, indexed to the overnight rate (Box IV.D and Table IV.1). This makes the government's fiscal position more sensitive to monetary policy tightening, possibly adding another source of pressure on the central bank if the amounts involved are very large. One way of limiting or avoiding both of these effects is to impose a non-remunerated reserve requirement to absorb excess reserves or to pay differential rates on those reserves. This would amount to a tax on the banking system, raising an additional set of issues.

The normalisation of monetary policy in the major economies also has implications well beyond their borders. Developments in the past decade have shown that monetary policy spillovers can pose complicated challenges for central banks and disrupt adjustments in the global economy.[18]

EMEs are likely to be the most exposed (Chapter III). Given the large increase in US dollar credit post-crisis, rising global interest rates and an appreciating US dollar raise foreign currency debt burdens and widen spreads. This tightening of financial conditions, together with volatility in financial markets, could have significant macroeconomic implications.[19] On the one hand, tighter financial conditions would

Key indicators of central bank balance sheets

End-April 2017   Table IV.1

	United States	Euro area	Japan	United Kingdom	Sweden
Excess reserves[1] *% of general government debt*	11.8	16.6	28.5	25.1	22.1
Government securities[2]					
% of general government debt	13.4	16.8	38.9	21.4	14.2
% of total assets	55.1	38.8	84.5	70.0	29.9
Residual maturity[3] *years*	8.0	8.0	6.9	12.3	5.0
Maturing within one year *% of total holdings*	11.4	…	18.6	6.5	9.7
Maturing within two years *% of total holdings*	27.7	…	30.0	12.0	27.1
Other securities[4] *% of total assets*	39.8	8.1	3.9	1.9	…
Memo: General government debt[5] *% of GDP*	*98.9*	*89.3*	*201.3*	*90.0*	*41.7*

[1] For the United States and Japan, reserves in excess of required reserves; for the euro area, the sum of excess reserves in current accounts and the recourse to the deposit facility; for the United Kingdom, total reserve balances; for Sweden, the sum of liabilities to Swedish credit institutions related to monetary policy operations and debt certificates issued.   [2] For the United States, Treasuries held outright (face value); for the euro area, securities held under the Public Sector Purchase Programme (PSPP) and the Securities Market Programme (at amortised cost); for Japan, Japanese government securities (face value); for the United Kingdom, gilt holdings under the Asset Purchase Facility (in nominal terms); for Sweden, holdings under the government bond purchase programme (in nominal terms).   [3] Weighted average maturity; for the euro area, the residual maturity of holdings under PSPP.   [4] For the United States, federal agency debt securities and mortgage-backed securities; for the euro area, asset-backed securities, corporate bonds and covered bonds; for Japan, commercial paper, corporate bonds, ETFs and J-REITs; for the United Kingdom, corporate bonds.   [5] Core debt, nominal value; as of Q4 2016.

Sources: Datastream; national data; BIS total credit statistics; BIS calculations.

Box IV.C

Unwinding central bank balance sheets

Central banks face several challenges in unwinding their balance sheets. This box complements the main text by considering two issues that can help shape the choice of unwinding strategies, ie the end-point, in particular the balance sheet's target size and composition, and views about the impact of balance sheet adjustments on financial conditions.

The end-point: balance sheet size and composition

Pre-GFC, the size of central banks' balance sheets was determined mainly by two factors: on the asset side, any desired foreign exchange reserve holdings; on the liability side, the amount of cash demanded by the public, and bank reserve balances, which were treated as autonomous factors to be passively accommodated. Absent large foreign exchange reserve holdings, this meant a rather small balance sheet, given that demand for cash was limited and control over the policy rate did not require large holdings of bank reserve balances. Indeed, where the central bank did not rely on reserve requirements, as in Canada, holdings were negligible.[1]

The economics of central bank balance sheet size have not fundamentally changed post-crisis. True, there may be reasons for central banks to operate with larger balance sheets than before. The authorities may wish to broaden access beyond banks or continue to set interest rates through a floor system (via the rate on deposit facilities for excess reserve balances) rather than through a corridor system. They may also want to augment the supply of liquid assets for banks. But none of these considerations requires a significantly larger balance sheet. For example, a floor system can be operated with a small amount of excess reserves, and short-term government paper can substitute closely for bank reserves as a safe liquid asset. Because larger balance sheets raise challenges (eg of a political economy nature) and constrain future room for manoeuvre, it is not surprising that central banks are considering how to trim them to a more "normal" size, with due regard for country-specific features and as circumstances allow.

On the asset side, the desired balance sheet composition largely reflects structural factors and philosophical perspectives. Foreign exchange reserves are more important for non-reserve currency countries, especially small open advanced economies and EMEs. Another key issue is the distinction between private and public sector claims. In some countries, such as the United States or the United Kingdom, there has been a long-standing tradition of holding claims on the public sector only; in others, such as some European economies, it has been more common to hold private sector claims. This reflects a difference in the respective central banks' predominant concerns, about influencing the allocation of credit within the private sector on the one hand, and with being perceived to finance the government on the other. Within the euro area, an important additional concern is that of inadvertently generating transfers between member countries, which should be quintessentially a fiscal decision.

The transition: transmission channels and unwinding strategies

Empirical evidence confirms the widely held view that large-scale asset purchases have significantly influenced yields and financial conditions.[2] At the same time, it remains less clear through which channels they have worked, and this question can affect choices about unwinding strategies.

A first distinction is between the impact of asset purchases as such, on the one hand, and of the information they convey about the future policy interest rate path (the "signalling channel"), on the other. The former operates mainly through term premia, the latter through the expected path of short-term rates (see also Box II.A).

The existence of a significant signalling channel complicates communication and tends to favour more passive unwinding strategies, communicated in advance and in principle unresponsive to economic conditions. By adopting such a strategy, the central bank would effectively put the unwinding on "autopilot", preannouncing a given size-reduction path. The pace could involve, for instance, a predetermined schedule for phasing out reinvestments and for allowing securities to run off as they mature. This would limit any signalling effect to the time of the announcement, so that the central bank could thereafter signal its stance exclusively through changes in the policy rate. But clearer communication comes at the expense of less flexibility in responding to changing economic conditions – a price the central bank may be prepared to pay, especially if the effects of a more active strategy are perceived as unpredictable (see main text). At the cost of diluting the autopilot element, the strategy could be complemented with escape clauses in order to avoid excessive rigidity and strengthen credibility. The Federal Reserve, for instance, appears to have chosen to proceed this way.

A second distinction is between stock and flow effects. The prevailing view among economists is that stocks matter most for asset prices: at any given time, investors must be content with the portfolios they have, otherwise

prices will adjust. In particular, the duration of the central bank's holdings is especially important for term premia.[3] Similarly, the relative scarcity of specific securities may incentivise investors to purchase assets with greater duration and credit risk.[4] At the same time, it is also possible that flows matter – a view that has some currency among market participants. In this case, the balance between actual purchases and sales in any given period becomes critical.

Concerns with flow effects would induce central banks to pay more attention to smoothing out actual transactions and would strengthen the case for gradualism. Order imbalances could become more important as, on average, 24% of total central bank holdings of government securities are set to mature in the next two years (Table IV.1). This puts a premium on avoiding cliff effects linked to lumpiness in the portfolio's maturity profile. Similarly, the relationship with the Treasury's issuing schedule would also matter more. And since stocks are much less volatile than flows, if the central bank wished to avoid large adjustments in yields it would tend to prefer a more gradual unwinding pace (eg phasing out reinvestments as opposed to stopping them abruptly).

A third distinction is between the impact of announcements and actual transactions. Even in a pure stock view, is it the actual stock at any given point in time or the market expectations thereof that matters? Arguably, both play a role. That said, both casual and formal evidence indicate that announcements are quite important. For example, when central banks were easing policy, it was not uncommon for them to surprise markets, doing more than expected, thereby having a bigger impact on yields. To the extent that a central bank opts for more passive strategies during the unwinding phase, it may be important to update markets regularly about the evolution in its thinking about a chosen strategy and the implications of incoming data; this would ensure that markets are well prepared by the time of implementation and mitigate the risks of sharp price adjustments.

The composition of the assets held in the portfolio adds another set of considerations. One dimension concerns the maturity structure. The longer the maturity, the longer the period needed for the unwinding. The average residual maturity of central banks' holdings of government securities varies widely, ranging from five years in Sweden to 12 years in the United Kingdom (Table IV.1). Another dimension is the distinction between private and public sector claims. In the case of the Federal Reserve, for instance, it currently holds around $1.5 trillion of mortgage-backed securities that will mature between 2040 and 2048. Historically, claims on the private sector have only made up a small fraction of the Federal Reserve's balance sheet. In the case of the Eurosystem, market liquidity issues in some national sovereign and corporate markets could be especially important, given the large share of central bank holdings.

[1] See eg U Bindseil, "Evaluating monetary policy operating frameworks", in proceedings of the Federal Reserve Bank of Kansas City Jackson Hole symposium, August 2016.   [2] Surveys on the effects of unconventional policies include C Borio and A Zabai, "Unconventional monetary policies: a re-appraisal", in R Lastra and P Conti-Brown (eds), *Research Handbook on Central Banking*, Edward Elgar Publishing, 2017; and S Bhattarai and C Neely, "A survey of the empirical literature on US unconventional monetary policy", *Federal Reserve Bank of St Louis Working Paper*, no 2016-021A, October 2016.   [3] See eg R Greenwood and D Vayanos, "Bond supply and excess bond returns", *The Review of Financial Studies*, vol 27, no 3, 2014; and B Sack, "The SOMA portfolio at $2.654 trillion", Federal Reserve Bank of New York, remarks before the Money Marketeers of New York University, New York City, 20 July 2011.   [4] See eg discussion on the portfolio rebalancing channel in B Bernanke, "The economic outlook and monetary policy", in proceedings of the Federal Reserve Bank of Kansas City Jackson Hole symposium, August 2010.

depress economic activity. On the other hand, the depreciation of the domestic currency would put upward pressure on inflation, threatening second-round effects, especially in those economies with a poorer inflation record and more fragile fiscal positions. Central banks can seek to mitigate this dilemma by drawing on their foreign exchange reserves as well as by implementing macroprudential measures and possibly capital flow management tools. But there are clear limits to how far such a strategy can be pushed: it can help to smooth the adjustment but cannot solve the underlying problem.

Small open advanced economies will not be immune either (Chapter III). While any depreciation pressure on the domestic currency might be welcome where inflation is stubbornly below target, any spillovers through higher bond yields may not be – depending on the cyclical position and underlying financial conditions, not least the phase of the domestic financial cycle. Central banks may try to use forward guidance to insulate their yields from those in the core jurisdictions, but here, too, there are limits to how far such a strategy can be effective.[20]

Box IV.D

Fiscal impact of changing interest rates when central bank balance sheets are large

While much attention has focused on the impact on bond yields of changes in central banks' large-scale government bond purchases, the effect on a government's financing costs has gone largely unremarked. And yet, if those changes are large enough, the impact can be sizeable. And this could have significant macroeconomic implications especially in economies with a high government debt-to-GDP ratio.

The main reason is simple. From a consolidated public sector balance sheet perspective (ie one that nets out assets and liabilities between the central bank and government), large-scale purchases amount to a withdrawal of duration from the market: it is as if the government replaces long-term debt – the amount purchased by the central bank – with very short-term debt – the liabilities the central bank issues to finance the purchases.[1] Since these liabilities typically take the form of excess reserves held by banks, they are equivalent to overnight-indexed debt.[2] This makes the government's net borrowing costs more sensitive to higher rates.

How large can this effect be? A back-of-the-envelope calculation can help put this in context. Assume, for simplicity, that at the time of a policy rate increase all government bonds held by the central bank have a residual maturity of at least two years (ie none of the securities mature within that period) and that the central bank does not purchase any new securities.[3] Assume further that those bonds were issued at a fixed interest rate. This means that an increase in the cost of remunerating excess reserves (which moves with the policy rate) will not be matched by any increase in interest on central bank bond holdings. If the excess reserves in this calculation are, say, 10% of total government debt outstanding, each 1% increase in rates would raise interest payments by 0.1% of the debt stock.

The impact can be particularly significant when excess reserves and government debt are large. For instance, if central bank excess reserves are 50% of outstanding government debt, a 200 basis point rate rise would amount to 1% of government debt. If interest payments on government debt are, on average, 2%, this would be equivalent to a 50% increase in debt financing costs. And if the debt-to-GDP ratio were 100%, this would translate one-to-one into percentage points of GDP.

How indicative is this example? A number of factors need to be considered. First, central banks purchase government debt all the time in order to finance normal balance sheet growth arising from increases in reserve requirements and cash demand from the public. The back-of-the-envelope calculations above apply only to the change in central bank purchases specifically implemented to influence financial conditions. Second, the higher funding cost is *transitory*. Assuming a given balance sheet size, the central bank will need to reinvest the proceeds of any maturing bonds, and will do so at higher interest rates (across all maturities). Thus, over time, as the initial stock of bonds rolls over, the higher interest earned on the new bonds will offset the higher funding cost. In addition, the bond purchases would shorten the average maturity of the outstanding debt held by the public and hence would reduce the overall interest cost to the government over the long run as long as the yield curve is upwards-sloping. Third, the rules for central bank profit transfers and accounting conventions can make it difficult to track the size of the impact. Finally, the central bank could decide to offset some of the additional costs by lowering the average remuneration on required reserves, by either expanding unremunerated required reserves or applying differential rates on excess balances (eg a zero rate on a portion of excess balances).

Table IV.1 provides a sense of the relative sensitivity of government financing costs to rate increases for a range of central banks that have engaged in large-scale asset purchase programmes. Based on general government debt as a percentage of GDP alone, the impact is likely to be largest in Japan and smallest in Sweden. Based on excess reserves as a percentage of government debt, the impact would be smallest in the United States and largest in Japan. The United Kingdom, the euro area and Sweden fall somewhere in between. Based on today's average maturity of government securities on central bank balance sheets, the transitional effect would be larger and longer-lasting in the United Kingdom and smaller and shorter in Sweden, and somewhere between in the other countries.

[1] See eg C Borio and P Disyatat, "Unconventional monetary policies: an appraisal", *The Manchester School*, vol 78, no 1, September 2010; J Chadha, P Turner and F Zampolli, "The ties that bind: monetary policy and government debt management", *Oxford Review of Economic Policy*, vol 29, December 2013.   [2] Central banks can also influence financing conditions by swapping bonds of different maturities in their portfolio without issuing central bank securities or reserves, as the Federal Reserve did during Operation Twist in late 2011 and 2012.   [3] Alternatively, assume that the central bank does not reinvest the proceeds from the maturing bonds or attempt to prevent the automatic shortening of its bond portfolio's average maturity.

These challenges strengthen the case for enhanced central bank cooperation during normalisation. Depending on the severity of the spillovers and spillbacks, enhanced cooperation can take different forms. At a minimum, it could involve close dialogue so as to reach a better understanding of the perceived trade-offs, the reasoning behind decisions and the consequences of those decisions across the world. This would support enlightened self-interest, through which central banks would better take into account spillovers and spillbacks. In some cases, such self-interest could also extend to joint action, as during the GFC.[21]

Endnotes

1   See R Freeman, "Labor economics", *Palgrave Encyclopaedia of Economics*, 2005.

2   See L Karabarbounis and B Neiman, "The global decline of the labor share", *Quarterly Journal of Economics*, vol 129, no 1, 2014.

3   On the differential impact of automation on the wages of the skilled and unskilled, see eg M Elsby, B Hobijn and A Sahin, "The decline of the US labor share", *Brookings Papers on Economic Activity*, Fall 2013; and OECD, "The labour share in G20 economies", February 2015. On the possible role of the ascendancy of "winner takes all" firms in influencing the labour share, see D Autor, D Dorn, L Katz, C Patterson and J Van Reenen, "The fall of the labor share and the rise of superstar firms", *NBER Working Papers*, no 23396, May 2017. For a fuller assessment of potential factors at work, from institutional to measurement issues, see eg IMF, *World Economic Outlook*, April 2017.

4   See D Staiger, J Stock and M Watson, "Prices, wages and the US NAIRU in the 1990s", in A Krueger and R Solow (eds), *The roaring 90s: can full employment be sustained?*, Russell Sage and Century Fund, 2001.

5   See a review by R Bidder, "Are wages useful in forecasting price inflation?", *Economic Letter*, Federal Reserve Bank of San Francisco, no 33, 2015.

6   See J Stock and M Watson, "Phillips curve inflation forecasts", in *Understanding inflation and the implications for monetary policy: a Phillips curve retrospective*, Federal Reserve Bank of Boston, 2009.

7   See eg S Aaronson, T Cajner, B Fallick, F Galbis-Reig, C Smith and W Wascher, "Labor force participation: recent developments and future prospects", *Brookings Panel on Economic Activity*, September 2014; and US Council of Economic Advisers, "The labor force participation rate since 2007: causes and policy implications", July 2014.

8   See eg M Daly and B Hobijn, "Downward nominal wage rigidities bend the Phillips curve", *Journal of Money, Credit and Banking*, vol 46, no 2, 2014.

9   See D Blanchflower and S Machin, "The current 2% UK wage growth norm", *CEP Real Wage Update*, March 2016.

10   See R Auer, C Borio and A Filardo, "The globalisation of inflation: the growing importance of global value chains", *BIS Working Papers*, no 602, January 2017.

11   See Chapter IV of the *86th Annual Report* for a more detailed discussion of natural rate measurement.

12   Natural rate estimates are methodology-dependent. For international evidence, see eg K Holston, T Laubach and J Williams, "Measuring the natural rate of interest: international trends and determinants", *Journal of International Economics*, forthcoming; and J Hamilton, E Harris, J Hatzius and K West, "The equilibrium real funds rate: past, present, and future", *Hutchins Center on Fiscal & Monetary Policy Working Papers*, no 16, October 2015. For a range of estimates in the United States, see C Borio, P Disyatat, M Drehmann and M Juselius, "Monetary policy, the financial cycle and ultra-low interest rates", *BIS Working Papers*, no 569, July 2016. Estimation uncertainty has been emphasised eg by B Johannsen and E Mertens, "The expected real interest rate in the long run: time series evidence with the effective lower bound", *FEDS Notes*, Board of Governors of the Federal Reserve System, February 2016; and J Hamilton et al, op cit.

13   For additional details, see related discussion in the *86th Annual Report*.

14   This is one aspect of the risk-taking channel of monetary policy. See C Borio and H Zhu, "Capital regulation, risk-taking and monetary policy: a missing link in the transmission mechanism?", *Journal of Financial Stability*, 2012 (also published as *BIS Working Papers*, no 268, December 2008); and H S Shin and T Adrian, "Financial intermediaries, financial stability and monetary policy", in *Maintaining stability in a changing financial system*, proceedings of the Federal Reserve Bank of Kansas City Jackson Hole symposium, 2008.

15   See H S Shin, "How much should we read into shifts in long-dated yields?", speech at the US Monetary Policy Forum, New York City, 3 March 2017.

[16] For the Federal Reserve, see "FOMC statement on policy normalization principles and plans", 17 September 2014; and "Minutes of the Federal Open Market Committee", 17–18 March 2015. For the ECB, see M Draghi, "Monetary policy and the economic recovery in the euro area", speech at The ECB and Its Watchers XVIII Conference, Frankfurt, 6 April 2017; and B Cœuré, "Central bank communication in a low interest rate environment", speech at an event organised by Bruegel, Brussels, 31 March 2017. For the Bank of England, see "The MPC's asset purchases as Bank Rate rises", *Inflation Report*, November 2015.

[17] See L Pereira da Silva and P Rungcharoenkitkul, "QE experiences and some lessons for monetary policy: defending the important role central banks have played", Eurofi High-Level Seminar, Malta, 5–7 April 2017; C Borio and A Zabai, "Unconventional monetary policies: a re-appraisal", in R Lastra and P Conti-Brown (eds), *Research Handbook on Central Banking*, Edward Elgar Publishing, 2017; and A Filardo and J Nakajima, "Cross-country macro evidence on the effectiveness of unconventional monetary policies in a low interest rate environment", *BIS Working Papers*, forthcoming.

[18] See Q Chen, M Lombardi, A Ross and F Zhu, "Global impact of US and euro area unconventional monetary policies: a comparison", *BIS Working Papers*, no 610, February 2017; Q Chen, A Filardo, D He and F Zhu, "Financial crisis, US unconventional monetary policy and international spillovers", *Journal of International Money and Finance*, no 67, 2016; and B Hofmann and E Takáts, "International monetary spillovers", *BIS Quarterly Review*, September 2015.

[19] See H S Shin, "The bank/capital markets nexus goes global", speech at the London School of Economics and Political Science, 15 November 2016.

[20] See A Filardo and B Hofmann, "Forward guidance at the zero lower bound", *BIS Quarterly Review*, March 2014.

[21] See the *85th Annual Report* for a discussion of collective action problems in global monetary policy.

V. The financial sector – preparing for the future

The financial sector faces an improving but still challenging environment. The near-term economic outlook has brightened substantially, and financial headwinds have turned into tailwinds in many advanced economies. Even so, uncertainty about the sustainability of the expansion lingers alongside structural challenges, such as technological innovation and consolidation pressures. And interest rates and term premia remain low across the major economies, compressing intermediation margins.

Against this backdrop, and with the main regulatory reforms about to be completed, it is important that banks and other financial institutions take advantage of improved conditions to further increase resilience and reshape their business models. The ultimate goal is a stronger financial system that supports the resilience of the global economy. This requires the continued resolve of both the private and public sectors.

This chapter first reviews recent banking, insurance and asset management sector developments. It then discusses how banks are adjusting their business models in response to key financial sector trends. It finally elaborates on changing US dollar funding patterns and their implications for bank business models and systemic risk.

Financial institutions: dissipating headwinds

Banks

In recent years, bank profitability has been hamstrung by tepid economic growth, low interest rates and relatively muted client activity. Yet, with the global recovery maturing and monetary policy in key jurisdictions poised for a gradual tightening, the outlook for banks' bottom line is now improving. This underlines the need for banks to use the "growth dividend" of dissipating headwinds to complete the adjustment of their business models to the post-crisis reality.

Conjunctural factors continued to be a drag on profitability, even though the impact varied across regions. Net income, for example, remained well below pre-Great Financial Crisis (GFC) levels. Relative to total assets, it hovered around zero across much of Europe and was only slightly higher in many other jurisdictions, including key emerging market economies (EMEs). Past years of low and declining interest rates had eroded yields on earning assets. Even though interest expenses also declined, assets typically repriced more quickly, weighing on net interest income. Revenue from fees and commissions and other capital market activities also remained subdued. That said, corporate bond issuance and merger and acquisition (M&A) activity supported bank revenues in jurisdictions such as the United States (Table V.1).

There are now signs that conjunctural headwinds are receding. To the extent that economic activity continues to strengthen, higher interest rates and rising term spreads should support intermediation margins. Stronger demand for banking services and higher capitalisation levels, in turn, should underpin business volume and balance sheet expansion. And both revenue growth and capital buffers would help cushion any interest rate-driven valuation losses on securities portfolios. Post-

crisis declines in interest rates have increased the duration of outstanding securities, making unhedged fixed income positions vulnerable to mark-to-market losses ("snapback risk", Chapter II). Such pressures could be particularly pronounced in a context of tightening US dollar funding conditions (see below).

Individual banks' ability to benefit from the improved macroeconomic backdrop and rising interest rates depends on a number of factors. One is asset composition: revenue growth is driven by the rollover of maturing fixed rate assets and loans and, hence, depends on the share of fixed rate versus floating rate assets. On the liabilities side, core deposits are known to be relatively price-insensitive. Since they are a key funding source for many banks, increases in funding costs generally lag those in short-term rates. In addition, moderately stronger economic growth and higher rates tend to boost client activity across several business lines. Indeed, starting in mid-2016 capital market revenues benefited from higher market volatility after the Brexit referendum and in anticipation of US policy rate action (Chapter II).

Profitability of major banks[1]

As a percentage of total assets   Table V.1

	Net income			Net interest income			Fees and commissions[2]			Loan loss provisions		
	2012–14	2015	2016	2012–14	2015	2016	2012–14	2015	2016	2012–14	2015	2016
Major AEs												
Japan (5)	0.61	0.60	0.52	0.79	0.74	0.68	0.46	0.46	0.45	0.03	0.02	0.06
United States (10)	1.12	1.40	1.36	2.27	2.24	2.25	1.31	1.24	1.15	0.26	0.23	0.28
Euro area												
France (4)	0.25	0.42	0.42	0.87	0.85	0.84	0.35	0.39	0.36	0.18	0.15	0.13
Germany (4)	0.12	–0.12	0.03	0.92	1.01	0.97	0.62	0.70	0.68	0.14	0.08	0.11
Italy (4)	–0.46	0.29	–0.67	1.46	1.30	1.21	0.88	0.85	0.84	1.06	0.51	0.99
Spain (6)	0.06	0.57	0.53	1.97	2.04	2.03	0.67	0.64	0.66	1.18	0.65	0.51
Other AEs												
Australia (4)	1.24	1.25	1.17	1.78	1.62	1.73	0.43	0.38	0.39	0.16	0.10	0.15
Canada (6)	1.05	0.97	0.97	1.63	1.51	1.54	0.72	0.72	0.72	0.17	0.15	0.18
Sweden (4)	0.73	0.80	0.78	0.91	0.88	0.87	0.44	0.52	0.51	0.07	0.06	0.07
Switzerland (3)	0.23	0.17	0.11	0.70	0.88	0.78	1.31	1.48	1.40	0.01	0.02	0.01
United Kingdom (6)	0.26	0.27	0.22	1.06	1.25	1.15	0.49	0.49	0.44	0.26	0.15	0.15
EMEs												
Brazil (3)	1.57	0.67	1.99	3.33	2.09	3.22	1.82	1.76	1.86	1.24	1.62	1.65
China (4)	1.65	1.50	1.34	2.41	2.30	1.92	0.61	0.57	0.53	0.28	0.42	0.41
India (2)	1.67	1.57	0.56	2.64	2.74	2.56	0.76	0.76	0.71	0.47	0.87	1.88
Korea (5)	0.62	0.60	0.63	1.92	1.72	1.67	0.41	0.40	0.36	0.47	0.35	0.27
Russia (3)	1.79	0.63	1.86	3.87	2.98	4.44	0.88	0.89	1.04	0.92	1.71	1.30

Number of banks in parentheses. The first column per category shows the corresponding simple average over the period 2012–14.

[1] The calculation of total assets may differ across banks due to different accounting rules (eg netting of derivatives positions).   [2] Net fee and commission income.

Sources: SNL; BIS calculations.

Another factor is asset quality. This should generally improve as GDP growth picks up, unemployment declines and rising demand supports the corporate sector. In most advanced economies, expectations are that this will help non-performing loans (NPLs) to level off and ultimately decline. That said, banking systems in some jurisdictions still look vulnerable to a further deterioration in credit quality. In a number of euro area countries, for example, the share of NPLs remains stubbornly high. Structural factors, such as ineffective legal frameworks and defective secondary markets for NPLs, have been hindering the resolution of problem loans.[1]

The outlook for asset quality becomes more differentiated once countries' position in the financial cycle is considered (Chapter III). Standard metrics, such as credit-to-GDP gaps, signal financial stability risks in a number of EMEs, including China and other parts of emerging Asia. Gaps are also elevated in some advanced economies, such as Canada, where problems at a large mortgage lender and the credit rating downgrade of six of the country's major banks highlighted risks related to rising consumer debt and high property valuations.[2] While banks' NPL ratios in all these countries mostly remained low, a majority of EMEs have continued to see financial booms, flattering credit quality indicators. Thus, loan performance should be expected to deteriorate once the financial cycle turns. In addition, pressures could also emerge as a result of spillovers from tighter US monetary policy. In some Asian economies, for example, non-financial corporates took advantage of easy global financing conditions to leverage up in US dollars.[3] Many of these corporates may thus find themselves unhedged and exposed to currency mismatches if their domestic currencies depreciate. Any balance sheet strains, therefore, could ultimately feed into banks' credit risk exposures.

Other financials

Just like their banking sector peers, many insurance companies continued to struggle with the confluence of an often sluggish recovery and low interest rates. Insurers' performance depends on investment returns and the business mix, primarily property and casualty (P&C) and life insurance, as well as the importance of legacy guaranteed-return contracts. Declining interest rates inflate the value of both assets and liabilities, but long maturities and negative duration gaps mean that the net effect is negative (Graph V.1, left-hand panel). Together with low investment returns, this can cause considerable strains, particularly for life insurers with high guaranteed rates in the legacy book, such as in Germany and the Netherlands.

In recent years, insurers – and pension funds – have tackled these pressures in a variety of ways. On the liabilities side, they have shifted underwriting practices towards contracts with reduced or no guarantees as well as unit-linked products, which place the investment risk with the policyholder. Such adjustments, however, can take a rather long time to be effective. For instance, according to the International Association of Insurance Supervisors, some 80% of life insurance premiums in Germany are for previously written guaranteed rate plans.

On the assets side, there has been a trend to reach for yield. Asset allocation has shifted towards riskier assets, often via collective investment vehicles and in foreign currency (Graph V.1, centre panel). For example, the proportion of investment fund shares in the sector's total assets rose from 16% in 2009 to 23% in 2016, on average, in the United States and the euro area. Even then, given prudential considerations, changes in asset portfolio composition were generally too modest to prevent investment yields from falling further (Graph V.1, right-hand panel). On balance, however, in 2016 many insurers enjoyed profits, thanks to higher gross premiums and improved conditions (such as low natural catastrophe losses) in the non-life market (Table V.2).

Insurance and pension fund sector

Graph V.1

Lower rates raise asset values by less than liabilities[1]
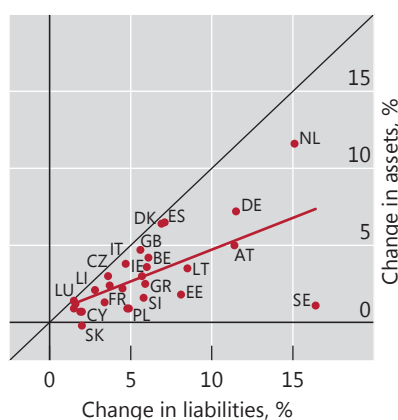
Portfolios shift towards collective investment funds[2]
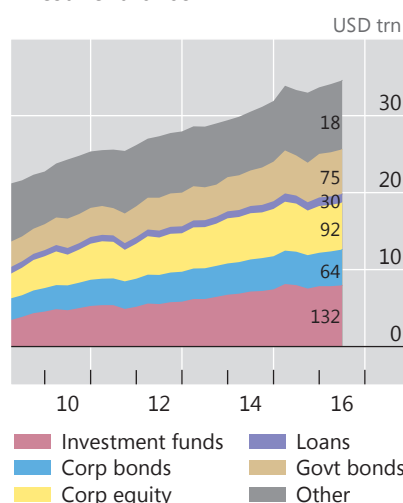
Average investment yields decline[3]
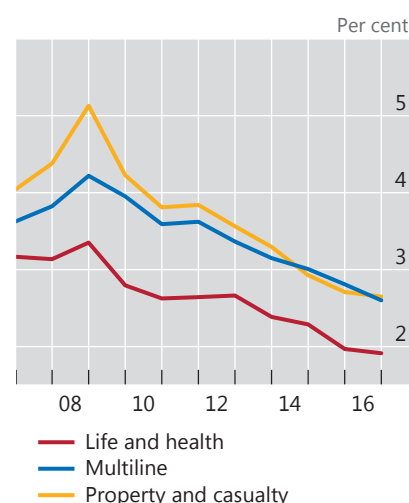
[1] Impact of a "low for long" scenario on the valuation of liabilities and assets; see *2016 EIOPA Insurance Stress Test Report*, Table 5.   [2] Euro area and US insurance companies and pension funds. The numbers on the stacked areas show the cumulative percentage change for each asset portfolio category.   [3] Simple average across a sample of European insurers with at least $10 billion of total assets in 2014.

Sources: Board of Governors of the Federal Reserve System; ECB; European Insurance and Occupational Pensions Authority (EIOPA); SNL; BIS calculations.

While profitability pressures are likely to continue, the outlook is improving across the major insurance markets. This should support premium growth. In life insurance, premium volumes tend to be highly correlated with employment and GDP, as a stronger economy pushes up sales. Rising interest rates, in turn, would boost asset values relative to liabilities, generating valuation gains, and help alleviate some of

Profitability of major insurance companies

In per cent

Table V.2

	Non-life				Life			
	Premium growth		Combined ratio[1]		Premium growth		Benefit ratio[1]	
	2012–15	2016	2012–15	2016	2012–15	2016	2012–15	2016
Australia	4.3	–2.7	96.7	98.0	7.6	–11.6	...	...
France	1.1	2.0	99.5	99.4	2.0	1.1	89.4	...
Germany[2]	2.5	3.3	99.8	98.8	1.3	–1.2	81.2	...
Japan	4.4	–1.2	99.4	97.9	2.8	–6.2	...	...
Netherlands	0.1	...	99.0	...	–9.4	0.8	143.7	...
United Kingdom	0.2	3.0	95.6	96.6	1.2	3.0	...	...
United States	3.9	3.8	99.0	101.0	0.5	3.4	85.5	89.7

The first column per category shows the corresponding simple average over the period 2012–15.

[1] Combined ratio defined as the ratio of incurred losses and expenses to total earned premiums; benefit ratio defined as the ratio of total payments to written premiums; values below 100 indicate underwriting profits.   [2] Estimated figures for 2015 and 2016.

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

US funds exposed to US stocks, but
fixed income exposure also up[1]

Euro area funds' foreign exposures
on the rise[2]

Large swings in equity and bond
funds[3]

US funds:
- Bond (light blue)
- Equity (light pink)

EA funds:
- Bond (dark blue)
- Equity (dark red)

Euro area assets:
- Corp equity
- Govt bonds
- Corp bonds
- IF shares

Non-euro area assets:
- Corp equity
- Bonds
- IF shares

- Corp equity (US)
- Corp equity (non-US)
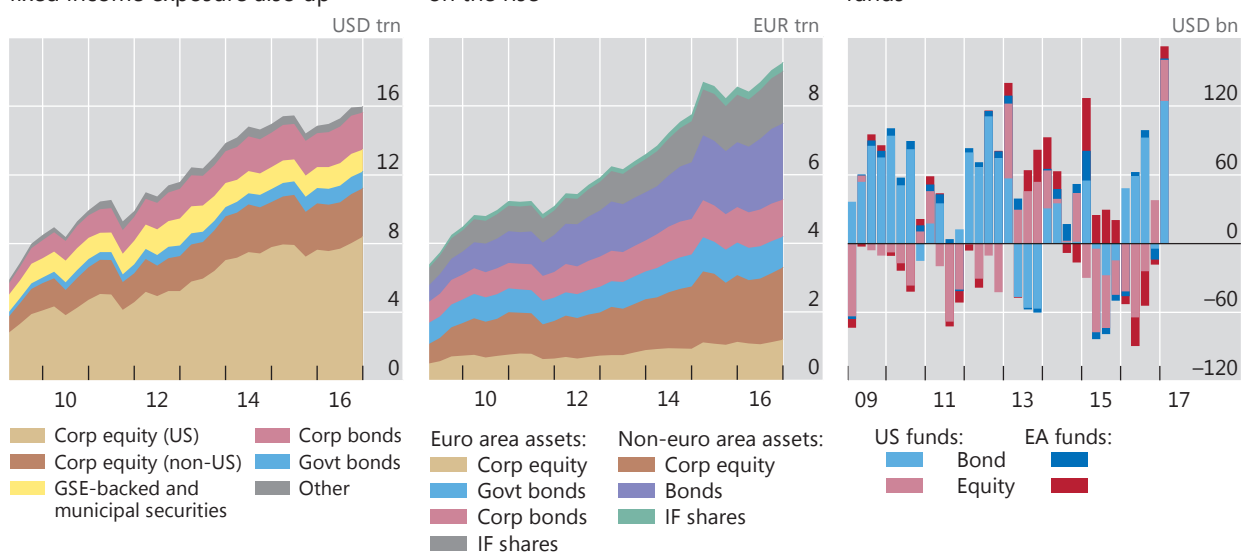- GSE-backed and municipal securities
- Corp bonds
- Govt bonds
- Other

GSE = government-sponsored enterprise; IF = investment fund.

[1] US mutual funds (excluding money market mutual funds) and exchange-traded funds.   [2] Euro area investment funds (excluding money market mutual funds).   [3] Quarterly sums of monthly data. Data cover net portfolio flows (adjusted for exchange rate changes) to dedicated funds for the United States and the euro area (AT, BE, DE, ES, FI, FR, GR, IE, IT, NL and PT).

Sources: Board of Governors of the Federal Reserve System; ECB; EPFR; BIS calculations.

the margin pressure on guaranteed-return products. That said, investment returns will adjust only gradually, as portfolios continue to be heavily tilted towards fixed income instruments and many insurers have been forced to replace maturing bonds with lower-yielding securities. In addition, in life insurance additional investment income accrues mostly to policyholders. This is in contrast to the P&C business, where the investment risk and associated returns are fully borne by the insurer.

Yet there could be risks to profitability, especially if markets disappoint. One such risk stems from the sector's increased equity holdings, which expose insurers to stock market corrections and tail risks (Chapter II). Another risk may come from high direct and indirect investment fund exposures. Over the last few years, asset managers and other return-sensitive investors have increased their footprint in markets for less liquid or riskier assets, such as corporate bonds (Graph V.2, left-hand and centre panels). Given these investors' growing allocations to such asset classes, their portfolio decisions may test market liquidity under stress, which hinges on market-makers' willingness to accommodate temporary supply-demand imbalances.[4] Sure enough, net flows into and out of investment funds have been very volatile, such as during the "taper tantrum" bond market sell-off of 2013 (Graph V.2, right-hand panel). The resulting redemption pressures can generate "fire sale externalities" that would affect insurers' investment income both directly, through their investment fund holdings, and indirectly, through any impact on market prices.

Bank business models: the quest for sustainable profits

Banks have been facing persistent pressures to reshape their business models post-GFC. Notable progress has been made in diversifying both income streams and

funding mix, while reducing balance sheet leverage. Yet market valuations for many banks still point to investor scepticism. The sector thus still needs to adapt to generate sustainable profits.

Signs of progress, but scepticism remains

Post-crisis, global banks' business models have been challenged. In addition to a difficult conjuncture (see above), banks have been under market and regulatory pressure to raise capitalisation levels, often decisively, and cut leverage (Graph V.3, left-hand panel). Overall, the transition to higher capital ratios, both in risk-adjusted and non-risk adjusted terms, is nearing completion and has primarily been achieved through retained earnings. Most banks monitored by the Basel Committee on Banking Supervision already meet the fully phased-in Basel III standards. The larger internationally active banks report, on average, a Common Equity Tier 1 (CET1) capital ratio of nearly 12% and a leverage ratio of 5.6%.

Two other major trends have marked banks' adjustment to the post-crisis environment. One concerns their funding mix: banks have generally reduced their reliance on (unsecured) short-term wholesale funding and increased that on retail funding, such as customer deposits. This has formed part of a broader shift towards more retail-oriented business models, with relatively stable funding and income sources (Graph V.3, centre and right-hand panels). Activity has also shifted towards collateralised funding and central clearing, reflecting a keener awareness of counterparty credit risks as well as regulatory incentives. That said, exposure to rollover risks remains significant in some cases, notably in the global US dollar funding market (see next section).

Banks are strengthening balance sheets and stabilising revenues

In per cent   Graph V.3

Bank capitalisation improves[1,2]

Retail funding share rises[1]

Shift towards more stable income[3]
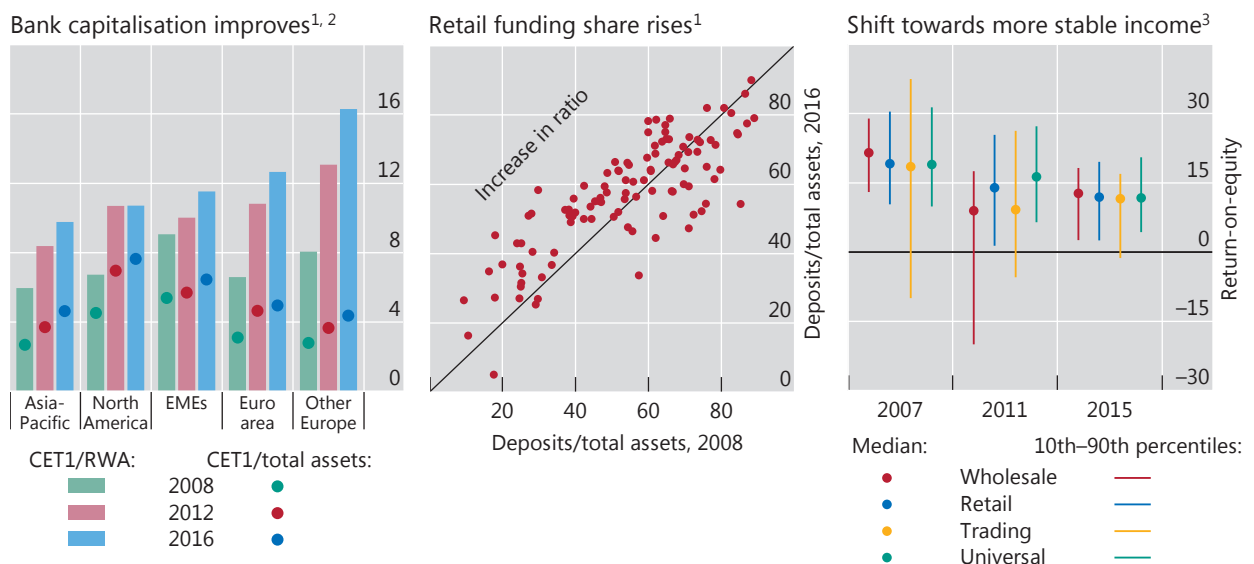
CET1 = Common Equity Tier 1; RWA = risk-weighted assets.

[1] Sample of more than 100 banks with at least $100 billion of total assets in 2014.   [2] Median ratios; values for 2008 may overstate actual capitalisation levels due to imperfect adjustment to new capital/RWA definitions.   [3] Based on a classification of bank/year observations into four business models.

Sources: R Roengpitya, N Tarashev, K Tsatsaronis and A Villegas, "Bank business models: popularity and performance", mimeo, June 2017; SNL; BIS calculations.

The other trend concerns banks' activity mix. Post-crisis, many banks downsized or exited business lines that had suffered large losses in the past or that had ex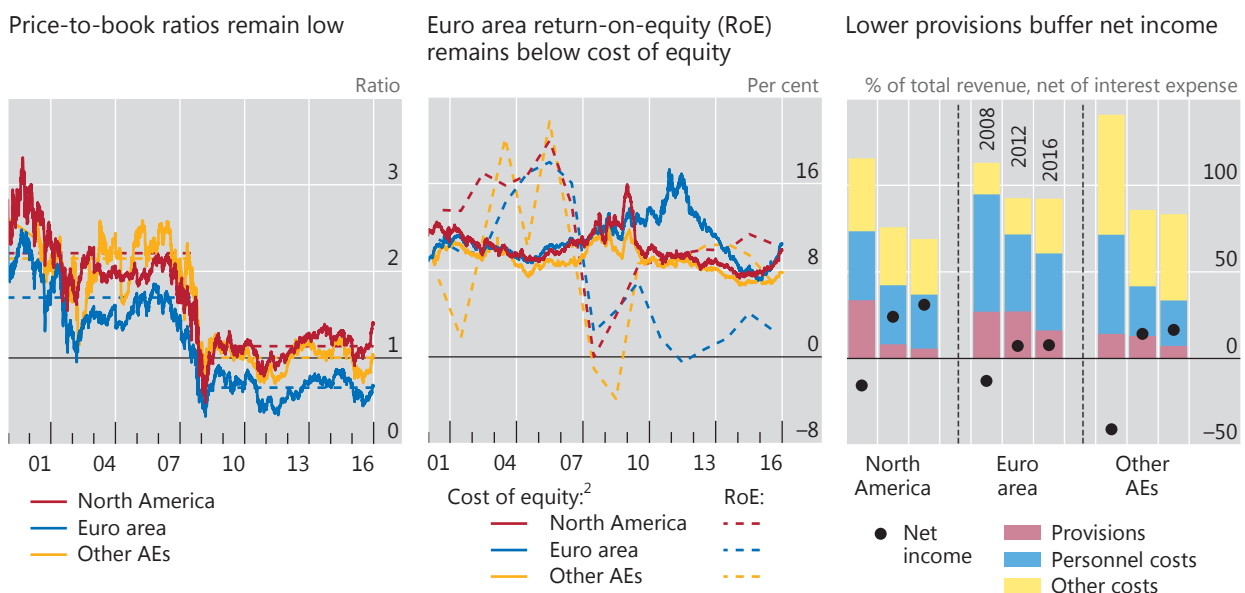posed them to litigation risks. For many major banks, headline revenues from activities such as proprietary trading have diminished and been partly replaced by other sources of non-interest income, such as wealth management. Yet, while a more diversified income base supports more sustainable profits, scale economies and competitive pressures point to diversification limits for smaller banks and the banking sector as a whole.

Despite the progress made and signs of an improved earnings outlook (see above), market valuations continue to suggest investor scepticism about bank business models, at least in some jurisdictions. For example, while broadly recovering most recently, price-to-book ratios have remained below unity for many advanced economy banks (Graph V.4, left-hand panel). Part of this scepticism reflects the macroeconomic outlook and unresolved NPL problems in some countries (see above). Another part points to unfinished business model adjustments and limited earnings capacity more generally.

This is in line with how returns-on-equity (RoEs) have developed relative to investors' required returns. To be sure, the gap between observed and required returns has narrowed. Even so, it remains positive in some regions, suggesting that current RoEs continue to fall short of investor expectations (Graph V.4, centre panel). This is so even though market-based estimates of the cost of bank equity have receded from their crisis highs and broadly returned to their pre-crisis levels. Notably, in Europe the gap widened most recently, highlighting persistent pressures to further improve profitability.

Despite improvements, many banks are still struggling to adjust[1]

Graph V.4

Price-to-book ratios remain low — Euro area return-on-equity (RoE) remains below cost of equity — Lower provisions buffer net income

The dashed lines in the left-hand panel indicate pre-crisis (Q1 2000–Q2 2008) and post-crisis (Q3 2009–latest) averages.

[1] Based on a sample of 75 AE banks; asset-weighted averages. North America = CA and US; euro area = AT, BE, DE, ES, FR, IT and NL; other AEs = AU, CH, JP and SE.   [2] Derived from a variant of the capital asset pricing model (CAPM) as shown in eg M King, "The cost of equity for global banks: a CAPM perspective from 1990 to 2009", *BIS Quarterly Review*, September 2009, pp 59–73; equity risk premia calculated as in A Damodoran, "Equity risk premiums (ERP): determinants, estimation and implications – the 2016 edition", March 2016. CAPM betas are estimated over a one-year rolling window of 250 trading days.

Sources: Datastream; SNL; BIS calculations.

Moving ahead?

What steps are needed to alleviate market scepticism and complete business model adjustments? Naturally, there is no "one size fits all" solution. However, several areas are likely to remain important from both an individual bank and a banking sector perspective: (i) capital allocation; (ii) cost efficiency; and (iii) excess capacity.

Banks' capital allocation decisions determine the balance sheet capacity available across business lines. The design of the Basel III framework, with its reliance on multiple regulatory metrics, and the greater use of supervisory stress testing in some jurisdictions mean that banks may have to adjust their capital allocation practices. Given the interaction between regulatory constraints, optimal capital allocation now involves considering multiple risk-return trade-offs. For example, there is anecdotal evidence that banks implement the leverage ratio at the business unit level, as opposed to the firm-wide level foreseen under Basel III. This simplifies capital allocation, but also implies that the leverage ratio may discourage certain low-risk/high-volume activities, such as market-making or repo market intermediation, even when the leverage ratio is not binding at the consolidated level (Box V.A). This would tend to open up business opportunities for competitors, in turn promoting further adjustments to banks' practices until the industry converges to a new benchmark. Policymakers can aid this convergence by swiftly finalising the remaining elements of regulatory reform and by ensuring consistent implementation. This includes setting a high bar for any proposed adjustments to the new regulatory standards, which should be based solely on assessments of regulatory benefits and costs at the social – not the private or sectoral – level.

The second area is improving cost efficiency, particularly in the light of increasing digitalisation and competition from non-bank entities. Despite some recent progress, cost-to-income ratios have remained stubbornly high for many banks, as cost savings have tended to go hand in hand with declining revenues. Although branch networks have generally been pruned, personnel costs, typically the largest component of banks' operating expenses, have changed little as a share of operating income – at least not after an initial, crisis-induced contraction. Much of the recent improvement in net income, particularly among European banks, was due to lower provisions, because of stronger credit quality, rather than lower operating costs (Graph V.4, right-hand panel). Pressures to further rein in costs thus remain strong, especially for banks in jurisdictions known to suffer from excess capacity.[5]

Technological innovations, often referred to as "fintech", are likely to play an important role in this context. These innovations provide new ways to communicate, store and process information, and to access financial services. As such, they are changing how banks interact with each other and with their customers. In addition, many of these new technologies were created by non-financial firms and, in some cases, allow customers to access financial services without bank involvement, adding to competition and margin pressure.[6] Admittedly, the volume of fintech-related activities remains small, and many new applications may fail. Even so, some technologies have the potential to profoundly change bank business models.

Retail and commercial lending is one of the areas where competition between banks and fintech companies has been most direct. Electronic platforms such as online or peer-to-peer lenders, for example, facilitate credit provision by matching borrowers with investors (Box V.B). Total credit volumes have so far remained small relative to traditional bank lending. Yet recent trends indicate a range of activities that allow banks to exploit scale economies and link their own comparative advantages (eg a large client base and associated data) with those of partnering fintech firms (eg a low cost base).

Box V.A

Bank capital allocation with multiple regulatory metrics

Research suggests that complementary regulatory metrics, like those now introduced by the Basel III framework, can improve market outcomes and economic welfare.[1] For example, non-risk-based metrics, such as the leverage ratio (LR), can act as backstops for banks' risk-weighted capital requirements.[2] Multiple metrics require banks to adjust their internal capital (and liquidity) allocation management – a process that is still under way.

A simple model, which focuses on the role of the LR, helps to illustrate the impact of the interaction between such allocation decisions and regulation.[3] The model, calibrated on US bank data, can rationalise why the LR may affect banks' capital allocation across business units (eg a trading unit and a loan-issuing unit as in the model) even if a bank reports an LR well above regulatory minima, as is generally the case (Graph V.A, left-hand panel).
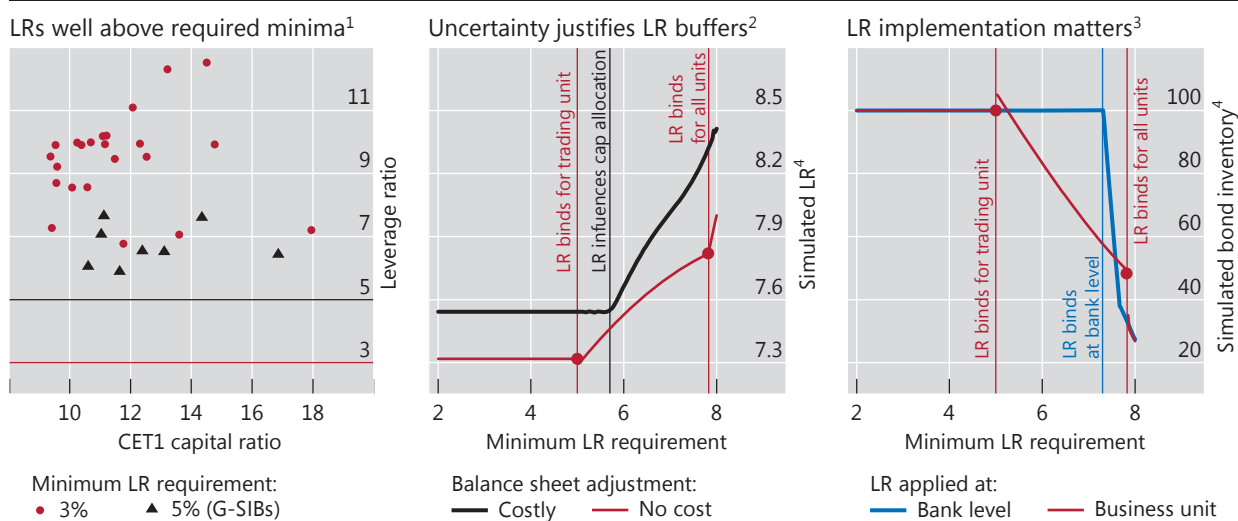
First, banks need to strike a balance between expanding their balance sheets today and costly deleveraging in the future should they be hit by an adverse shock or subjected to a stress test. Since opting for a higher LR reduces the risk of having to deleverage, such uncertainties induce banks to hold a buffer over the minimum requirement (Graph V.A, centre panel).

Second, the LR tends to be tighter for banks that apply the ratio at a business unit rather than at the consolidated bank-wide level, as intended by regulation. In the former case, low-risk/high-volume activities with low risk-weighted regulatory capital charges, such as market-making, should be constrained most. Adjusting capital allocation to take a more bank-wide perspective would reduce the tightness of the LR. Simulations indicate that the associated capital relief could have sizeable effects on banks' balance sheets, eg by supporting banks' capacity to warehouse assets for market-making purposes (Graph V.A, right-hand panel). This points to scope for future adjustments to capital allocation frameworks to ease any perceived LR-induced pressures.

How binding is the leverage ratio (LR)?

In per cent

Graph V.A

LRs well above required minima[1]

Uncertainty justifies LR buffers[2]

LR implementation matters[3]

Minimum LR requirement:
● 3%   ▲ 5% (G-SIBs)

Balance sheet adjustment:
— Costly   — No cost

LR applied at:
— Bank level   — Business unit

[1] End-2016 ratios; sample of large US bank holding companies. CET1 = Common Equity Tier 1.   [2] If adjusting the balance sheet after a shock in order to meet regulatory requirements is costly (eg due to fire sale externalities), the bank chooses a higher leverage ratio ex ante (black line) as compared with the case where adjustments carry no additional costs.   [3] A tightening of the LR has a weaker impact on banks that apply the LR at the bank level (blue line) as compared with those applying it by business unit (red line), because the former tolerate higher leverage for individual business units (eg for market-making) as long as the bank-wide LR requirement is met.   [4] Projected change in the bank's LR (centre panel) and bond inventory (right-hand panel) in response to an increase in the minimum LR requirement.

Sources: T Goel, U Lewrick and N Tarashev, "Leverage regulation and bank capital allocation", mimeo, June 2017; SNL.

[1] See eg F Boissay and F Collard, "Macroeconomics of bank capital and liquidity regulations", *BIS Working Papers*, no 596, December 2016.   [2] See I Fender and U Lewrick, "Calibrating the leverage ratio", *BIS Quarterly Review*, December 2015, pp 43–58.   [3] See T Goel, U Lewrick and N Tarashev, "Leverage regulation and bank capital allocation", mimeo, June 2017.

Box V.B

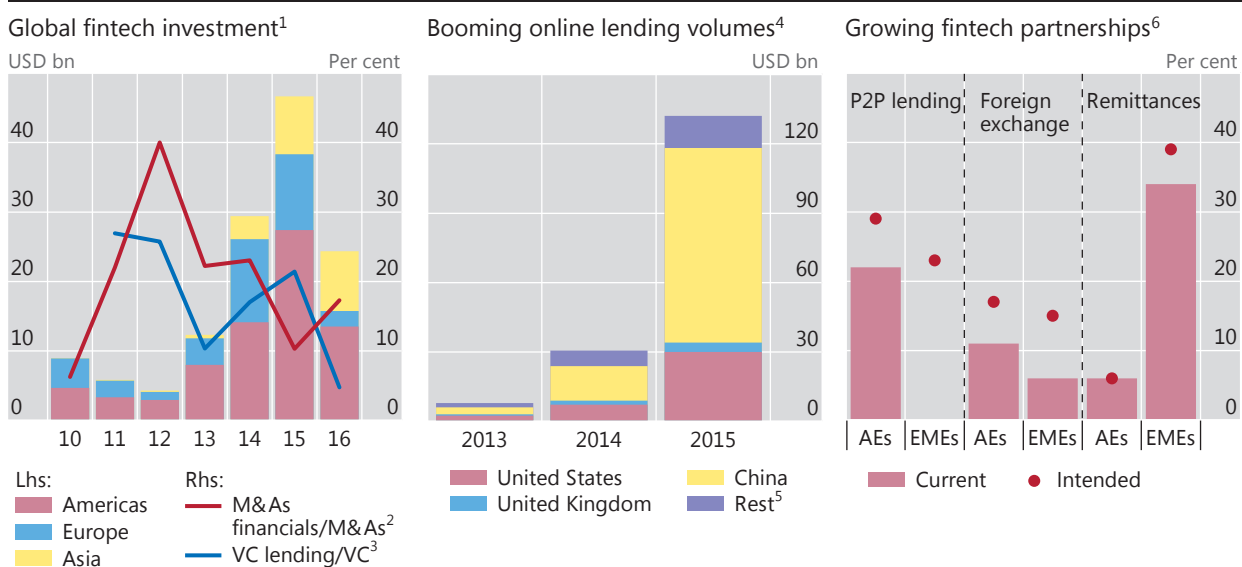# Banks and online lending: from competition to cooperation?

Fintech solutions enable customers to access financial services without – or with reduced – bank involvement, potentially disintermediating incumbents.① Fintech investment has been growing strongly (Graph V.B, left-hand panel), albeit from a low base. One rapidly expanding area is online/peer-to-peer (P2P) lending, especially in jurisdictions such as China and the United States (centre panel). From a bank perspective, online lending presents both challenges and opportunities. Lending platforms are a potentially disruptive source of competition in a key business line, particularly if they are subject to more lenient regulation. Yet banks can also reap the cost reductions, improved customer experience and enhanced efficiency that these platforms offer. Many banks have thus been working actively to integrate online lending solutions into their business models.

One approach is for banks to directly invest in online platforms through mergers and acquisitions (M&As) or venture capital. M&As have generally accounted for the largest share of global fintech investment. A substantial part of these investments has come from banks and other financials, providing them with a stake in any returns and, in some cases, access to the platforms' technology. Banks also provide debt financing to fintech platforms, for example by funding fintech loans as institutional investors or by purchasing fintech loans.

Another approach is via partnerships. Partnerships in online/P2P lending and other fintech activities are expected to grow in both advanced and emerging market economies (Graph V.B, right-hand panel). This can take a variety of forms. One is referrals, whereby a bank refers certain borrowers to whom it denied credit to the fintech platform, while the fintech platform refers customers that require banking services to the bank. A second one is loan origination, in which the bank originates loans that have been assessed and priced on the online platform, sometimes selling these loans back to the platform. A third one involves the provision of services, such as payment and settlement services or guarantees. In some cases, mostly in the United States, banks have also supplied warehousing facilities and related services that allow online platforms to securitise fintech loans. Finally, some banks partner with platforms to use fintech models/processes in their own lending.

Buoyant global investment in fintech and online credit volumes

Graph V.B

Global fintech investment[1]

Booming online lending volumes[4]

Growing fintech partnerships[6]

Lhs: Americas, Europe, Asia
Rhs: M&As financials/M&As[2], VC lending/VC[3]

United States, China, United Kingdom, Rest[5]

Current, Intended

[1] Total global investment: venture capital, mergers and acquisitions (M&As) and private equity. [2] M&As by financials as a share of total M&As. [3] Venture capital (VC) investment in online lending as a share of total fintech VC investment. [4] Total volume of financing, including crowdfunding, by online platforms. [5] Americas excluding the United States, Europe excluding the United Kingdom and Asia excluding China. [6] Percentage of banks offering services in partnership with fintech companies and expectations (next 12 months); survey of 61 banks across 24 countries, as of May 2016.

Sources: KPMG, *The pulse of fintech Q4 2016*, February 2017 (data sourced from PitchBook); Cambridge Centre for Alternative Finance; UBS.

① Fintech refers to a wide range of technologies, including online/peer-to-peer lending, payments and settlement (including distributed ledgers), insurance and trading/investment (including robo-advisers). See eg BIS, *86th Annual Report*, June 2016, p 110.

With the fintech sector still evolving, a pressing question for regulators is how to ensure prudent risk management.[7] Technologies based on vast amounts of personal data, for example, give rise to new challenges in ensuring customer privacy and data security. Mounting concerns about cyber-security underscore the potential risks of technology-enhanced financial services. Due diligence of possibly multiple internal and external service providers may be needed to ensure IT systems' integrity. Furthermore, competition between banks and fintech platforms may require approaches that maintain a cross-sectoral level playing field ("same risk, same rules") to reduce regulatory arbitrage, while preserving incentives for technological innovation, such as via regulatory "sandboxes".

The third area concerns challenges at the industry level, such as excess capacity, which are likely to require a coordinated response by prudential authorities and policymakers. In many cases, excess capacity reflects policies that aim at protecting weak banks from failure by providing explicit or implicit public support. Clearly, such policies can be crucial in addressing systemic risks during crises. They can also be a catalyst for a concerted clean-up of bank balance sheets, for example by helping to sell off impaired assets. Yet they should not keep non-viable banks from exiting or become an obstacle to bank merger activity. Indeed, barriers to exit remain high in many banking sectors, notwithstanding improved resolution mechanisms and tightened conditionality on bank recapitalisations. Policymakers may thus need to step up their efforts to help reduce excess capacity in banking sectors that suffer from weak profitability. This includes complementary supportive measures, ranging from increased supervisory attention, to targeted legal steps to facilitate the workout of problem loans (including via dedicated asset management companies), to more comprehensive reforms that address deficiencies in national labour and capital markets (Chapter I).

US dollar funding: a key pressure point?

Since major banks are at the core of the global financial system, their business model choices can have far-reaching implications. The GFC, for example, illustrated how non-US banks' heavy reliance on wholesale and, in particular, US dollar funding can amplify systemic risk. In the run-up to the crisis, many banks had built up maturity mismatches in their foreign currency business. When wholesale markets dried up, maturing funds became difficult to roll over or replace, forcing banks to scramble for US dollar funding or deleverage. These funding pressures, in turn, quickly spilled over across counterparties and jurisdictions. Thus, structural vulnerabilities in banks' funding models increased the vulnerability of the financial system as a whole.

Post-crisis reforms have sought to minimise such risks. They have targeted bank resilience, in terms of both capital and funding, as well as that of other key market participants, such as money market mutual funds (MMMFs). Yet banks' continued heavy reliance on short-term US dollar funding remains a pressure point, especially given the high degree of market concentration.

US dollar funding risks

Foreign currency funding risk was prominent at the height of the GFC. In the wake of their rapid international expansion pre-crisis, banks, particularly in Europe, had accumulated foreign claims at a pace that outstripped domestic credit growth. Foreign currency funding needs grew in lockstep, especially in US dollars, and were met in part from cross-currency sources – that is, by borrowing in one currency to

fund assets in another in the foreign exchange (FX) swap market. Even though these funding profiles may have appeared robust from an individual bank's perspective, the onset of the GFC in 2007 exposed system-wide vulnerabilities.[8] Indeed, many non-US financial institutions found it unexpectedly hard to roll over large amounts of US dollar funding, in both money and FX markets.[9]

Have such funding needs subsided post-crisis? The data suggest that the location of US dollar funding risks may have changed, but that they appear to remain large. Graph V.5 portrays the relevant information for the consolidated Canadian, German and Japanese banking systems, based on these sectors' US dollar books. German banks – along with those from France and other European countries – entered the GFC with large gross US dollar claims and liabilities (left-hand panel). These, in turn, gave rise to sizeable net US dollar positions (dollar exposures that exceed on-balance sheet dollar liabilities; red lines), mainly financed and hedged by off-balance sheet instruments, such as FX swaps.[10] The resulting "US dollar funding gap" for the combined European banking sector peaked in mid-2007, and has come down significantly since then. By contrast, Japanese banks kept expanding both their gross and net US dollar positions, thereby creating substantial structural funding needs (centre panel). Canadian banks' positions followed a similar trend, though at lower overall levels (right-hand panel).

Graph V.6 provides a richer picture for a broader range of banking systems (left-hand panel). It shows dollar claims and liabilities by bank headquarters location, combined with information on the location of banks' counterparties. A number of points are worth highlighting.

First, US dollar-based financial intermediation is both large and very much international. Indeed, the majority of international US dollar lending occurs vis-à-vis non-US counterparties.[11] Banks headquartered in – and with funding sourced from – countries outside the United States play a key role. Japanese banks stand out, with dollar assets worth more than $3 trillion, supported by on-balance sheet funding of around $2.5 trillion (see also Graph V.5). The difference is most likely

Diverging trends in banks' US dollar foreign positions

By counterparty sector, in trillions of US dollars   Graph V.5
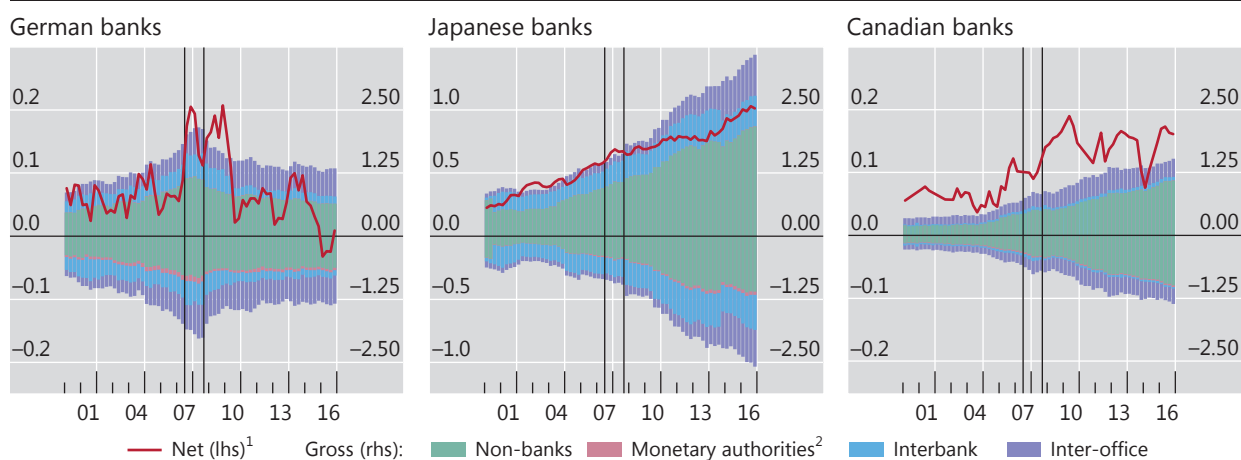
The vertical lines indicate the 2007 beginning of the Great Financial Crisis and the 2008 collapse of Lehman Brothers.

[1] US dollar assets minus US dollar liabilities.   [2] Cross-border positions in all currencies and local positions in foreign currencies vis-à-vis official monetary authorities.

Sources: BIS consolidated banking statistics (immediate counterparty basis) and locational banking statistics; BIS calculations.

Banks' US dollar intermediation reflects geographical differences

As of end-September 2016   Graph V.6

Banks' US dollar positions, by counterparty location[1]

Banks' foreign positions, by booking location[7]

Legend (left chart):
- United States
- Other AEs[4]
- Offshore centres
- EMEs
- Unallocated[5]
- Implied FX swaps (net)[6]

Categories (left chart x-axis): US[2], JP, GB, CH, FR, CA, DE, CN[3], ES

Legend (right chart):
- USD-denominated
- Other currencies

[1] US dollar-denominated (including intragroup) positions booked by BIS reporting banks headquartered in the countries shown. Assets (positive) and liabilities (negative) comprise cross-border and local positions booked in all BIS reporting countries combined (including in the United States and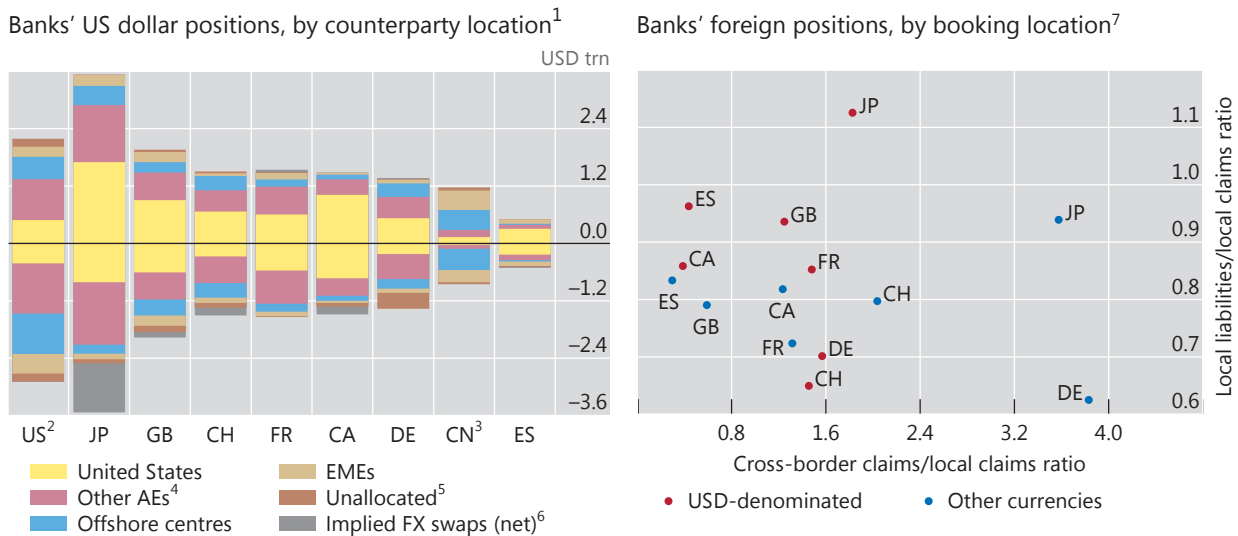 China, except for local positions of US banks in the US and local positions of banks in China). [2] Excludes US banks' domestic dollar positions inside the United States; implied FX swap position not shown. [3] Excludes Chinese banks' domestic dollar positions inside China; implied FX swap position not calculated. [4] Positions vis-à-vis counterparties in other AEs. [5] Positions with no country breakdown (including international organisations). [6] Cross-currency funding (or lending) inferred by equating US dollar assets with liabilities, and implied reliance on FX swaps assuming that banks fully hedge open dollar positions. [7] Local positions comprise those booked where the counterparty resides; cross-border positions include those booked by banks' home offices as well as positions booked by banks' foreign affiliates; intragroup positions and positions on the home country are excluded.

Sources: BIS consolidated banking statistics (immediate counterparty basis) and locational banking statistics.

accounted for by instruments such as FX swaps (grey bars in Graph V.6). As of end-2016, this took total non-US banks' US dollar funding to around $10.5 trillion (Box V.C). The heavy demand for FX swap dollar borrowing is reflected in the premium banks typically pay in the FX swap market relative to the wholesale cash market (Chapter II).[12]

Second, there are signs of significant rollover risks, as sizeable parts of banks' US dollar funding rely on short-term instruments such as repos and FX swaps. Recent market reactions to MMMF reform in the United States provide an admittedly imperfect test of non-US banks' resilience to these risks (Box V.C). They suggest that the global banking system has been able to adjust rather smoothly to the loss of US dollar funding from a key supplier, US "prime" funds. While the cost spread on this funding has increased somewhat, volumes have largely been replaced. However, the reform was gradual and well anticipated, leaving open questions about banks' ability to retain funding under less benign conditions.

A mitigating factor is that a substantial part of banks' short-term funding is known to be collateralised, often with high-quality assets. This should help them obtain funding from alternative sources, including central banks, if current ones were to dry up. Yet although collateral helps mitigate both credit and liquidity risks, haircuts could well increase during a liquidity squeeze – at least for lower-quality collateral. There are also signs that banks' funding mix has been shifting towards offshore US dollar deposits (Box V.C), which lack the direct backstop ultimately provided by the Federal Reserve.

Box V.C

US money market fund reform and non-US banks' global dollar funding

The reform of US money market mutual funds (MMMFs) took effect in October 2016. Along with other rule changes, the reform requires "prime" MMMFs to maintain a floating net asset value, changing the funds' economics from an investor perspective. Since non-US banks rely heavily on unsecured funding from prime MMMFs, it was feared that the reform would lead to a US dollar funding crunch for these banks. Eventually, the reform did result in a substantial loss of dollar funding from MMMFs and some increase in its cost (Chapter II). However, non-US banks were able to mute the effect by raising US dollar deposits and similar funds from other sources.[①]

On net, MMMF reform subtracted some $310 billion of US dollar funding from non-US banks in the four quarters to September 2016, by which time most of the adjustment had taken place. A loss of about $480 billion from prime MMMFs was partially compensated by some $170 billion in repo funding from government-only funds (ie those not subject to the new regulations), with the maturity of MMMF funding declining in the process (Graph V.C, left-hand panel). The composition of US dollar funding also changed, as foreign banks' US operations responded by running down their holdings of excess reserves at the Federal Reserve and, to a lesser extent, drawing on funding from headquarters.

Overall, global (on-balance sheet) US dollar funding for non-US banks stood at almost $9.5 trillion at end-2016 (Graph V.C, right-hand panel). Off-balance sheet funding, mainly via FX swaps, raised the total to around $10.5 trillion. Despite the run-off of eurodollar deposits by US MMMFs, offshore deposits at non-US banks rose to about $4.1 trillion by September 2016, reflecting the rising importance of offshore funding in the global banking system. The MMMF reform episode thus appears to confirm global banks' ability to maintain US dollar funding. Yet questions remain about the resilience of funding under more stressed conditions.

Deposits from US MMMFs down, but eurodollars up at non-US banks

Graph V.C

Funding by US money market funds to foreign banks

On-balance sheet dollar funding of non-US banks[4]
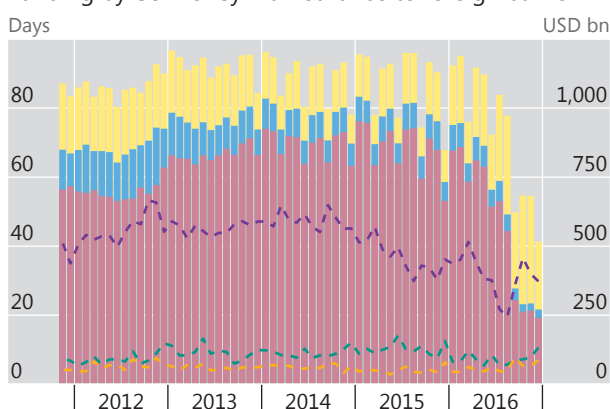
Avg[1] days to maturity (lhs):
- - - Unsecured funding by prime funds[2]
- - - Repos by prime funds
- - - Repos by govt funds[3]

Amount of funding (rhs):
- Repos by govt funds
- Repos by prime funds
- Unsecured by prime funds
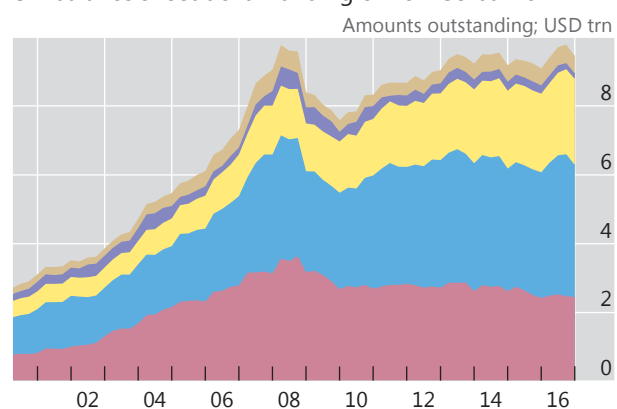
Deposits of non-banks:
- Banks in the US[5]
- Banks outside the US[6]
- International bonds[7]

Liabilities to:
- US banks[8]
- CBs[9]

[1] Value weighted by notional amounts. [2] Includes certificates of deposit, commercial paper and other sources of funding. [3] Government and treasury funds. [4] Excluding positions reported by China and Russia, both of which started reporting to the BIS locational banking statistics as from Q4 2015. [5] US dollar-denominated local liabilities (total) plus US dollar-denominated cross-border liabilities to non-banks by foreign affiliates in the United States; local liabilities are sourced from the BIS consolidated banking statistics on an immediate counterparty basis. [6] US dollar-denominated liabilities to non-banks by non-US banks located outside the US. [7] US dollar-denominated issuances by non-US public and private banks; includes bonds, medium-term notes and money market instruments. [8] US dollar-denominated interbank claims of US banks. [9] US dollar-denominated liabilities to official monetary authorities (CBs) by non-US banks.

Sources: Crane Data; Dealogic; Euroclear; Thomson Reuters; Xtrakter Ltd; BIS consolidated banking statistics (immediate counterparty basis), debt securities statistics and locational banking statistics; BIS calculations.

[①] See BIS, "Highlights of global financial flows", *BIS Quarterly Review*, March 2017, pp 15–23.

Third, international dollar intermediation appears to be rather concentrated. Interbank US dollar lending is known to be dominated by about a dozen or so large banks, with banks from eight non-US economies accounting for more than 60% of international dollar assets and liabilities. Much of the associated US dollar funding flows through repo markets, which are themselves fairly concentrated, due to sizeable scale economies in clearing and settlement. US triparty repos, where clearing and settlement depend on services from only two clearing banks, are estimated to account for about half of US repo market volume, at $1.7 trillion. The other half is settled bilaterally. Similarly, inter-dealer repos in US government securities are cleared via a single central counterparty (CCP), which accounted for total net cash borrowings of about $124 billion in May 2017.[13]

Finally, banks – and banking systems – are likely to perform differently in terms of shock transmission and absorption.[14] Varying degrees of reliance on offshore centres (blue bars in Graph V.6), for example, reflect differences in the way funds are sourced and redistributed across banks' global operations. The right-hand panel of Graph V.6 provides a fuller picture of banks' organisational structures, highlighting the degree of centralisation of their international activities. On the basis of aggregate asset positions, banks from Germany, Japan and Switzerland are relatively centralised. That is, a lot of their US dollar and other foreign currency assets are booked via their home offices or third countries, as opposed to banks' local branches and subsidiaries (high ratios on the horizontal axis). Liability patterns, however, differ in that much of Japanese banks' US dollar financing is locally sourced (high values on vertical axis), whereas German and Swiss banks rely more on home office and third-country funds. By contrast, Spanish and Canadian banks' balance sheets reflect much more locally managed and funded foreign activities.[15]

Policy implications

The patterns highlighted above suggest that global US dollar funding markets are likely to be a key pressure point during any future market stress episode. Non-US entities' US dollar funding needs remain large, posing potentially sizeable rollover risks. They are also concentrated on a rather limited number of major banks. Interconnectedness is another important factor, as dollar funds are sourced from a variety of bank and non-bank counterparties to support both outright US dollar lending and various types of market-based dollar intermediation. In this context, counterparties such as MMMFs, insurance companies and large corporates interact with banks in a range of markets, including those for repos and FX swaps. In addition, many of the same banks provide services to entities such as CCPs, which – under stress – can be a source of large liquidity demands.

What does this imply for policy? A first key issue is banks' organisational structures and the spillover risks that can arise from the links between their head offices and local affiliates. This underlines the importance of supervisory cooperation. Cooperation is essential to share information on banks' global US dollar funding profiles and conduct targeted stress tests (eg of banks' reliance on the FX swap market). Key tools include supervisory colleges, memoranda of understanding (MoUs) and less formal home-host supervisory bilateral cooperation. In addition, in some host jurisdictions regulators now require that foreign banks' local operations be more self-sufficient. Such measures, which sometimes involve full legal subsidiarisation, give rise to important trade-offs. For instance, while mitigating systemic risk concerns, subsidiarisation, and corresponding supervisory constraints on foreign branches, may hinder the movement of funds across affiliates within the same holding company and raise operating costs. This could deter foreign bank participation – a consideration that may be especially relevant for EME regulators.[16]

Spillover risks also support work on broader preventive measures in several areas. One is regulatory requirements to limit banks' maturity transformation and rollover risks. Examples include Basel III's Liquidity Coverage Ratio, which can be implemented at the individual currency level. Another involves more general steps to enhance the resilience of banks and other financial institutions, including other requirements under the Basel III package and similar regulations for non-banks, such as US MMMF reform. International minimum standards, such as Basel III, also help to reduce any distortions from unlevel playing fields or regulatory fragmentation. A third area concerns market infrastructure design, including triparty repos and CCPs. US repo market reform, for example, has successfully reduced the use of clearing bank-provided intraday credit in triparty repos – addressing a concern highlighted by the GFC. CCP resilience, in turn, is supported by measures such as the CPMI-IOSCO *Principles for financial market infrastructures* and work under way to enhance CCP recovery planning and resolution.[17]

A second key policy issue concerns access to US dollar funding during market disruptions. Given cross-currency funding mismatches and associated rollover risks, national authorities may need to facilitate access to US dollar funds to meet the foreign exchange needs of domestic banks and corporates.

One way of doing so is through their holdings of foreign exchange reserves. In 2008, some EMEs used their reserves for this purpose.[18] Yet authorities may be reluctant to dip into their reserves: financial markets could see it as a negative signal about the country's condition. There are also signs that reserve management can generate undesirable procyclical effects. During the GFC, for example, many reserve managers reduced their placements with riskier counterparties, especially banks, and cut back on their securities lending programmes.[19]

Another way to mobilise foreign currency funding is through central bank swap lines. For the US dollar, only the Federal Reserve is in a technical position to supply dollars elastically.[20] This is why, during the GFC, major central banks opted for a network of ad hoc swap lines among themselves to supply and distribute US dollar liquidity. The arrangement's success underlines the need for central banks to retain the ability to offer such swap lines, some of which have since been made permanent.[21] Owing to several considerations, not least moral hazard and risk management, such arrangements are likely to remain narrow in scope and be designed for use only as backstops.[22]

Endnotes

1   See eg J Fell, M Grodzicki, R Martin and E O'Brien, "Addressing market failures in the resolution of non-performing loans in the euro area", *ECB Financial Stability Review*, November 2016.

2   See Moody's Investors Service, "Rating action: Moody's downgrades Canadian banks", 10 May 2017.

3   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.

4   See BIS, *86th Annual Report*, June 2016, Chapter VI; and CGFS, *Fixed income market liquidity*, CGFS Papers, no 55, January 2016.

5   See eg V Constâncio, "Challenges for the European banking industry", lecture at the University of Navarra conference "European banking industry: what's next?", Madrid, 7 July 2016.

6   See BIS, ibid; and CGFS-FSB, *FinTech credit: Market structure, business models and financial stability implications*, May 2017.

7   See eg CPMI, *Distributed ledger technology in payment, clearing and settlement – an analytical framework*, February 2017.

8   See BIS, *78th Annual Report*, June 2008, Chapter VI.

9   For a more detailed analysis, see P McGuire and G von Peter, "The US dollar shortage in global banking and the international policy response", *International Finance*, vol 15, issue 2, June 2012.

10   For an explanation of the calculation methodology, see McGuire and von Peter, ibid.

11   International lending excludes more than $10 trillion worth of purely domestic positions of US banks.

12   See C Borio, R McCauley, P McGuire and V Sushko, "Covered interest rate parity lost: understanding the cross-currency basis", *BIS Quarterly Review*, September 2016, pp 45–64.

13   See V Baklanova, O Dalton and S Tompaidis, "Benefits and risks of central clearing in the repo market", *Office of Financial Research Brief Series*, no 17-04, March 2017.

14   See I Fender and P McGuire, "Bank structure, funding risk and the transmission of shocks across countries: concepts and measurement", *BIS Quarterly Review*, September 2010, pp 63–79; and N Cetorelli and L Goldberg, "Liquidity management of US global banks: internal capital markets in the great recession", *Journal of International Economics*, vol 88, issue 2, November 2012, pp 299–311.

15   During the GFC, local claims booked by banks' foreign affiliates, particularly if funded by local liabilities in local currencies, tended to be more stable than cross-border and inter-office claims. See eg R McCauley, P McGuire and G von Peter, "After the global financial crisis: from international to multinational banking?", *Journal of Economics and Business*, vol 64, issue 1, January–February 2012, pp 7–23.

16   For a discussion, see CGFS, *EME banking systems and regional financial integration*, CGFS Papers, no 51, March 2014.

17   See BCBS-CPMI-FSB-IOSCO, *Progress report on the CCP workplan*, August 2016.

18   See CGFS, *Global liquidity – concept, measurement and policy implications*, CGFS Papers, no 45, November 2011.

19   See R McCauley and J-F Rigaudy, "Managing foreign exchange reserves in the crisis and after", *BIS Papers*, no 58, October 2011.

20   For details, see D Domanski, I Fender and P McGuire, "Assessing global liquidity", *BIS Quarterly Review*, December 2011, pp 57–71.

[21]   See ECB, "Experience with foreign currency liquidity-providing central bank swaps", *Monthly Bulletin*, August 2014; and CGFS, *Designing frameworks for central bank liquidity assistance: addressing new challenges*, *CGFS Papers*, no 58, April 2017.

[22]   In addition to self-insurance via foreign exchange reserves, a possible alternative to swap lines is cross-border collateral arrangements (CBCAs). Such arrangements can be an effective shock mitigant in cases of dysfunction in individual local funding markets. CBCAs allow central bank liquidity to be made available to foreign affiliates against a broader range of assets than would otherwise be the case, aiding central bank responses in times of stress. See CGFS (2014), op cit.

VI. Understanding globalisation

Globalisation has had a profoundly positive impact on people's lives over the past half-century. Nevertheless, despite its substantial benefits, it has been blamed for many shortcomings in the modern economy and society. Indeed, globalisation has faced more severe criticism than technological innovation and other secular trends that have potentially had even more profound consequences. This chapter outlines how increased economic globalisation – tighter trade and financial integration – has contributed to a remarkable increase in living standards. Adjustment costs and financial risks need to be carefully managed, but they do not justify a backlash against globalisation.[1]

Trade and financial openness are deeply symbiotic. Trade integration not only relies on, but generates, financial linkages. Banks with international operations underpin trade financing and follow their customers into foreign markets. Trade denominated in a foreign currency can require hedging, with counterparties accumulating international positions. Firms may build capacity in a foreign country with an attractive skill or resource base in order to export from there. Managing the financial asset and liability positions built up through trade induces still deeper financial linkages, including international trade in financial services.

Tighter global economic integration has been hugely beneficial. Globalisation has been instrumental in raising living standards and has helped lift large parts of the world population out of poverty. Trade openness has greatly enhanced productive efficiency and vastly improved consumption opportunities. Financial openness, in addition to supporting international trade, allows greater scope for diversifying risks and earning higher returns. It also makes funding more readily available and facilitates the transfer of knowledge and know-how across countries.

Globalisation has also posed well known challenges. Gains from trade have not been evenly distributed at the national level. Domestic policies have not always succeeded in addressing the concerns of those left behind. The requisite structural adjustment has taken longer, and been less complete, than expected. Furthermore, unless properly managed, financial globalisation can contribute to the risk of financial instability, much like domestic financial liberalisation has. And, not least through financial instability, it can increase inequality. But globalisation has also often been made a scapegoat. For instance, there is ample evidence that globalisation has not been responsible for the majority of the concurrent increase in within-country income inequality.

Attempts to roll back globalisation would be the wrong response to these challenges. Globalisation, like technological innovation, has been an integral part of economic development. As such, it should be properly governed and managed. Countries can implement domestic policies that boost resilience. These include flexible labour and product markets and policies that enhance adaptability, such as retraining programmes. Close cross-country linkages imply that policies and actions of individual countries inevitably affect others. Hence, international cooperation must supplement domestic policies. In particular, a global regulatory framework should be the basis for a sound and resilient international financial system.

This chapter first outlines the deep interconnectedness of trade and financial openness and sets out a stylised framework to analyse globalisation. It then maps out the historical path of globalisation – from the "first wave" leading up to World War I, through the "great reversal" of the interwar years, to the revival and surge in

globalisation post-World War II in the "second wave". The chapter argues that recent suggestions of "peak globalisation" are misleading. Next, it reviews how the structure of trade and financial integration has evolved in the second wave. It then discusses the impact of globalisation on welfare, noting its contribution to the substantial growth in incomes and the dramatic decline in poverty as well as the risks to financial stability linked with financial openness. The final section makes some concluding observations, discussing policy measures that can further enhance the benefits of globalisation and minimise the adjustment costs.

Trade and financial openness are intertwined

International trade and financial openness go hand in hand. Trade is facilitated by financial links, such as international payments and credit, and in turn results in financial links, such as the accumulation of international assets and liabilities. As a result, it is not surprising that countries that are more open to trade also tend to have higher financial openness (Graph VI.1, left-hand panel).

The relationship between real and financial openness, however, evolves with the degree of integration and development. Conceptually, one can think of three globalisation layers. The first, most basic layer is trade of commodities and finished goods and the corresponding simple international financial links, such as cross-border payments. The second layer involves more complex trade and financial connections. It includes trade in intermediate goods and services associated with the efficiency-driven fragmentation of production across countries and the corresponding financing arrangements. The third layer concerns the financial transactions increasingly used to actively manage balance sheet positions. These

Financial openness increases with trade openness and GDP per capita

Graph VI.1

Financial and trade openness

Financial openness and GDP per capita

Ratio of financial openness to trade openness[1]
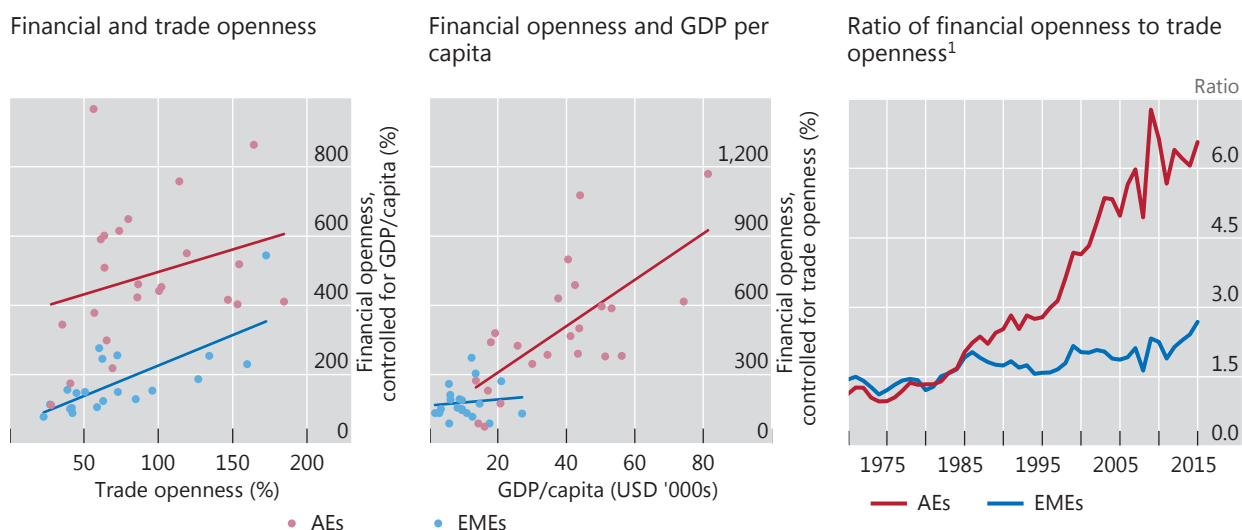
Financial openness = (foreign assets + liabilities) / GDP; trade openness = (exports + imports) / GDP; financial openness controlling for GDP/capita (trade openness) = financial openness less that part explained by demeaned GDP/capita (trade openness) in a regression of financial openness on both GDP/capita and trade openness.

AEs = AT, AU, BE, CA, CH, DE, DK, EE, ES, FI, FR, GB, GR, IT, JP, LT, LV, NO, PT, SE, SI, SK and US; EMEs = AR, BR, CL, CN, CO, CZ, HU, ID, IN, KR, MX, MY, PE, PH, PL, RU, SA, TH, TR and ZA.

[1] Median across countries listed in each group. Excluding CH, CN, CZ, EE, HU, KR, LT, LV, PL, PT, RU, SI and SK.

Sources: Lane and Milesi-Ferretti (2017); World Bank; BIS calculations.

positions include the stocks of assets and liabilities, and exposures more generally, created by the first two layers, as well as the allocation and diversification of savings, not necessarily related to trade. The third layer thus introduces some decoupling between real and financial openness.

The links between trade and financial openness are most immediate in the first globalisation layer. Trade in this layer is mostly driven by resource endowments and is directly supported by a range of international financial services. Trade is settled with international payments, which almost always involve foreign exchange transactions. Indeed, trade payments are generally denominated in a global currency rather than that of either the exporter or importer: around half of all international trade is invoiced in US dollars and close to a quarter in euros (even excluding the trade of the United States and euro area countries, respectively).[2] Furthermore, as international transactions take time to complete given shipping time and customs processing, they require extra financing. Banks' trade finance facilitates around one third of international trade, with large global banks providing between one quarter and one third of this.[3] Letters of credit, where a bank guarantees payment upon delivery of goods, underpin around one sixth of trade.

In the second globalisation layer, international financial linkages support a greater degree of specialisation in trade and production, notably in the trade of intermediate goods. Production can occur through ownership of foreign facilities established by foreign direct investment (FDI), outsourcing to foreign firms, or fragmented production in a global value chain (GVC). This more complex trade can go hand in hand with the growth of multinational corporations that serve multiple markets, often through production-focused foreign affiliates while concentrating research and development in the parent.[4] These more intricate production structures require more, and often more complex, financing. GVC-related investments may call for cross-border financing, often in foreign currency. And longer production chains may involve more working capital and larger foreign currency exposures.[5] Finance can promote trade by reducing these risks, for instance through derivatives or borrowing in foreign currency to match corresponding income streams.

The third globalisation layer is characterised by intricate financial links established solely for financial purposes. This layer builds upon the first two to the extent that trade has generated stocks of assets and liabilities that need to be managed financially. More generally, the demand for, and supply of, more sophisticated financial products and services increases with the wealth of businesses and households. In a sense, trade also supports this third layer of globalisation through its contribution to higher income growth. Indeed, financial openness tends to increase strongly with income levels (Graph VI.1, centre panel). However, gross foreign asset and liability positions grow much larger than net positions, underlining the more independent nature of financial linkages: financial openness has substantially outpaced real openness since the late 1980s, most notably for advanced economies (Graph VI.1, right-hand panel).

The three layers share some common elements. One is the use of global currencies. As the dominant global currency, the US dollar is used to denominate not only around half of trade, but also roughly half of global cross-border bank claims and more than 60% of central banks' foreign exchange assets, and features in 90% of foreign exchange transactions. Consequently, the dollar plays a central role in determining global financial conditions (see also Chapter V). Another is globally active financial institutions. They operate in many countries across multiple continents. Through their international presence and sophistication, they facilitate the global transfer of funding and financial risks. Balance sheets that are managed at a consolidated level create close international financial linkages.

The evolution of globalisation

The first globalisation wave, which died out with World War I and the Great Depression, saw a substantial increase in both real and financial cross-border linkages. Trade openness for the then major economies, measured as the ratio of imports plus exports to GDP, more than doubled from the early 1800s to be close to 30% by the turn of the century (Graph VI.2).[6] The increase in financial openness, measured as investment assets held by foreigners as a share of GDP, was no less dramatic, with capital flows to colonies particularly notable. However, the first globalisation wave was relatively simple: most transactions were in the first, or second, layer. The collapse of the first wave was as remarkable as its build-up: the "great reversal" in the interwar period witnessed an almost complete unwinding. Many factors contributed, not least increased protectionism, responsible for around half of the decline in global trade in the Great Depression.[7]

The second globalisation wave, starting after World War II, has far outstripped the first. Trade openness surged beyond its prewar peak as countries traded more, and more countries traded. For the world as a whole, trade openness has doubled since 1960 (Graph VI.2). Improvements in transport and communication have again played a role, but trade liberalisation has been a much more important factor than in the first wave.[8] Trade growth in the two decades up to the mid-2000s was particularly rapid: China and former communist countries re-entered global trade and the second globalisation layer expanded quickly. The specialisation through the division of production stages across national borders resulted in the unprecedented expansion of GVCs.

Financial openness increased with trade openness in both waves, but its rise has been much more marked in the second. Available estimates, while highly imperfect, suggest that financial openness is more than triple its prewar peak. External financial assets and liabilities have soared, from around 36% of GDP in 1960 to around 400% ($293 trillion) in 2015.

The rapid expansion in financial openness from the mid-1990s has been concentrated in advanced economies. Relative to GDP, the external positions of advanced economies and emerging market economies (EMEs) were roughly equal

The second wave of economic globalisation has outstripped the first

As a percentage of country sample GDP

Graph VI.2

Legend: Financial assets and liabilities (lhs)[1]; Trade (rhs): Fixed sample; All countries
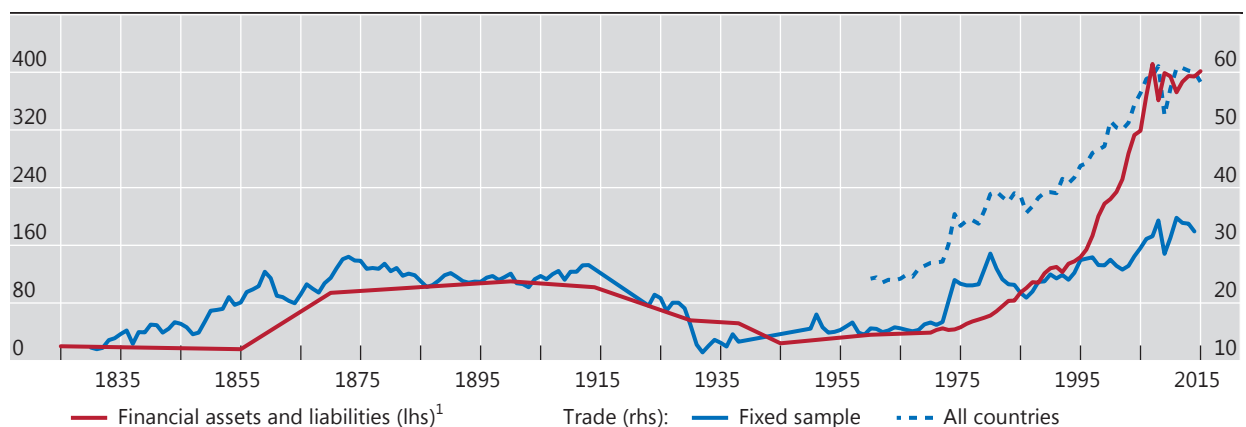
[1] Prior to 1970, calculated as external financial assets multiplied by two.

Sources: Federico and Tena-Junguito (2017); Lane and Milesi-Ferretti (2017); Obstfeld and Taylor (2004); Federal Reserve flow of funds accounts; IMF, *Balance of Payments Statistics*; World Bank; US Department of the Treasury; McKinsey Global Institute analysis; BIS calculations.

up until the early 1990s. Since then, the cross-border financial assets and liabilities of advanced economies have surged, from roughly 135% to over 570% of GDP. In contrast, the increase for EMEs during the same period was more modest, from approximately 100% to 180% of GDP.

Trade

The nature of trade has changed markedly during the second globalisation wave. Economic development, greater market access, and improvements in transportation and in information and communication technology have broadened the range of items traded. Natural resource endowments were an important determinant of trade flows 50 years ago, with much of trade in the first globalisation layer. Now, the location of skilled and unskilled labour and relative expertise has become more important, with the second globalisation layer becoming dominant. In the early 1960s, food accounted for nearly one quarter of traded goods; today, its share is less than 10% (Graph VI.3, left-hand panel). Similarly, trade in fuel and that in metals and ore are little changed as a share of GDP, abstracting from the large price swings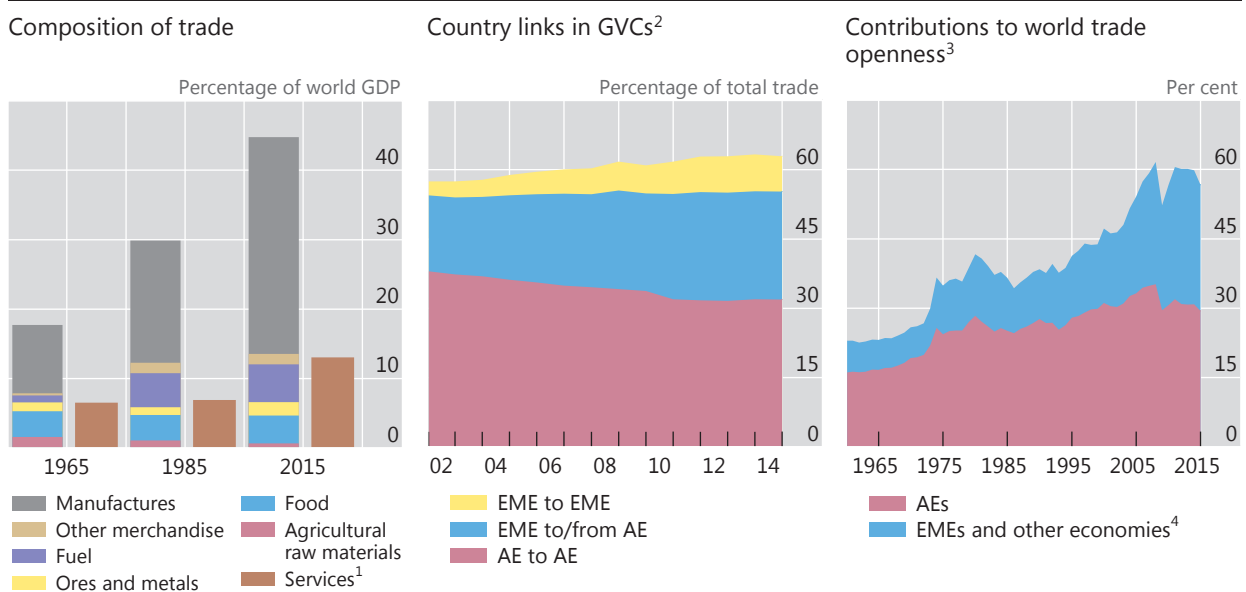 in those commodities. In contrast, trade in services, including financial, has surged over the past three decades, from 7% of global GDP to 13%. And by far the biggest change has been the growth in the trade of manufactured goods: they now constitute over half of global trade.

GVCs have been a key driver of trade growth, especially in manufactured goods, facilitated by the improvements in market access, transport and technology.[9] The process started in the mid-1980s, with high- and low-skill tasks increasingly being located in different countries. As a result, trade in intermediate goods and services now accounts for almost two thirds of total global trade.

EME participation in GVCs has increased dramatically. In 2014, EMEs were involved in half of GVC trade, as measured by trade in intermediate goods and

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Trade has become more complex as EME involvement has grown   Graph VI.3

Composition of trade — Percentage of world GDP

Manufactures / Food / Other merchandise / Agricultural raw materials / Fuel / Ores and metals / Services[1]

Country links in GVCs[2] — Percentage of total trade

EME to EME / EME to/from AE / AE to AE

Contributions to world trade openness[3] — Per cent

AEs / EMEs and other economies[4]

[1] Value imputed for 1965.   [2] Based on trade in intermediate goods and services. AE = AT, AU, BE, CA, CH, CY, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, JP, LT, LU, LV, MT, NL, NO, PT, SE, SI, SK and US; EME = BG, BR, CN, CZ, HR, HU, ID, IN, KR, MX, PL, RO, RU, TR, TW and rest of the world.   [3] Exports plus imports of country group divided by world GDP.   [4] World total less the share of advanced economies.

Sources: World Bank; World Input-Output Database; BIS calculations.

services, up from around one third in 2001 (Graph VI.3, centre panel). The share of GVC trade between EMEs has more than doubled. China alone is now responsible for 19% of GVC trade, up from 7%. And in the process, intra-EME trade integration has increased at a faster rate than that of advanced economies, alongside EMEs' greater heft in the world economy (Box VI.A; Graph VI.3, right-hand panel).

Large multinational corporates dominate global trade. These firms, with operations in multiple countries, often play a prominent role in GVCs. For example, in the United States around 90% of trade involves multinationals, and half is between related entities within a multinational.[10] Despite the expansion in EME trade, multinationals remain more prevalent in advanced economies.

Finance

Advanced economies' financial openness accelerated markedly from the mid-1990s. International assets and liabilities soared as financial liberalisation and innovation provided new opportunities to manage positions and risk. Advanced economies' external liabilities surged from under 80% of GDP in 1995 to over 290% in 2015. Every major component of external liabilities at least doubled as a share of GDP. Highlighting the prominence of the third globalisation layer, portfolio debt liabilities quadrupled and portfolio equity liabilities more than quintupled.

Tighter financial integration was most evident in advanced Europe, where the introduction of the euro helped boost cross-border transactions (Graph VI.4, left-hand panel). Between 2001 and 2007, 23 percentage points of the increase in the ratio of advanced economies' external liabilities to GDP was due to intra-euro area financial transactions and another 14 percentage points to non-euro area countries' financial claims on the area.

Just as multinational corporations play a key role in trade, large internationally active financial institutions increasingly dominate global finance, particularly in advanced economies. These giants have subsidiaries and branches in countries across several continents. They engage not only in cross-border financial transactions, but also in local borrowing and lending, not classified as international transactions in the balance of payments (BoP) accounting framework. As a result, standard BoP-based measures of financial openness tend to underestimate the degree of global interconnectedness (Box VI.B), just as they do for the non-financial sector, where multinationals' subsidiaries produce for their local market.

For EMEs, overall financial openness has grown only slightly faster than trade openness, but the composition of external liabilities has changed substantially to support greater risk-sharing (Graph VI.4, right-hand panel). The share of equity (portfolio equity and the equity component of FDI) has risen considerably since the early 1980s.

A couple of factors have contributed to the growing share of equity liabilities in EMEs. First, tighter EME trade integration has stimulated equity flows, such as through GVCs. Second, improvements in institutional quality and governance and in macroeconomic conditions have whetted investors' appetite for long-run EME exposures. These factors have been particularly important for FDI, given its dependence on longer-run macroeconomic considerations.[11]

However, the increase in risk-sharing is not as great as the rising total FDI share in global capital flows suggests. First, FDI flows consist not only of equity but also of debt, which engenders less risk-sharing. The debt component captures (non-financial) intra-company flows, driven by non-financial corporates' offshore issuance and investment activity.[12] As a result, FDI debt tends to behave more like portfolio debt than like the more stable FDI equity. Second, a large part of the recent rise reflects positions vis-à-vis financial centres. To this extent, it mirrors mainly the

Different evolution of external positions in AEs and EMEs

Gross external liabilities as a percentage of GDP   Graph VI.4
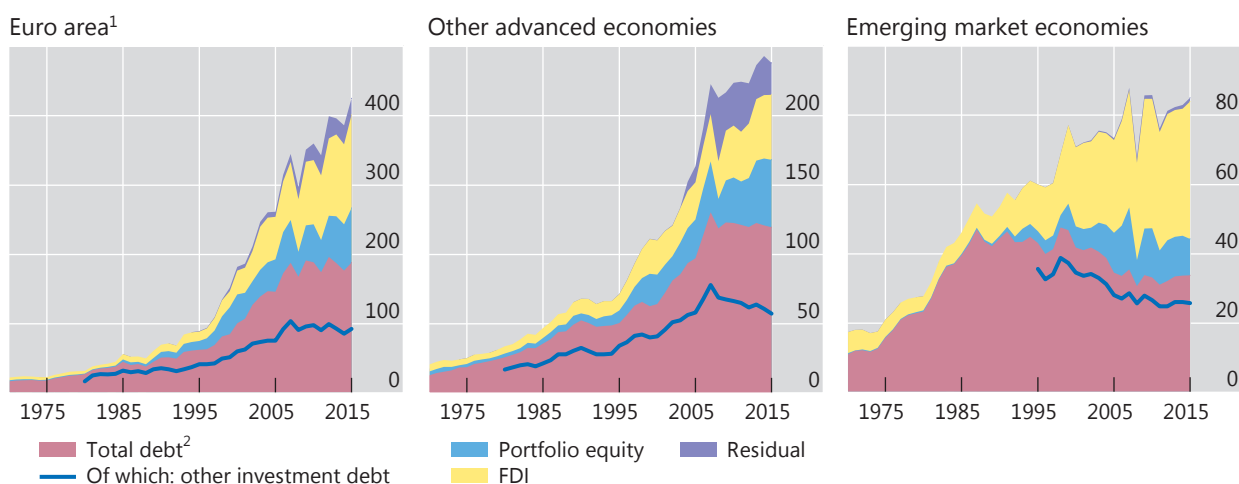
Euro area[1]　　　　　　　　　　　Other advanced economies　　　　　Emerging market economies

Legend:
- Total debt[2]
- Of which: other investment debt
- Portfolio equity
- FDI
- Residual

The complete list of countries is available at http://www.bis.org/statistics/ar2017stats/ar87_c6.xlsx.

[1] The series for the euro area are constructed as sums of the respective series for individual countries; intra-euro area positions are not netted out.　　[2] For the time periods in which "other investment debt" is plotted, the difference between total debt and "other investment debt" is primarily "portfolio debt", although there is also a small unallocated debt residual.

Sources: Lane and Milesi-Ferretti (2017); BIS calculations.

greater complexity of multinational corporations' corporate structure rather than traditional greenfield investment.[13]

The composition of EMEs' external assets is very different from that of their liabilities. This reflects how EMEs have responded to the increase in third-layer globalisation among advanced economies. The greater size and range of global financial interactions have made EMEs more susceptible to financial shocks, as witnessed by the financial crises in the 1980s and 1990s. These crises prompted many EME governments to accumulate substantial foreign exchange reserves. Also, the combination of EMEs' rising incomes, high saving and limited availability of domestic safe assets increased the private sector's demand for advanced economy assets.

Has globalisation peaked?

The rise in globalisation has been in check since the Great Financial Crisis (GFC) of 2007–09.[14] International trade collapsed during the GFC and, despite a rapid rebound, has remained relatively weak (Graph VI.3, right-hand panel).[15] In real terms, global trade has barely grown in line with global GDP. This is striking given that trade has consistently outpaced GDP since the mid-1800s, with the exception of the interwar years. In nominal terms, trade appears even weaker, failing to keep up with GDP growth owing to the fall in the relative prices of traded goods and services, particularly commodities. The GFC also brought to a halt the rapid rise in standard BoP-based measures of financial openness. The global stock of external assets and liabilities in 2015 was little changed from its 2007 peak of just over 400% of global GDP, in sharp contrast to the nearly 190 percentage point rise between 2000 and 2007 (Graph VI.2).

The interaction of real and financial factors within the first two globalisation layers in part explains the easing in both trade and financial openness. In the early

Box VI.A

A globalisation map

Trade and financial connections are not evenly spread across countries. Geographically close and economically similar countries tend to have higher bilateral trade openness (Table VI.A, top left-hand panel).① As a result, intraregional trade openness (diagonal elements in top left-hand panel) tends to be greater than interregional trade openness (off-diagonal elements). Advanced Europe is by far the most internally open region. That said, over the past 15 years, intraregional trade openness has changed little among advanced economies, but has grown noticeably among EMEs (Table VI.A, bottom left-hand panel). This has coincided with increased trade between advanced economies and EMEs, driven primarily by the growth and development of EMEs.

Highlighting the imprints of the first two layers of globalisation, in which real and financial openness are closely linked, there are clear similarities between the patterns of bilateral financial and trade links.② Similar to trade links, the strongest bilateral cross-border financial links are among and within advanced economy regions (Table VI.A, top right-hand panel). Furthermore, just as in the case of international trade, there are strong financial linkages between advanced and emerging Europe, between North and Latin America, and between all advanced economy groups and emerging Asia. These similarities between the real and financial linkage maps reflect the first two globalisation layers.

Bilateral trade links are widely spread but financial links are more concentrated

Interregional bilateral trade and financial links as a percentage of region-wide GDP   Table VI.A

| Trade links | | | | | | | Financial links | | | | | | |

2015

			Importers								Borrowers			
		AEu	OA	EEu	EA	LA	AME			AEu	OA	EEu	EA	LA	AME
	AEu	20.9	1.4	2.7	1.5	0.6	1.5		AEu	86.2	23.6	7.6	4.5	5.9	5.3
	OA	1.0	7.7	0.2	1.9	1.3	0.5		OA	20.5	31.0	0.7	4.1	4.1	2.1
Exporters	EEu	3.1	0.2	9.0	0.6	0.2	1.0	Lenders	EEu	2.1	0.3	1.8	0.2	0.1	0.0
	EA	1.9	2.8	0.8	12.0	1.0	1.6		EA	0.9	1.7	0.3	2.4	0.3	0.8
	LA	0.5	1.5	0.2	0.7	3.5	0.3		LA	0.7	1.0	0.0	0.0	1.5	0.0
	AME	1.1	0.6	0.4	2.0	0.2	5.4		AME	3.5	2.0	0.5	0.5	0.3	5.5

Change between 2001 and 2015 | | | | | | | **Change between 2001 and 2015**

			Importers								Borrowers			
		AEu	OA	EEu	EA	LA	AME			AEu	OA	EEu	EA	LA	AME
	AEu	0.3	0.1	1.2	0.4	0.1	0.5		AEu	31.5	8.4	4.8	2.6	1.9	2.6
	OA	−0.1	−0.4	0.1	0.3	0.3	0.2		OA	7.7	17.9	0.4	2.3	1.7	1.4
Exporters	EEu	1.5	0.1	2.6	0.1	0.1	0.6	Lenders	EEu	1.6	0.1	1.2	0.0	0.1	0.0
	EA	0.4	0.6	0.3	4.1	0.5	0.7		EA	0.3	1.0	0.3	0.2	0.2	0.6
	LA	0.1	0.3	0.1	0.4	0.2	0.1		LA	0.6	0.7	0.0	0.0	0.6	0.0
	AME	0.0	0.0	0.1	0.5	0.0	2.5		AME	2.2	1.7	0.4	0.5	0.3	4.4

Weaker link   Stronger link

AEs: AEu = advanced Europe; OA = other AEs.

EMEs: AME = Africa and Middle East; EA = emerging Asia; EEu = emerging Europe; LA = Latin America.

In each cell, the numerator is calculated as the sum of individual countries' bilateral (financial or trade) links; the denominator is equal to the combined GDP of the two regions, adjusted to exclude any missing bilateral links. The complete list of countries is available at http://www.bis.org/statistics/ar2017stats/ar87_c6.xlsx.

Sources: IMF, Coordinated Portfolio Investment Survey and *Direction of Trade Statistics*; United Nations Conference on Trade and Development, Foreign Direct Investment Statistics; BIS locational banking statistics; BIS calculations.

Nevertheless, in line with the third layer of globalisation, there are also important differences between the patterns of real and financial linkages. For example, the bilateral financial links are more narrowly concentrated than their trade equivalents. The strongest links, those within advanced Europe, are substantially deeper than those between advanced economies and EMEs, or within EMEs.

The evolution of financial and trade linkages has differed considerably over the past couple of decades. While there has been a marked increase in intra-EME trade, particularly among EMEs in the same regions, the same is not true for financial flows, with the exception of Africa and the Middle East (Table VI.A, bottom panels). The much larger increases for financial flows between advanced economies than EMEs suggest that, despite the global financial crisis, the pace of financial innovation and development is still much higher in advanced economies (top left-hand quadrant of bottom right-hand panel). This is a clear manifestation of the third layer of globalisation.

① This is a long-standing finding in the international trade literature; see eg J Bergstrand, "The gravity equation in international trade: some microeconomic foundations and empirical evidence", *The Review of Economics and Statistics*, vol 67, no 3, pp 474–81, 1985.   ② The three layers of globalisation, as outlined in the main text, relate to an increasing degree of sophistication in the links between economies. They are (i) trade of commodities and finished goods and associated simple international financial links such as cross-border payments; (ii) more complex trade and financial connections, including the efficiency-driven fragmentation of production across countries and corresponding financing arrangements; and (iii) financial transactions increasingly used to actively manage balance sheet positions, including the stocks of assets and liabilities created by the first two layers.

stages of the GFC, tighter financial conditions amplified the sharp fall in trade.[16] Exports of more financing-dependent consumer durable and capital goods plummeted, and the desire to borrow and availability of funds diminished. Other common factors have been more important since then. The demand-induced weakness in trade-intensive physical investment has also depressed the corresponding international financing flows. The weak economic recovery in Europe – an especially trade-intensive and financially open region – has been another element. More generally, the pullback in trade and financial openness reflects a desire to reduce risk, most obviously by financial institutions, but also by non-financial companies, as seen in the decline in disruption-sensitive GVCs.

However, at least on the financial side, the apparent pause in globalisation needs to be interpreted with caution. First, conventional measures somewhat overstate the reduction in openness. Despite being stagnant at the global level, the ratio of external liabilities to GDP has continued to grow for both advanced economies and EMEs post-crisis (Graph VI.4). This seeming anomaly reflects that the level of financial globalisation is much lower for EMEs than for advanced economies, and so EMEs' growing share of global GDP depresses the global measure of financial globalisation. The expansion of financial openness for advanced economies has slowed considerably since the crisis; by contrast, that for EMEs has continued unabated.

Second, the pullback in finance has been limited to some types of flows. It has been concentrated in cross-border bank loans, a component that had fuelled the rapid pre-crisis expansion in the highly procyclical third globalisation layer.[17] Thus, at least part of the current contraction reflects a healthy unwinding of unsustainable pre-crisis positions.[18] Furthermore, the contraction in cross-border loans has been partly offset by a pickup in portfolio debt flows. Bond markets and asset managers, spurred by low and sometimes negative yields, have largely filled the gap left by banks – what has been termed the "second phase of global liquidity".[19] FDI and portfolio equity have also continued to grow.

Finally, the contraction in bank lending is not as severe when measured using alternative metrics of financial openness. The above figures are based on the *residence* of the economic units, which is how the BoP statistics are constructed. A complementary measure is based on the location of those units' headquarters, or *nationality* basis, and consolidates the corresponding balance sheet. This better captures the decision-making unit and is especially relevant for internationally

Box VI.B

Financial deglobalisation in banking?

"Peak trade" denotes the hypothesis that global trade is no longer growing faster than global GDP, which may preclude the strategy of trade-led economic growth. A parallel thesis, perhaps global "peak finance", asserts that the world has seen the peak of global finance and that financial deglobalisation has begun. In particular, observers have interpreted international banking data as showing financial deglobalisation. This box argues against this inference.

BIS data on cross-border banking positions give the appearance that banking deglobalisation set in during the Great Financial Crisis (GFC) of 2007–09 and has continued since. Graph VI.B.1 (left-hand panel) shows that the cross-border claims reported by banks in more than 40 jurisdictions declined from a peak of 60% of global GDP in 2007 to less than 40% since 2013. These data are compiled on a balance of payments (locational) basis. Such stocks of external assets are frequently used to measure international financial integration.①
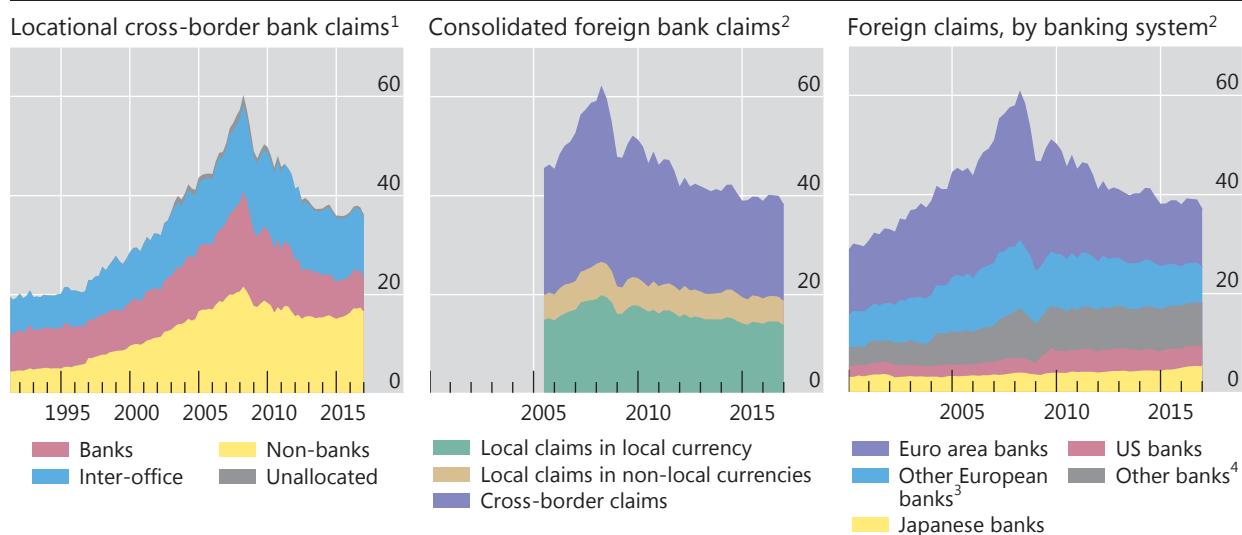
A limitation of using external assets is that these double-count some positions, and ignore other relevant ones. Giving priority to where the banking business is conducted can be useful in a discussion of macroeconomic aggregates, such as employment and value added. But cross-border claims are perhaps not the best way to analyse globalisation trends in banking. They double-count positions in which a bank's headquarters funds its branch in a financial centre like London (left-hand panel, blue area) before lending abroad. At the same time, banks' local positions, ie those booked by a foreign affiliate on host country residents, are not captured in the external positions of either the banks' home country or the affiliates' host country. On a consolidated view, these *are* foreign positions – the bank has a claim on a borrower outside the home country, also if it is booked and even funded locally.

The BIS consolidated banking statistics, organised by nationality (on the basis of the location of banks' headquarters), provide a clearer perspective on banking deglobalisation. First, local positions have not contracted nearly as much as cross-border ones (Graph VI.B.1, centre panel). True, subtracting inter-office claims just about offsets adding local claims – as a result, the centre panel tells a similar story to the left-hand panel. But the consolidated perspective also makes clear that the shrinkage of international banking is largely confined to European banks (Graph VI.B.1, right-hand panel).

Deglobalisation? Locational vs consolidated perspectives

As a percentage of world GDP

Graph VI.B.1

Locational cross-border bank claims[1]

Consolidated foreign bank claims[2]

Foreign claims, by banking system[2]

Legend (left panel):
- Banks
- Inter-office
- Non-banks
- Unallocated

Legend (centre panel):
- Local claims in local currency
- Local claims in non-local currencies
- Cross-border claims

Legend (right panel):
- Euro area banks
- Other European banks[3]
- Japanese banks
- US banks
- Other banks[4]

[1] Total cross-border claims (including inter-office positions) reported by banks in all reporting locations on borrowers worldwide.   [2] Consolidated foreign claims (excluding inter-office positions) of banks headquartered in all reporting countries on borrowers worldwide. Foreign claims include both cross-border claims and the local claims of banks' overseas affiliates, but exclude claims on residents of banks' home countries. The split of local claims into local claims in local currencies and local claims in non-local currencies is derived by applying the share of local claims (all currencies) in foreign claims from the ultimate risk statistics to the total foreign claims value in the immediate borrower statistics.   [3] Banks headquartered in CH, DK, GB, NO and SE.   [4] Banks headquartered in AU, BR, CA, CL, HK, IN, KR, MX, PA, SG, TR and TW.

Sources: IMF, *World Economic Outlook*; BIS consolidated (immediate borrower and ultimate risk basis) and locational banking statistics.

European banks shed foreign assets to strengthen their capitalisation

Graph VI.B.2

Locational/consolidated claims growth, 2007–16[1]

Per cent

(Bar chart showing Locational and Consolidated claims growth for EA, GB and CH; US; Other AEs; EMEs. Y-axis values: 100, 50, 0, −50. Legend: Locational, Consolidated.)
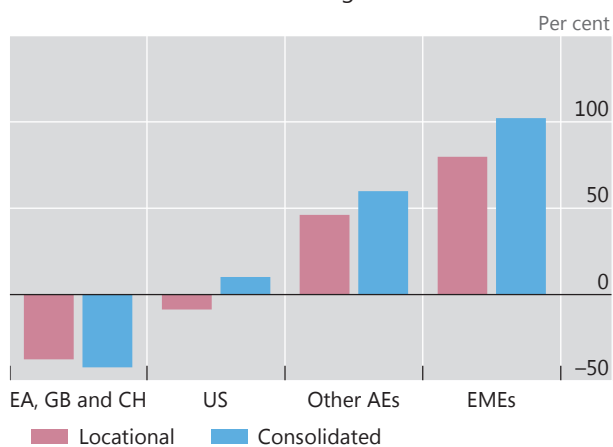
Capital to risk-weighted asset change, 2007–16[2]

Percentage points

(Bar chart showing change for EA, GB and CH; US; Other AEs; EMEs. Y-axis values: 10, 0, −10, −20. Legend: ● Total change, 2007–16; Change in: Total assets, Risk-weighted asset density, Capital.)
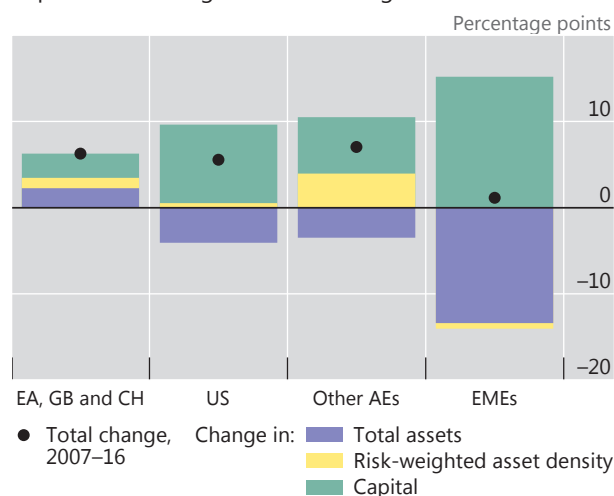
[1] Locational: EA, GB and CH = AT, BE, CH, DE, ES, FI, FR, GB, GR, IE, IT, LU, NL and PT; Other AEs = AU, CA, DK, HK, JP, NO, SE and SG; EMEs = BR, CL, IN, KR, MX, MY, PA, TR and TW. Consolidated: EA, GB and CH = AT, BE, CH, DE, ES, FI, FR, GB, GR, IE, IT, NL and PT; Other AEs = AU, CA, DK, HK, JP, NO, SE and SG; EMEs = BR, CL, IN, MX, PA, TR and TW. US numbers correct for breaks in series.   [2] Sample of more than 100 banks with at least $100 billion of total assets in 2014. EA, GB and CH = AT, BE, CH, DE, ES, FR, GB, GR, IE and IT; Other AEs = AU, CA, DK, HK, NO, SE and SG; EMEs = CN, IN, KR, MY, TR and TW. The graph decomposes the change in the Common Equity Tier 1 (CET1) capital ratio into additive components. The total change in the ratios is indicated by dots. The contribution of a particular component is denoted by the height of the corresponding segment. A negative contribution indicates that the component had a capital ratio-reducing effect. All figures are weighted averages using end-2016 total assets as weights.

Sources: B Cohen and M Scatigna, "Banks and capital requirements", *Journal of Banking and Finance*, vol 69, sup 1, pp S56–S69, 2016; SNL; BIS locational and consolidated banking statistics; BIS calculations.

That the apparent deglobalisation is more regional than global can be seen by contrasting asset growth by booking location with that by bank nationality (Graph VI.B.2, left-hand panel). Banks headquartered in Europe accounted for more than all of the global decline – that is, these banks' foreign claims declined by more than $9 trillion, while those of US banks and banks from other advanced countries and EMEs grew. The strength of the apparent deglobalisation in banking reflects the size of European banks before the GFC and their subsequent contraction.

The shrinkage of European banks' foreign claims is better interpreted as (cyclical) deleveraging after a banking glut than as a structural deglobalisation trend. While there has been a common move among big banks to raise the ratio of capital to risk-weighted assets since the GFC (Graph VI.B.2, right-hand panel, black dots), European banks uniquely did so in part by reducing total assets (a positive violet bar). Big banks elsewhere raised enough equity through retained earnings and equity issuance while expanding total assets. Put differently, European banks did not raise enough capital to achieve the 5 percentage point improvement in their weighted capital ratio without also shedding assets. Given European banks' extensive overseas operations, their retrenchment was felt around the globe.[2] Indeed, apart from Spanish banks, home bias tended to spare claims at home from the asset shedding.

A retreat to the home market when a bank has suffered losses can reflect lower expected returns abroad or increased risk aversion, especially given losses abroad. But it can also reflect policy choices in the context of widespread government support for banks and unconventional monetary policy that targets domestic lending.[3] On this view, the home bias evident in the European bank deleveraging may partly reflect policies. In any case, consolidated banking data identifies the regional origin of the apparent trend in global aggregates.

[1] P Lane and G Milesi-Ferretti, "International financial integration in the aftermath of the global financial crisis", *IMF Working Papers*, no WP/17/115, 2017.   [2] R McCauley, A Bénétrix, P McGuire and G von Peter, "Financial deglobalisation in banking?", *BIS Working Papers*, forthcoming.   [3] K Forbes, D Reinhardt and T Wieladek, "The spillovers, interactions, and (un)intended consequences of monetary and regulatory policies", *Journal of Monetary Economics*, vol 85, pp 1–22, 2016.
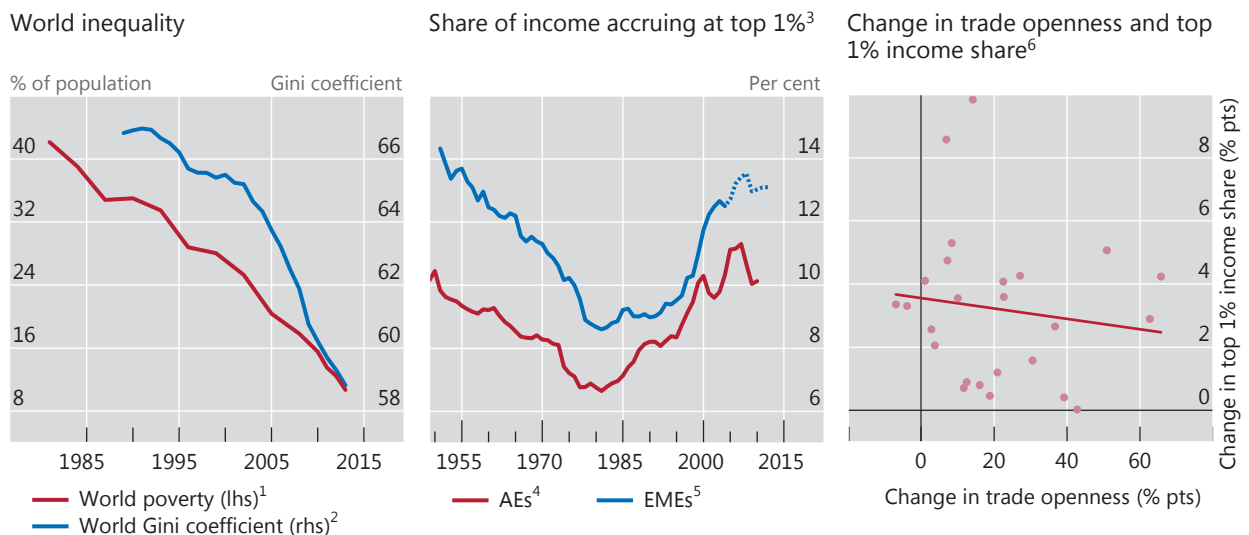
active banks, as it includes the operation of their offices abroad. As the BIS international banking statics (IBS) indicate, this transnational component has been much more stable post-crisis (Box VI.B). Furthermore, there is some evidence that EME banks, many of which are not captured by the IBS, have substantially increased their international presence through foreign offices. This trend is especially pronounced at the regional level.[20]

Globalisation and welfare

Globalisation has greatly contributed to higher living standards worldwide and boosted income growth. Over the past three decades, it has been an important factor driving the large decline of the share of the world population living in significant poverty, and of income inequality across countries (Graph VI.5, left-hand panel).[21] For example, poverty has fallen markedly in China, where the development of export industries has been a key force behind the rapid growth of GDP and incomes.

Over the same period, the income gains have not been evenly spread. The biggest gains have accrued to the middle classes of fast-growing EMEs and the richest citizens of advanced economies. In contrast, the global upper middle class has experienced little income growth.[22] This has seen within-country income inequality increase in advanced economies and even many EMEs. The share of income accruing to the top 1% of income earners has increased substantially since the mid-1980s (Graph VI.5, centre panel).[23] This contrasts with the fall in the interwar period, attributed to capital destruction and regulatory and fiscal policies, and for several decades thereafter.[24] Some degree of income inequality resulting from returns to effort can enhance growth by creating incentives for innovation. But high inequality appears to be harmful to growth and has undermined public support for globalisation.[25]

World inequality has fallen, but rising national inequality is mostly not from trade   Graph VI.5

World inequality | Share of income accruing at top 1%[3] | Change in trade openness and top 1% income share[6]

World poverty (lhs)[1]
World Gini coefficient (rhs)[2]
AEs[4]   EMEs[5]
Change in trade openness (% pts)

[1] Poverty headcount ratio at $1.90/day (2011 PPP).   [2] Darvas (2016) 128-country world Gini coefficient estimate using a deterministic log-normal distribution.   [3] Simple average across the economies listed.   [4] AU, CA, CH, DE, DK, ES, FR, GB, IE, IT, JP, NL, NO, NZ, PT, SE and US.   [5] AR, CN, ID, IN, KR, MY, SG and ZA. Due to data constraints, the dotted line excludes AR, ID and IN.   [6] Change from 1985 to 2012, except for: IN, change to 1999; AR and ID, change to 2004; PT, change to 2005; IE and IT, change to 2009; CA, CH, DK and JP, change to 2010; DE, change to 2011. Country sample same as in the centre panel.

Sources: Darvas (2016); World Bank; World Wealth and Income database.

There is strong empirical evidence that globalisation is not the main cause of increased within-country income inequality; technology is.[26] Still, the critics of globalisation have often confounded the challenges that it poses with the main drivers of many economic and social ills.

Globalisation and growth

Both trade and financial openness can be expected to increase the rate of economic growth. Trade between nations increases the marketplace's size and the competition between firms. This improves efficiency as production is concentrated in the most productive firms, wherever they may be. The most productive ones expand, achieving greater scale economies and further enhancing their efficiency, while the least efficient firms contract, increasing aggregate productivity. Overall, trade has been found to boost growth in many economies. Trade also directly benefits consumers, as they can choose from a greater variety of higher-quality products.[27]

Financial openness should also boost growth, by enabling a more efficient allocation of capital and facilitating the transfer of technology and know-how. The ability to hold foreign financial assets increases opportunities for higher returns and for risk diversification. The injection of foreign capital can provide funding for previously capital-constrained firms, increasing real competition and efficiency. FDI can yield even greater benefits through the transfer of knowledge and technology and the spread of best practices.

Empirical work has not universally identified increases in income or growth from increased financial openness. One reason could be that the relationship is non-monotonic: the benefits may materialise only if certain thresholds are met regarding the recipient country's financial market development, institutional quality, governance framework, macroeconomic policies and international trade integration. It has also been suggested that the benefits from capital account deregulation may be less direct and take time to detect.[28] Last but not least, many of the existing empirical studies treat trade openness and financial openness as independent variables, thus implicitly assuming that trade integration could take place without financial integration. Yet, as discussed above, trade and financial openness tend to go hand in hand.

Globalisation and inequality

National income undoubtedly increases with trade. However, the gains are unevenly distributed – a general feature of economic dynamism. Less efficient firms facing new competition contract, and it may take time for new ones to enter the market, for instance because of regulatory or financial constraints. The winners and losers are unevenly distributed across skills, income levels and location. Trade between advanced economies and EMEs generally increases the return to advanced economy skilled labour, which is relatively scarce globally. In contrast, the returns to unskilled labour in advanced economies may well diminish because of the greater competition from the large pool of unskilled EME labour. Conversely, unskilled labour in EMEs may benefit. At the same time, trade also leads to relative price falls for goods disproportionately consumed by lower-income households, boosting their relative purchasing power.[29] Given these offsetting effects, the net effect on inequality from trade openness is uncertain in economic models.

There are also opposing channels through which financial openness could affect income inequality. If financial openness increases the ability of low-income individuals to borrow, it can enhance their opportunities for income generation. Indeed, there is evidence that greater access to (domestic) finance can increase

incomes of the poor.[30] Alternatively, if financial openness, and FDI in particular, increases capital intensity and the returns to skill, the benefits could accrue to higher-income individuals. Financial openness could also increase income inequality if domestic institutions are not strong enough to prevent special interest groups from capturing the associated gains.[31]

Trade and financial openness can also increase inequality by favouring income from capital sources. Greater international mobility of goods and capital, relative to labour, can reduce labour's "pricing" power, putting downward pressure on wages, and constrain the feasibility of taxing capital, contributing to higher taxes on labour income.[32] Since lower-income households rely primarily on labour income, these effects are likely to increase inequality.

In practice, trade and financial openness appear to have made only a fairly small contribution to the increase in income inequality (Graph VI.5, right-hand panel). For financial globalisation, this effect is likely to have been somewhat larger in low-income countries.[33] Rather, technology appears to have been the dominant factor: the returns to skilled labour, which uses technology more intensely, have increased substantially.[34]

While declining labour shares have been linked to globalisation, the evidence indicates that it is not the only driver. Declines have not occurred in some highly open countries, such as France and the United Kingdom, and industries, including agriculture and financial and business services. Moreover, labour shares in many economies decreased the most in previously regulated services and utilities, many of which are not traded, where returns fell as a result of structural reforms. In a number of other countries, the decline in labour shares was mainly due to surging housing rents (including imputed rents of homeowners).[35]

Importantly, the impact of trade on inequality depends on obstacles to adjustment. In some cases, there have been persistent localised economic contractions in areas adversely affected. Falls in employment and wages in import-competing firms have been compounded by these firms' reduced purchases from their suppliers, who are often located nearby. This spills over to spending more broadly in the local community.[36] These effects can be persistent if labour is immobile across regions and industries.

Globalisation and financial stability

One specific mechanism through which globalisation can affect economic growth, poverty and inequality is its impact on financial stability. Financial crises can result in a permanent loss of income, have a devastating effect on poverty and increase inequality.[37]

Just like poorly managed domestic financial liberalisation, unfettered financial openness can contribute to financial instability unless sufficient safeguards are in place. It is no coincidence that, after financial crises were relatively common in the first globalisation wave, there were few in the following era of financial repression which lasted into the 1970s. The EME financial crises of the 1980s and 1990s involved sharp reversals of international capital flows. And the GFC saw large spillovers between national financial systems. In addition, financial openness may adversely affect financial stability if it constrains the effectiveness of independent domestic monetary policy.[38]

Past episodes of financial instability have demonstrated the importance of three international propagation mechanisms. First, highly mobile international capital can behave in a very procyclical manner, amplifying financial upswings and reversals. Second, foreign currency exposure, in particular in dollars, transmits tighter global financial conditions and exposes countries to foreign exchange

losses. And third, close financial linkages between globally active financial institutions can spread financial stress, although they may also act as a buffer when problems have a domestic origin.

International credit has been a key source of procyclicality. Such flows tend to be procyclical with respect to the recipient economy's business and financial cycles. Cross-border bank loans and portfolio debt flows are both positively correlated with domestic business and credit cycles.[39] FDI flows tend to be acyclical, while portfolio equity flows into advanced economies even appear to be slightly countercyclical.

The close link between cross-border and domestic credit may add to financial stability risks. Cross-border credit tends to amplify domestic credit booms, as it acts as the marginal funding source: the cross-border component typically outgrows its domestic counterpart during financial booms, especially those that precede serious financial strains.[40]
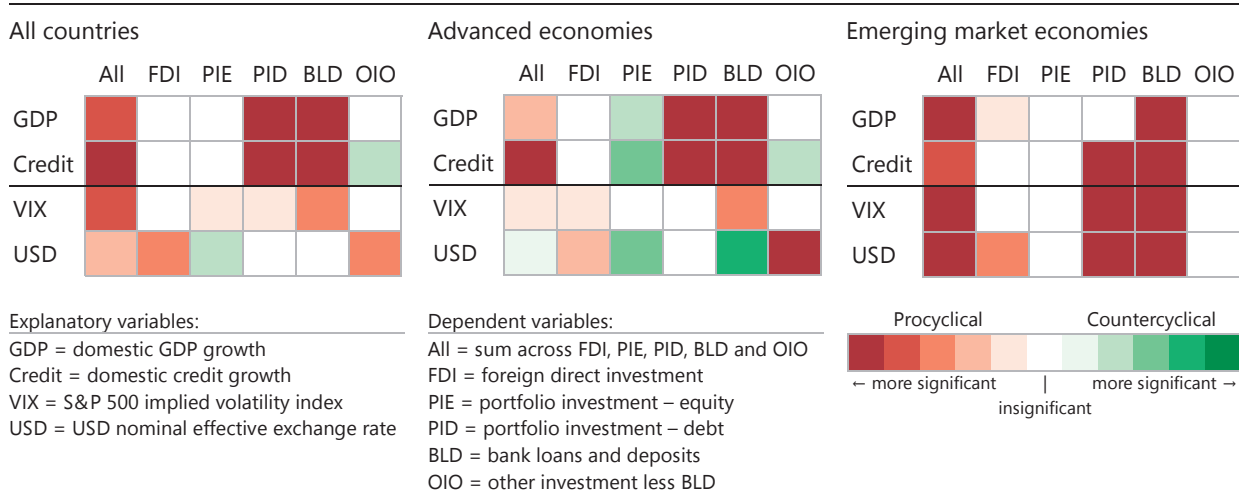
Debt flows are also sensitive to global factors. In particular, loan and bond flows to EMEs have been sensitive to global risk aversion and the US dollar's strength (Graph VI.6, centre and right-hand panels). In fact, global risk aversion, or at least its historical proxy (the VIX), has had a non-negligible impact on bank lending even to advanced economies. This sensitivity, however, appears to have declined of late.[41] By contrast, there is evidence that the sensitivity of cross-border bank lending and portfolio debt flows to US monetary policy has increased considerably since the GFC.[42]

The high sensitivity of capital flows to US monetary policy is a manifestation of the "excess elasticity" of the international monetary and financial system – its ability to amplify financial booms and busts and thereby cause serious macroeconomic costs.[43] There are two main channels through which monetary policy regimes interact to create this excess elasticity. In the first, monetary policy settings in core economies are spread to the rest of the world through resistance to exchange rate

Debt flows are more procyclical than equity flows

Summary of regression coefficient estimates, by recipient economy   Graph VI.6

Explanatory variables:
GDP = domestic GDP growth
Credit = domestic credit growth
VIX = S&P 500 implied volatility index
USD = USD nominal effective exchange rate

Dependent variables:
All = sum across FDI, PIE, PID, BLD and OIO
FDI = foreign direct investment
PIE = portfolio investment – equity
PID = portfolio investment – debt
BLD = bank loans and deposits
OIO = other investment less BLD

Procyclical   Countercyclical

← more significant | more significant →
                 insignificant

For GDP and Credit, Procyclical (Countercyclical) refers to a positive (negative) relationship; for the VIX and USD, Procyclical (Countercyclical) refers to a negative (positive) relationship. The colour-coding of each cell is based on an index reflecting the overall statistical significance of the respective coefficients obtained from a set of panel regressions. The dependent variable in each regression is the respective capital flow type (scaled by GDP); each regression contains one domestic and one global explanatory variable, as well as country fixed effects.

Sources: IMF, *Balance of Payments Statistics* and *World Economic Outlook*; Bloomberg; BIS effective exchange rate indices and locational banking statistics; BIS calculations.

appreciation, typically based on concerns about the loss of competitiveness (on the real side) and the possibility of surges in capital flows (on the financial side). The second channel is related to the fact that the domains of major international currencies extend well beyond their respective national jurisdictions.[44]

This global currency channel is especially powerful in the case of the US dollar – the dominant international currency. The outstanding stock of US dollar-denominated credit to non-bank borrowers outside the United States, a key indicator of global liquidity conditions, stood at $10.5 trillion as of end-2016. This outsize external role means that changes in the US monetary policy stance have a substantial influence on financial conditions elsewhere (Box VI.C). And since monetary policymakers, including those in control of major international currencies, are focused on domestic conditions, they could unintentionally end up contributing to financial imbalances well beyond their national borders. Notably, against the backdrop of the exceptionally accommodative US monetary policy stance, US dollar credit to non-bank EME borrowers roughly doubled between 2008 and 2016, reaching $3.6 trillion at the end of that period.

One of the key channels through which US monetary policy impacts financial conditions elsewhere is the US dollar exchange rate. In the so-called "risk-taking channel of currency fluctuations", the depreciation of a global funding currency flatters the balance sheets of currency-mismatched borrowers and boosts lenders' risk-taking. This channel is especially relevant for external debt flows to EMEs (Graph VI.6, right-hand panel). The channel may also influence, in particular, manufactured trade through the GVCs, which are especially sensitive to financing conditions.[45]

The intermediation of global currencies, especially the dollar, also creates close linkages between globally active banks. The GFC demonstrated how such interconnectedness propagated funding stress between the world's largest banks and forced them to deleverage internationally. Thus, the regulatory reforms in the aftermath of the GFC have focused on strengthening the resilience of international banks that are the backbone of global financial intermediation.

Getting the most from globalisation

The globalisation surge over the past half-century has brought many benefits to the world economy. Openness to trade has enhanced competition and spread technology, driving efficiency gains and aggregate productivity. The resulting stronger income growth has supported a remarkable decline in global poverty and cross-country income inequality. The ability to source cheaper, and better-quality, goods and services from all over the world has also directly increased households' living standards. And the benefits do not just relate to trade. Financial openness is inextricably intertwined with trade openness: financial linkages both support trade, and are created by trade. Financial openness, properly managed, can also independently enhance living standards through a more efficient allocation of capital and know-how transfers.

While globalisation increases living standards, it does create challenges. First, the gains are not equally distributed. The distributional implications of trade and financial openness need to be addressed to ensure fair outcomes within societies and continued support for growth-enhancing policies and economic frameworks, including global commerce. That said, other factors – most notably technology – have played a dominant role in the increase in income inequality. Just as there is no suggestion to wind back technology, reversing globalisation would be greatly detrimental to living standards.

Second, financial openness exposes economies to potentially destabilising external forces. This risk can be managed by designing appropriate safeguards, just as in the case of risks associated with domestic financial liberalisation. Since international trade and finance are inextricably intertwined, particularly in the first two globalisation layers, reaping the benefits of trade would be impossible without international finance. That is why the policy solution is not to reduce financial openness, but rather to carefully address the associated risks.

The challenges of managing economic change are not unique to globalisation. As with other secular trends, well designed policies can offset the adjustment costs associated with globalisation and enhance the gains from it.

On the domestic front, countries can implement policies that boost resilience. Just as in the case of technology, flexible labour and product markets and measures that enhance adaptability, such as retraining programmes, can reduce any trade-induced dislocations. Well targeted policies may also help counteract the sometimes persistent losses experienced by segments of society, for example region-specific employment initiatives.[46]

Strong policy and institutional frameworks designed to make financial systems sounder are critical to reaping the full benefits of financial openness. The domestic financial stability policy toolkit is important.[47] This calls for well articulated macroprudential frameworks on a firm microprudential base. And it also requires the capacity to address directly any debt overhang and asset quality problems that might arise during financial busts, in order to repair balance sheets and improve overall creditworthiness.

Indeed, EMEs have been taking important steps in this direction since the mid-1990s. And this has gone hand in hand with a better external balance sheet structure, helping to reduce their vulnerability to external factors, including through considerably stronger net international investment positions, substantial increases in their foreign exchange reserves and a higher FDI share.[48]

International cooperation that addresses global linkages must supplement domestic policies. The special roles of global financial institutions and global currencies transcend international trade and the financial interactions directly linked to it in the first two layers. An internationally agreed joint regulatory approach is needed to ensure that policymakers properly manage global financial risks, not least those associated with the highly procyclical third layer. Because policies and actions of individual countries affect others, multilateralism is key for delivering the best outcomes for all.

As regards global financial institutions, the first priority is to complete the international financial reforms already under way. These reforms will go a long way to boosting the resilience of the global financial system. An agreed global regulatory framework is the basis for effective supervision of internationally active banks, including mechanisms for cross-border information-sharing. And it fosters a level playing field, a precondition for efficiency and soundness at the global level.

As regards global currencies, effective crisis management mechanisms remain important, and naturally require international cooperation. Central banks have built on the successful cooperation during the GFC. 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. However, a greater emphasis on preventing the build-up of financial imbalances appears desirable. At a minimum, this would mean taking more systematic account of spillovers and spillbacks when setting policies.[49]

International cooperation is also needed beyond finance to ensure a level playing field in trade and areas such as tax. Multilateral trade agreements provide

the largest common markets to maximise efficiency. Trade and financial linkages enable companies, particularly large multinationals, to make decisions regarding production and profit declaration to minimise their taxes. Avoiding this can ensure that highly mobile capital can share the tax burden with less mobile labour, and so address income inequality. Together, such well designed domestic and international actions can ensure that globalisation continues to be a greatly beneficial force for the world economy and people's living standards.
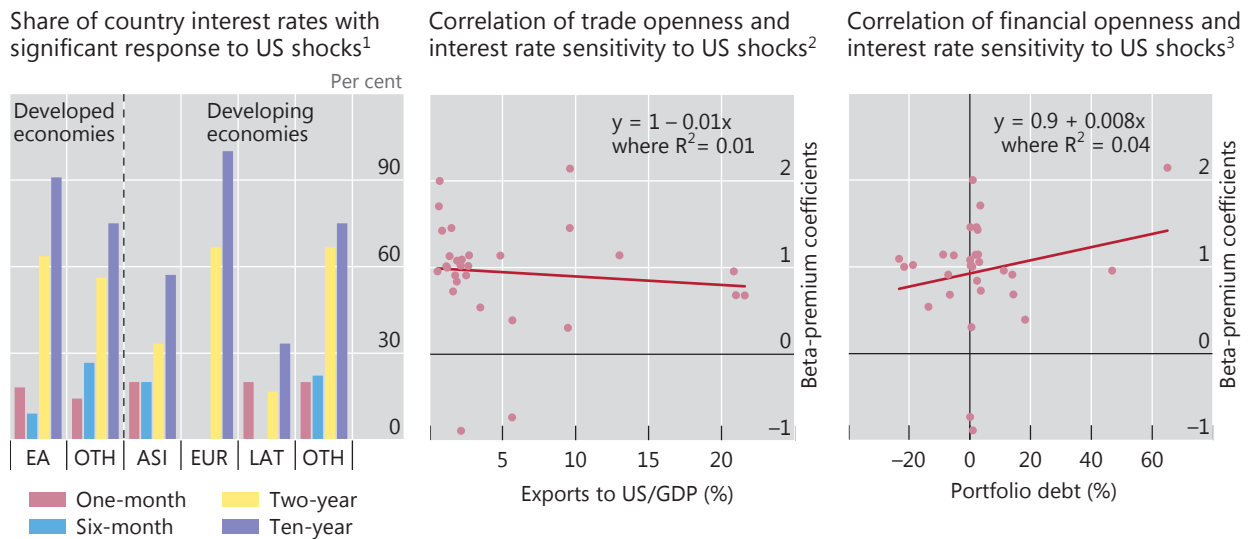
Globalisation and interest rate spillovers

Increased globalisation has coincided with a significant rise in the co-movement of global asset prices. For example, the correlation of advanced economy sovereign 10-year yields in the past two decades more than doubled relative to the previous two. Given the myriad of changes in real and financial linkages between countries, it is difficult to assess whether asset price co-movement reflects common factors or spillovers from specific countries. One way to disentangle this is to examine the response of international asset prices to an unexpected development ("shock") that clearly emanates from one country.

A useful shock is monetary policy announcements, as they are primarily related to domestic conditions. Because asset prices incorporate all expected developments, the shock must be measured as the unexpected change in monetary policy and include information about the future policy path.① The response of interest rates to a monetary policy shock in a foreign country is assessed by regressing the daily change in the domestic interest rate on the foreign policy shock, which is identified from the change in short- and long-term foreign interest rates in a 25-minute window around a policy announcement.② The response of one- and six-month and two- and 10-year interest rates is analysed for a panel of 47 advanced economies and EMEs.

The results point to significant spillovers across countries, in particular for longer-term interest rates and from the United States. For example, 10-year bond yields in 34 of the 47 countries display a statistically significant response to

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Interest rate spillovers relate to financial and not to trade linkages

Graph VI.C

Share of country interest rates with significant response to US shocks[1]

Correlation of trade openness and interest rate sensitivity to US shocks[2]

$$y = 1 - 0.01x$$
where $R^2 = 0.01$

Correlation of financial openness and interest rate sensitivity to US shocks[3]

$$y = 0.9 + 0.008x$$
where $R^2 = 0.04$

Developed economies: EA = AT, BE, DE, ES, FI, FR, GR, IE, IT, NL, PT; OTH = AU, CA, CH, CZ, DK, GB, HK, IL, JP, KR, NO, NZ, SE, SG, TW, US.
Developing economies: ASI = CN, ID, IN, MY, PH, TH, VN; EUR = PL, RO, TR; LAT = BR, CL, CO, MX, PE, VE; OTH = NG, PK, RU, ZA.

[1] Share of countries with a statistically significant response to US interest rate shock for one- and six-month overnight index swaps and two- and 10-year yields. Regional country groupings follow the IMF classification. [2] Scatter plot of coefficient on term premium in 10-year yield spillover regression against ratio of each country's exports to the United States relative to own GDP. The correlation is not statistically significant. [3] Scatter plot of coefficient on term premium in 10-year yield spillover regression against ratio of portfolio debt assets to GDP. The correlation is statistically significant at a p-value of 0.12.

Source: J Kearns, A Schrimpf and D Xia, "The monetary spillover matrix: explaining interest rate spillovers", *BIS Working Papers*, forthcoming.

US shocks, compared with around half this number for euro interest rate shocks and only five to eight countries for shocks from five other advanced economy central banks. These responses are also economically significant: for the median country, long-term yields rise 4 basis points in response to a 10 basis point increase in the US term premia. The prominence of US monetary policy announcements relates to the pre-eminent role of the US dollar in international financial markets. The international spillovers are also clearly larger for longer-term interest rates. For one- and six-month interest rates, only eight countries display significant spillovers from US interest rates. In contrast, for two- and 10-year bond yields, 23 and 34 countries have significant responses, respectively (Graph VI.C, left-hand panel).

Interest rate spillovers are more closely related to financial openness than trade openness. The intensity of interest rate spillovers shows no relationship with trade openness, measured as the trade-to-GDP ratio (Graph VI.C, centre panel). In contrast, it correlates with measures of financial openness. For example, there is a statistically significant relationship between the intensity of interest rate spillovers and financial openness, measured by the ratio of international portfolio debt assets to GDP (Graph VI.C, right-hand panel).

① The shocks used are from M Ferrari, J Kearns and A Schrimpf, "Monetary policy's rising FX impact in the era of ultra-low rates", *BIS Working Papers*, no 626, 2017. The response of interest rates to foreign monetary policy shocks from seven central banks is outlined in J Kearns, A Schrimpf and D Xia, "The monetary spillover matrix: explaining interest rate spillovers", *BIS Working Papers*, forthcoming. ② Three shocks are used to capture the full extent of information in the central bank's policy announcement: (i) the change in the one-month overnight index swap interest rate (referred to as the "target shock"); (ii) the change in the two-year bond yield that is orthogonal to the first shock (referred to as the "path shock"); and (iii) the change in the 10-year bond yield that is orthogonal to the first two shocks (referred to as the "term premium shock").

Endnotes

1   This chapter does not deal with migration flows across national borders, another important dimension of globalisation. Borjas (2015) reviews the potential gains to GDP that could accrue from migration. Obviously, there would be many practical impediments to realising these gains. Furthermore, this chapter uses de facto measures of real and financial openness, which are based on observed outcomes, rather than de jure measures, which are based on rules and legal restrictions. De facto measures generally provide a better indicator of actual openness, as de jure measures fail to take into account the effectiveness of controls or implicit protection.

2   This is more prominent in EMEs, where the proportion rises to around two thirds compared with around one third in advanced economies, based on calculations from the data used by Casas et al (2016). See also Ito and Chinn (2015).

3   See CGFS (2014). Foreign banks are found empirically to assist exports from EMEs by helping to provide external finance and guarantees of payment (Claessens et al (2015)).

4   For example, the sales of US multinationals' subsidiaries are spread wide, going to: their home market (over half), third countries (one third) and the United States (11%) (Antràs and Yeaple (2014)). Multinationals not only engage in more FDI and trade, but also spread technology by concentrating research and development in the parent and production in subsidiaries (Keller (2010)). In this second layer, transfer of knowledge and ideas can promote trade, but also act as a substitute for trade, an idea taken up by Baldwin (2016).

5   See Kim and Shin (2016) on the connection between the length of the production chain and the intensity of external finance required.

6   The exact level of trade openness differs somewhat across estimates, but the profile is similar; see Federico and Tena-Junguito (2016), Klasing and Milionis (2014) and Estevadeordal et al (2003).

7   Irwin (2002) attributes half of the decline in world trade in 1929–32 to higher tariffs, import quotas and foreign exchange controls.

8   For example, Constantinescu et al (2017) argue that trade agreements have boosted trade growth by 2 percentage points per annum since 1995, while Meissner (2014) argues that episodes of strong growth have seen trade grow faster than GDP.

9   For an overview of global value chains, see Elms and Low (2013), Kowalski et al (2015), WTO (2014) and the references therein.

10   See Antràs and Yeaple (2014) and Bernard et al (2009).

11   On the factors contributing to the growth of equity-type investment and FDI in particular, see Kose et al (2009) and Koepke (2015).

12   See Avdjiev et al (2014) and Gruić et al (2014).

13   See Lane and Milesi-Ferretti (2017).

14   See the discussion and references contained in Caruana (2017).

15   There are many studies of the fall and subsequent weakness in trade. A selection includes Baldwin (2009), Constantinescu et al (2015, 2017), ECB (2016), Hoekman (2015), IMF (2016) and Haugh et al (2016).

16   Amiti and Weinstein (2011), Ahn et al (2011), Chor and Manova (2012) and Cheung and Guichard (2009) find evidence of a role of tightening credit conditions in the fall in trade, while Paravisini et al (2015) and Levchenko et al (2010) argue the contrary.

17   See Milesi-Ferretti and Tille (2011).

18   See eg Borio (2014) and Caruana (2017).

[19] See Shin (2013).

[20] See Claessens and van Horen (2015) and CGFS (2014).

[21] For overviews of global income inequality, see Bourguignon (2015), Lakner and Milanović (2015), Deaton (2013) and Milanović (2013). See also Pereira da Silva (2016).

[22] See Milanović (2013).

[23] A similar trend is also apparent in the top 10%, but the data prior to the 1980s are less comprehensive for this measure.

[24] See Piketty and Saez (2014).

[25] Dabla-Norris et al (2015) find that a higher income share for the top 20% reduces growth (but a higher share for the bottom 20% boosts growth), while Ostry et al (2014) come to the same conclusion using a Gini coefficient to measure inequality. Halter et al (2014) suggest that inequality boosts growth in the short run but not in the long run.

[26] See Cline (1997) and IMF (2007).

[27] On trade and growth there are many papers, including Frankel and Romer (1999), Irwin and Terviö (2002), Lee et al (2004) and Noguer and Siscart (2005). Broda and Weinstein (2006) show that increased variety of goods is an important source of gains from trade.

[28] Kose et al (2006) provide an extensive review and conclude that the benefits are indirect and difficult to measure. Rodrik and Subramanian (2009) and references therein summarise the lack of firm evidence for substantive benefits from financial globalisation. Some research, however, does find that financial and capital market liberalisation boosts growth, eg Alfaro et al (2004), Bekaert et al (2005) and Klein and Olivei (2008).

[29] See Faijgelbaum and Khandelwal (2016).

[30] Beck et al (2007) conclude that greater access to finance increased incomes of the poor. This has been confirmed recently by Ben Naceur and Zhang (2016) for most measures of financial development, but not for financial liberalisation. Reduced restrictions on bank operations can also boost incomes of poorer households, as shown in Beck et al (2010).

[31] See Claessens and Perotti (2007) for a summary.

[32] Autor et al (2017) find evidence that the fall in the labour share is driven largely by between-firm reallocation rather than by a fall in the unweighted mean labour share within firms. They link this finding to the evidence that the most productive firms in each industry are the biggest beneficiaries of globalisation.

[33] That financial openness increases income inequality is a fairly uniform finding in the literature. On this topic, see eg Cabral et al (2016), Figini and Görg (2011), IMF (2007) and Jaumotte et al (2013). This finding is not dominated by EMEs. For example, even for OECD countries, Denk and Cournède (2015) find that financial expansion increased income inequality and there is no evidence that this results from financial crises.

[34] While many studies find that trade openness has reduced inequality (Jaumotte et al (2013), IMF (2007)), and probably lowered unemployment (Görg (2011)), this contrasts with the review of country studies by Goldberg and Pavcnik (2007). These opposing conclusions may reflect that other factors influence the relationship between trade and inequality. For example, Milanović (2005) finds that trade openness reduces the income share of the poor at low income levels, but raises it at higher country income levels.

[35] For an overview of the decline in the labour share, see ILO and OECD (2014) and Karabounis and Neiman (2014).

[36] See Autor et al (2013).

[37]   Borio et al (2011) outline the role that international capital can play in facilitating domestic financial excess. Most studies find that financial crises increase inequality: see Bazillier and Héricourt (2014), de Haan and Sturm (2017), Atkinson and Morelli (2011), Baldacci et al (2002) and Li and Yu (2014); although others do not: see Denk and Cournède (2015), Honohan (2005) and Jaumotte and Osorio Buitron (2015). In part, these differences may reflect the fact that the impact of crises on inequality is seemingly greater for EMEs than for advanced economies; see Galbraith and Jiaqing (1999) and Agnello and Sousa (2012). Chen and Ravallion (2010) note the significant impact that financial crises have on poverty.

[38]   See Rey (2015).

[39]   For additional empirical evidence on the procyclicality of capital flows with respect to domestic GDP growth, see Broner et al (2013), Contessi et al (2013), Bluedorn et al (2013), Hoggarth et al (2016) and Avdjiev et al (2017b). Hoggarth et al (2016) also examine the procyclicality of capital flows with respect to domestic credit. For additional empirical evidence on the procyclicality of capital flows with respect to global factors, see Koepke (2015), Nier et al (2014) and Eichengreen et al (2017).

[40]   See Borio et al (2011), Avdjiev et al (2012) and Lane and McQuade (2014).

[41]   See Shin (2016).

[42]   See Avdjiev et al (2017a).

[43]   See Borio (2014, 2016) and Caruana (2015).

[44]   See Shin (2015).

[45]   On the risk-taking channel of currency fluctuations, see Bruno and Shin (2015, 2017) and Hofmann et al (2016).

[46]   For a recent review of policies that can make trade reform more equitable, see IMF-World Bank-WTO (2017).

[47]   See Borio (2014).

[48]   Caballero et al (2005) demonstrate benefits of risk-sharing with a comparison of Australia and Chile in the Asian financial crisis.

[49]   See Agénor et al (2017).

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