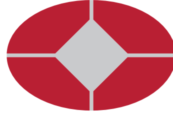
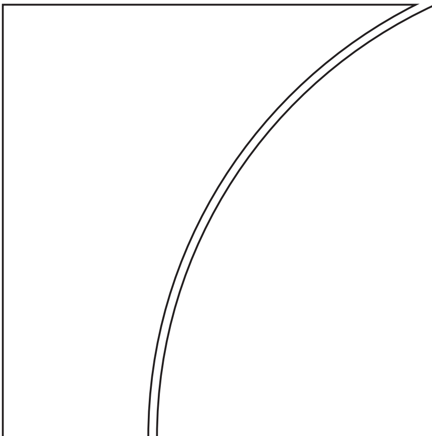


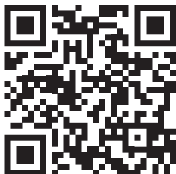
BANK FOR INTERNATIONAL SETTLEMENTS



87th Annual Report

1 April 2016–31 March 2017

Basel, 25 June 2017



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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 Herzegovina	HU	Hungary	PH	Philippines
BE	Belgium	ID	Indonesia	PK	Pakistan
BG	Bulgaria	IE	Ireland	PL	Poland
BR	Brazil	IL	Israel	PT	Portugal
CA	Canada	IN	India	QA	Qatar
CH	Switzerland	IS	Iceland	RO	Romania
CL	Chile	IT	Italy	RU	Russia
CN	China	JP	Japan	SA	Saudi Arabia
CO	Colombia	KR	Korea	SE	Sweden
CY	Cyprus	KW	Kuwait	SG	Singapore
CZ	Czech Republic	KZ	Kazakhstan	SI	Slovenia
DE	Germany	LT	Lithuania	SK	Slovakia
DK	Denmark	LU	Luxembourg	TH	Thailand
DZ	Algeria	LV	Latvia	TR	Turkey
EA	euro area	LY	Libya	TW	Chinese Taipei
EE	Estonia	MK	Macedonia, FYR	US	United States
ES	Spain	MT	Malta	VE	Venezuela
EU	European Union	MX	Mexico	VN	Vietnam
FI	Finland	MY	Malaysia	ZA	South Africa
FR	France	NG	Nigeria		
		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.

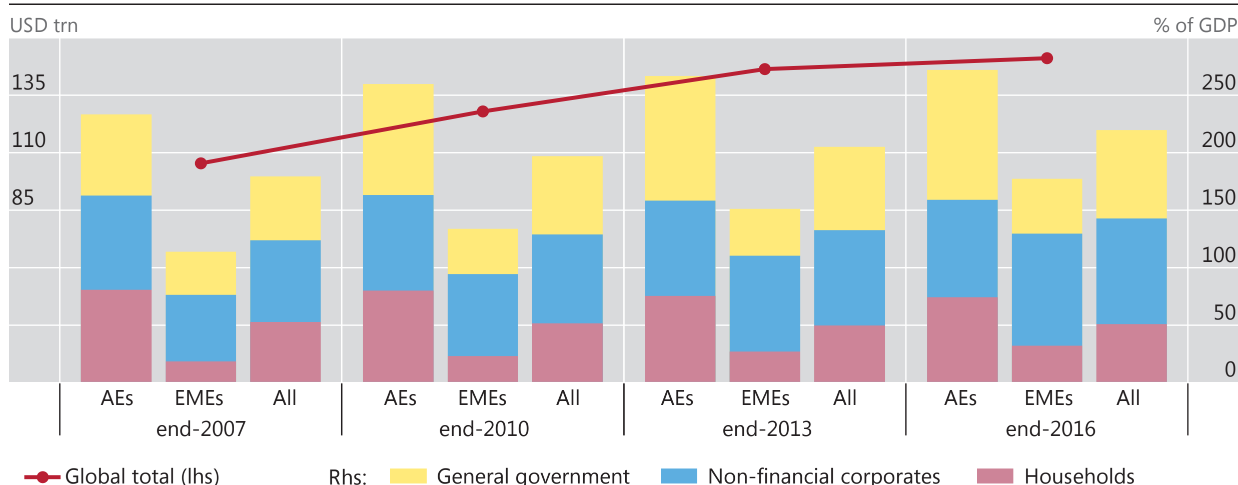
Yet, despite the best near-term prospects for a long time, paradoxes and tensions abound. Financial market volatility has plummeted even as indicators of policy uncertainty have surged. Stock markets have been buoyant, but bond yields have not risen commensurately. And globalisation, a powerful engine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



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.

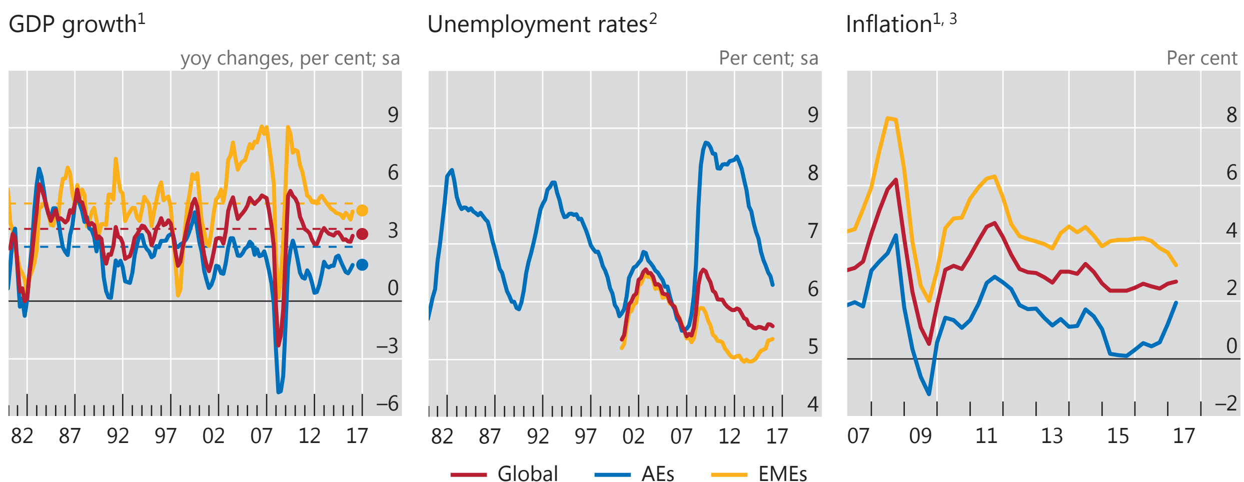
In the rest of this introductory chapter, we briefly review the year in retrospect before analysing the medium-term risks to the sustainability of the expansion. We conclude with an exploration of policy options.

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



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.

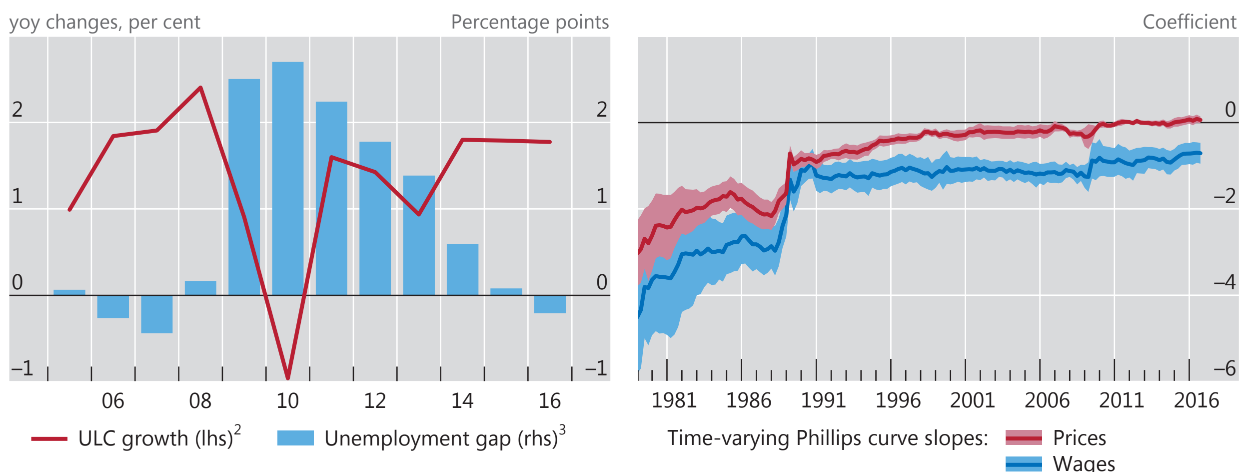
The deeper reasons for these developments are not well understood. One possibility is that they reflect central banks' greater inflation-fighting credibility. Another is that they mainly mirror more secular disinflationary pressures associated with globalisation and the entry of low-cost producers into 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]



[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).

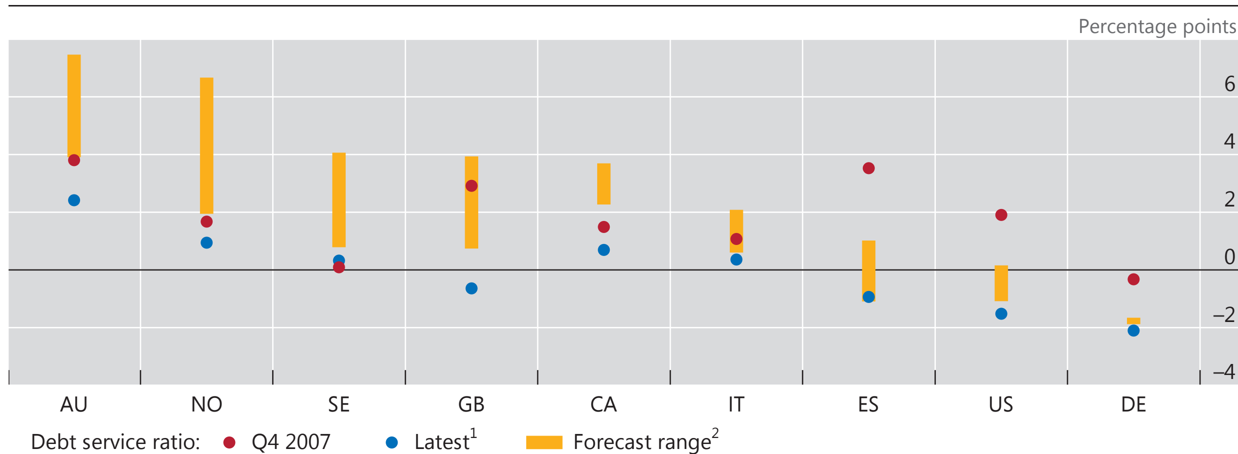
An analysis of the debt service burden-induced interest rate sensitivity of consumption points to vulnerabilities (Chapter III and Graph I.4). These are apparent in economies that have experienced household credit booms post-crisis, often alongside strong property price increases, including several small 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



[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

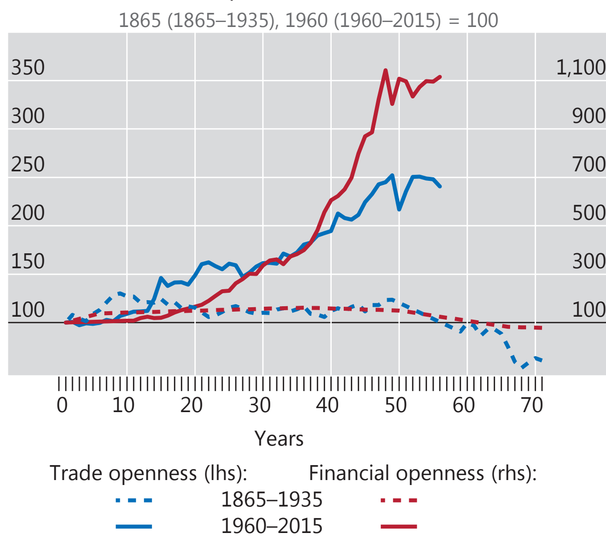
Since the GFC, protectionist arguments have been gaining ground. They have been part of a broader social and political backlash against globalisation. Rolling back globalisation would strike a major blow against the prospects for a sustained and robust expansion. Investment would be the first casualty, 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).

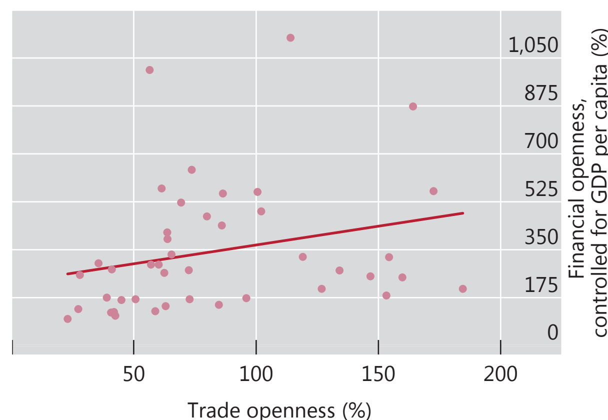
As is well known, the gradual process of tighter integration that the global economy has witnessed since World War II – and which took a quantum leap following the end of the cold war era – is not unprecedented (Graph I.5, left-hand panel). A first globalisation wave took place starting in the second 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





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

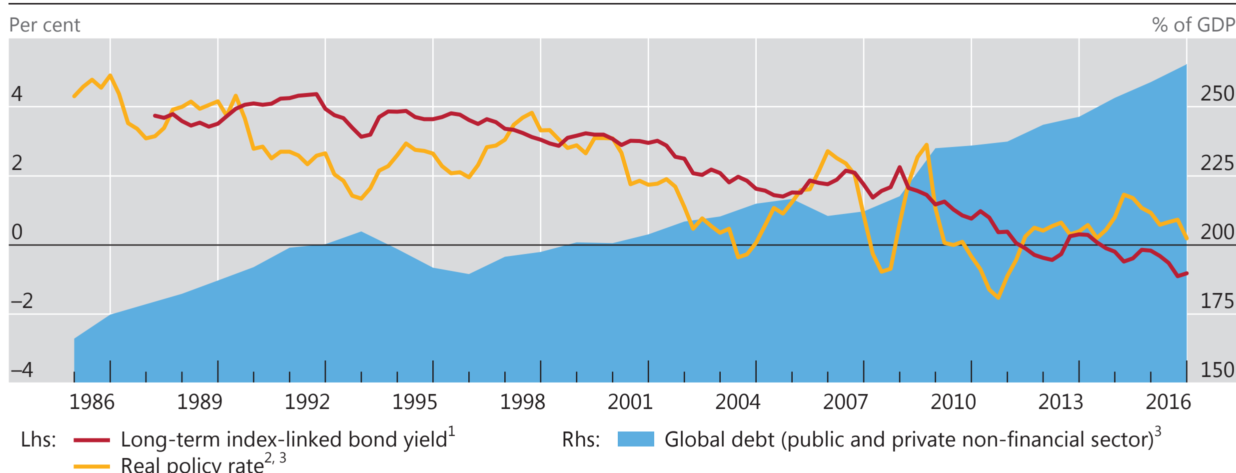
assessment of fiscal space could anchor the needed medium-term consolidation of public finances.

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



[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

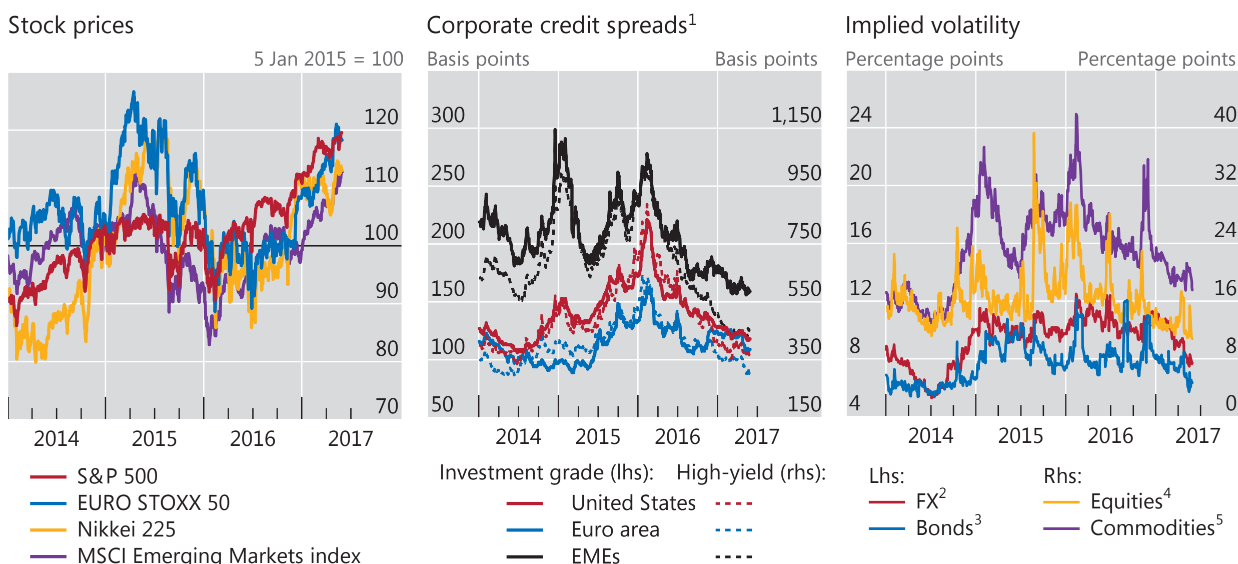
From mid-2016 onwards, the improving growth outlook contributed to rising stock prices and narrowing credit spreads in major advanced and emerging economies (Graph II.1, left-hand and centre panels). As growth gathered steam, market volatility remained very subdued (Graph II.1, right-hand panel), even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



[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.

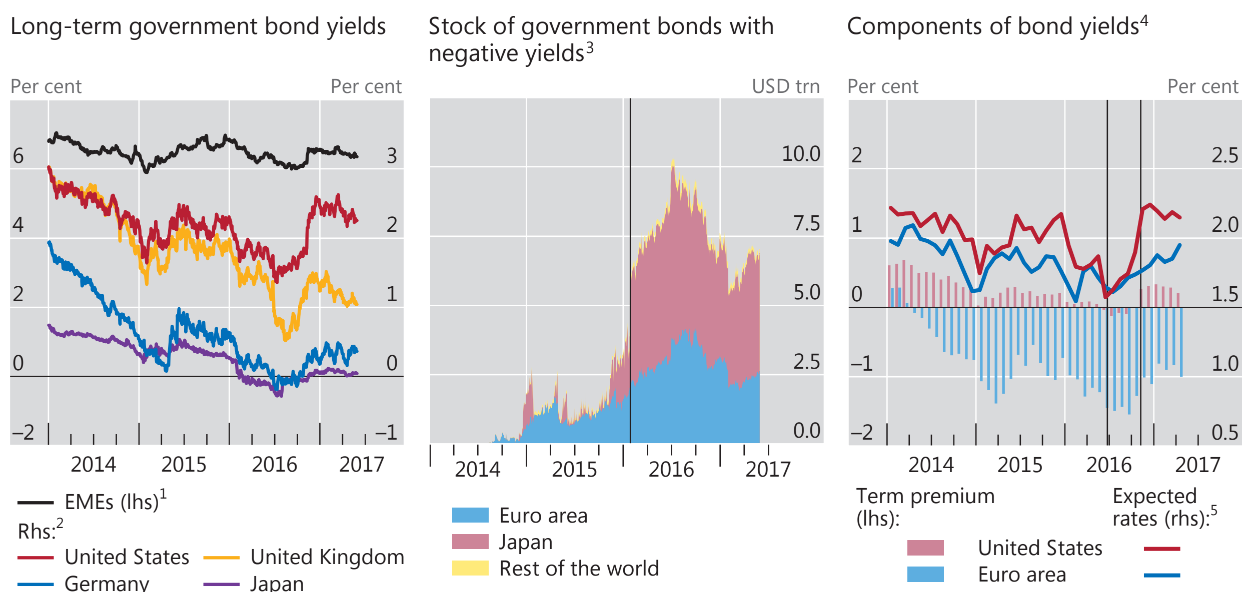
been in place since late 2014 (Graph II.2, left-hand panel). The US 10-year yield reached a low of 1.4% on 8 July, the day data releases showed strong hiring in June. From then on, it rose steadily, reaching 1.9% on the eve of the presidential election. The 10-year German bund yield also rebounded, after 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).

Bond yields rise, but diverge Graph II.2



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.

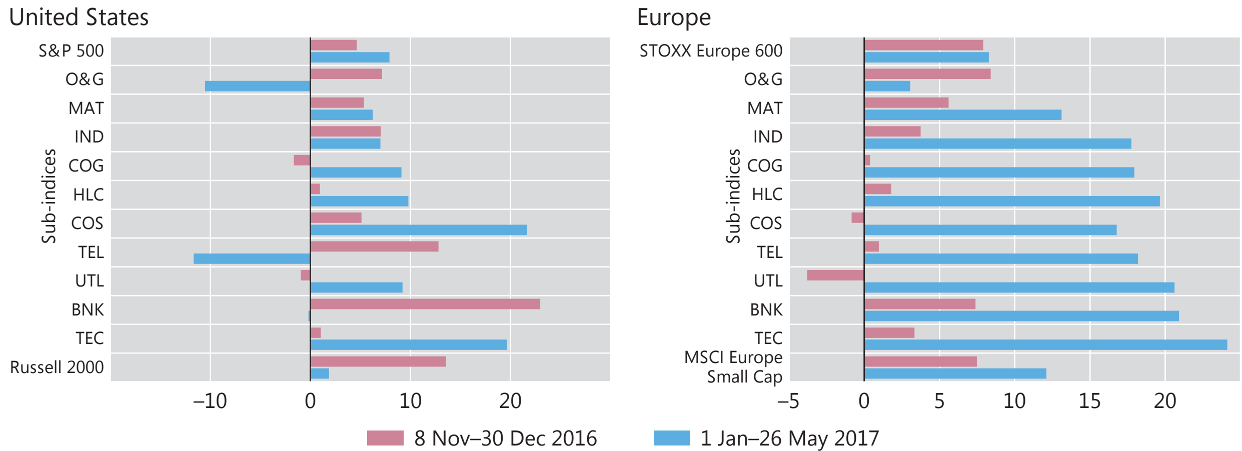
The rapid rise of US yields – the spread of US over German two-year yields widened to more than 2 percentage points, the highest since 2000 – supported the dollar against the euro and other currencies (Graph II.4). The dollar had started to rise against the euro and yen in July and August 2016, roughly 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



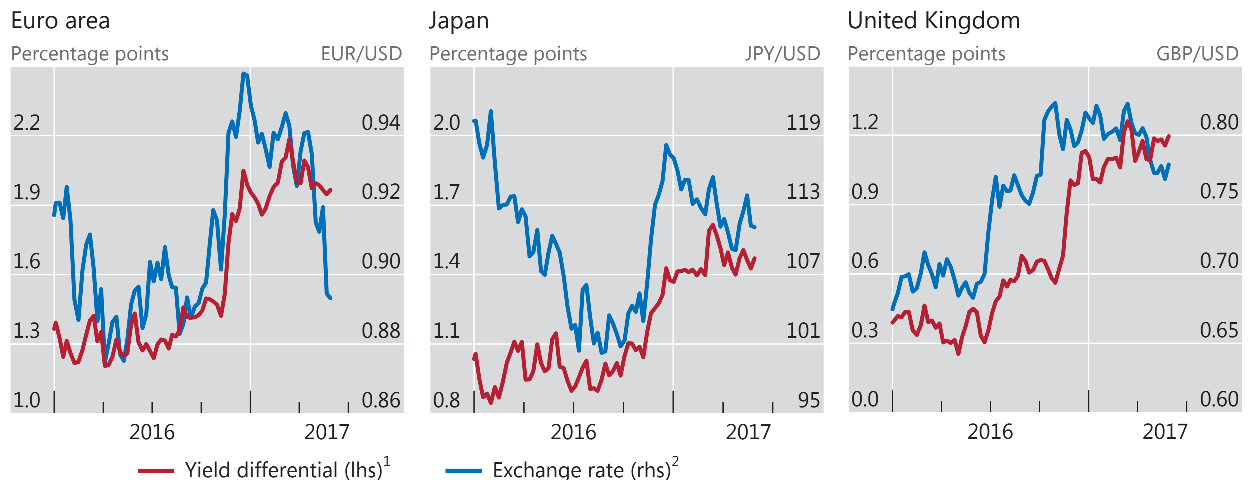
BNK = banks; COG = consumer goods; COS = consumer services; HLC = health care; IND = industrials; MAT = basic materials; O&G = oil and gas; TEC = technology; TEL = telecommunications; UTL = utilities.

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

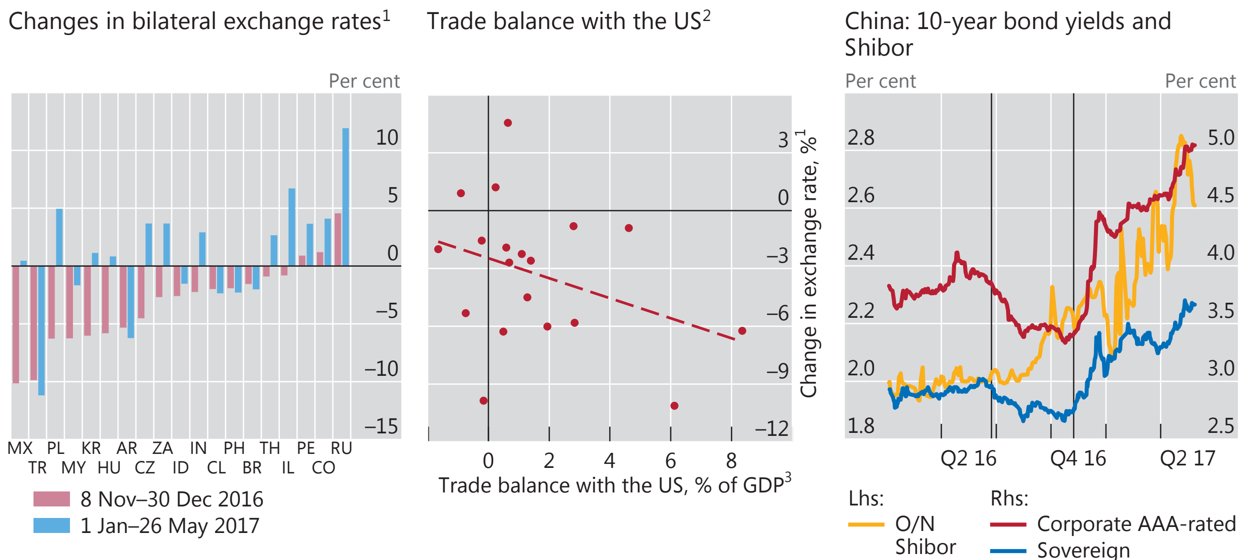
Divergence in bond yields supports the dollar — Graph II.4



[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



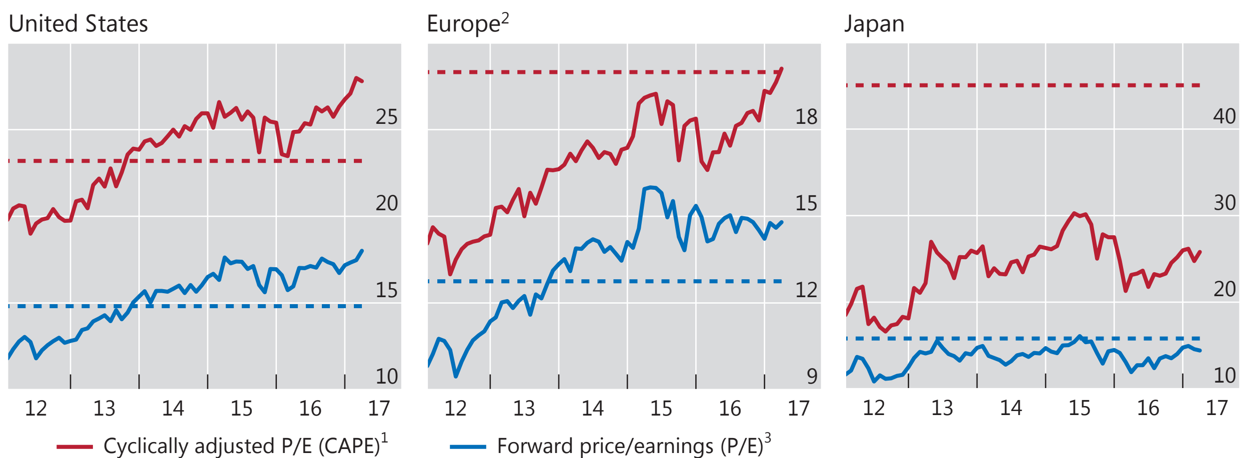
The vertical lines in the right-hand panel indicate 23 June 2016 (UK referendum on EU membership) and 8 November 2016 (US presidential election).

[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



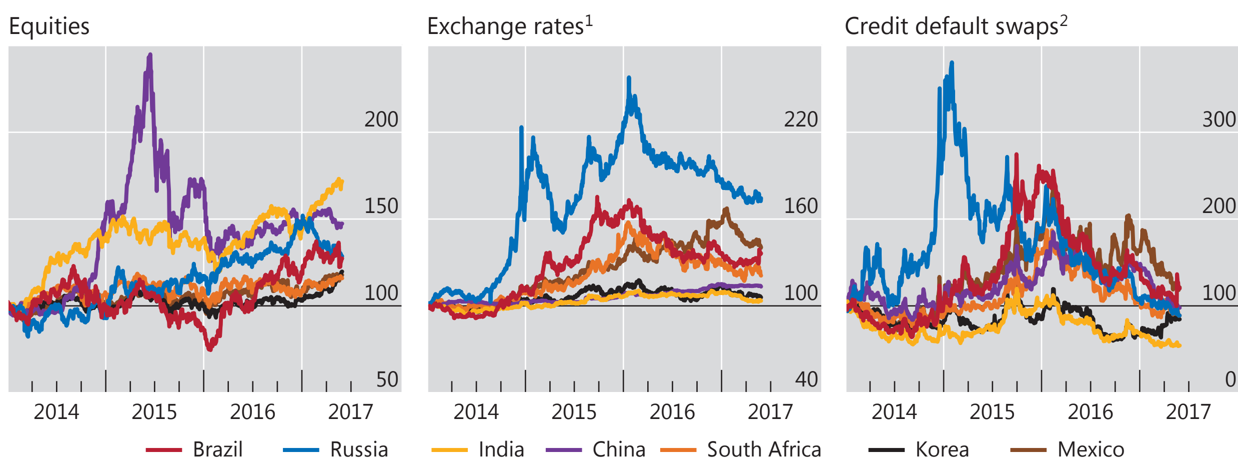
The dashed lines indicate the long-term averages of the CAPE ratio (December 1982–latest) and the forward P/E ratio (July 2003–latest).

[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



[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.

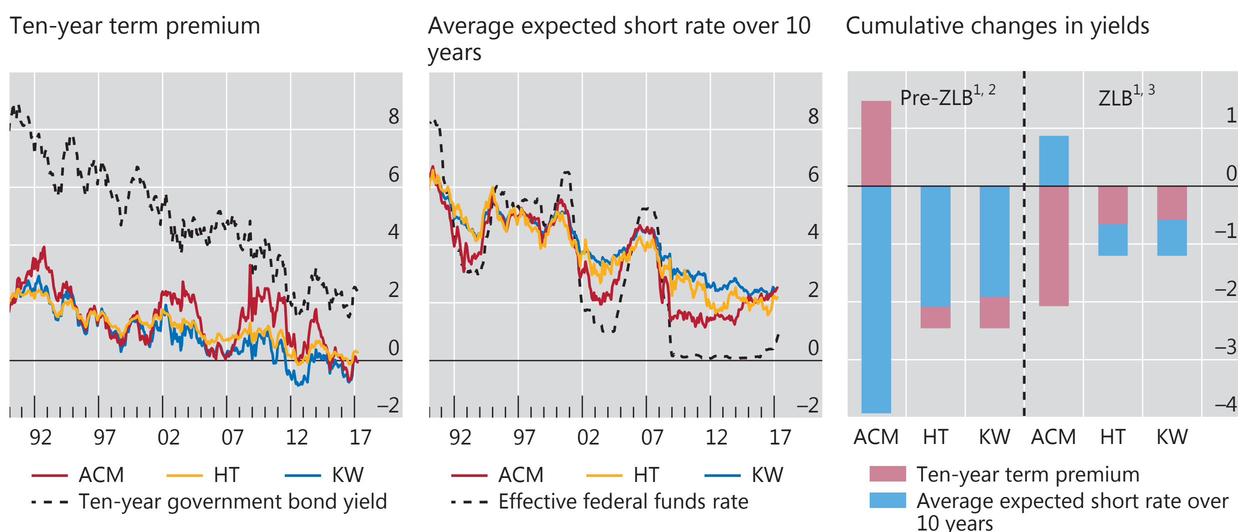
Neither term premia nor the expected path of future short-term interest rates – the two assumed components of bond yields – are directly observable. Thus, estimates depend crucially on the approach followed and the additional assumptions made.

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



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.

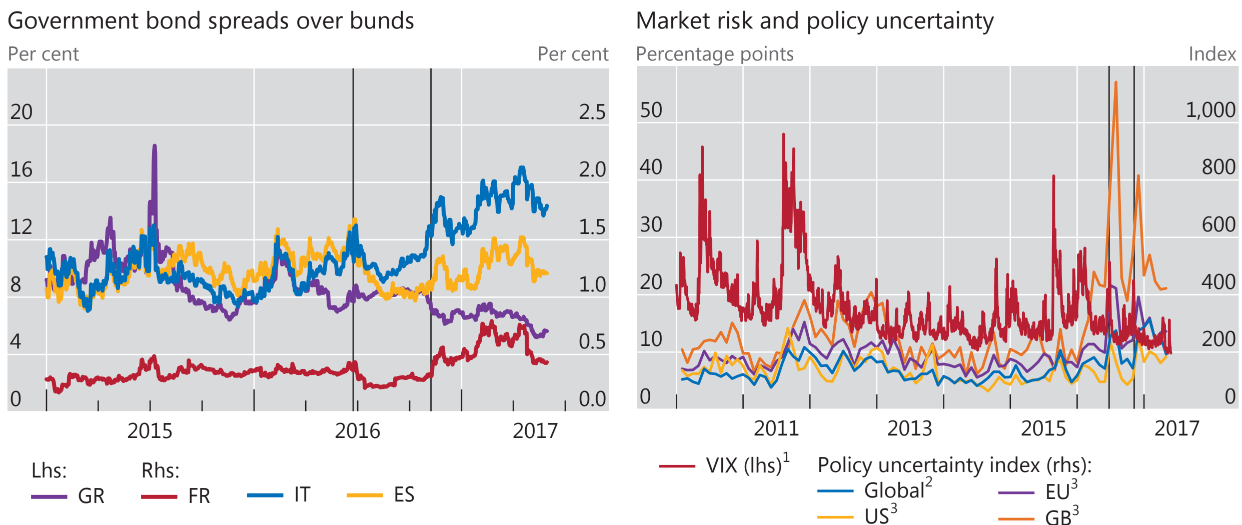
An additional difference across models relates to their real-time performance. Are the estimates revised as more observations become available and the parameter estimates updated? Here, the models that include more parameters or data inputs that are themselves heavily revised, such as estimates of the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

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



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).

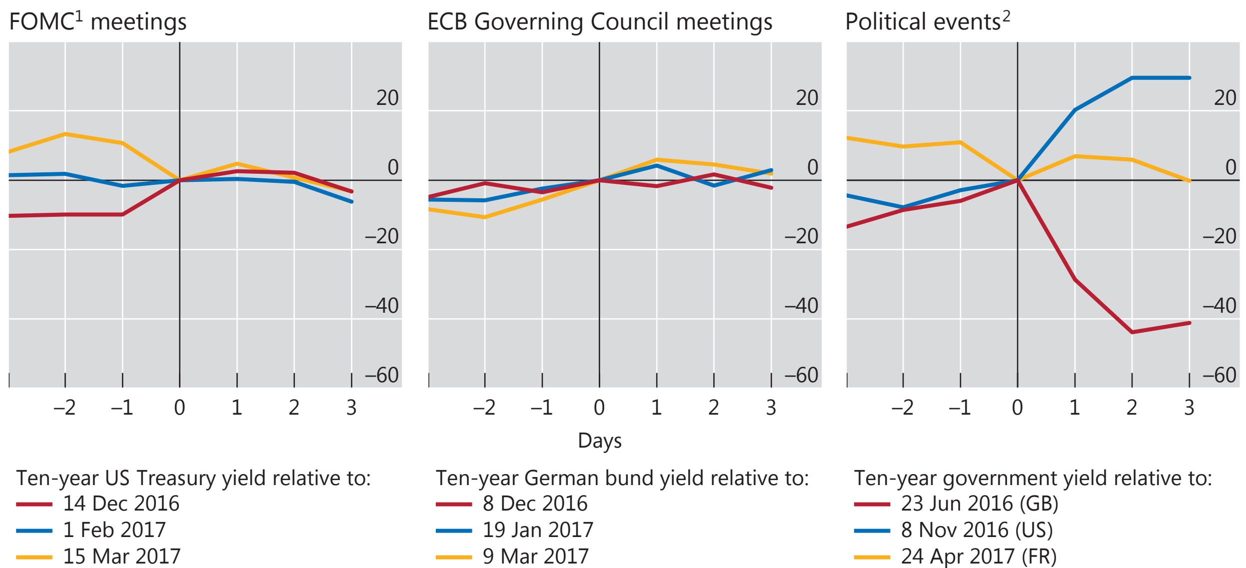
A greater focus on politics also influenced return correlations across asset classes – the first indication of a shift in the pricing of risk in financial markets (Graph II.10). This was particularly visible in equity markets. For instance, in the weeks following the US presidential election, market 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

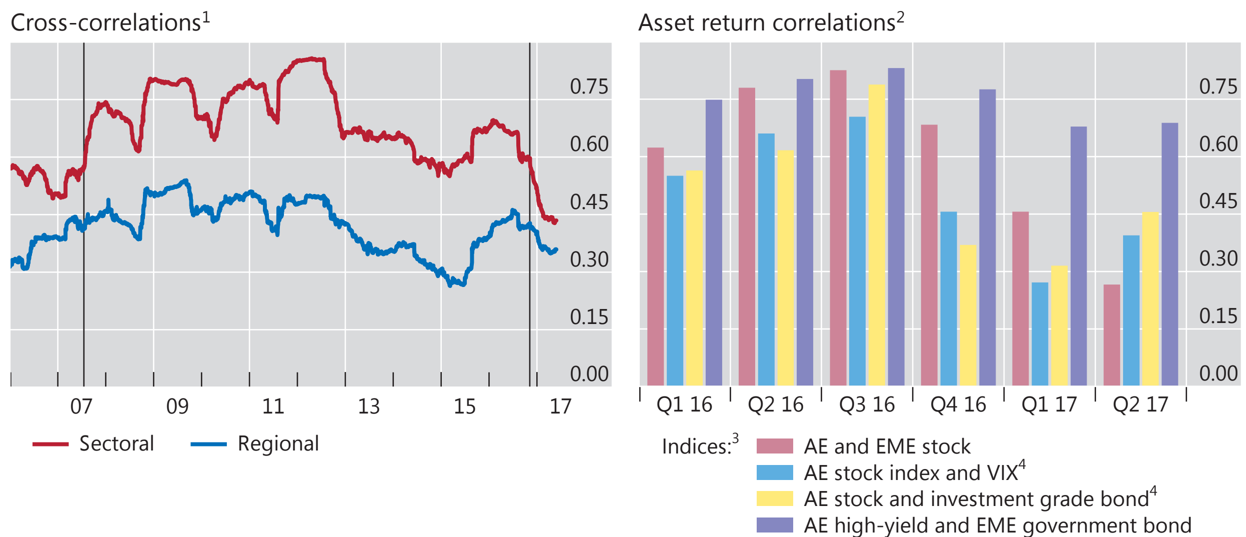


[1] Federal Open Market Committee. [2] 23 June 2016: UK referendum on EU membership; 8 November 2016: US presidential election; 24 April 2017: first round of French presidential election.

Sources: Bloomberg; BIS calculations.

Correlation patterns break down

Correlation coefficient Graph II.10



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

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.

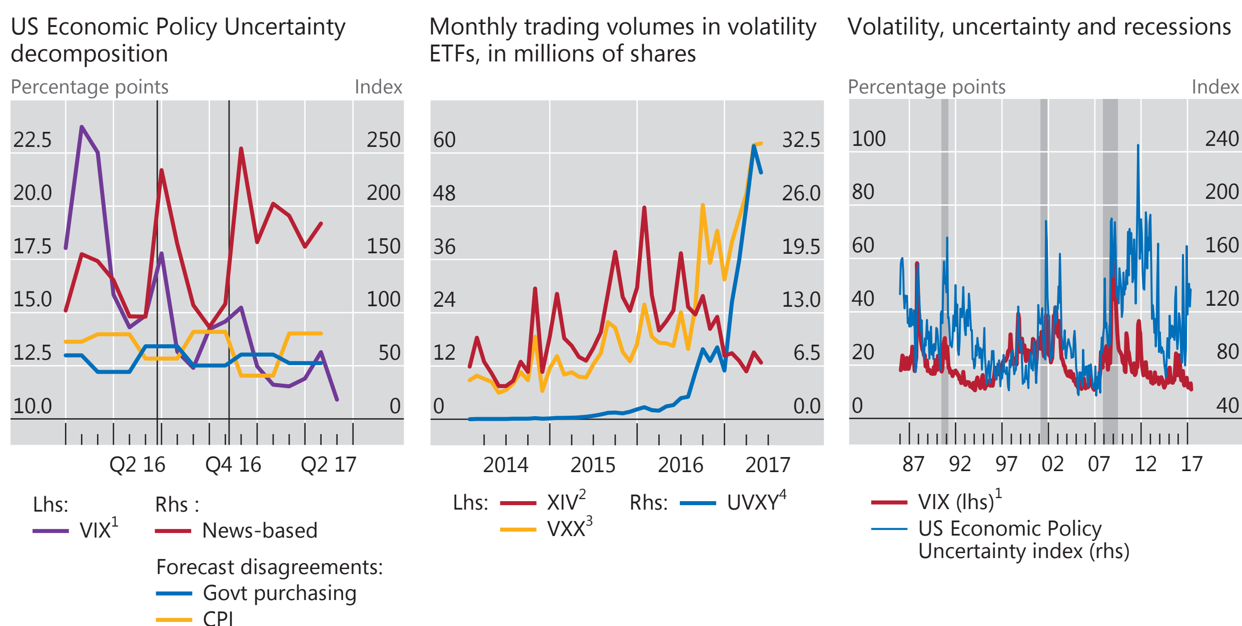
While implied volatility (as derived from option prices) has become the most prominent measure of financial risk, policy uncertainty is, by its very nature, more challenging to quantify. Among the various indicators, the Baker, Bloom and Davis (2016) policy uncertainty index has become quite popular.① 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



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.

central banks' quantitative easing policies. Another possibility is that policy uncertainty captures tail risks that may not significantly affect implied volatilities due to the inherent difficulty in assigning probability to tail events. Position-taking in volatility-based products, in which activity has grown rapidly in recent years, could be suppressing the underlying volatility index (Graph II.B, centre panel). Finally, the news-based measures of uncertainty may reflect concerns that are not yet on market participants' radar, if their effects play out over a longer horizon.

The divergence between policy uncertainty and market volatility is not unprecedented. Previous bouts of high policy uncertainty alongside relatively low market volatility occurred in the wake of the early 1990s recession, in the years after the bursting of the tech bubble and the 9/11 attacks, and in the aftermath of the Great Financial Crisis. In general, the volatility and policy uncertainty indices appear to have been tightly related and relatively subdued in periods leading up to crises, and disconnected in the early stages of economic recovery (Graph II.B, right-hand panel).

① S Baker, N Bloom and S Davis, "Measuring economic policy uncertainty", *Quarterly Journal of Economics*, vol 131, no 4, pp 1593–636, 2016.

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

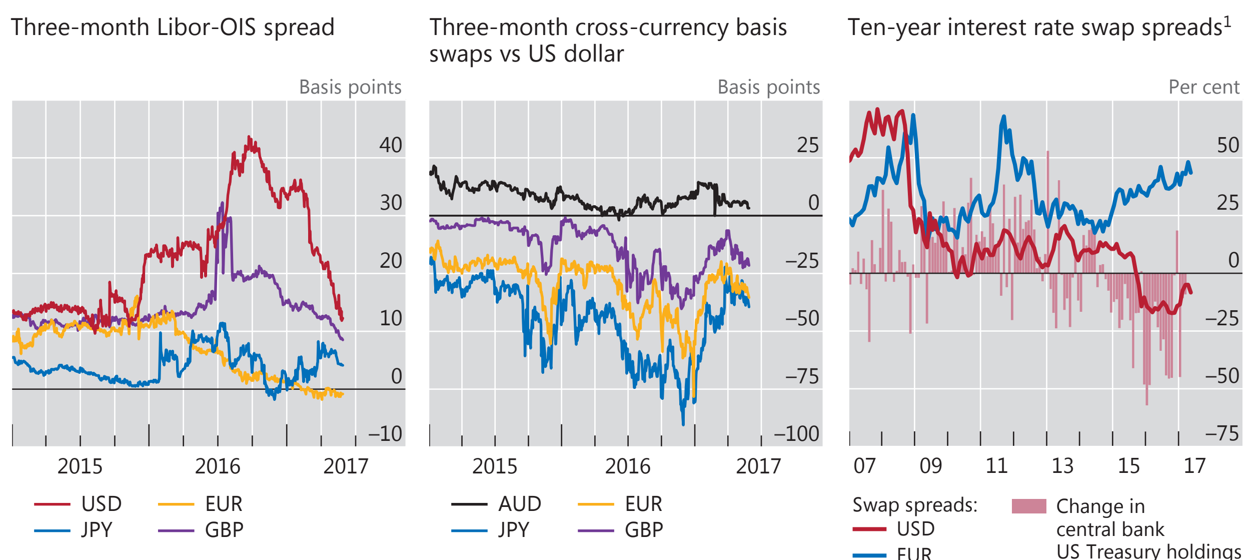
sources in anticipation of the revised rules, these changes affected short-term US dollar money markets. For example, the spread between US dollar Libor and overnight index swap (OIS) rates widened throughout 2016 (Graph II.12, left-hand panel). This spread narrowed once the October deadline passed, 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

Financial market anomalies narrow, but persist — Graph II.12



[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).

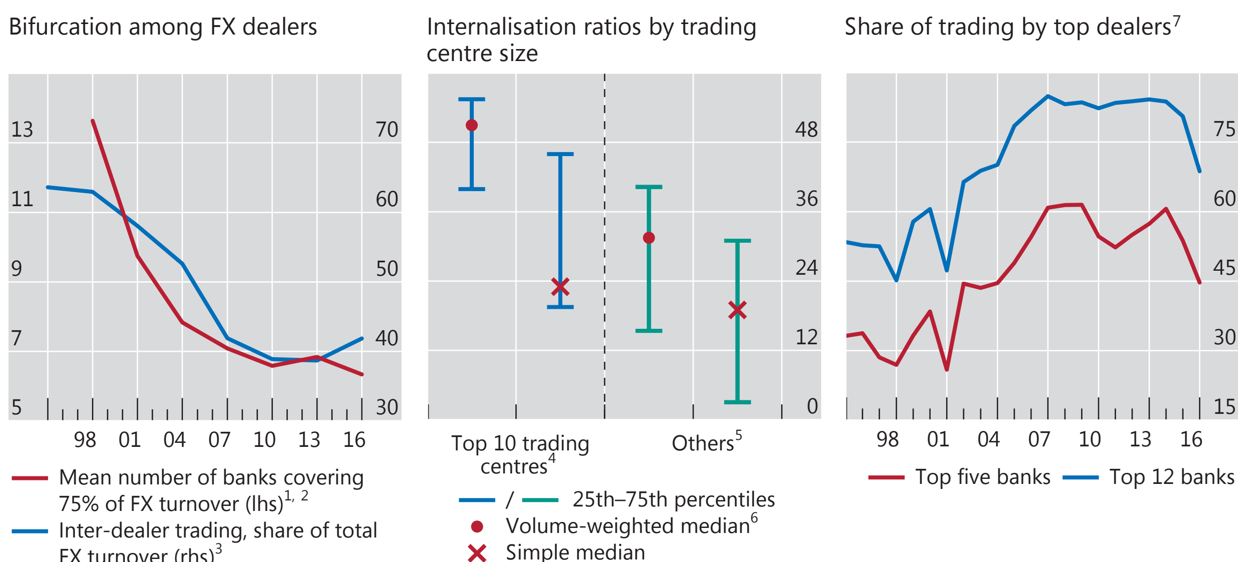
Among dealer banks, there has been a growing bifurcation between the few large institutions still willing to take risks onto their balance sheets as principals and those that have primarily moved to an agency model of market-making. Indeed, the 2016 Triennial Survey found that the number of banks accounting 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

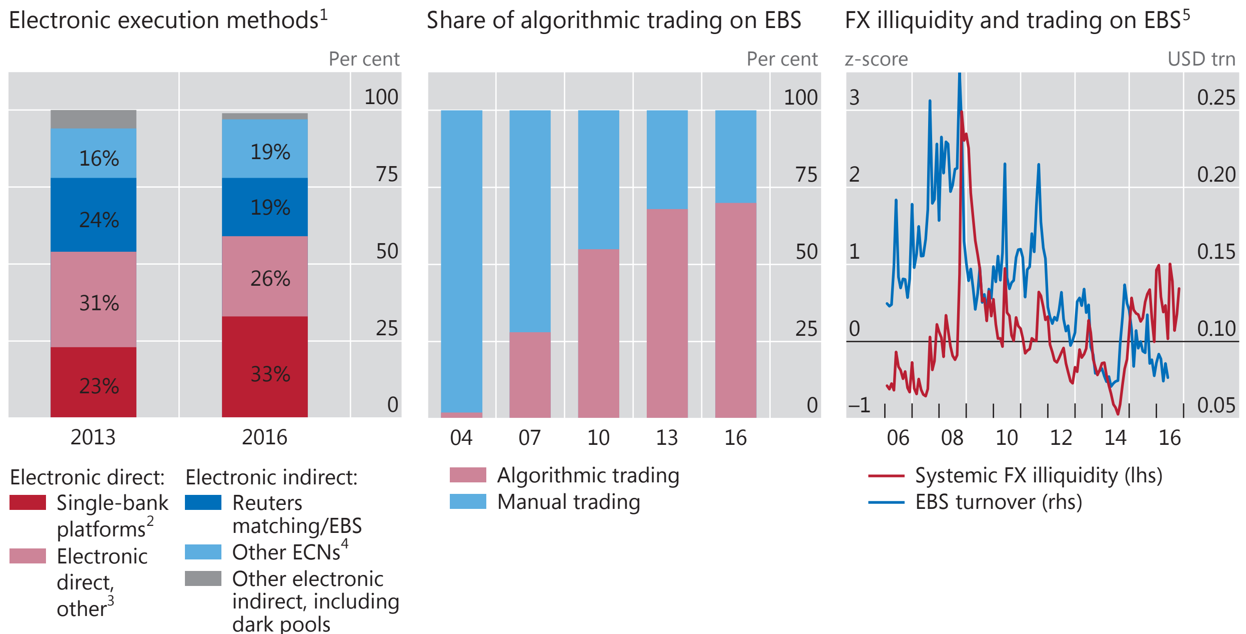


[1] Across the following jurisdictions: AU, BR, CH, DE, DK, FR, GB, HK, JP, SE, SG and US. [2] Spot, outright forwards and FX swaps. [3] Adjusted for local and cross-border inter-dealer double-counting, ie "net-net" basis; daily averages in April. [4] AU, CH, DE, DK, FR, GB, HK, JP, SG and US. [5] Remaining 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



[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.

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.

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.

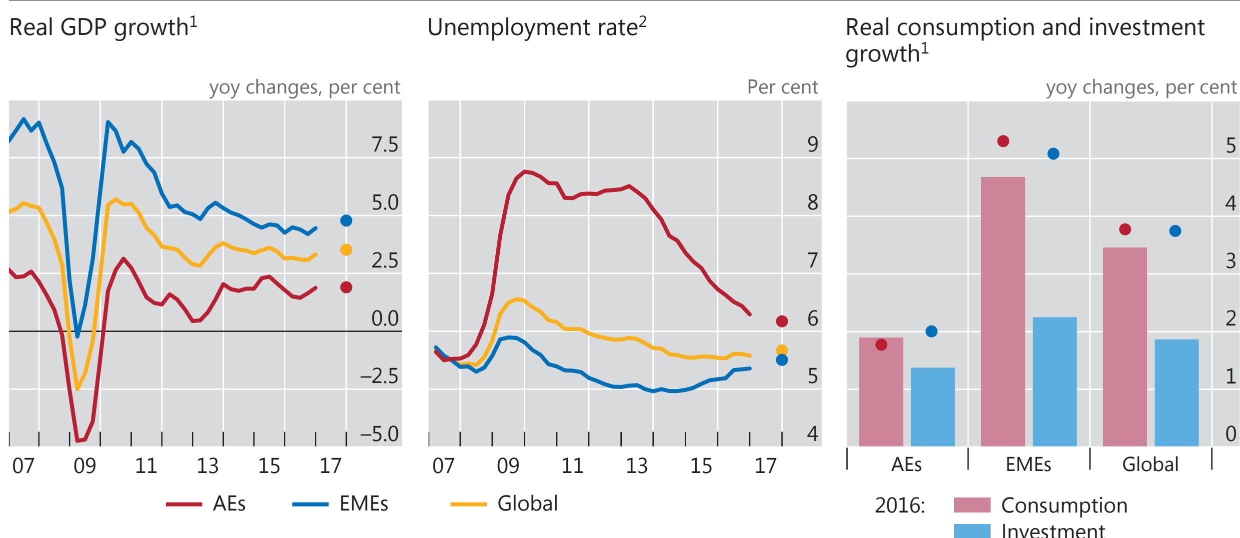
Macro-financial developments – at inflection points?

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



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).

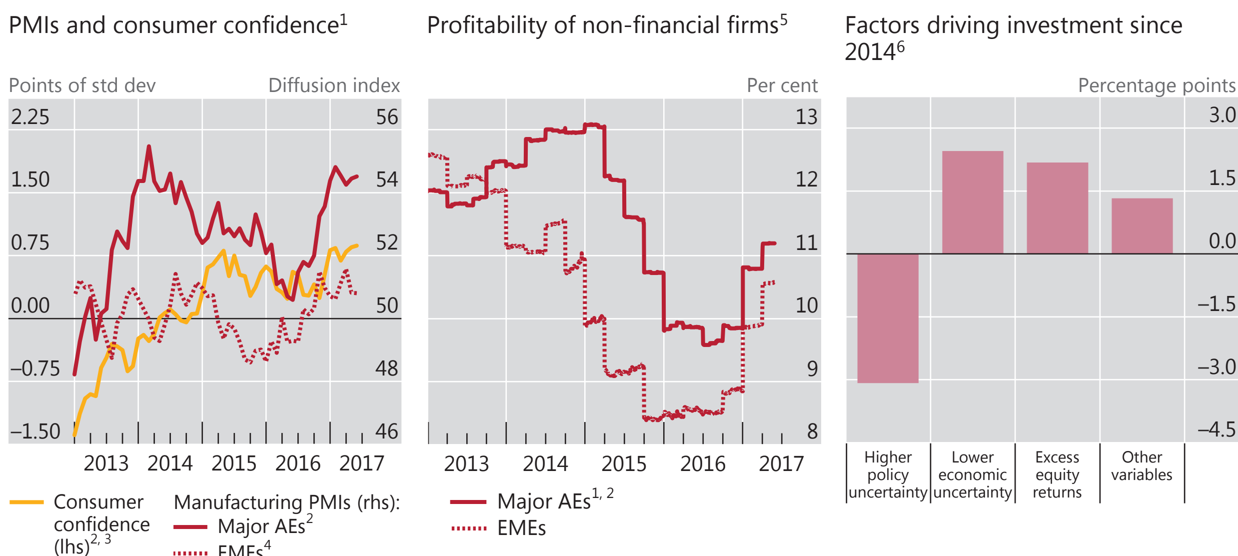
Consumption was the key factor driving demand in both advanced economies and EMEs during 2016. Consumption growth exceeded investment growth by around half a percentage point in advanced economies and by over 2 percentage points in EMEs (Graph III.1, right-hand panel). For 2017, investment is forecast 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

Favourable near-term outlook Graph III.2



[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.

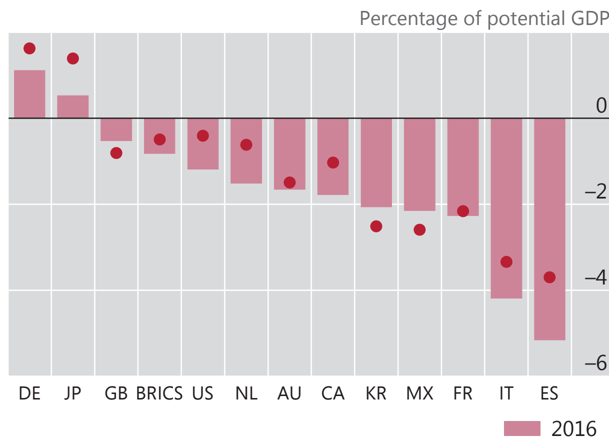
In other advanced economies that were less affected by the GFC, financial booms moderated. The growth in the private credit ratio slowed by around 6 percentage points from the previous year, even as property prices continued to rise. The slowdown mainly reflected weaker corporate debt growth, while household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

Shrinking economic slack

Graph III.3

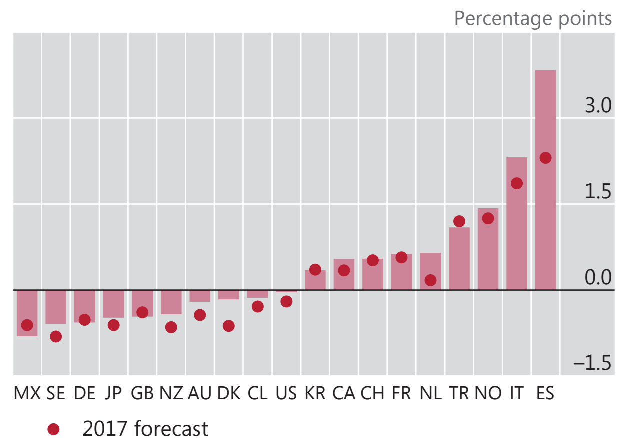
Output gaps[1]

Percentage of potential GDP



Unemployment gaps[2]

Percentage points



2016 ● 2017 forecast

[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.

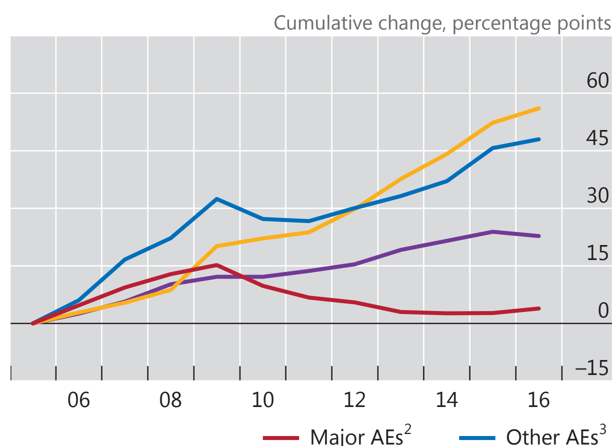
Many EMEs experienced slowing financial booms and some outright downturns in 2016. In aggregate terms, both real house prices and credit relative to output flattened out. Excluding China, EMEs even experienced a small reduction in their credit-to-GDP ratio. This reflected, in particular, downturns in 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]

Graph III.4

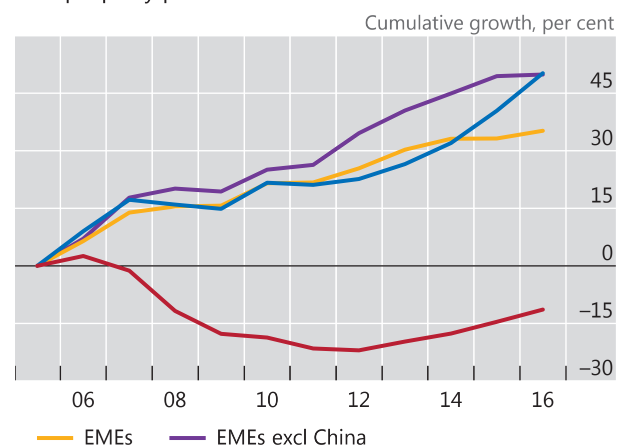
Private non-financial credit to GDP

Cumulative change, percentage points



Real property prices[4]

Cumulative growth, per cent



Major AEs[2] Other AEs[3] EMEs EMEs excl China

[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.

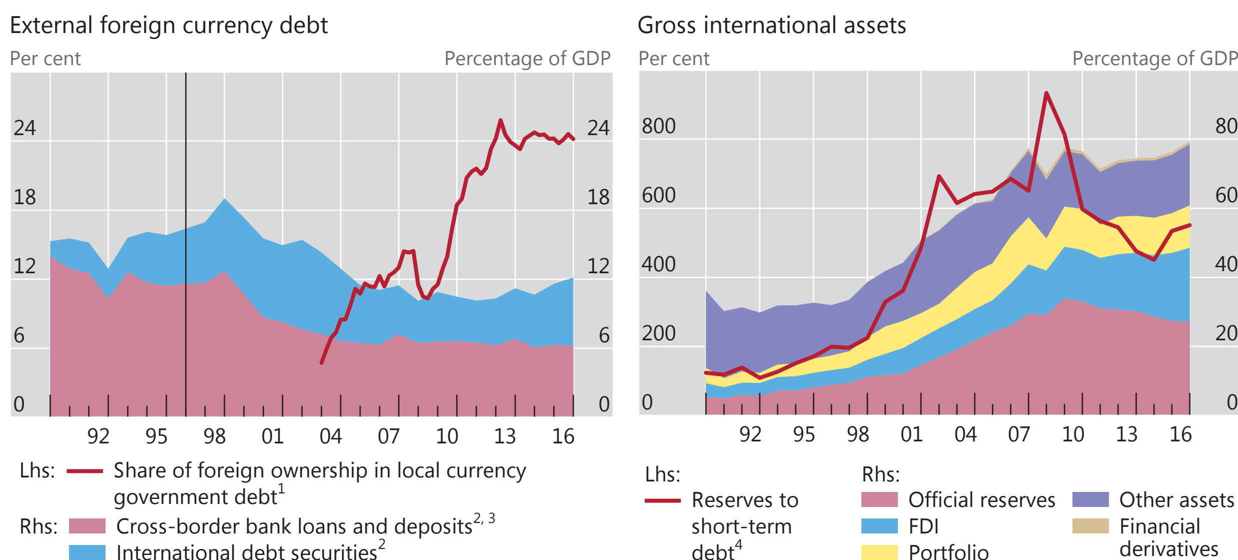
[1] For those economies where the credit-to-GDP gap is above a critical threshold, asterisks indicate a property price gap also above a critical threshold in at least one of the last five years. For a derivation of critical thresholds for credit-to-GDP and property price gaps, and their measurement, 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



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.

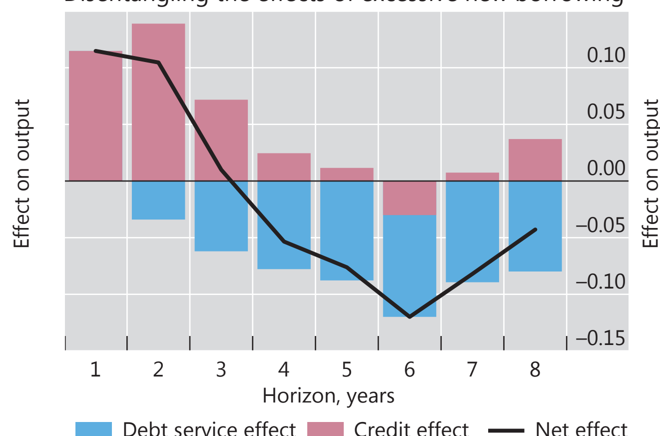
Empirically, these simple accounting relationships suggest a transmission channel whereby excessive credit expansions lead to future output losses. In particular, using a panel of 17 mainly advanced economies from 1980 to

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]



[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.

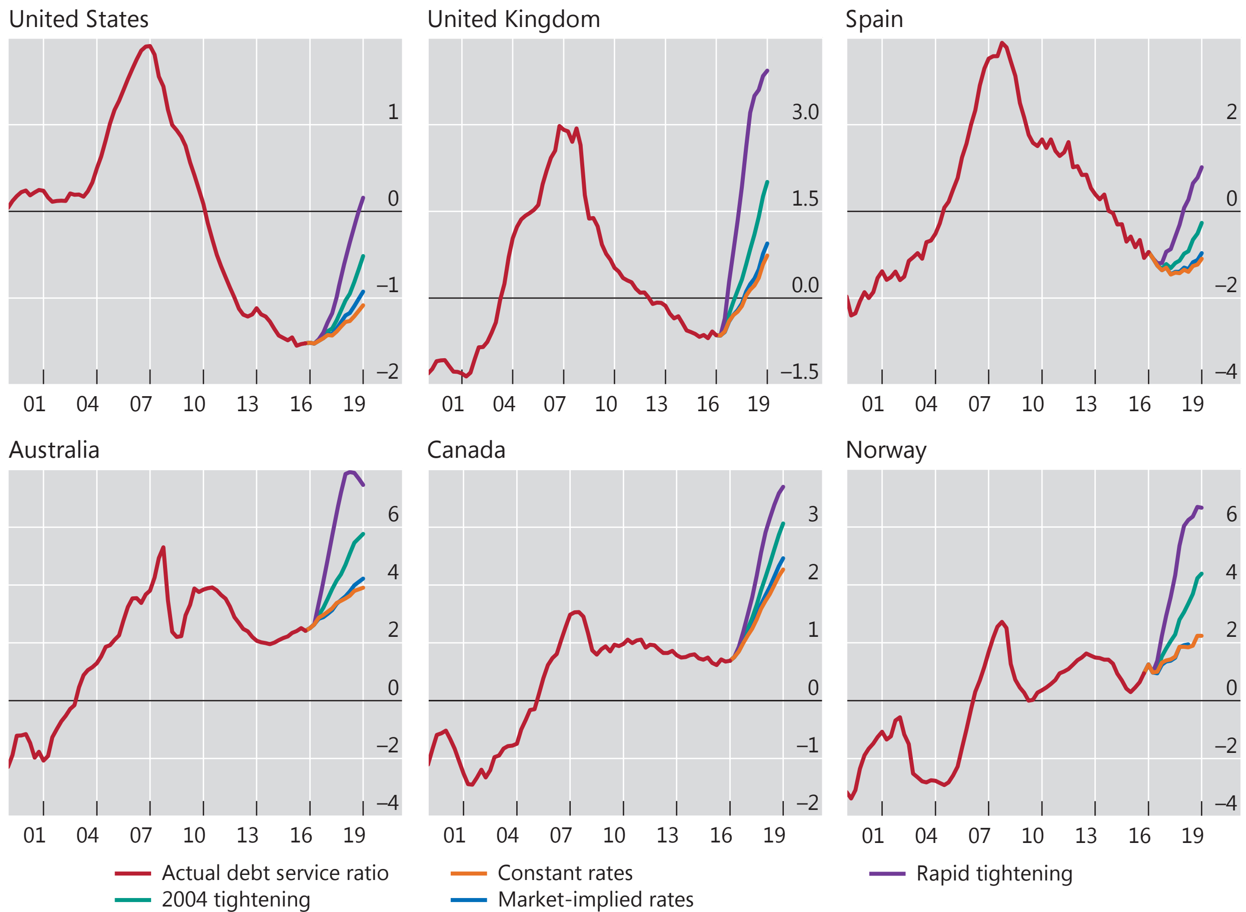
Additional risks to consumption arise from elevated levels of household debt, in particular given the prospect of higher interest rates. Recent evidence from a sample of advanced economies suggests that increasing household debt in relation to GDP has boosted consumption in the short term, but this has 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



[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

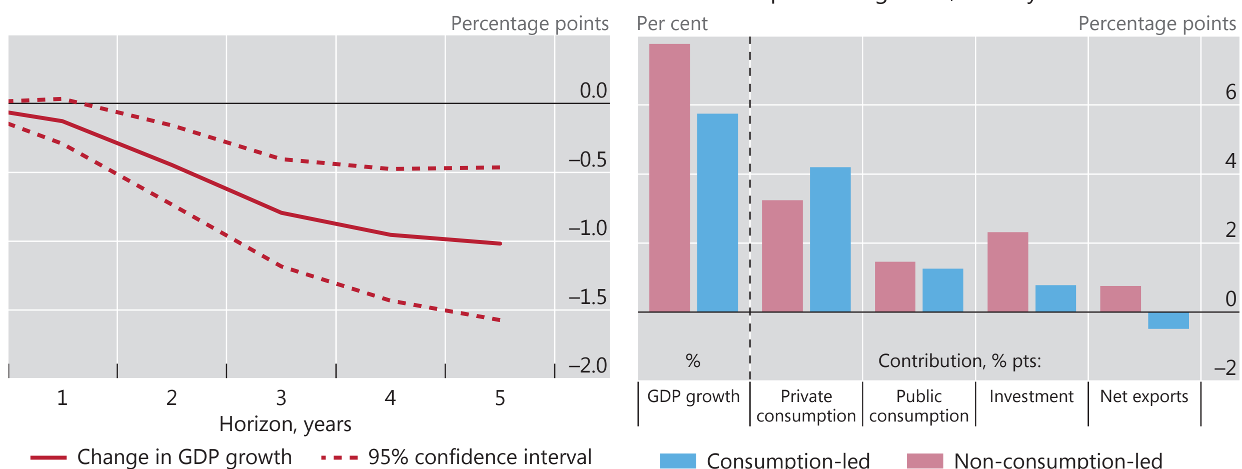
build-up of inflationary pressures. Indeed, consumption-led expansions – defined as private consumption growing more rapidly than output – appear to be less durable than those driven by other components of demand. Evidence for advanced economies indicates that consumption-led growth heralds below-average 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



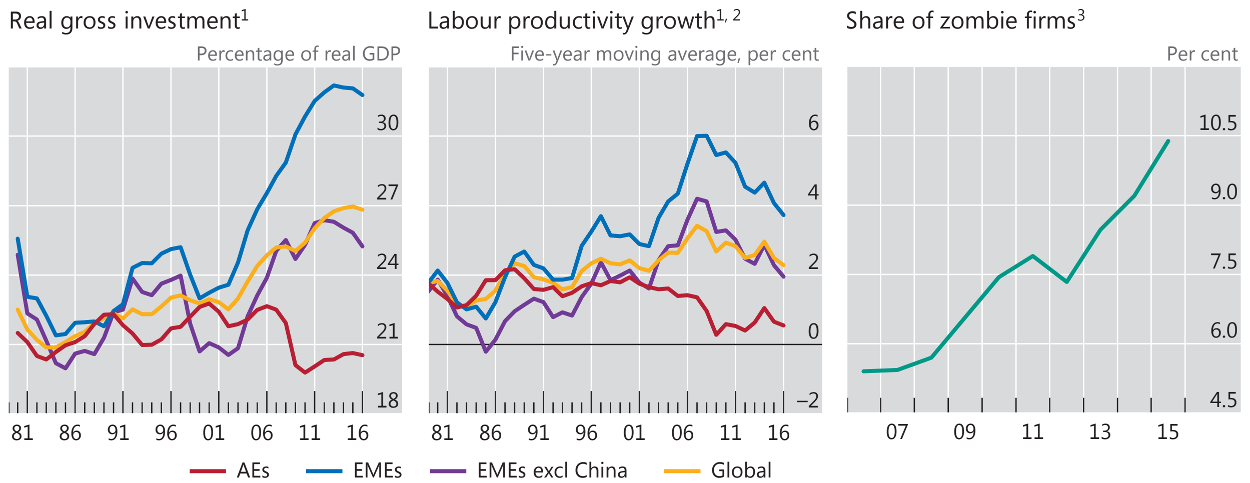
The sample covers 18 major advanced economies over the period 1991–2016. Consumption-led expansions are defined as periods of increasing private consumption-to-GDP ratios. Periods with negative real GDP growth are excluded.

[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

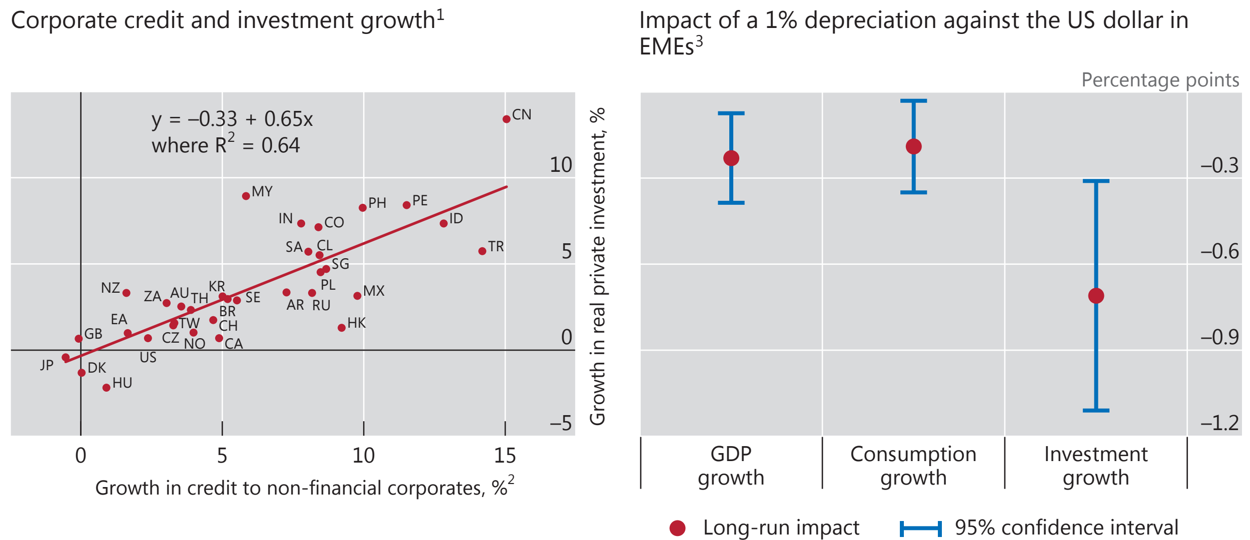


[1] Weighted averages based on rolling GDP and PPP exchange rates. [2] Per person employed. [3] Zombie firms are defined as listed firms with a ratio of earnings before interest and taxes to interest expenses below one, with the firm aged 10 years or more. Shown is the median share across AU, BE, CA, 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



[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.

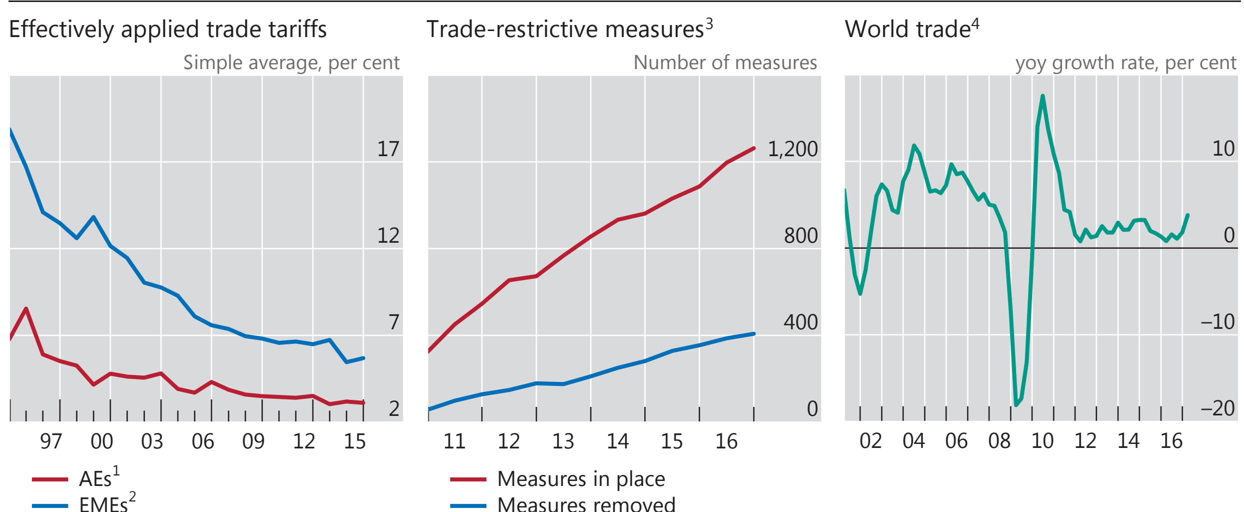
Over the past 10 years, there has been a close positive correlation between the growth of corporate credit and investment (Graph III.9, left-hand panel). A build-up of corporate debt has financed investment in many economies, particularly in EMEs, including high investment rates in China. Turning financial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



[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.

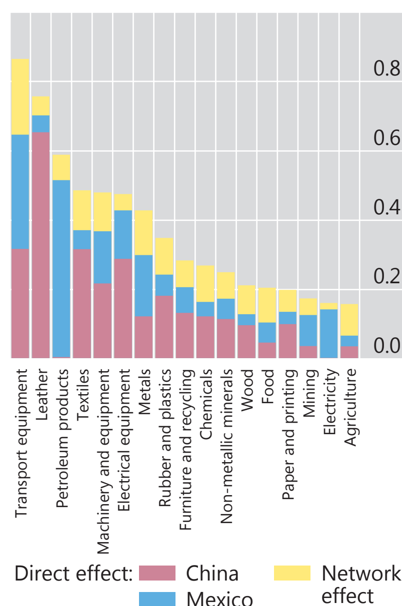
Overall, this simulation reveals a comparatively large sensitivity of US production costs to tariffs on imports from Mexico or China. To put the resulting cost shocks in context, the centre panel of Graph III.B displays the reduction in US wages that would be required to fully compensate for the increasing 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

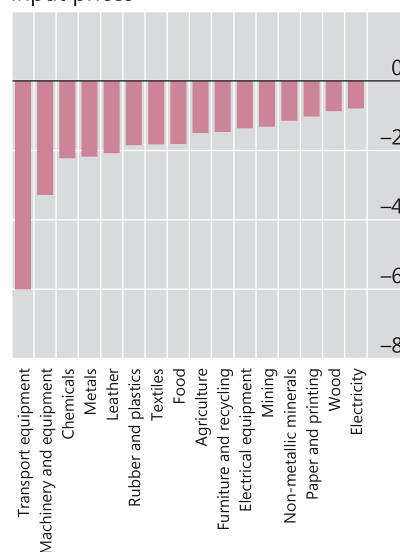
In per cent

Graph III.B

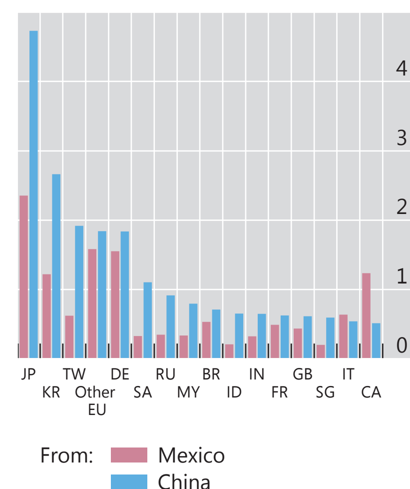
Cost shock to US industry of a tariff[1]



Decline in sectoral US labour costs required to compensate for higher input prices[2]



Origin of value added embodied in exports[3]



[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

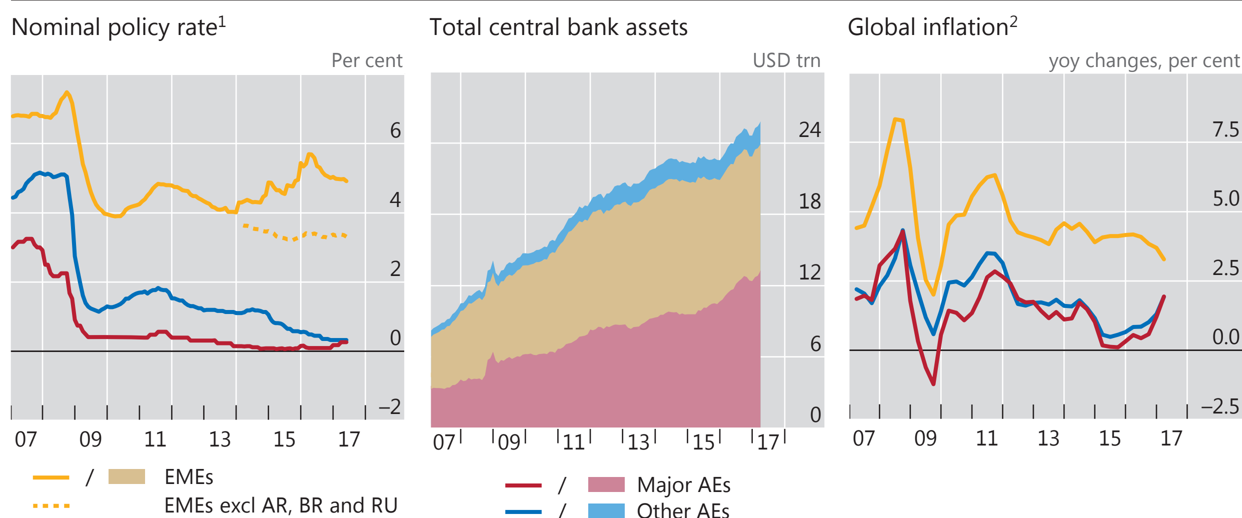
Nearly a decade after the outbreak of the Great Financial Crisis (GFC), policy rates continued to sit near historical lows, with geopolitical events prompting some additional easing in mid-2016 (Graph IV.1, left-hand panel). While the total size of central bank balance sheets reached new heights (Graph 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



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).

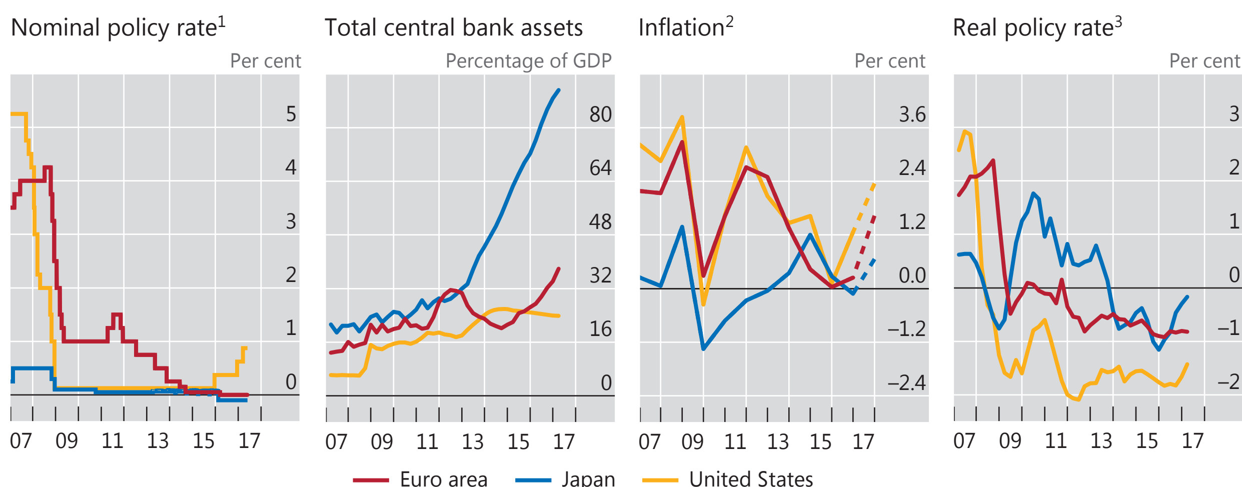
The ECB kept its key policy rates unchanged – with the main refinancing rate at 0% and the deposit facility rate at –0.4% – so as to sustain a very substantial degree of accommodation. The ECB cited subdued inflationary pressures and mixed economic and financial prospects as its key reasons for keeping 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



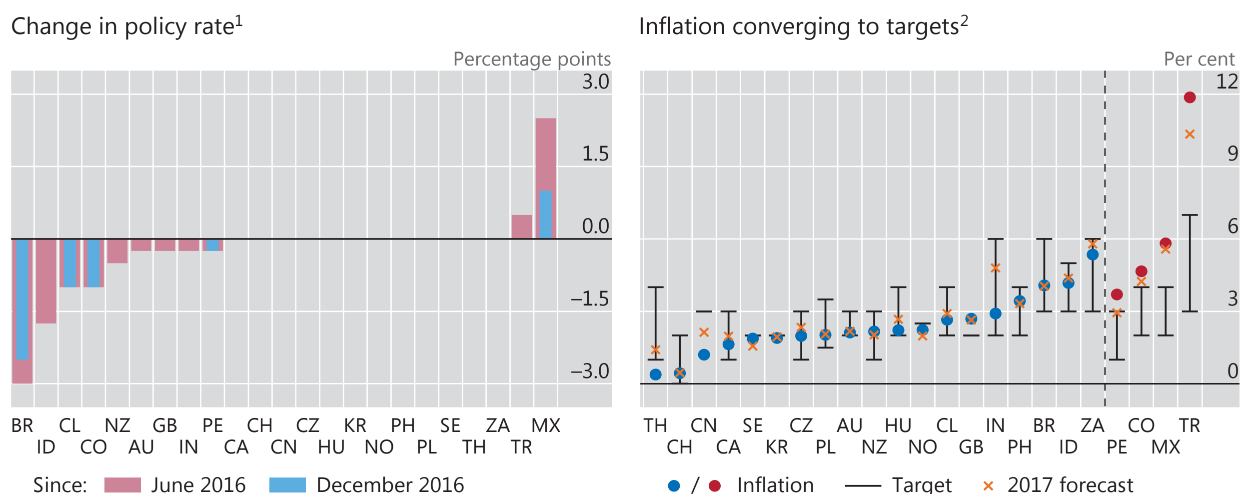
[1] Policy rate or closest alternative. [2] For 2017 (dashed lines), forecasts; for Japan, includes a consumption tax hike adjustment for 2014 and 2015. [3] Nominal policy rate less inflation excluding food and energy; for Japan, also adjusted for the consumption tax hike.

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



[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

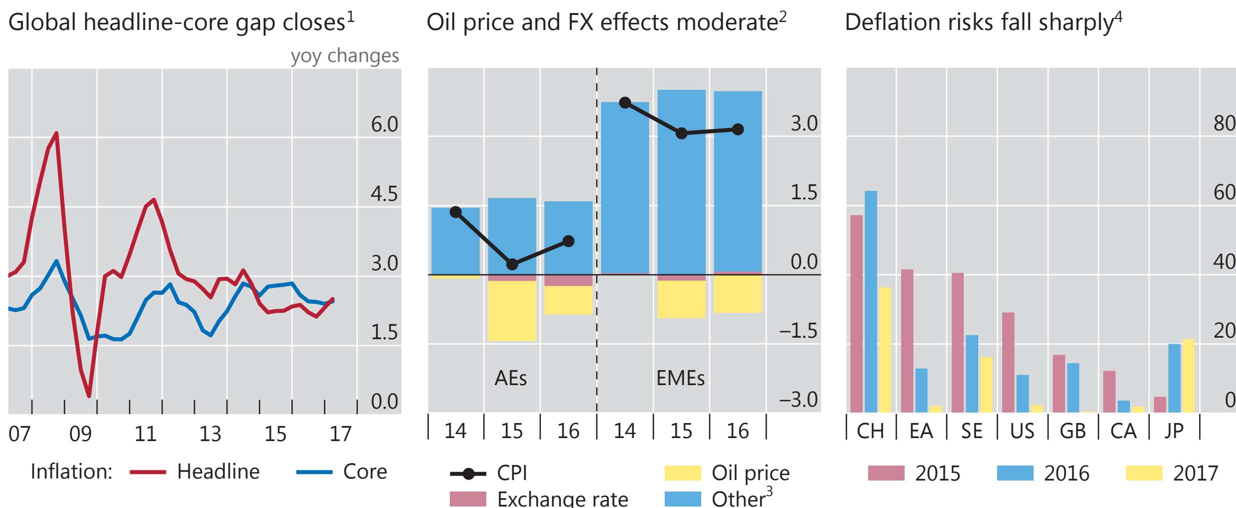
Global inflation edged up to 2.5% (Graph IV.4, left-hand panel). Both near-term and cyclical inflation drivers played significant roles. Commodity prices ticked up. Exchange rates stabilised. Shrinking output gaps and generally tighter labour markets reflected the cumulative effect of the long-lived 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



[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.

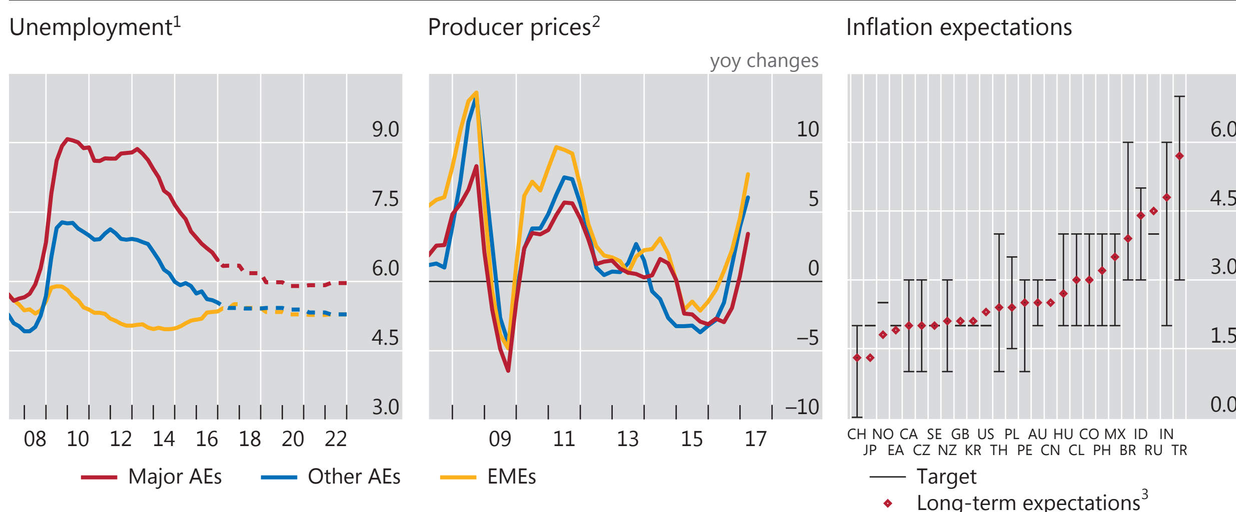
Despite the moderate near-term and cyclical reflationary forces at work, secular factors, such as globalisation and technology, seemingly continued to work in the opposite direction. The *86th Annual Report* raised the possibility that improvements in technology and expanding global value chains (GVCs) 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



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.

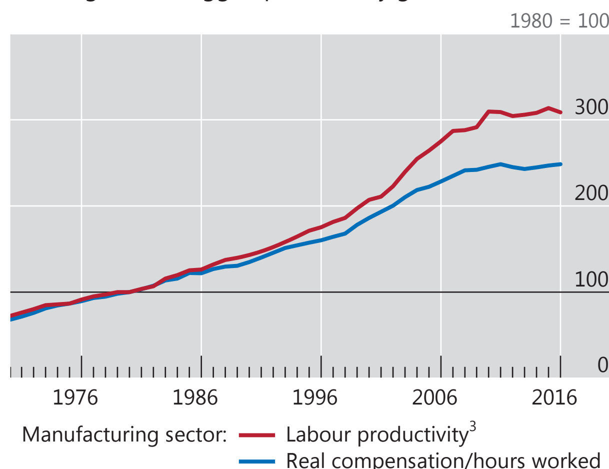
A second factor has been industrial automation. New technologies have long been a significant influence on production processes and demand for skilled labour in advanced economies. With the quickening pace and growing versatility of current robotic technologies, manufacturing labour pools face new challenges. 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

Globalisation and technology have been driving secular labour market trends[1]   Graph IV.6

Labour share has declined...[2]

...as wages have lagged productivity gains



[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.

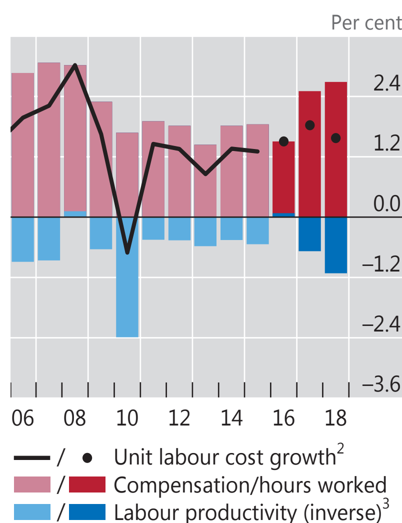
The consequences of ULC developments for prices are somewhat less clear. To be sure, ULC growth and inflation appear to co-move closely in the long run.[4] In addition, there is evidence of a link at cyclical frequencies (Graph IV.7, right-hand panel). That said, the link has become weaker and has been, 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]

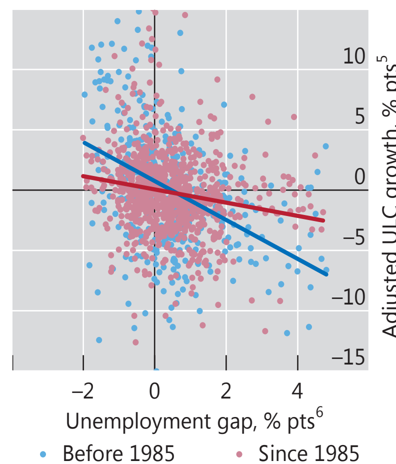
Other factors may have weakened the relationship between slack and wage growth only temporarily. Wage gains may have been unusually weak simply because of the depth of the recession and nominal wage rigidities.[8] With inflation having eroded real wage gains since then, wage pressure might revive if 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

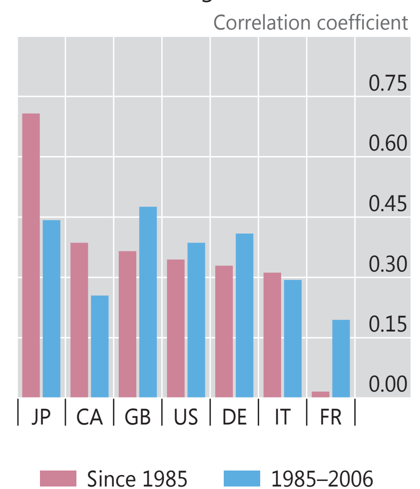
ULC growth in AEs[1]



Falling unemployment rates point to a further pickup in ULC growth[4]



Rising ULC growth historically correlated with higher inflation[7]



[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]

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

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).

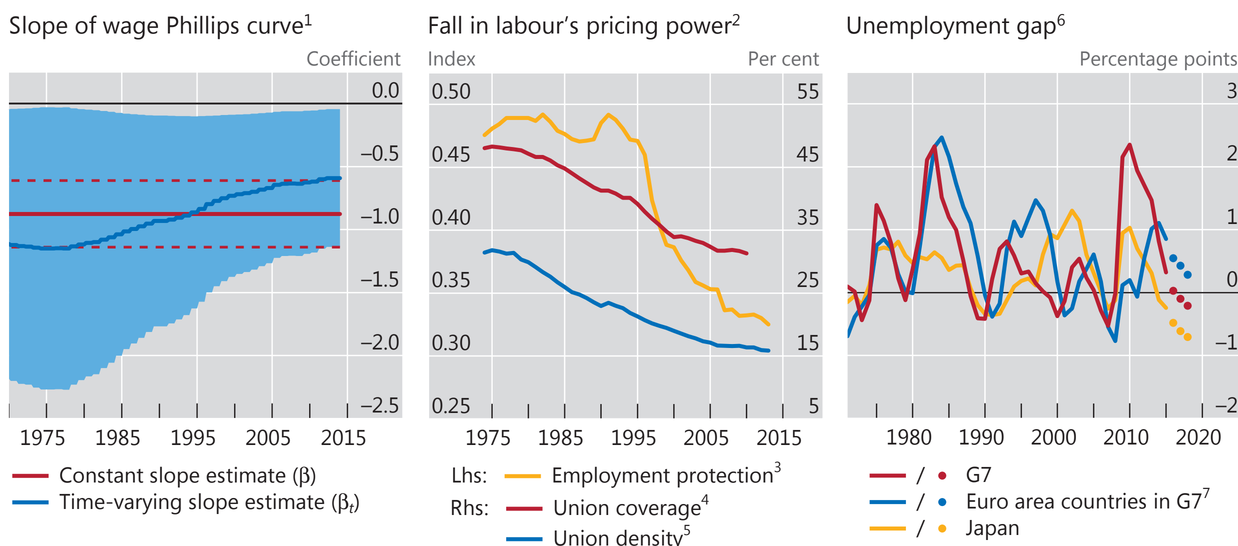
One possible driver of a changing sensitivity of ULCs to slack conditions is the increased contestability of markets associated with the trend decline in workers' pricing power. To explore this possibility, a measure of pricing power (denoted $z_{i,t}$) is constructed by applying the method of principal 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 $z_{i,t}$:

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

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



[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

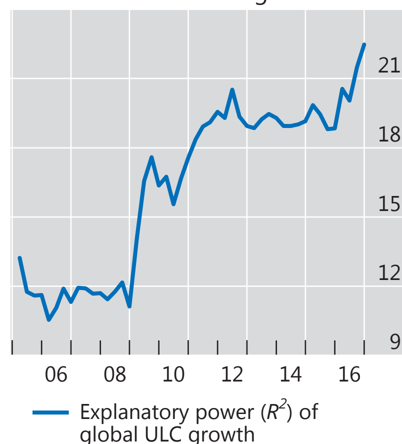
Labour cost developments have become increasingly synchronised across countries over the past two decades. This general trend is reflected in the growing statistical power of global ULC growth in explaining domestic ULC growth – measured by the R^2 in a rolling-window regression for 15 countries from 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.

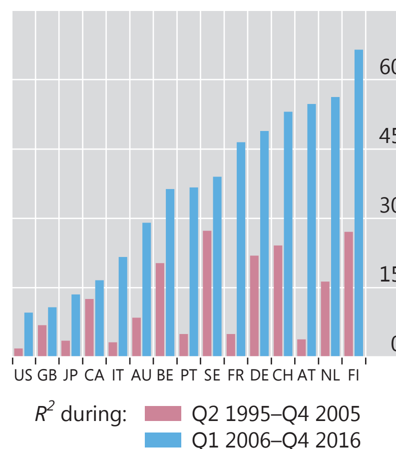
The growing importance of *global* ULC growth can be inferred by looking at the country-specific R^2 values for the two subsamples Q2 1995–Q4 2005 and Q1 2006–Q4 2016 (centre panel). The explanatory power of the statistical relationship has increased for all countries, quite substantially in some cases.

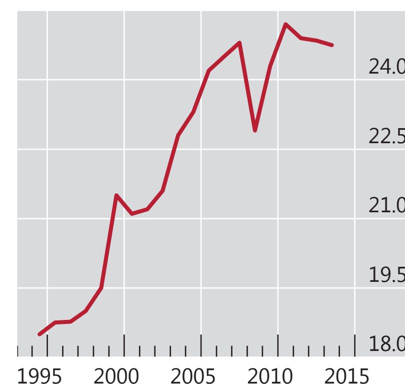
The increasing global co-movement of ULCs is likely to have resulted from greater economic integration. Economic globalisation has fostered greater substitutability not only of intermediate and final goods and services but also of labour across countries. In particular, the rapid expansion of global 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





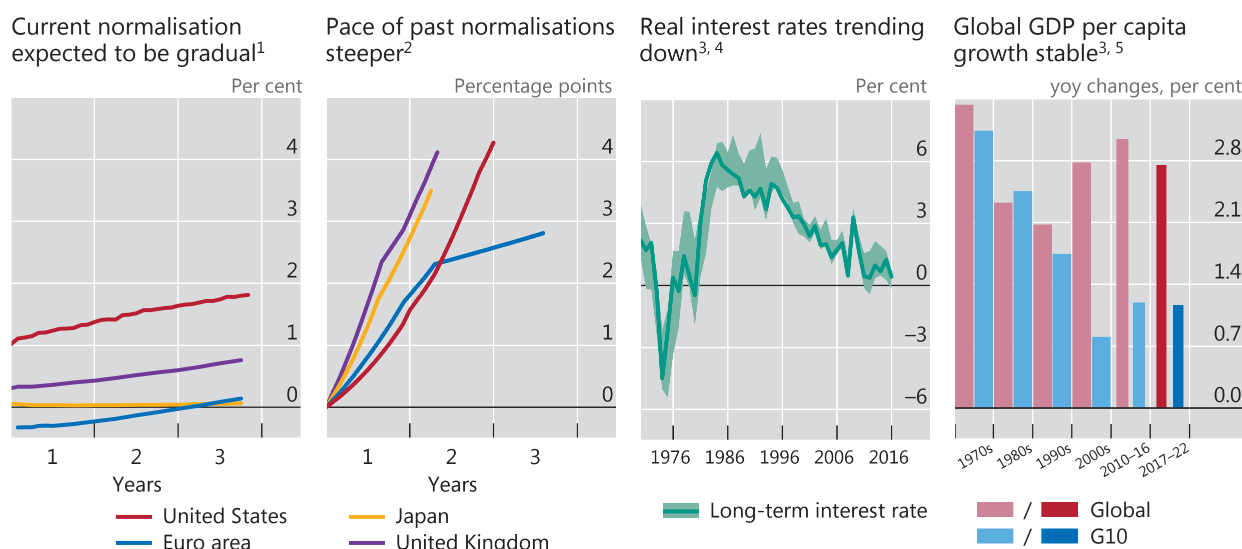


[1] R^2 from the estimated stacked country regression $\widehat{ulc}_{i,t} = \alpha_i + \beta_i\, \widehat{ulc}_{f,t} + \varepsilon_{i,t}$, where $\widehat{ulc}_{i,t}$ is quarterly real ULC growth in country i and $\widehat{ulc}_{f,t}$ is the global measure defined as average real ULC growth in the other 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



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

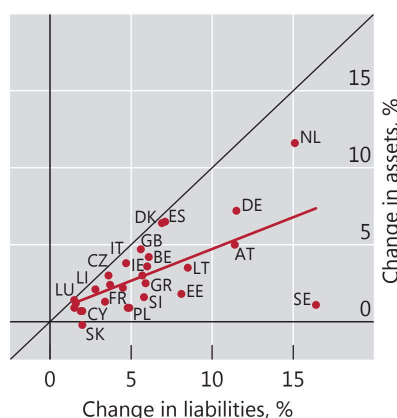
Just like their banking sector peers, many insurance companies continued to struggle with the confluence of an often sluggish recovery and low interest rates. Insurers' performance depends on investment returns and the business mix, primarily property and casualty (P&C) and life insurance, as well as 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.

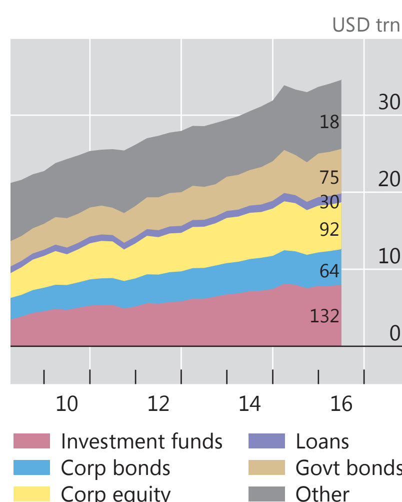
In recent years, insurers – and pension funds – have tackled these pressures in a variety of ways. On the liabilities side, they have shifted underwriting practices towards contracts with reduced or no guarantees as well as unit-linked products, which place the investment risk with the policyholder. 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.

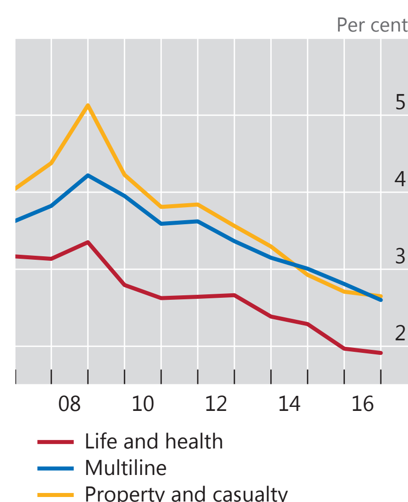
On the assets side, there has been a trend to reach for yield. Asset allocation has shifted towards riskier assets, often via collective investment vehicles and in foreign currency (Graph V.1, centre panel). For example, the proportion of investment fund shares in the sector's total assets rose from 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







[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

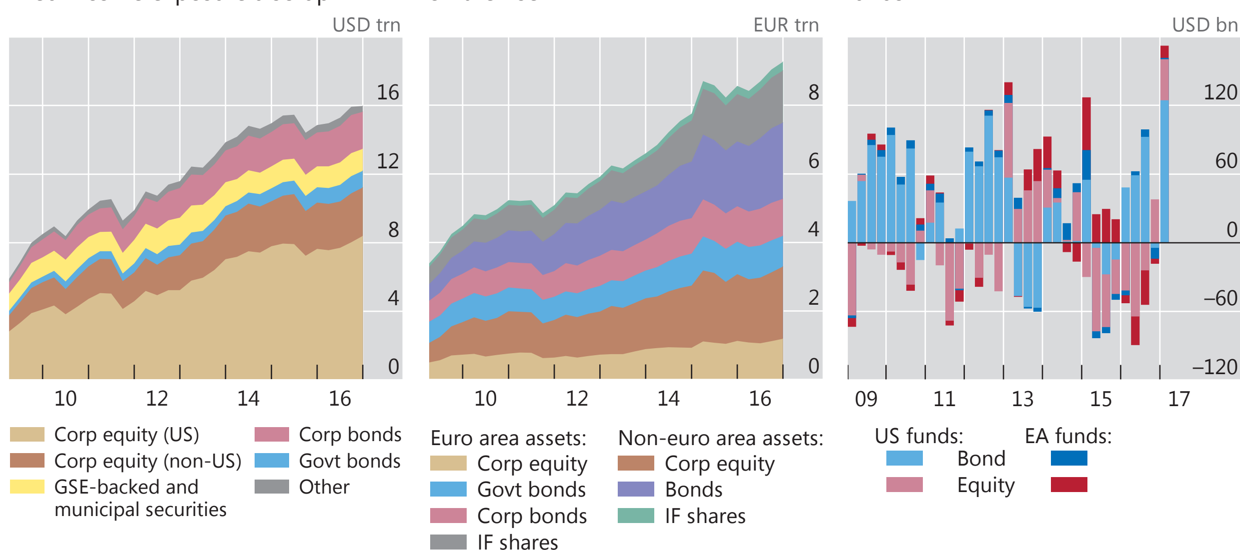
The first column per category shows the corresponding simple average over the period 2012–15.

[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.

Investment fund sector

Graph V.2



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

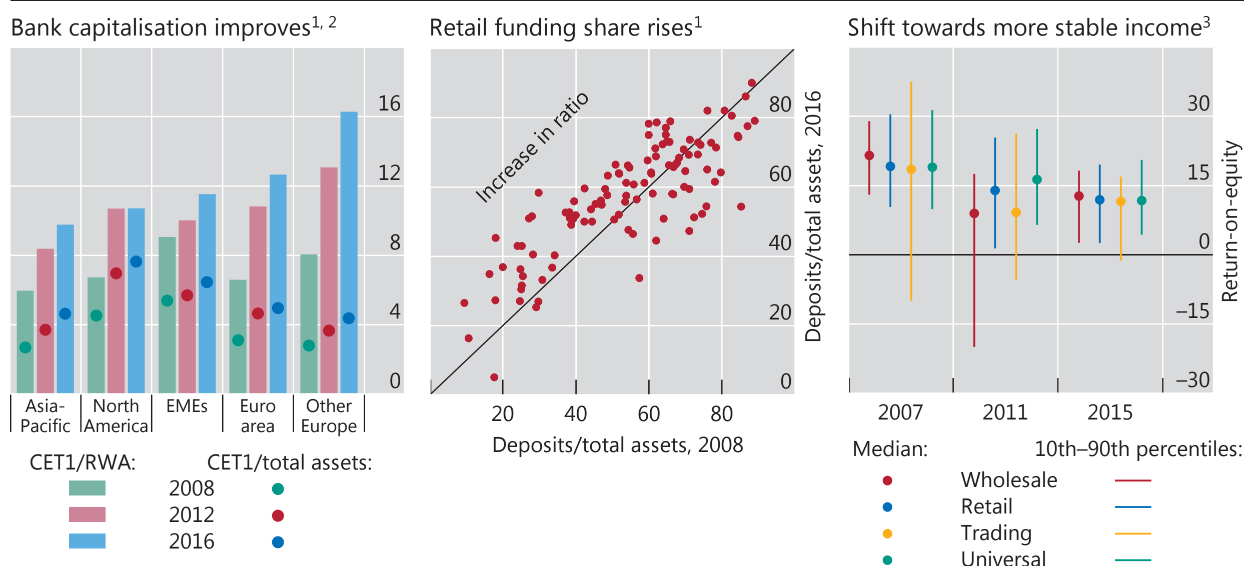
Post-crisis, global banks' business models have been challenged. In addition to a difficult conjuncture (see above), banks have been under market and regulatory pressure to raise capitalisation levels, often decisively, and cut leverage (Graph V.3, left-hand panel). Overall, the transition to higher 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



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.

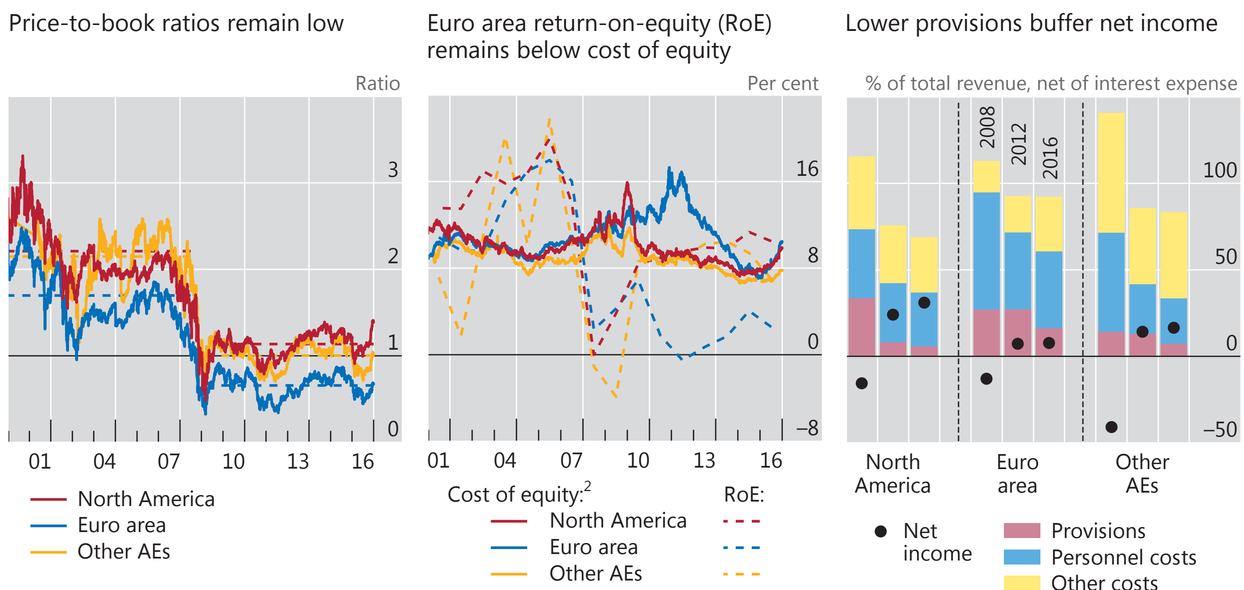
Sources: R Roengpitya, N Tarashev, K Tsatsaronis and A Villegas, "Bank business models: popularity and performance", mimeo, June 2017; SNL; BIS calculations.

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 exposed 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



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).

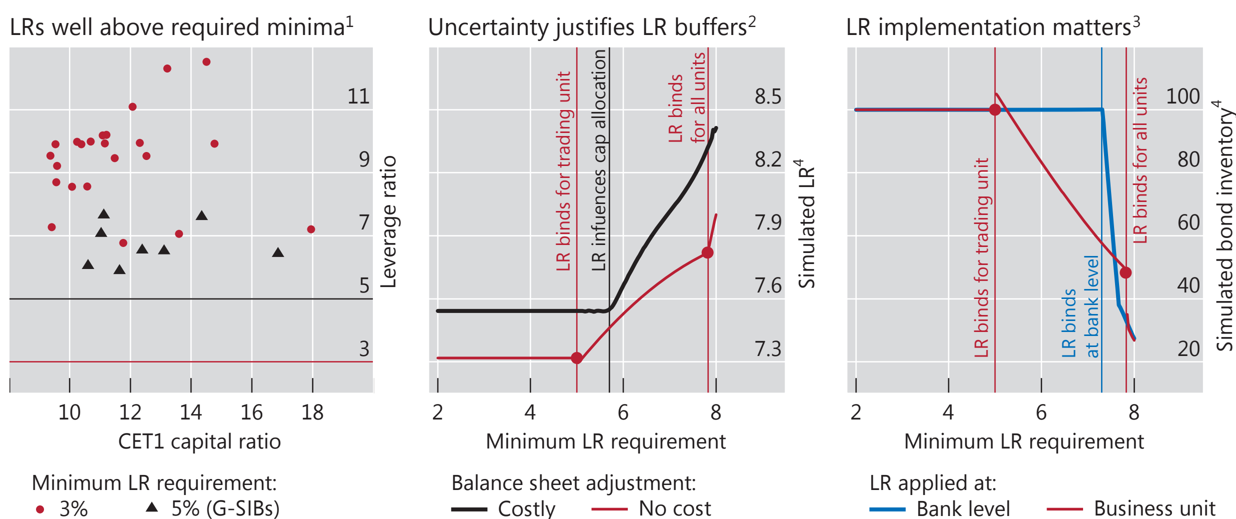
First, banks need to strike a balance between expanding their balance sheets today and costly deleveraging in the future should they be hit by an adverse shock or subjected to a stress test. Since opting for a higher LR reduces the risk of having to deleverage, such uncertainties induce banks to hold 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



[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?

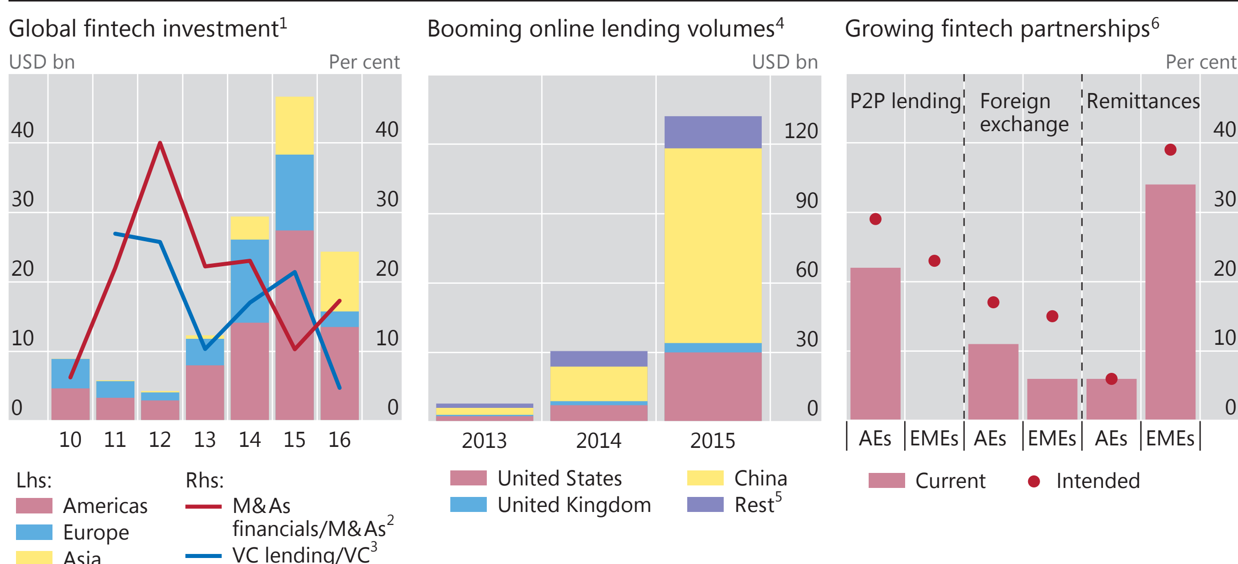
Fintech solutions enable customers to access financial services without – or with reduced – bank involvement, potentially disintermediating incumbents.① Fintech investment has been growing strongly (Graph V.B, left-hand panel), albeit from a low base. One rapidly expanding area is online/peer-to-peer (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



[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).

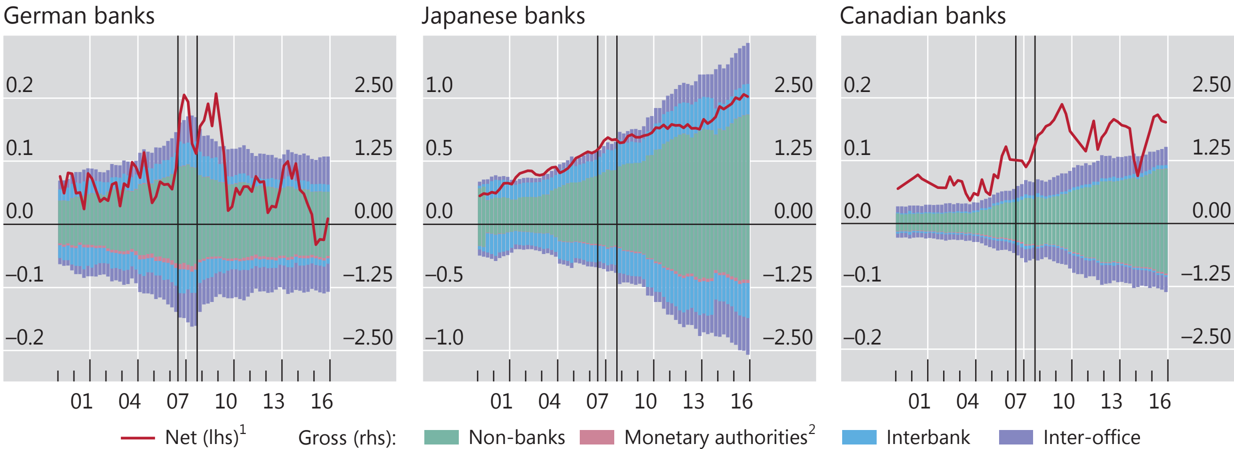
Graph V.6 provides a richer picture for a broader range of banking systems (left-hand panel). It shows dollar claims and liabilities by bank headquarters location, combined with information on the location of banks' counterparties. A number of points are worth highlighting.

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



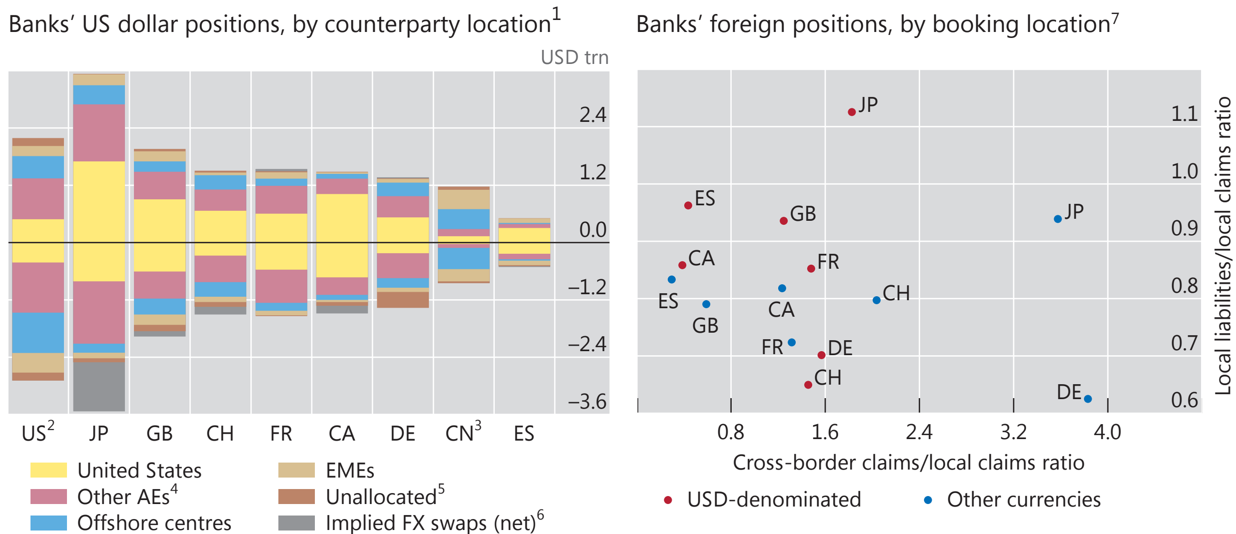
The vertical lines indicate the 2007 beginning of the Great Financial Crisis and the 2008 collapse of Lehman Brothers.

[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



[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

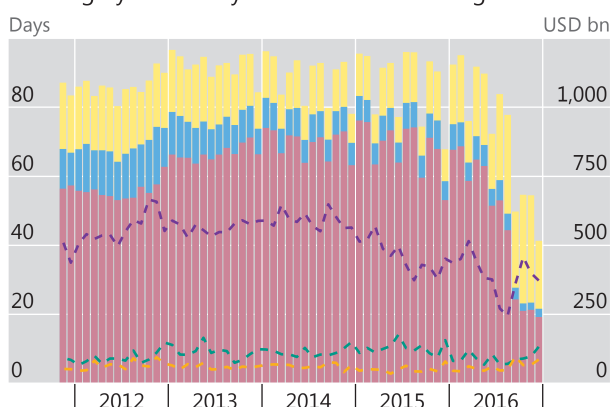
On net, MMMF reform subtracted some $310 billion of US dollar funding from non-US banks in the four quarters to September 2016, by which time most of the adjustment had taken place. A loss of about $480 billion from prime MMMFs was partially compensated by some $170 billion in repo funding from government-only 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.

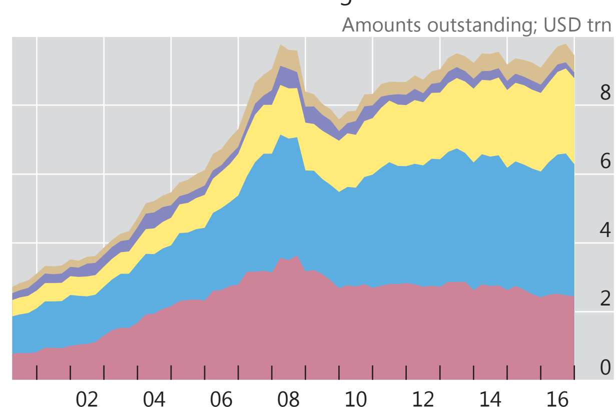
Deposits from US MMMFs down, but eurodollars up at non-US banks

Graph V.C

Funding by US money market funds to foreign banks



On-balance sheet dollar funding of non-US banks[4]



[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

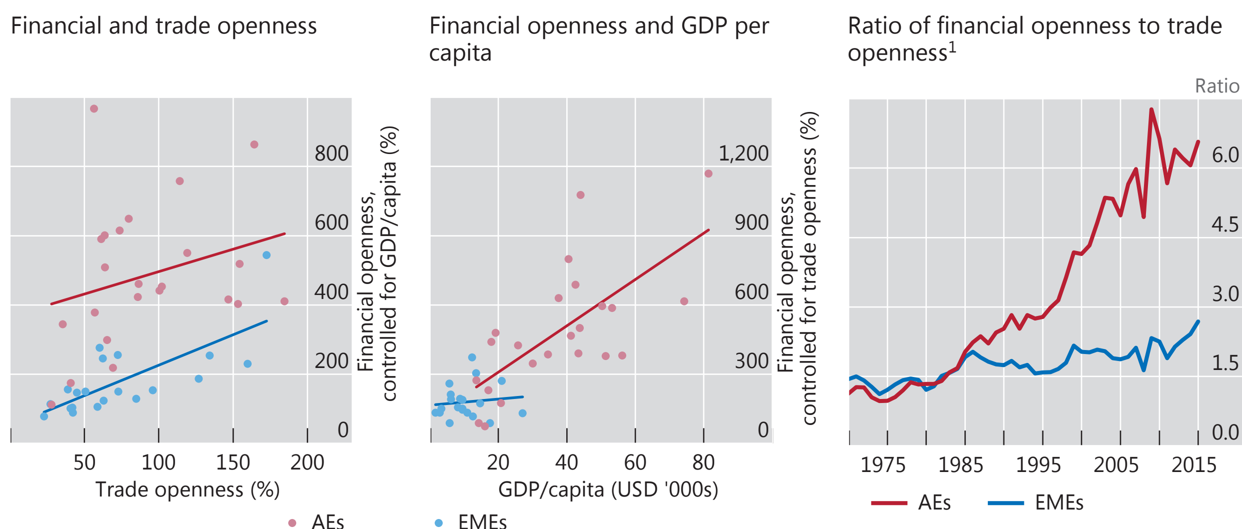
globalisation post-World War II in the "second wave". The chapter argues that recent suggestions of "peak globalisation" are misleading. Next, it reviews how the structure of trade and financial integration has evolved in the second wave. It then discusses the impact of globalisation on welfare, noting 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 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]

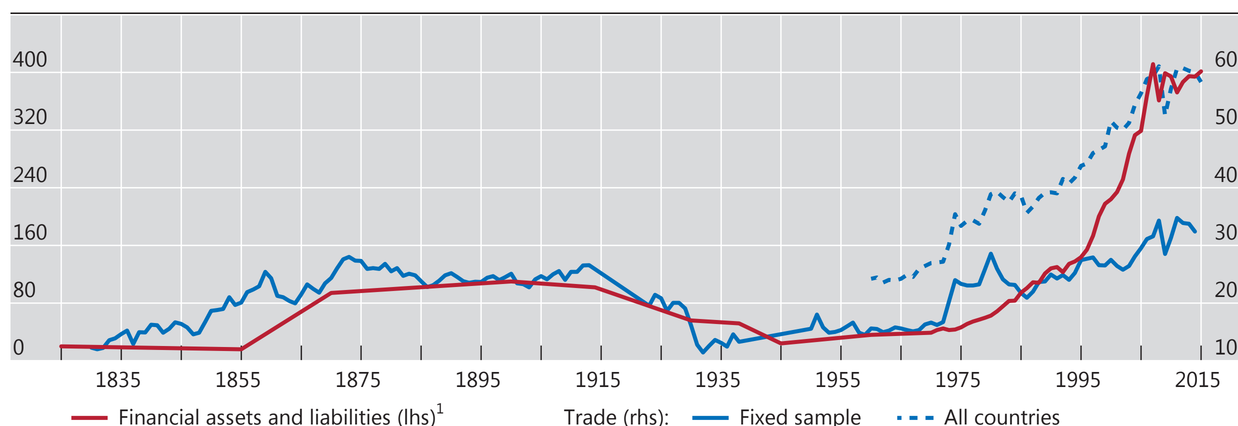
The second globalisation wave, starting after World War II, has far outstripped the first. Trade openness surged beyond its prewar peak as countries traded more, and more countries traded. For the world as a whole, trade openness has doubled since 1960 (Graph VI.2). Improvements in transport and communication 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



[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.

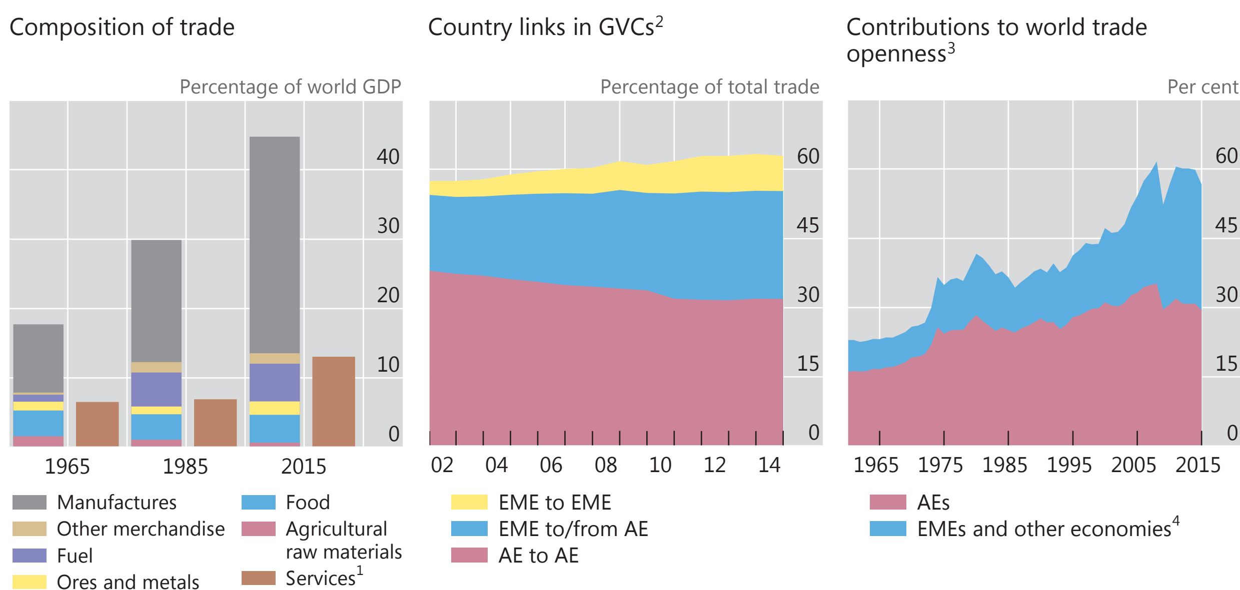
Trade

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

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



[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.

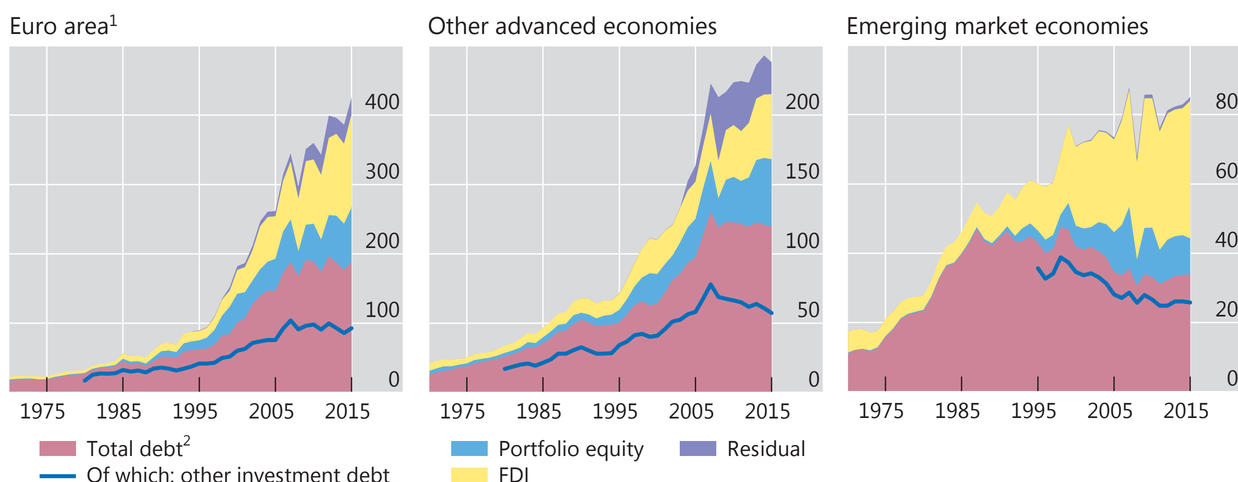
For EMEs, overall financial openness has grown only slightly faster than trade openness, but the composition of external liabilities has changed substantially to support greater risk-sharing (Graph VI.4, right-hand panel). The share of equity (portfolio equity and the equity component of FDI) has risen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



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 — 2015 (rows: Exporters; columns: Importers)

Exporters	AEu	OA	EEu	EA	LA	AME
AEu	20.9	1.4	2.7	1.5	0.6	1.5
OA	1.0	7.7	0.2	1.9	1.3	0.5
EEu	3.1	0.2	9.0	0.6	0.2	1.0
EA	1.9	2.8	0.8	12.0	1.0	1.6
LA	0.5	1.5	0.2	0.7	3.5	0.3
AME	1.1	0.6	0.4	2.0	0.2	5.4

Financial links — 2015 (rows: Lenders; columns: Borrowers)

Lenders	AEu	OA	EEu	EA	LA	AME
AEu	86.2	23.6	7.6	4.5	5.9	5.3
OA	20.5	31.0	0.7	4.1	4.1	2.1
EEu	2.1	0.3	1.8	0.2	0.1	0.0
EA	0.9	1.7	0.3	2.4	0.3	0.8
LA	0.7	1.0	0.0	0.0	1.5	0.0
AME	3.5	2.0	0.5	0.5	0.3	5.5

Trade links — Change between 2001 and 2015 (rows: Exporters; columns: Importers)

Exporters	AEu	OA	EEu	EA	LA	AME
AEu	0.3	0.1	1.2	0.4	0.1	0.5
OA	–0.1	–0.4	0.1	0.3	0.3	0.2
EEu	1.5	0.1	2.6	0.1	0.1	0.6
EA	0.4	0.6	0.3	4.1	0.5	0.7
LA	0.1	0.3	0.1	0.4	0.2	0.1
AME	0.0	0.0	0.1	0.5	0.0	2.5

Financial links — Change between 2001 and 2015 (rows: Lenders; columns: Borrowers)

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

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.

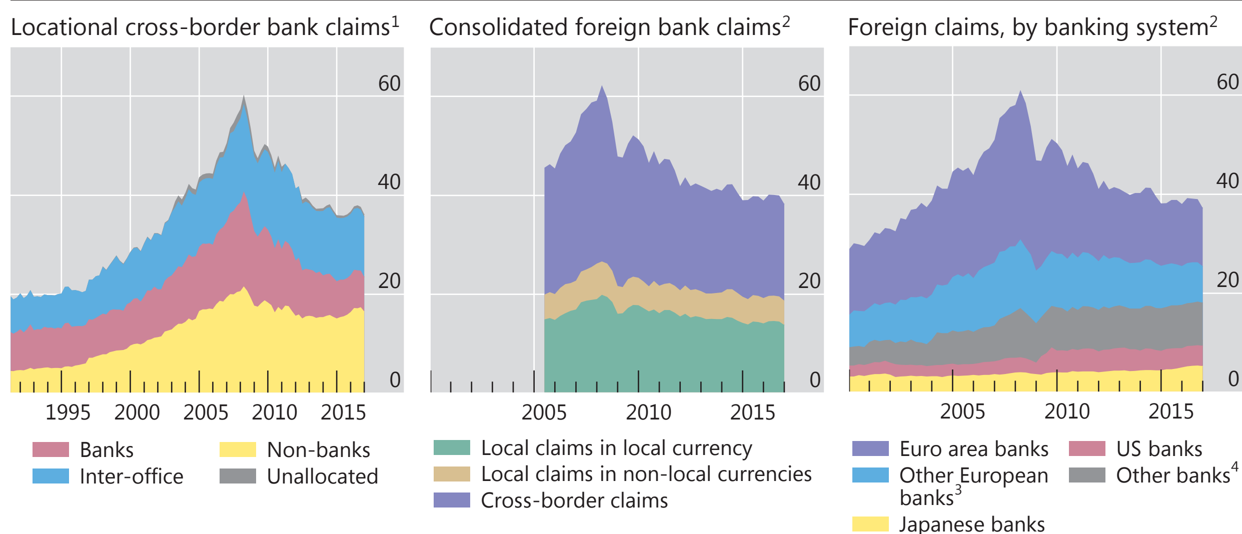
BIS data on cross-border banking positions give the appearance that banking deglobalisation set in during the Great Financial Crisis (GFC) of 2007–09 and has continued since. Graph VI.B.1 (left-hand panel) shows that the cross-border claims reported by banks in more than 40 jurisdictions declined from 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



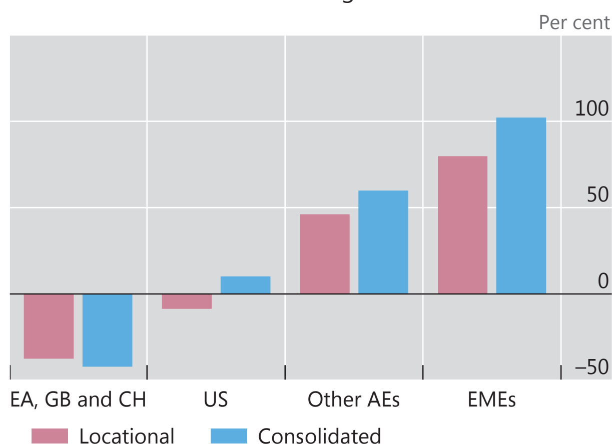
[1] Total cross-border claims (including inter-office positions) reported by banks in all reporting locations on borrowers worldwide. [2] Consolidated foreign claims (excluding inter-office positions) of banks headquartered in all reporting countries on borrowers worldwide. Foreign claims include both 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.

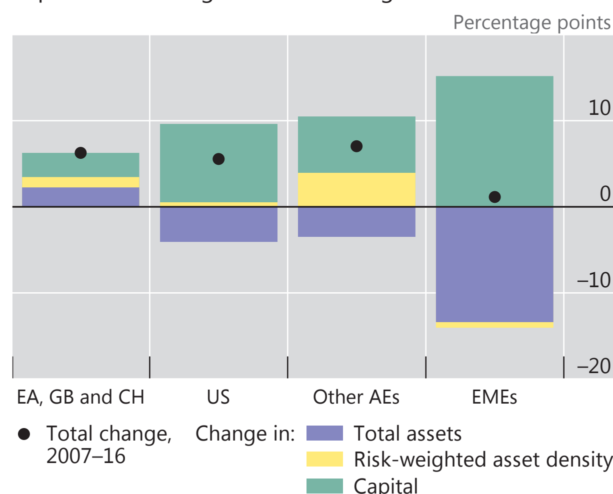
European banks shed foreign assets to strengthen their capitalisation

Graph VI.B.2

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



Capital to risk-weighted asset change, 2007–16[2]



[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.

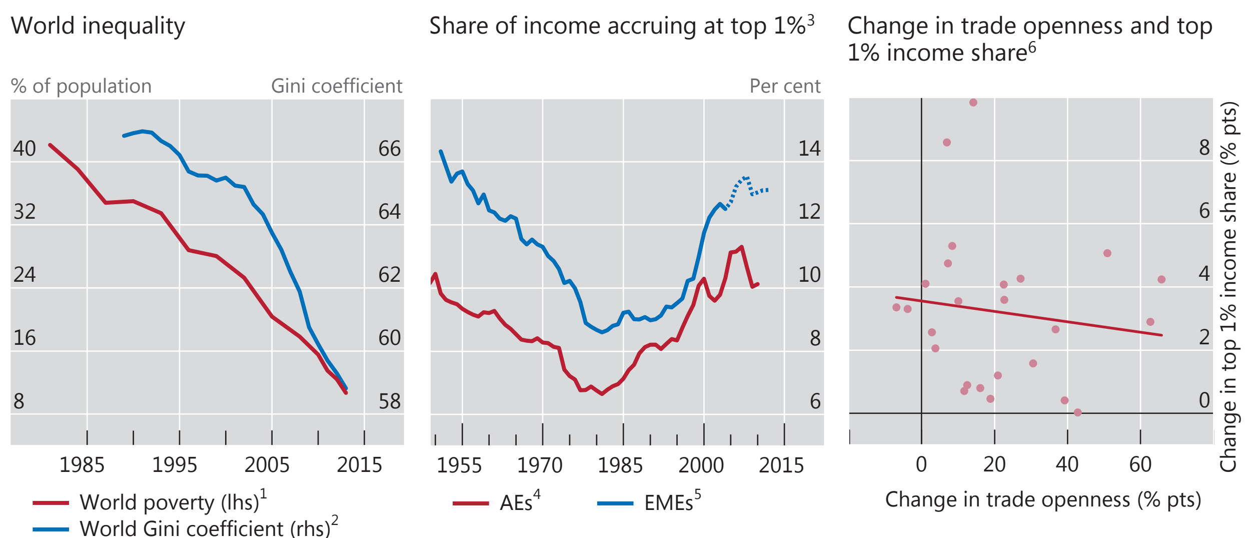
active banks, as it includes the operation of their offices abroad. As the BIS international banking statics (IBS) indicate, this transnational component has been much more stable post-crisis (Box VI.B). Furthermore, there is some evidence that EME banks, many of which are not captured by the IBS, have 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



[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.

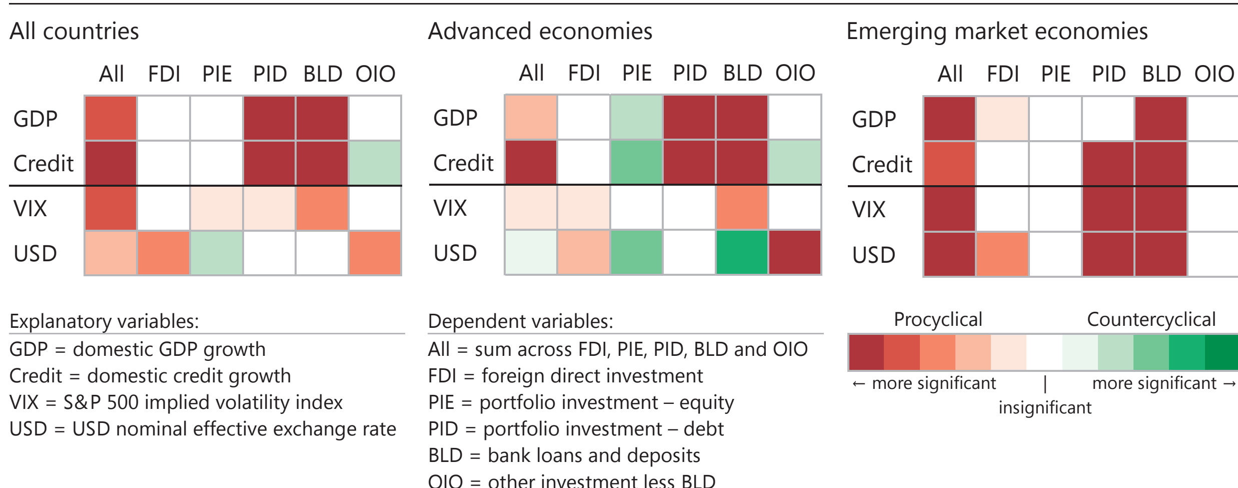
The close link between cross-border and domestic credit may add to financial stability risks. Cross-border credit tends to amplify domestic credit booms, as it acts as the marginal funding source: the cross-border component typically outgrows its domestic counterpart during financial booms, especially 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



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.

Box VI.C

Globalisation and interest rate spillovers

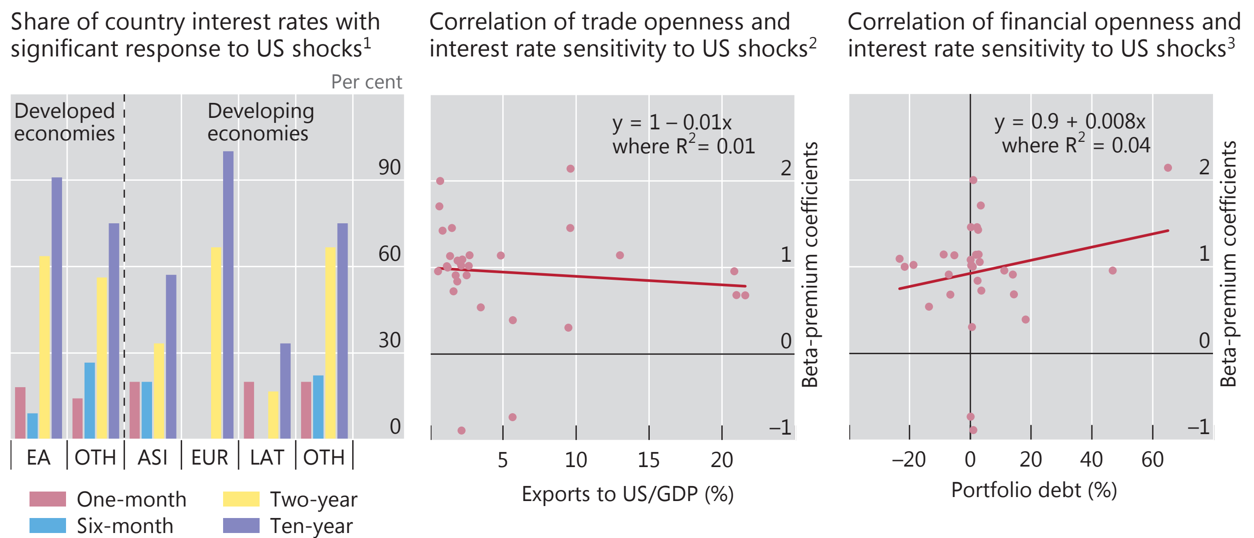
Increased globalisation has coincided with a significant rise in the co-movement of global asset prices. For example, the correlation of advanced economy sovereign 10-year yields in the past two decades more than doubled relative to the previous two. Given the myriad of changes in real and financial 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

Interest rate spillovers relate to financial and not to trade linkages

Graph VI.C



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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Statistical Annex

Output growth, inflation and current account balances[1]

Table A1

	Real GDP				Consumer prices				Current account balance		
	Annual percentage changes				Annual percentage changes				Percentage of GDP		
	2015	2016	2017	1996–2006	2015	2016	2017	1996–2006	2015	2016	2017
Global	**3.5**	**3.1**	**3.5**	**3.9**	**2.4**	**2.4**	**2.9**	**4.5**	**0.6**	**0.6**	**0.6**
AEs	**2.1**	**1.6**	**1.9**	**2.7**	**0.2**	**0.7**	**1.9**	**1.9**	**0.0**	**0.1**	**0.2**
United States	2.6	1.6	2.1	3.4	0.1	1.3	2.4	2.6	–2.6	–2.6	–2.7
Euro area[2]	1.9	1.7	1.7	2.3	0.0	0.2	1.6	1.9	3.0	3.3	3.1
France	*1.0*	*1.1*	*1.4*	*2.3*	*0.0*	*0.2*	*1.3*	*1.6*	*–0.2*	*–0.9*	*–1.2*
Germany	*1.5*	*1.8*	*1.6*	*1.5*	*0.2*	*0.5*	*1.8*	*1.4*	*8.3*	*8.3*	*7.9*
Italy	*0.7*	*1.0*	*0.9*	*1.5*	*0.0*	*–0.1*	*1.4*	*2.4*	*1.6*	*2.7*	*2.3*
Spain	*3.2*	*3.2*	*2.7*	*3.8*	*–0.5*	*–0.2*	*2.1*	*3.0*	*1.4*	*2.0*	*1.8*
Japan	1.1	1.0	1.4	1.2	0.8	–0.1	0.7	0.0	3.1	3.7	3.7
United Kingdom	2.2	1.8	1.7	3.0	0.1	0.6	2.6	1.6	–4.3	–4.4	–3.2
Other western Europe[3]	1.9	1.7	1.9	2.8	0.2	1.0	1.3	1.4	8.4	7.1	7.7
Canada	0.9	1.5	2.4	3.2	1.1	1.4	2.0	2.0	–3.4	–3.3	–2.4
Australia	2.4	2.5	2.5	3.7	1.5	1.3	2.2	2.6	–4.7	–4.7	–0.9
EMEs	**4.6**	**4.3**	**4.8**	**5.5**	**4.1**	**3.6**	**3.7**	**5.5**	**1.1**	**0.9**	**0.9**
Asia	6.3	6.1	6.1	7.0	2.4	2.5	2.9	3.2	2.5	2.0	1.7
China	*6.9*	*6.7*	*6.6*	*9.5*	*1.4*	*2.0*	*2.1*	*1.4*	*2.7*	*1.8*	*1.8*
India[4]	*8.1*	*7.1*	*7.3*	*6.7*	*4.9*	*4.5*	*4.8*	*4.8*	*–1.1*	*–0.8*	*–1.2*
Korea	*2.8*	*2.8*	*2.6*	*5.2*	*0.7*	*1.0*	*1.9*	*3.2*	*7.7*	*7.0*	*5.9*
Other Asia[5]	*3.8*	*4.0*	*4.2*	*4.0*	*2.7*	*2.1*	*3.0*	*4.6*	*4.4*	*4.5*	*3.9*
Latin America[6]	0.0	–0.6	1.5	3.2	8.1	8.0	6.4	6.5	–3.4	–2.2	–2.1
Brazil	*–3.8*	*–3.6*	*0.6*	*2.6*	*10.7*	*6.3*	*4.0*	*7.7*	*–3.3*	*–1.3*	*–1.2*
Mexico	*2.7*	*2.0*	*1.8*	*3.7*	*2.1*	*3.4*	*5.6*	*4.4*	*–2.9*	*–2.7*	*–2.7*
Central Europe[7]	3.9	2.5	3.2	4.0	–0.5	–0.2	2.2	3.1	0.4	0.8	0.2
Poland	*3.9*	*2.8*	*3.4*	*4.4*	*–0.9*	*–0.6*	*2.1*	*2.5*	*–0.6*	*–0.3*	*–0.8*
Russia	–2.8	–0.2	1.3	4.3	12.9	5.4	4.2	12.9	5.1	2.0	3.1
Turkey	6.0	3.0	3.1	4.8	7.7	7.8	10.3	25.5	–3.7	–3.8	–4.3
Saudi Arabia	4.1	1.4	0.2	2.9	2.2	3.5	2.4	0.5	–8.7	–3.9	–2.1
South Africa	1.2	0.5	1.0	3.5	4.6	6.3	5.8	5.0	–4.4	–3.3	–3.4

[1] Figures for 2017 are based on May 2017 Consensus Economics forecasts. For the aggregates, weighted averages based on GDP and PPP exchange rates. 1996–2006 values refer to average annual growth and inflation (for EMEs, inflation calculated over 2001–06). [2] Current account based on the aggregation of extra-euro area transactions. [3] CH, DK, NO and SE. [4] Fiscal years (starting in April). [5] HK, ID, MY, PH, SG, TH and TW. [6] AR, BR, CL, CO, MX and PE. For AR, consumer price data are based on official estimates, which contain a methodological break in December 2013. [7] CZ, HU and PL.

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

Debt of the private non-financial sector

Table A2

	Level at end-2016, % of GDP			Change since end-2007, % pts of GDP			Change since end-2015, % pts of GDP		
	Household	Corporate	Total private	Household	Corporate	Total private	Household	Corporate	Total private
Global[1]	**57**	**81**	**138**	**9**	**13**	**23**	**1**	**0**	**1**
AEs[1]	**95**	**101**	**195**	**7**	**4**	**12**	**2**	**0**	**2**
United States	79	73	152	–18	3	–16	0	2	2
Japan	63	95	158	0	–3	–3	1	1	2
Euro area	59	104	163	–1	8	8	–1	0	–1
France	*57*	*129*	*186*	*11*	*25*	*35*	*1*	*2*	*3*
Germany	*53*	*53*	*107*	*–8*	*–3*	*–10*	*0*	*1*	*0*
Italy	*41*	*76*	*117*	*3*	*0*	*3*	*–1*	*–2*	*–2*
Netherlands	*110*	*123*	*233*	*0*	*2*	*2*	*–2*	*–1*	*–4*
Spain	*64*	*102*	*166*	*–17*	*–23*	*–39*	*–3*	*–5*	*–8*
Australia	123	81	204	16	0	16	3	–1	1
Canada	101	117	218	22	28	50	3	1	4
Sweden	86	144	229	21	18	39	2	–6	–5
Switzerland	128	87	215	22	11	33	3	2	5
United Kingdom	88	76	164	–6	–7	–13	1	3	4
EMEs[1, 2]	**36**	**71**	**107**	**10**	**19**	**30**	**1**	**0**	**1**
Brazil	23	44	66	7	9	17	–2	–3	–5
China	44	166	211	26	70	95	6	4	9
India	10	47	57	0	4	4	0	–4	–4
Indonesia	17	23	40	5	9	14	0	–1	0
Korea	93	100	193	21	12	32	5	–3	2
Mexico	16	27	44	3	12	15	1	2	3
Poland	37	50	87	14	16	30	1	3	3
Russia	16	52	68	5	12	18	0	–5	–5
South Africa	34	38	72	…	…	–5	–2	1	–1
Turkey	18	66	84	7	36	43	0	4	4

[1] Simple averages. [2] Excluding PE, PH and TW, as no data available.

Source: BIS total credit statistics.

Residential property prices

Annual averages of year-on-year changes, in per cent — Table A3

	Nominal				Real[1]			
	2014	2015	2016	2007–13 average[2]	2014	2015	2016	2007–13 average[2]
United States	6.5	5.5	5.5	–2.9	4.8	5.4	4.2	–4.9
Euro area	0.4	1.6	3.3	0.1	0.0	1.5	3.0	–1.8
Austria	*3.4*	*4.2*	*7.3*	*5.3*	*1.8*	*3.3*	*6.4*	*3.0*
Belgium	*–0.6*	*1.7*	*2.6*	*3.2*	*–0.9*	*1.1*	*0.6*	*0.9*
France	*–1.6*	*–1.5*	*1.1*	*1.4*	*–2.1*	*–1.5*	*0.9*	*–0.2*
Germany	*3.1*	*4.5*	*6.0*	*1.7*	*2.2*	*4.3*	*5.5*	*0.0*
Greece	*–7.4*	*–5.0*	*–2.4*	*–4.1*	*–6.2*	*–3.3*	*–1.6*	*–6.4*
Ireland	*17.1*	*8.2*	*6.5*	*–8.4*	*16.8*	*8.6*	*6.4*	*–9.6*
Italy	*–4.4*	*–2.6*	*–0.7*	*–0.3*	*–4.6*	*–2.7*	*–0.6*	*–2.3*
Netherlands	*0.8*	*3.6*	*5.2*	*–2.0*	*–0.2*	*3.0*	*4.9*	*–3.9*
Portugal	*4.3*	*3.0*	*7.1*	*–2.8*	*4.6*	*2.5*	*6.5*	*–4.5*
Spain	*0.3*	*3.6*	*4.6*	*–4.5*	*0.5*	*4.1*	*4.9*	*–6.5*
Japan[3]	1.6	2.4	2.2	–0.9	–1.2	1.6	2.3	–0.8
United Kingdom	8.0	6.0	7.3	0.6	6.4	5.9	6.6	–2.3
Canada	5.2	5.8	12.5	4.4	3.2	4.7	10.9	2.6
Sweden	9.4	13.1	8.7	4.9	9.6	13.1	7.7	3.4
Australia	9.1	9.0	5.5	5.0	6.4	7.4	4.2	2.2
Asia								
China	*2.7*	*–3.7*	*6.6*	*4.6*	*0.7*	*–5.1*	*4.5*	*1.2*
Hong Kong SAR	*5.9*	*15.8*	*–3.6*	*15.3*	*1.4*	*12.4*	*–5.8*	*11.6*
India	*14.8*	*13.7*	*6.7*	*20.0*	*7.8*	*8.4*	*1.6*	*10.8*
Indonesia	*7.0*	*5.6*	*3.2*	*4.4*	*0.6*	*–0.8*	*–0.4*	*–1.7*
Korea	*1.5*	*3.4*	*2.7*	*3.4*	*0.2*	*2.6*	*1.7*	*0.4*
Malaysia	*8.5*	*7.5*	*6.6*	*7.2*	*5.2*	*5.3*	*4.4*	*4.7*
Philippines	*11.7*	*10.0*	*10.0*	*5.2*	*7.2*	*8.5*	*8.1*	*1.4*
Singapore	*–2.9*	*–3.9*	*–3.1*	*9.1*	*–3.8*	*–3.3*	*–2.6*	*5.4*
Thailand	*5.7*	*2.6*	*1.4*	*3.4*	*3.8*	*3.5*	*1.2*	*0.7*
Latin America								
Brazil	*4.9*	*–3.9*	*–10.4*	*18.7*	*–1.3*	*–11.8*	*–17.6*	*12.7*
Chile	*6.3*	*8.9*	*3.1*	*5.2*	*1.8*	*4.3*	*–0.7*	*1.8*
Colombia	*8.0*	*9.9*	*12.3*	*11.4*	*4.9*	*4.7*	*4.5*	*7.2*
Mexico	*4.4*	*6.6*	*8.1*	*4.9*	*0.4*	*3.8*	*5.1*	*0.6*
Peru	*12.8*	*6.3*	*6.1*	*16.8*	*9.3*	*2.7*	*2.4*	*13.2*
Central Europe								
Czech Republic	*2.4*	*4.0*	*7.1*	*–1.4*	*2.1*	*3.7*	*6.4*	*–3.2*
Hungary	*4.3*	*11.0*	*10.7*	*–2.5*	*4.6*	*11.0*	*10.2*	*–6.6*
Poland	*1.0*	*1.5*	*1.9*	*5.3*	*0.8*	*2.5*	*2.5*	*2.1*
Russia	1.3	1.3	–5.3	11.0	–6.0	–12.4	–11.5	2.0
South Africa	9.3	6.2	5.9	5.5	3.0	1.5	–0.4	–1.0
Turkey	14.4	18.4	14.4	11.5	5.1	9.9	6.1	3.7

[1] Deflated using consumer prices. [2] For CZ, HU, IN, PH, PL and TR, shorter periods according to data availability. [3] Backdated with land prices.

Sources: CEIC; national data; BIS database on property price statistics; BIS calculations.

Fiscal positions[1]

Table A4

	Overall balance[2]			Underlying government primary balance[3]			Gross debt[2, 4]		
	2014–16 average	2017	Change	2014–16 average	2017	Change	2006	2016	Change
AEs									
Austria	–1.8	–1.0	0.8	2.2	1.7	–0.5	67	85	17.5
Belgium	–2.8	–2.2	0.6	0.5	0.3	–0.2	91	106	14.9
Canada	–1.3	–2.3	–0.9	0.3	–0.8	–1.1	53	73	20.0
France	–3.6	–3.0	0.6	–0.3	–0.1	0.2	64	97	32.3
Germany	0.5	0.5	0.0	1.2	0.4	–0.8	66	68	1.9
Greece	–4.4	–0.2	4.2	5.9	7.5	1.6	104	179	75.9
Ireland	–2.2	–0.5	1.7	0.3	0.7	0.4	24	76	52.0
Italy	–2.7	–2.4	0.2	4.0	3.0	–1.1	102	133	30.1
Japan	–5.6	–5.2	0.3	–5.6	–5.6	0.0	147	201	54.7
Netherlands	–1.8	0.0	1.8	0.2	0.1	–0.1	45	62	17.4
Portugal	–4.7	–2.1	2.6	3.2	2.8	–0.4	69	130	61.2
Spain	–5.2	–3.6	1.6	2.3	0.8	–1.5	39	99	60.5
Sweden	–0.4	–0.1	0.4	–0.2	–1.0	–0.8	44	42	–2.0
United Kingdom	–4.4	–3.1	1.3	–3.2	–2.1	1.1	41	90	49.0
United States	–4.8	–4.9	–0.1	–1.4	–1.8	–0.4	58	99	41.1
EMEs									
Brazil	–8.4	–9.1	–0.7	–1.6	–1.1	0.4	65	77	12.8
China	–2.5	–3.7	–1.3	–1.5	–2.7	–1.2	26	46	20.7
India	–6.9	–6.4	0.6	–2.3	–1.5	0.7	77	68	–9.2
Indonesia	–2.4	–2.4	0.0	–1.0	–0.8	0.3	36	28	–8.4
Korea	0.4	0.7	0.4	–0.2	0.4	0.5	23	40	17.4
Malaysia	–2.8	–3.0	–0.2	–1.2	–0.9	0.3	39	53	13.3
Mexico	–3.8	–2.9	0.9	–1.4	0.5	1.8	20	38	17.9
South Africa	–3.6	–3.5	0.1	0.3	0.8	0.6	34	55	21.0
Thailand	–0.1	–1.6	–1.5	0.8	–0.8	–1.6	23	31	7.8

[1] For the general government. [2] As a percentage of GDP. [3] As a percentage of potential GDP; excluding net interest payments. OECD estimates are adjusted for the cycle and for one-off transactions, and IMF estimates are adjusted for the cycle. [4] Gross debt at nominal value (for KR, at market value).

Sources: IMF, *Fiscal Monitor* and *World Economic Outlook*; OECD, *Economic Outlook*; BIS total credit statistics.

Annual changes in foreign exchange reserves

In billions of US dollars

Table A5

	At current exchange rates						*Memo: amounts outstanding*
	2011	2012	2013	2014	2015	2016	*Dec 2016*
World[1]	**940**	**747**	**732**	**–97**	**–669**	**–203**	***10,715***
AEs[2]	**266**	**198**	**55**	**7**	**70**	**88**	***2,448***
United States	0	–2	–2	–6	–3	0	*39*
Euro area	1	12	1	7	18	15	*261*
Japan	185	–28	9	–3	–21	–21	*1,158*
Switzerland	54	197	21	10	62	74	*635*
EMEs[3]	**621**	**485**	**602**	**–87**	**–673**	**–281**	***7,172***
Asia[4]	424	239	529	52	–471	–249	*5,212*
China	334	130	510	22	–513	–320	*3,011*
Chinese Taipei	4	18	14	2	7	8	*434*
Hong Kong SAR	17	32	–6	17	30	27	*386*
India	–5	–1	6	28	32	9	*337*
Indonesia	14	2	–12	13	–5	10	*111*
Korea	11	19	19	18	5	3	*362*
Malaysia	27	6	–4	–19	–20	0	*91*
Philippines	12	6	2	–4	2	0	*72*
Singapore	12	21	14	–16	–9	–1	*244*
Thailand	0	6	–12	–10	0	15	*164*
Latin America[5]	97	51	–6	25	–32	20	*706*
Argentina	–7	–3	–12	1	–5	13	*34*
Brazil	63	19	–13	6	–6	8	*357*
Chile	14	0	0	0	–2	2	*40*
Mexico	23	16	15	17	–17	0	*169*
Venezuela	–3	0	–4	1	–1	–4	*3*
CEE[6]	3	15	20	–22	–12	37	*298*
Middle East[7]	88	148	76	–13	–140	–88	*648*
Russia	8	32	–17	–129	–18	–1	*308*
Memo: Net oil exporters[8]	*141*	*220*	*76*	*–143*	*–230*	*–122*	*1,368*

[1] World aggregate as published by the IMF. [2] Excluding NO, which is included in net oil exporters. [3] All countries from the groups Asia, Latin America, CEE and Middle East. [4] Countries shown. [5] Countries shown plus CO and PE. [6] Central and eastern Europe: BG, CZ, EE, HR, HU, LT, LV, PL, RO, SI and SK. [7] KW, LY, QA and SA. [8] AO, DZ, KZ, MX, NG, NO, RU, VE and the Middle East.

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

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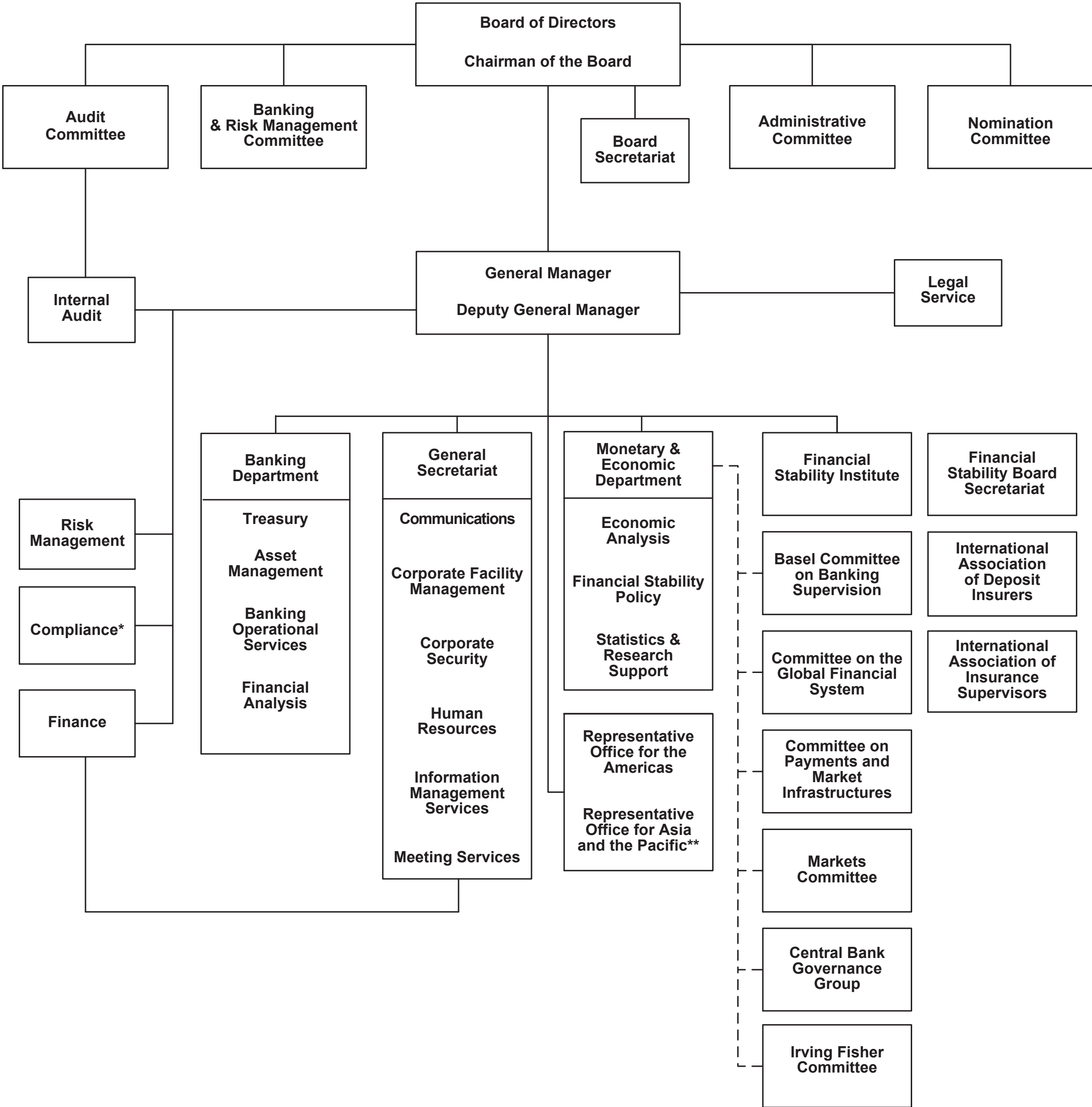
Organisation of the BIS as at 31 March 2017



* Direct access to the Audit Committee.
** Also provides banking services to the region's monetary authorities.

The BIS: mission, activities, governance and financial results

The Bank for International Settlements (BIS) serves central banks in their pursuit of monetary and financial stability, fosters international cooperation in those areas and acts as a bank for central banks. In outline, the BIS pursues this mission by:

- facilitating dialogue and collaboration among central banks and other authorities that are responsible for promoting financial stability;
- conducting research on policy issues confronting central banks and financial supervisory authorities;
- acting as a prime counterparty for central banks in their financial transactions; and
- serving as an agent or trustee in connection with international financial operations.

The BIS has its head office in Basel, Switzerland, and representative offices in the Hong Kong Special Administrative Region of the People's Republic of China (Hong Kong SAR) and in Mexico City.

In the light of the above aims, this chapter reviews the BIS's activities, and those of the groups it hosts, for the financial year 2016/17; describes the institutional framework that supports their work; and presents the year's financial results.

The Basel Process

The Basel Process refers to the way in which the BIS promotes international cooperation among monetary authorities and financial supervisory officials. By offering a forum for discussion among central banks and other financial authorities, and by hosting and supporting international groups, the BIS, through the Basel Process, plays a key role in helping to strengthen the stability and resilience of the global financial system.

Bimonthly meetings and other regular consultations

Governors and other senior officials of BIS member central banks hold bimonthly meetings, normally in Basel, to discuss current developments and the outlook for the world economy and financial markets. They also exchange views and experiences on issues of interest to central banks.

Global Economy Meeting

The Global Economy Meeting (GEM) comprises the Governors of 30 BIS member central banks in major advanced and emerging market economies (EMEs) that account for about four fifths of global GDP. The Governors of another 19 central banks attend the GEM as observers.[1] Chaired by Agustín Carstens, Governor of the

[1] The members of the GEM are from the central banks of Argentina, Australia, Belgium, Brazil, Canada, China, France, Germany, Hong Kong SAR, India, Indonesia, Italy, Japan, Korea, Malaysia, Mexico, the Netherlands, Poland, Russia, Saudi Arabia, Singapore, South Africa, Spain, Sweden, Switzerland, Thailand, Turkey, the United Kingdom and the United States and also the ECB. The observers are from the central banks of Algeria, Austria, Chile, Colombia, the Czech Republic, Denmark, Finland, Greece, Hungary, Ireland, Israel, Luxembourg, New Zealand, Norway, Peru, the Philippines, Portugal, Romania and the United Arab Emirates.

Bank of Mexico, the GEM has two main roles: (i) monitoring and assessing developments, risks and opportunities in the world economy and the global financial system; and (ii) providing guidance to three BIS-based central bank committees – the Committee on the Global Financial System, the Committee on Payments and Market Infrastructures and the Markets Committee.

The GEM's economic discussions focus on current macroeconomic and financial developments in major advanced and emerging market economies. Specific topics discussed by the GEM over the past year included: snapback risks in core bond markets; inflation targets; consumption-led expansion; and the mix of monetary, fiscal and structural policies.

Economic Consultative Committee

The Economic Consultative Committee (ECC) is an 18-member group that supports the work of the GEM. Also led by the GEM Chairman and comprising all Governors participating in the BIS Board meeting, and the BIS General Manager, the ECC conducts analyses and prepares proposals for the GEM's consideration. In addition, the ECC Chairman makes recommendations to the GEM on the appointment of Chairs of the three central bank committees mentioned above and on the composition and organisation of those committees.

All Governors' Meeting

The All Governors' Meeting comprises the Governors of the 60 BIS member central banks and is chaired by the Chairman of the Board. It convenes to discuss selected topics of general interest to its members. In 2016/17, the topics discussed were foreign exchange market intervention; the issues arising from cyber risk for central banks; promoting economic resilience; the macroeconomic implications of global value chains; and global dollar intermediation: patterns and risks.

By agreement with the GEM and the BIS Board, the All Governors' Meeting is responsible for overseeing the work of two other groups that have a broader network or membership than the GEM. These are the Central Bank Governance Group, which also meets during the bimonthly meetings, and the Irving Fisher Committee on Central Bank Statistics.

Central Bank Governors and Heads of Supervision

The Group of Central Bank Governors and Heads of Supervision (GHOS) is a high-level forum responsible for international collaboration on banking supervision. Chaired by Mario Draghi, President of the ECB, the GHOS meets periodically to decide on global banking regulations and oversee the work of the Basel Committee on Banking Supervision (see page 140).

Other meetings of Governors

The central bank Governors of major EMEs meet three times a year – during the January, May and September bimonthly meetings – to discuss issues of importance to their economies. The topics discussed in 2016/17 included inflationary and deflationary pressures, challenges facing banks in EMEs, and the implications of political events on the outlook for EMEs.

Regular meetings were also held for the Governors of central banks in small open economies.

Other consultations

In addition, the Bank regularly organises various meetings that bring together senior central bank officials and, occasionally, representatives from other financial authorities, the private financial sector and the academic community to discuss topics of shared interest. Some of these meetings are organised by the BIS's representative offices in Hong Kong SAR and Mexico City.

During the past year, these events included:

- the annual meetings of the working parties on monetary policy, held in Basel but also hosted at a regional level by central banks in Asia, central and eastern Europe, and Latin America;
- a meeting of Deputy Governors of EMEs on macroprudential frameworks; and
- the high-level meetings organised by the Financial Stability Institute in various regions of the world for senior officials of central banks and supervisory authorities.

BIS-hosted committees and associations

The BIS hosts and supports a set of international groups – six committees and three associations – engaged in standard setting and the pursuit of financial stability. Co-location at the BIS facilitates communication and collaboration among these groups as well as their interaction with central bank Governors and other senior officials in the context of the BIS's regular meetings programme.

The limited size of these groups is conducive to flexibility and openness in the exchange of information, thereby facilitating coordination and preventing overlaps and gaps in their work programmes. The BIS also supports the work of these committees and associations with its expertise in economic research and statistics and its practical experience in banking.

The hosted committees, whose agendas are guided by various sets of central banks and supervisory authorities, are as follows:

- the Basel Committee on Banking Supervision (BCBS): develops global regulatory standards for banks and seeks to strengthen micro- and macroprudential supervision;
- the Committee on the Global Financial System (CGFS): monitors and analyses issues relating to financial markets and systems;
- the Committee on Payments and Market Infrastructures (CPMI): analyses and sets standards for payment, clearing and settlement infrastructures;
- the Markets Committee: monitors developments in financial markets and their implications for central bank operations;
- the Central Bank Governance Group: examines issues related to the design and operation of central banks; and
- the Irving Fisher Committee on Central Bank Statistics (IFC): addresses statistical issues relating to economic, monetary and financial stability.

The hosted associations are as follows:

- the Financial Stability Board (FSB): an association including finance ministries, central banks and other financial authorities in 25 countries; coordinates the work of national authorities and international standard setters and develops policies to enhance financial stability;
- the International Association of Deposit Insurers (IADI): sets global standards for deposit insurance systems and promotes cooperation on deposit insurance and bank resolution arrangements; and
- the International Association of Insurance Supervisors (IAIS): sets standards for the insurance sector to promote globally consistent supervision.

The Bank's own Financial Stability Institute (FSI) facilitates the dissemination of the standard-setting bodies' work to central banks and financial sector supervisory and regulatory agencies through its extensive programme of meetings, seminars and online tutorials.

Activities of BIS-hosted committees and the FSI

This section reviews the year's principal activities of the six committees hosted by the BIS and of the Financial Stability Institute.

Basel Committee on Banking Supervision

The Basel Committee on Banking Supervision (BCBS) is the primary global standard setter for the prudential regulation of banks and provides a forum for cooperation on banking supervisory matters. Its mandate is to strengthen the regulation, supervision and practices of banks worldwide with the purpose of enhancing global financial stability.

The Committee consists of senior representatives of banking supervisory authorities and central banks responsible for banking supervision or financial stability in the Committee's member jurisdictions. It is chaired by Stefan Ingves, Governor of Sveriges Riksbank, and generally meets four times a year. The Committee reports to the Group of Governors and Heads of Supervision (GHOS) and seeks its endorsement for major decisions and strategic priorities.

Current work programme

During the past year, the Basel Committee made substantial progress in finalising its Basel III post-crisis reforms. The post-crisis reforms are aimed at reducing excessive variability in risk-weighted assets (RWAs), with a view to restoring the credibility of the risk-weighted framework.

In addition, the Committee continued to promote strong supervision, effective cooperation and full, timely and consistent implementation of the Basel regulatory framework.

The key themes of the Committee's current work programme and strategic priorities are:

- **Finalising ongoing policy initiatives:** this includes key policy issues related to accounting provisions, the assessment methodology for global systemically important banks and the regulatory treatment of sovereign exposures.
- **Monitoring emerging risks and exploring appropriate responses:** the Committee will continue to monitor risks and behavioural changes in the banking system from a micro- and macroprudential perspective and develop appropriate supervisory and policy responses as needed.
- **Assessing the implementation and impact of the Committee's post-crisis reforms:** the Committee will build on its existing assessment of the impact of its post-crisis reforms, particularly regarding their effectiveness in reducing excessive variability of RWAs. The Committee will continue its monitoring and assessment of its members' implementation of Basel standards.
- **Promoting strong supervision:** this work aims to (i) foster the timely, consistent and effective implementation of the Committee's standards and guidelines; and (ii) seek improvements in practices and principles in banking supervision, particularly in Basel Committee member countries, by identifying emerging risks and supervisory challenges; developing and implementing supervisory policies;

improving supervisory tools and techniques; promoting cooperation and coordination; and supporting assessments of supervisory effectiveness.

Policy reform

The Committee finalised or issued for consultation a number of global standards for banks during the year.

Standardised measurement approach for operational risk. Issued in March 2016, this updated consultative document sets out revised proposals that emerged from the Committee's broad review of the capital framework. Revisions to the standardised approaches for calculating operational risk capital charges were originally proposed in October 2014. The revised framework will be based on a single non-model-based approach for the estimation of operational risk capital requirements. Building on the simplicity and comparability of a standardised approach, the new proposal embodies the risk sensitivity of an advanced approach. The combination, in a standardised way, of financial statement information and banks' internal loss experience is designed to promote consistency and comparability in operational risk capital measurement.

Pillar 3 disclosure requirements: consolidated and enhanced framework. Published in March 2016, the proposed enhancements issued in this consultation build on revisions to the Pillar 3 disclosure requirements that the Committee finalised in January 2015. Taken together, they form the consolidated and enhanced Pillar 3 framework, which seeks to promote market discipline through regulatory disclosure requirements.

Reducing variation in credit risk-weighted assets: constraints on the use of internal model approaches. This consultative document, issued in March 2016, sets out the Committee's proposed changes to the advanced and foundation internal ratings-based (IRB) approaches. The proposed changes include a number of complementary measures that aim to (i) reduce the complexity of the regulatory framework and improve comparability; and (ii) address excessive variability in the capital requirements for credit risk. Specifically, the Committee proposed to (i) remove the option to use the IRB approaches for certain exposures where it is judged that the model parameters cannot be estimated with sufficient reliability for regulatory capital purposes; (ii) adopt floors on the model parameters at the exposure level to ensure a minimum of conservatism for portfolios where the IRB approaches remain available; and (iii) provide greater specification of parameter estimation practices to reduce variability in RWAs for portfolios where the IRB approaches remain available.

Revisions to the Basel III leverage ratio framework. This consultation document, issued in April 2016, sets out the Committee's proposed revisions to the design and calibration of the Basel III leverage ratio framework, which introduced a simple, transparent, non-risk-based leverage ratio to act as a supplementary measure to the risk-based capital requirement. The proposed changes have been informed by the monitoring process in the parallel run period since 2013, and by feedback from market participants and stakeholders received since the January 2014 release of the standard Basel III leverage ratio framework and disclosure requirements.

Interest rate risk in the banking book (IRRBB). Published in April 2016, this standard revises the Committee's 2004 *Principles for the management and supervision of*

interest rate risk, which set out supervisory expectations for banks' identification, measurement, monitoring and control of IRRBB as well as its supervision. It reflects changes in market and supervisory practices since the Principles were first published, and is a measure that is particularly pertinent in the light of the current exceptionally low interest rates in many jurisdictions. The revised standard is expected to be implemented by 2018.

Revisions to the securitisation framework. In July 2016, the Committee published an updated standard for the regulatory capital treatment of securitisation exposures that includes the regulatory capital treatment for "simple, transparent and comparable" (STC) securitisations. This amends the Committee's 2014 capital standards for securitisations and sets out additional criteria for differentiating the capital treatment of STC securitisations from that of other securitisation transactions.

Regulatory treatment of accounting provisions. In October 2016, the Committee released in parallel a consultative document and a discussion paper on the policy considerations related to the regulatory treatment of accounting provisions under the Basel III regulatory capital framework. Accounting standard boards have adopted provisioning standards that require the use of expected credit loss (ECL) models rather than incurred loss models. These new accounting standards modify provisioning standards to incorporate forward-looking assessments in the estimation of credit losses. The consultative document sets out proposals to retain, for an interim period, the current regulatory treatment of provisions under the standardised and the IRB approaches. The discussion paper seeks input on policy options for the long-term regulatory treatment of provisions under the new ECL standards.

TLAC holdings standard. This document, released in October 2016, is the final standard on the regulatory capital treatment of banks' investments in instruments that comprise total loss-absorbing capacity (TLAC) for global systemically important banks (G-SIBs). The standard aims to reduce the risk of contagion within the financial system should a G-SIB enter resolution. It applies to both G-SIBs and non-G-SIBs that hold such investments. The standard also reflects changes to Basel III to specify how G-SIBs must take account of the TLAC requirement when calculating their regulatory capital buffers.

The Committee also published a series of responses to frequently asked questions. These covered:

- market risk capital requirements;
- the Basel III leverage ratio framework;
- the revised Pillar 3 disclosure requirements;
- the supervisory framework for measuring and controlling large exposures; and
- the Net Stable Funding Ratio (NSFR).

Policy implementation

Implementation of the regulatory framework remains a key priority for the Committee. The Regulatory Consistency Assessment Programme (RCAP) monitors progress by Committee member jurisdictions on implementation and assesses the consistency and completeness of the adopted standards. The RCAP also facilitates dialogue among Committee members and assists the Committee in developing standards.

During the year, RCAP jurisdictional assessments were conducted for Argentina, Indonesia, Japan, Korea, Russia, Singapore and Turkey. The frameworks for SIBs were reviewed in member jurisdictions that are home to G-SIBs: China, the European

Union, Japan, Switzerland and the United States. The Committee completed its review of the implementation of the risk-based capital framework by all its members in December 2016. Work is under way to assess the consistency of capital and the Liquidity Coverage Ratio (LCR) regulations in Australia, Brazil, Canada, China, the European Union, Switzerland and the United States.

In addition, the Committee published several other reports relating to the implementation of the Basel framework.

RCAP: Analysis of risk-weighted assets for credit risk in the banking book. This report is the second to analyse variations in RWAs in banks using internal ratings-based models to calculate credit risk capital requirements. The report also describes sound practices observed in the independent model validation functions of banks, including the governance of the validation process, the methodology and scope of banks' validation functions, and the role of the validation function across different phases of model development and implementation.

Progress reports on adoption of the Basel regulatory framework. Issued in April and October 2016, these semiannual reports provide a high-level view of Basel Committee members' progress in adopting Basel III standards. The reports focus on the status of domestic rule-making to ensure that the Basel standards are turned into national law or regulation according to the internationally agreed time frames. The reports cover the Basel III risk-based capital standards, the leverage ratio, the LCR, the NSFR, the SIB frameworks, Pillar 3 disclosure requirements and the large exposure framework.

Report to G20 Leaders on implementation of the Basel III regulatory reforms. This report, issued in August 2016, updated G20 Leaders on progress and challenges in the implementation of the Basel III regulatory reforms since November 2015, when the Committee last reported to the G20. It summarises the steps taken by the Committee's member jurisdictions to adopt the Basel III standards, banks' progress in bolstering their capital and liquidity positions, the consistency of implementation in jurisdictions assessed since the Committee's last report and the Committee's implementation work plan.

RCAP: Handbook for Jurisdictional Assessments. Based on experience with the RCAP to date, the Committee updated the procedures and process for conducting jurisdictional assessments under the RCAP in one document, the *Handbook for Jurisdictional Assessments*, published in March 2016. The Handbook describes the assessment methodology and also introduces the RCAP questionnaires that member jurisdictions complete ahead of the assessment. The Handbook and the RCAP questionnaires will help regulators, supervisors and financial stability authorities to evaluate their own progress in the implementation of the Basel III framework and identify areas for improvement. These documents will be kept under review and updated as the scope of the RCAP expands to include other aspects of the Basel III framework.

Basel III monitoring. The Committee published two monitoring reports, in September 2016 and February 2017, as part of the rigorous reporting process to regularly review the implications of the Basel III standards. The results of previous exercises have been published since 2012, in twice-yearly reports. With data as of 30 June 2016, on a fully phased-in basis, the latest report shows that virtually all participating banks meet both the Basel III risk-based capital minimum Common Equity Tier 1 (CET1) requirement of 4.5% and the target level CET1 requirement of

7.0% when including the capital conservation buffer (plus the surcharges on G-SIBs as applicable).

Supervision

During the year, the Committee published several documents to aid supervisors in undertaking effective supervision of banks.

Prudential treatment of problem assets: definitions of non-performing exposures and forbearance. Issued in April 2016, the definitions proposed in this consultation document aim to foster harmonisation in the measurement and application of two important measures of asset quality, thereby promoting consistency in supervisory reporting and disclosures by banks. Hitherto, banks have categorised problem loans in a variety of ways, and therefore consistent international standards for categorising problem loans are lacking.

Guidance on the application of the Core principles for effective banking supervision *to the regulation and supervision of institutions relevant to financial inclusion*. Issued in September 2016, this document builds on past work by the Committee to elaborate additional guidance in the application of the Committee's *Core principles* to the supervision of financial institutions that provide services to the hitherto financially unserved and underserved. This work includes a report on the *Range of practice in the regulation and supervision of institutions relevant to financial inclusion*, and expands on *Microfinance activities and the Core principles for effective banking supervision*.

Revisions to the annex on correspondent banking. In this document, published in November 2016, the Committee consults on proposed revisions that are consistent with the Financial Action Task Force (FATF) guidance on *Correspondent banking services* issued in October 2016 and serve the same purpose of clarifying rules applicable to banks conducting correspondent banking activities. They form part of a broader international initiative to assess and address the decline in correspondent banking.

BCBS: www.bis.org/bcbs

Committee on the Global Financial System

The Committee on the Global Financial System (CGFS) monitors financial market developments for the Governors of the BIS Global Economy Meeting and analyses the implications for financial stability and central bank policy. Chaired by William C Dudley, President of the Federal Reserve Bank of New York, the Committee comprises Deputy Governors and other senior officials from 23 central banks of major advanced and emerging market economies, as well as the Head of the BIS's Monetary and Economic Department and its Economic Adviser.

In the past year, the Committee's conjunctural discussions focused on topics relating to asset prices and the financial activity of financial and non-financial firms. It monitored the implications for financial stability of bond and equity valuations and of currency market conditions as they relate to global demand for US dollar funding. It examined banking sector profitability, the changing patterns of capital flows, and the management of corporate balance sheets in terms of cash management and debt issuance. It discussed the potential risks from yield curve steepening in view of signs of increasing inflation expectations and an uptick in longer-term rates.

Additionally, in-depth studies are commissioned from groups of central bank experts. Three such reports were published in 2016/17. Two of them pertain to the Committee's ongoing interest in topics related to macroprudential policy. The report on *Experiences with the ex ante appraisal of macroprudential instruments* provides an overview of central banks' experiences with methodologies used to assess the effect of instruments; with the selection of the appropriate policy instrument, its calibration and its timing; and with the assessment of financial risks and vulnerabilities. The second report, on *Objective-setting and communication of macroprudential policies,* argues that adopting a systematic policy framework that channels policymaking through a set of predictable procedures can help address these challenges. A key part of such a framework is a communication strategy that clearly explains how macroprudential actions can contribute to achieving financial stability. The report provides an overview of how objectives are set in macroprudential policy and how policy is communicated in practice. One of the report's conclusions is that explaining the macroprudential policy framework facilitates policy actions early on in the cycle, when instruments may be more effective and adjustment less costly.

The report on *Designing frameworks for central bank liquidity assistance: addressing new challenges* was motivated by the recognition that central banks have made advances in building capacity to deal with future systemic crises, but a number of open issues remain that are related to the provision of liquidity assistance. The report presents eight principles in three areas: the provision of liquidity assistance to internationally active financial intermediaries, transparency on liquidity assistance operations, and the provision of assistance to a market. The report underlines the need for central banks to enhance preparedness in calm times and, in particular, to consider how the interaction of national frameworks might affect cross-border coordination and assistance, and how they might engage ex ante in bilateral discussions to facilitate the timely execution of an operation when necessary.

CGFS: www.bis.org/cgfs

Committee on Payments and Market Infrastructures

The Committee on Payments and Market Infrastructures (CPMI) promotes the safety and efficiency of payment, clearing, settlement and reporting systems and arrangements. The CPMI is a global standard setter in this field. It also serves as a forum for central banks to monitor and analyse developments and cooperate in related oversight, policy and operational matters, including the provision of central bank services. Chaired by Benoît Cœuré, a member of the ECB's Executive Board, the Committee comprises senior officials from 25 central banks.

Monitoring implementation of standards for financial market infrastructures

The CPMI-IOSCO *Principles for financial market infrastructures* (PFMI), published in April 2012 together with the International Organization of Securities Commissions, set out international regulatory standards for systemically important financial market infrastructures (FMIs) and specify the responsibilities for the authorities that oversee, supervise or regulate them.

Monitoring the implementation of the PFMI, a high priority for the CPMI, involves three phases: Level 1, on the adoption of the PFMI in domestic regulatory frameworks; Level 2, on the completeness and consistency of these regulatory frameworks; and Level 3, on the consistency in the outcomes of the PFMI implementation across jurisdictions.

Level 1: In June 2016, the CPMI and IOSCO published a third update to the Level 1 assessments, which showed that the 28 participating jurisdictions continue to make good progress in implementing the PFMI. In particular, the report highlighted that 19 of them had completed their implementation measures for all FMI types, up from 15 jurisdictions in 2015.

Level 2: In June 2016, the CPMI and IOSCO started Level 2 assessments of implementation measures applicable to all FMI types in Hong Kong SAR and Singapore. Reports are scheduled to be published in the first half of 2017.

Level 3: In August 2016, the CPMI and IOSCO published *Implementation monitoring of PFMI: Level 3 assessment – Report on the financial risk management and recovery practices of 10 derivatives CCPs*. The assessment found that central counterparties (CCPs) have made important progress in implementing arrangements consistent with the standards. Some gaps and shortcomings were nevertheless identified, notably in the areas of recovery planning and credit and liquidity risk management. The report also identified a number of differences in the outcomes of implementation across CCPs.

CCP resilience and recovery

The CPMI and IOSCO published in August 2016 a consultative report outlining further guidance on financial risk management and recovery planning for CCPs. The report is based on the workplan agreed in April 2015 by the BCBS, CPMI, FSB and IOSCO to coordinate their respective international policy work on the resilience, recovery planning and resolvability of CCPs and to work in close collaboration.[2]

Harmonisation of OTC derivatives data

Since November 2014, the CPMI and IOSCO have been working to develop guidance on the harmonisation of key over-the-counter (OTC) derivatives data, including uniform transaction and product identifiers. Following three consultative reports in 2015, the group published further consultation reports, on the *Harmonisation of the Unique Product Identifier* in August 2016 and on the *Harmonisation of critical OTC derivatives data elements (other than UTI and UPI) – second batch* in October 2016.

Retail payments

Published in November 2016, the report on *Fast payments* sets out key characteristics of fast retail payments, defined as payments that make funds immediately available to the payee on a 24/7 basis. It takes stock of various initiatives in CPMI jurisdictions, analyses supply and demand factors that may foster or hinder their development, discusses the benefits and risks, and examines the potential implications for different stakeholders, in particular central banks.

Correspondent banking

The CPMI's report on *Correspondent banking*, published in July 2016, provides basic definitions, outlines the main types of correspondent banking arrangement,

[2] See www.bis.org/cpmi/publ/d134b.pdf.

summarises recent developments and touches on the underlying drivers. The report sets out recommendations on technical measures relating to (i) know-your-customer (KYC) utilities; (ii) use of the Legal Entity Identifier (LEI) in correspondent banking; (iii) information-sharing initiatives; (iv) payment messages; and (v) use of the LEI as additional information in payment messages.

Cyber resilience in FMIs

Building on their previous separate work on cyber resilience, the CPMI and IOSCO established a joint working group on cyber resilience for FMIs in December 2014 with a view to considering additional guidance and identifying other relevant issues. After public consultation, the *Guidance on cyber resilience for financial market infrastructures* ("Cyber Guidance") was published in June 2016. In accordance with the Cyber Guidance, FMIs are expected to take immediate steps, in concert with relevant stakeholders, to improve their cyber resilience. Notably, the Cyber Guidance calls for the development, within 12 months of its publication, of concrete plans to meet the stringent recovery time objectives applicable to this industry.

Wholesale payments security

In mid-2016, the CPMI started to look into the security of wholesale payments in the light of the recent increase in cyber fraud. With this work, the CPMI aims to ensure that adequate protections and controls are in place at each stage of the wholesale payments process. This effort builds on previous CPMI work on cyber security and operational risk and, more generally, existing procedures to continuously test and strengthen infrastructure.

Digital innovations

In 2016, the CPMI began work on the potential effects of digital innovations in payment, clearing and settlement systems. The CPMI hosted an industry workshop with the FSB in October on the use of distributed ledger technologies in the financial markets and issues for financial authorities. This was followed by the publication of the CPMI report on *Distributed ledger technology in payment, clearing and settlement: an analytical framework* in February 2017. The report is designed to help central banks and other authorities to review and analyse the use of distributed ledgers in this part of the financial system.

Payment aspects of financial inclusion

The final report on *Payment aspects of financial inclusion* was published in April 2016. Setting out guiding principles designed to assist countries that seek to advance financial inclusion in their markets through payment services and technology, the report was produced by a joint task force set up by the CPMI and the World Bank Group in mid-2014.

Red Book statistics

The CPMI published in December 2016 its annual update of the *Statistics on payment, clearing and settlement systems in the CPMI countries*.

CPMI: www.bis.org/cpmi

Markets Committee

The Markets Committee is a forum where senior central bank officials jointly monitor developments in financial markets and assess their implications for market functioning and central bank operations. With a membership of 21 central banks, the Committee is chaired by Jacqueline Loh, Deputy Managing Director at the Monetary Authority of Singapore. She succeeded Guy Debelle, Deputy Governor of the Reserve Bank of Australia, who served as the Committee's Chair until January 2017.

The Committee's discussions during the year focused on changes in the monetary policy stance by the major central banks as well as on policy and financial conditions in EMEs. Among the topics discussed were unconventional policy measures and their implications for market functioning, exchange rate movements, digital innovations and their potential impact on monetary policy operations and the impact of money market fund reform on short-term US dollar funding markets.

In December 2016, the Committee issued a report on *Market intelligence gathering at central banks*, with the aim of shedding light on their efforts to gain a better understanding of market functioning. It shows that market intelligence gathering can be conducted via a number of different models depending on the central bank and its remit, size and resources. A key focus is on the recent evolution of such activity, in terms of the markets and institutions about which market intelligence is gathered, as well as on the organisational models for its collection, synthesis and dissemination.

In January 2017, the Committee issued a report on *The sterling "flash event" of 7 October 2016*. Investigating the sudden sell-off in sterling during early Asian trading that day, the report points to a confluence of factors that catalysed the episode. Significant weight is placed on the time of day and mechanistic amplifiers, including options-related hedging flows, as contributory factors. The report notes that the 7 October event does not represent a new phenomenon, but rather a new example of what appears to be a series of flash events that are now apt to occur in a broader range of markets than before.

In addition to monitoring near-term developments, the Committee also considered longer-term structural and operational issues. It oversaw work on the foreign exchange part of the 2016 Triennial Central Bank Survey of Foreign Exchange and Derivatives Market Activity. Based on these data, the Committee discussed the implications of the evolution of the market ecosystem for market functioning. The Committee continued its work of producing a single global code of conduct for the foreign exchange market, collaborating with a group of market participants from the major financial centres in both advanced and emerging market economies. The code, together with proposals for measures that would ensure greater adherence to the code, is scheduled to be finalised in May 2017.

Markets Committee: www.bis.org/markets

Central Bank Governance Group

The Central Bank Governance Group is a venue for Governors to exchange views on the design and operation of their institutions. The focus is on the institutional and organisational setting in which central banks perform their functions, including the choice of functions, independence of decision-making and decision-making structures. The group comprises nine Governors and is currently chaired by Stefan Ingves, Governor of Sveriges Riksbank.

Discussions are based on information collected through the Central Bank Governance Network, comprising almost 50 of the BIS member central banks. This and other information is made available to central bank officials. Selected examples of this research are published.

In the past year, the Governance Group convened during several BIS bimonthly meetings to discuss, among other topics, conflicts of interest relating to payment system functions, appointment and dismissal arrangements for top central bank officials, trends in profitability, and parliamentary oversight mechanisms. The information and insights provided help central banks assess the effectiveness of their own arrangements as well as the alternatives available.

Central Bank Governance Group: www.bis.org/cbgov

Irving Fisher Committee on Central Bank Statistics

The Irving Fisher Committee on Central Bank Statistics (IFC) is a forum for central bank economists and statisticians to address statistical topics related to monetary and financial stability. Governed by the BIS member central banks, it is hosted by the BIS and associated with the International Statistical Institute (ISI). The IFC has 85 institutional members, including almost all BIS shareholder central banks, and is currently chaired by Claudia Buch, Vice President of the Deutsche Bundesbank.

The IFC organised several activities in 2016/17 with the support of its member central banks and a number of international organisations. A key event was the Eighth Biennial Conference of central bank statisticians, on "Statistical implications of the new financial landscape" in September 2016. Together with the European Committee of Central Balance Sheet Data Offices (ECCBSO) and the Central Bank of the Republic of Turkey, the IFC also organised a conference on the "Uses of central balance sheet data office information" in September 2016. In March 2017, the IFC participated in the Asian Regional Statistics Conference co-hosted by the ISI and Bank Indonesia.

A significant part of the IFC's work has been conducted in cooperation with the G20-endorsed international Data Gaps Initiative (DGI) to enhance economic and financial statistics. One key DGI recommendation relates to data-sharing, for which the IFC was invited to conduct a survey to identify good practices to foster collaboration and micro data-sharing both within central banks and among public institutions. A report based on this stocktaking exercise, published in December 2016, served as an input to the international set of recommendations being prepared for the G20.

Another IFC report published in 2016 related to national policies and practices for financial inclusion. Its recommendations covered the definition of financial inclusion, the mandate of central banks in this area, internal coordination, data gaps to be addressed and international cooperation.

Lastly, and reflecting the strong interest of central banks in the topic of big data, the Committee has decided to focus on a few pilot projects related to using new information derived from internet activity and to the various large micro-data sets that are already available in administrative and commercial records. This preliminary work was presented at the IFC satellite seminar on big data during the ISI's March 2017 meetings.

IFC: www.bis.org/ifc

Financial Stability Institute

The Financial Stability Institute (FSI) assists supervisors worldwide in strengthening their financial systems by disseminating global financial standards, identifying relevant policy implementation issues, and facilitating adoption of sound supervisory practices. The FSI carries out these tasks through outreach events; FSI Connect, an e-learning tool; and policy implementation work.

In the latter part of 2016/17, the FSI started to implement a new strategy focused on (i) strengthening its outreach to senior policymakers worldwide; (ii) enhancing its policy implementation work by increasing the number of FSI publications and meetings that explore the range of policy options applied by different jurisdictions on key regulatory and supervisory issues, and highlight the main practical considerations attending their implementation; and (iii) intensifying efforts to gather input from key stakeholders to ensure that the FSI's work continues to reflect the interests and needs of financial sector supervisory authorities.

Outreach events

FSI outreach events include high-level meetings, policy implementation meetings, conferences, seminars and webinars. In 2016, more than 2,000 central bankers, financial sector supervisors and senior industry representatives attended 51 events.

High-level meetings

The FSI organises high-level meetings jointly with the Basel Committee on Banking Supervision (BCBS). These meetings, designed for Deputy Governors of central banks and heads of supervisory authorities, focus on policy discussions relating to current and emerging issues in the global and regional financial sector.

In 2016/17, high-level meetings were held in Africa, Latin America, and the Middle East and North Africa. The topics discussed included the remaining work to finalise the Basel III framework; supervisory approaches to enhance bank governance and culture; and the emergence of financial technology and its implications for banks' business models and risks.

Policy implementation meetings

Policy implementation meetings are aimed at senior officials at financial authorities who play key decision-making roles in implementing regulatory policies at the national level. The purpose of these meetings is to discuss policy and supervisory issues from a practical perspective.

Six policy implementation meetings were held in 2016. The meetings focused on topics such as Basel III implementation; expected loss provisioning and its interaction with regulatory capital; and supervisory approaches to financial technology innovations.

Conferences, seminars and webinars

These events provide a venue for supervisors around the world to discuss the technical aspects of financial sector regulation and supervision. Separate events cover banking, insurance, and cross-sectoral areas.

In 2016, the FSI organised 24 banking-related seminars and webinars. These included 15 regional events, which were organised in cooperation with 12 regional

supervisory groups,[3] and two webinars. The main topics covered included regulation and supervision of different banking risks; approaches to dealing with financial stability issues; and problem bank identification and early supervisory intervention.

The FSI held seven insurance-related seminars and eight webinars, most of which were organised in collaboration with the International Association of Insurance Supervisors (IAIS). The main topics covered were the new solvency and capital standards for insurers; the policy framework for global systemically important insurers (G-SIIs); and the emerging resolution framework for insurers.

Three cross-sectoral events were organised jointly with different partner institutions: a conference with the Global Partnership for Financial Inclusion (GPFI) on the supervision of digital financial inclusion; a conference with the International Association of Deposit Insurers (IADI) on bank resolution and deposit insurance; and a seminar with the International Organization of Securities Commissions (IOSCO) on trading book and market infrastructure issues.

FSI Connect

FSI Connect offers about 300 tutorials covering a wide range of financial sector regulatory and supervisory topics. It now has around 10,000 users from about 300 central banks and other financial authorities.

In 2016, the FSI released 37 new and updated tutorials on topics such as the TLAC standard; the revised market risk framework; the framework for domestic systemically important banks (D-SIBs); the framework for G-SIIs; and macroprudential surveillance in insurance.

Policy implementation work

In 2016, the FSI produced two occasional papers. One was developed jointly with the Association of Supervisors of Banks of the Americas (ASBA), and provided a qualitative discussion of the current supervisory treatment of interest rate risk in the banking book in Latin America. The second paper presented the results of a survey on supervisory priorities and challenges in non-BCBS member jurisdictions.

FSI: www.bis.org/fsi

Activities of BIS-hosted associations

This section reviews the year's principal activities of the three associations hosted by the BIS in Basel.

Financial Stability Board

The Financial Stability Board (FSB) promotes international financial stability by coordinating national financial authorities and international standard-setting

[3] Africa: Macroeconomic and Financial Management Institute of Eastern and Southern Africa (MEFMI). Americas: Association of Supervisors of Banks of the Americas (ASBA); Center for Latin American Monetary Studies (CEMLA); and Caribbean Group of Banking Supervisors (CGBS). Asia and the Pacific: Executives' Meeting of East Asia-Pacific Central Banks (EMEAP) Working Group on Banking Supervision; South East Asian Central Banks (SEACEN); and Central Banks of South East Asia, New Zealand and Australia (SEANZA) Forum of Banking Supervisors. Europe: European Banking Authority (EBA); European Supervisor Education Initiative (ESE); Group of Banking Supervisors from Central and Eastern Europe (BSCEE). Middle East: Arab Monetary Fund (AMF); and Gulf Cooperation Council (GCC) Committee of Banking Supervisors.

bodies as they develop strong regulatory, supervisory and other financial sector policies. It fosters a level playing field by encouraging coherent implementation of these policies across sectors and jurisdictions. The FSB's mandate, membership and framework of committees and management are described in its Annual Report. The FSB is chaired by Mark Carney, Governor of the Bank of England.

The FSB was set up by the G20 in 2009 to coordinate the development and implementation of the package of G20 financial regulatory reforms. The FSB's regional consultative groups (RCGs) broaden the range of countries engaged in the FSB's work to promote international financial stability. The RCGs bring together FSB members and approximately 65 non-member jurisdictions to exchange views on vulnerabilities affecting financial systems and initiatives to promote financial stability.

During 2016/17, the FSB continued its policy work to address the causes of the financial crisis, focusing increasingly on implementing the reforms and understanding their effects.

Reducing the moral hazard posed by global systemically important financial institutions

G-SIFI identification and higher loss absorbency

The identification of global systemically important financial institutions (G-SIFIs) is an important step towards understanding which financial institutions pose a risk to the financial system. Each year, the FSB publishes new lists of G-SIFIs based upon updated data and using methodologies developed by the BCBS and IAIS. The latest lists of global systemically important banks (G-SIBs) and global systemically important insurers (G-SIIs), were published in November 2016. The following month, the FSB issued a consultation on further guidance to implement the total loss-absorbing capacity (TLAC) standard agreed in November 2015.

G-SIFI resolution

Developing policy for effective recovery and resolution of global financial institutions is a key part of the FSB's ongoing work to address the failings highlighted by the financial crisis. In August 2016, the FSB published its fifth annual progress report to assess the implementation of agreed reforms and report on the resolvability of G-SIFIs. The report highlighted steps for FSB jurisdictions to take when developing policies for effective resolution of G-SIFIs and called for further action by G20 Leaders on the implementation of effective resolution regimes. The focus is on developing policy frameworks so that no firm is considered "too big to fail" and all firms can be effectively resolved without exposing taxpayers to the risk of loss. In June 2016, the FSB published guidance on resolution planning for systemically important insurers, and two consultations on resolution and resolution planning for central counterparties, in August 2016 and February 2017.

In August 2016, the FSB published guidance on temporary funding and on the operational continuity of banks in resolution and, in October 2016, it published a methodology to assess the implementation of the FSB's *Key Attributes of Effective Resolution Regimes for Financial Institutions* in the banking sector. In December 2016, a consultative paper was issued on possible arrangements to support the continued access to financial market infrastructures (FMIs) by firms in resolution.

More intense supervisory oversight

Following the 2015 publication of the FSB peer review on supervisory frameworks and approaches for domestic systemically important banks, work on supervisory effectiveness has been taken forward by various BCBS working groups and initiatives. The IAIS has also worked on supervisory effectiveness for G-SIIs, and more broadly for internationally active insurance groups, through its ComFrame project.

Making OTC derivatives markets safer

Improvements to over-the-counter derivatives markets were a key pillar of the G20 reforms. Trade reporting of OTC derivatives; central clearing and, where appropriate, exchange or electronic platform trading of standardised OTC derivatives; and higher capital and minimum margin requirements for non-centrally cleared derivatives were designed to mitigate systemic risk, increase transparency and reduce market abuse.

In August 2016, the FSB published a progress report on reforms to these markets, noting that, while reforms continued to be implemented, there were significant delays in implementing margin requirements for non-cleared derivatives, and platform trading frameworks were relatively undeveloped.

The FSB also published a report in the same month assessing member jurisdictions' plans to address legal barriers to reporting and accessing OTC derivatives transaction data. The report set out the steps jurisdictions are committed to taking to address these barriers, given the importance of trade reporting for the identification of risks in the OTC derivatives markets.

The FSB continued to support the harmonisation of key data elements necessary to support OTC derivatives data aggregation, notably the unique transaction identifier (UTI), unique product identifier (UPI) and Legal Entity Identifier (LEI). The FSB's working group to address UTI and UPI governance, formed in April 2016, is engaging with stakeholders ahead of finalising its recommendations.

Transforming shadow banking into resilient market-based finance

In November 2016, the FSB announced it would assess progress in transforming shadow banking into resilient market-based finance and would aim to complete this exercise in time for the G20 Leaders' Summit in Hamburg in July 2017. This work will review shadow banking activities since the global financial crisis and related financial stability risks, and whether the policies and monitoring put in place by FSB members are adequate to address these risks.

In January 2017, the FSB published recommendations to address structural vulnerabilities from asset management activities that could potentially present financial stability risks. This followed a consultation in June 2016 that set out potential financial stability risks and measures to address them.

Measures to reduce misconduct risk

Ethical conduct, and compliance with both the letter and spirit of applicable laws and regulations, are critical to public trust and confidence in the financial system. Misconduct is relevant to prudential oversight, as it can potentially affect the safety and soundness of individual financial institutions and ultimately the financial system. Following significant examples of misconduct by banks, in May 2015 the FSB launched a misconduct workplan that seeks to (i) examine whether reforms to incentives, for instance to governance and compensation structures, are having a

sufficient effect on reducing misconduct; (ii) improve global standards of conduct in the fixed income, commodities and currency markets; and (iii) reform major financial benchmarks. The FSB published a progress report on the implementation of its recommendations to reform major interest rate benchmarks in July 2016. In September, it also published a progress report on its misconduct workplan, including a section that considered the effectiveness of compensation tools in addressing misconduct risks.

Addressing the decline in correspondent banking

A reduction in the number of correspondent banking relationships is a source of concern because it may affect the ability to send and receive international payments, or it could drive some payment flows underground, with potential consequences for economic growth, financial inclusion and the stability and integrity of the financial system. The FSB has a four-point action plan to assess and address the causes of this decline. As part of this work, and collaborating closely with other international organisations, the FSB undertook a data collection exercise covering over 300 banks in some 50 jurisdictions to assess the issues. The FSB progress reports were published in August and December 2016.

Lessons from international experience on macroprudential policies

The IMF, FSB and BIS published a report in August 2016 to take stock of the lessons learned from national and international experience on the development and implementation of macroprudential policies.

Addressing data gaps

The global financial crisis highlighted significant information gaps that the authorities faced in the lead-up to the crisis, making it more difficult to identify emerging risks. As a result, the Data Gaps Initiative (DGI) was created in 2009 and is now in its second phase. The first progress report of this second phase was published in September 2016. Additionally, the FSB and the IAIS organised a thematic workshop to explore data gaps in systemic risk in the insurance sector in March 2017.

Advancing transparency through the Legal Entity Identifier

The FSB continued to provide secretariat support to the LEI Regulatory Oversight Committee. The global LEI System expanded its coverage, with nearly half a million LEIs issued since its establishment. It also prepared for the collection of ownership data on direct and ultimate parents of legal entities, which will be implemented during 2017 to support data aggregation at the level of corporate groups.

Strengthening accounting standards

Effective accounting and audit standards are essential for maintaining financial stability. In July 2016, the FSB encouraged work being undertaken by auditors to enhance the quality of the audits of SIFIs. The FSB also received updates on progress by accounting standard setters in finalising the accounting standards on expected loan loss provisions.

Task Force on Climate-related Financial Disclosure (TCFD)

In December 2015, the FSB established the TCFD to develop a set of voluntary, consistent disclosure recommendations for use by companies in providing information to investors, lenders and insurers about climate-related financial risks. In April 2016, the TCFD published its phase 1 report setting out its initial work and, in December 2016, published draft recommendations for public consultation. The TCFD's final recommended disclosures will be sent to the G20 Leaders' Summit in July 2017.

Assessing risks from fintech

The FSB workplan on assessing possible financial stability risks from fintech includes stocktakes of innovation facilitators developed by authorities, fintech credit intermediation, and issues for authorities in the use of distributed ledger technology. In November 2016, the FSB agreed a workplan, cooperating with other international organisations, to identify the supervisory and regulatory financial stability issues faced by the growth in fintech. The FSB will publish a report on its work ahead of the G20 Leaders' Summit in July 2017.

Monitoring implementation and evaluating the effects of reforms

The FSB, working with standard-setting bodies, has started to assess how far the post-crisis regulatory reforms have achieved their intended policy outcomes. The FSB published its second annual implementation and effects report in August 2016.

The FSB also undertook a number of peer reviews over this period. In May 2016, the FSB published a peer review evaluating the progress made by FSB member jurisdictions in implementing its policy framework for strengthening oversight and regulation of shadow banking. The review concluded that implementation of the framework remains at a relatively early stage and that more work is needed to enable jurisdictions to comprehensively assess and respond to potential shadow banking risks posed by non-bank financial entities. Additionally, the FSB published the country peer reviews of India and Japan in August and December 2016, respectively. The FSB also launched a thematic peer review on corporate governance as well as country peer reviews of Argentina, Brazil, France, Hong Kong SAR, Korea and Singapore.

For the July 2017 G20 Leaders' Summit, the FSB has developed a comprehensive workplan on the effects of reforms. It includes the development of a framework for post-implementation evaluation of the effects of the G20 financial regulatory reforms; work for the third annual implementation and effects report that will be published ahead of the Summit; a call for evidence from members on the effects of reforms; and two workshops – one with market participants and one with academics – to share experience in analysing the effects of reforms and evidence to date.

FSB: www.fsb.org

International Association of Deposit Insurers

The International Association of Deposit Insurers (IADI) is the global standard-setting body for deposit insurance systems. IADI contributes to the stability of financial systems by advancing standards and guidance for effective deposit insurance systems and promoting international cooperation among deposit insurers, bank resolution authorities and other safety-net organisations.

The number of organisations affiliated with IADI stands at 107, comprising 83 deposit insurers as members, 10 central banks and bank supervisors as associates, and 14 institutional partners. Thus, almost 70% of all jurisdictions with explicit deposit insurance systems are represented within IADI's membership. The President and Chair of IADI's Executive Council is Thomas M Hoenig, Vice President of the US Federal Deposit Insurance Corporation.

Strategic goals

IADI's strategic goals focus on three key objectives: promoting compliance with the IADI Core Principles for Effective Deposit Insurance Systems; advancing deposit insurance research and policy development; and providing IADI members with technical support to modernise and upgrade their systems. IADI's Core Principles are incorporated in the FSB's Key Standards for Sound Financial Systems, and are used in the Financial Sector Assessment Program (FSAP) reviews conducted by the IMF and the World Bank.

In support of its strategic goals, IADI completed a review of its governance structure and funding arrangements in May 2016. As a result, IADI's seven Standing Committees have been replaced by four newly established Council Committees (CCs), each carrying out an oversight and advisory role for the Association. Three of the CCs (Core Principles and Research; Member Relations; and Training and Technical Assistance) focus on one or more of the strategic goals, while the fourth (Audit and Risk) exercises an internal control function.

International conferences and events

Crisis prevention and management, together with the role of deposit insurers in crises, was the focus of IADI's 15th Annual Conference, held in October 2016 in Seoul, Korea.

In December 2016, IADI and the FSI held their seventh annual joint conference on bank resolution, crisis management and deposit insurance issues. The conference took place in Basel, bringing together more than 200 delegates from financial safety-net organisations in 75 jurisdictions.

IADI's Fourth Biennial Research Conference, to be held in June 2017 at the BIS in Basel, will provide a forum for researchers and safety net practitioners to advance their knowledge on a wide range of contemporary issues facing deposit insurers.

IADI also hosted global and regional seminars in a wide variety of locations, on topics identified in IADI member survey results, including deposit protection and mobile money, enhancing asset recovery, depositor reimbursement, and legal frameworks.

IADI: www.iadi.org

International Association of Insurance Supervisors

The International Association of Insurance Supervisors (IAIS) is the global standard-setting body for the insurance sector. Its mission is to promote effective and globally consistent insurance supervision and contribute to global financial stability so that policyholders benefit from fair, safe and stable insurance markets. The Executive Committee is chaired by Victoria Saporta, Executive Director of Prudential Policy at the Bank of England.

ComFrame

In 2011, the IAIS began a multi-year initiative to design a common framework, or ComFrame, for the supervision of internationally active insurance groups. In June 2016, the IAIS approved a plan to restructure ComFrame and integrate it directly into the IAIS-developed Insurance Core Principles (ICPs). In March 2017, it released for public consultation the first set of ComFrame material integrated with relevant ICPs (covering governance, supervisory measures, supervisory cooperation, and coordination and resolution). The IAIS is due to adopt ComFrame in late 2019, after which it will be available for implementation by members.

Global insurance capital standards

As part of ComFrame, the IAIS is developing the global risk-based insurance capital standard (ICS). In May 2016, the IAIS launched the second field-testing exercise designed to provide an evidence-based approach to ICS development. Forty-one volunteer insurance groups representing approximately 30% of global insurance premium volume participated. The field-testing exercise incorporated confidential reporting on the previously developed Basic Capital Requirement and Higher Loss Absorbency policy measure. In July 2016, the IAIS published its second ICS consultation paper, generating more than 2,000 pages of feedback from 75 organisations. The IAIS is using this feedback and lessons from field-testing to develop ICS Version 1.0 for extended field-testing, which will be published in July 2017.

Global systemically important insurers

Global systemically important insurers (G-SIIs) are insurance entities whose distress or disorderly failure would cause significant disruption to the global financial system and economic activity. As part of its scheduled three-year review cycle, the IAIS published the Updated G-SII Assessment Methodology in June 2016. The IAIS applied this updated methodology in making recommendations to the Financial Stability Board (FSB) as part of the FSB's annual G-SII identification process.

In July 2013, the IAIS published a framework of G-SII policy measures, including a classification table of typical insurance products and activities. After finding that the notion of non-traditional non-insurance activities and products required further clarification, the IAIS replaced this with a more granular and nuanced assessment of product features in a paper published in June 2016.

Implementation

The Self-Assessment and Peer Review process is a key component of the IAIS implementation programme. In 2016, 90 jurisdictions participated in IAIS assessments, with an average of 73 jurisdictions participating in each one. Assessments were completed on ICP 3 (Information Sharing and Confidentiality Requirements) and ICP 25 (Supervisory Cooperation and Coordination), as well as ICP 13 (Reinsurance and Other Forms of Risk Transfer) and ICP 24 (Macroprudential Surveillance and Insurance Supervision). Assessment results help identify areas for potential revision of supervisory material and provide critical inputs into the implementation efforts of the IAIS and its partners.

The IAIS collaborates with the FSI on insurance seminars and an online training seminar for insurance supervision professionals known as FIRST-ONE, consisting of webinars and tutorials. This web-based programme is delivered over a four-month

period through live webinars and self-directed FSI Connect modules. In 2016, 215 supervisors from more than 50 authorities participated.

To continue to enhance the capacity of insurance supervisors, the IAIS made further revisions to the Core Curriculum – a comprehensive learning and resource tool for supervisors. The IAIS also continued its engagement with the Access to Insurance Initiative to advance capacity-building for insurance supervisors in support of inclusive insurance markets.

The IAIS Multilateral Memorandum of Understanding, a global framework for cooperation and information exchange, continued to gain new signatories, with six more jurisdictions joining it. This brings the total number of signatories to 63 jurisdictions accounting for nearly 71% of worldwide premium volume.

International accounting and auditing

The IAIS submitted comments on the following International Auditing and Assurance Standards Board papers: "Enhancing audit quality in the public interest", "Strategic objectives & work plan for 2017–18", and "Exploring the growing use of technology in audit, with a focus on data analytics".

Insurance Core Principles

Insurance Core Principles developed by the IAIS provide a globally accepted regulatory and supervisory framework for the insurance sector. In March 2017, the IAIS released the following revised ICPs for public consultation: ICP 3, ICP 9 (Supervisory Review and Reporting), ICP 10 (Preventive Measures, Corrective Measures and Sanctions), ICP 12 (Exit from the Market and Resolution) and ICP 25.

Macroprudential policy and surveillance framework

In January 2017, the IAIS released its *2016 Global Insurance Market Report* covering the global insurance sector from a supervisory perspective with a focus on sector performance and key risks. A key component of the IAIS macroprudential policy and surveillance framework, the report shows that the (re)insurance sector has remained well functioning and stable, while operating in an increasingly difficult macroeconomic and financial environment characterised by weak global demand, low inflation rates, very low interest rates, and bursts of financial market volatility.

Supporting materials

In August 2016, the IAIS published an *Issues paper on cyber risk to the insurance sector* and, in November 2016, an *Application paper on approaches to supervising the conduct of intermediaries*.

IAIS: www.iaisweb.org

Economic analysis, research and statistics

The BIS's economic analysis and research on monetary and financial stability policy issues are conducted within its Monetary and Economic Department (MED). Economists are located at the head office in Basel and at the BIS Representative Offices in Hong Kong SAR and Mexico City. The BIS also compiles and disseminates

international statistics on financial institutions and markets. Through its economic analysis, research and statistics, the BIS helps to meet the needs of monetary and supervisory authorities for policy insight and data.

Analysis and research

Analysis and research at the BIS are the basis of its background notes for bimonthly and other meetings of central bank officials, analytical support for the Basel-based Committees, and the Bank's own publications. Research seeks to strike a balance between responsiveness to short-term issues and proactivity in exploring themes that are of strategic importance for central banks and prudential authorities.

Collaborative efforts with central bank and academic researchers around the world stimulate broad dialogue on key policy questions. As part of its efforts to strengthen research collaboration with senior professionals from academia and research institutions, the BIS in 2016 appointed Markus Brunnermeier, the Edwards S Sanford Professor of Economics at Princeton University, as the BIS's first Alexandre Lamfalussy Senior Research Fellow. This fellowship complements the visiting fellows programme for academic researchers and the Central Bank Research Fellowship (CBRF) Programme.

The BIS also organises conferences and workshops to bring together participants from policy, research and business. The flagship event for central bank Governors is the BIS Annual Conference. In June 2016, the 15th BIS Annual Conference focused on long-term issues for central banks, including financial structure and growth, and inequality and globalisation. Moreover, the semiannual meetings of the BIS Research Network provide an opportunity to discuss current macroeconomic and financial topics.

Most of the BIS's analysis and research activities are undertaken at its Basel headquarters, but an important part of the effort is carried out at its two representative offices. Both offices have developed research programmes as well as active secondment and exchange schemes to collaborate with member central banks in their respective regions. The Representative Offices also oversee a programme of conferences and collaborative research networks.

Regular reports of the research activities of the Asian Office are presented to the Asian Consultative Council (ACC), comprising the Governors of the 12 BIS member central banks in the Asia-Pacific region.[4] Research activities in the Americas Office are organised in cooperation with the Consultative Council for the Americas (CCA), a group of eight central banks in the Americas,[5] most notably the annual research conference and research networks, under the direction of a Scientific Committee of CCA central bank research heads. In May 2016, the Central Reserve Bank of Peru hosted the seventh BIS CCA Annual Research Conference on "Inflation dynamics: the role of labour markets, productivity and globalisation".

As part of its broader effort to strengthen research, last year BIS Management commissioned an external review of BIS research, which was presented to the Board in January 2017. The review's independent perspective on BIS research is a key input into the strategy to further enhance the quality and usefulness of BIS research and policy analysis for central banks. In March 2017, the BIS Board endorsed an action plan prepared by BIS Management which sets out the course of action for reinforcing BIS research over the coming years. The plan identifies areas for

[4] The central banks of Australia, China, Hong Kong SAR, India, Indonesia, Japan, Korea, Malaysia, New Zealand, the Philippines, Singapore and Thailand.

[5] The central banks of Argentina, Brazil, Canada, Chile, Colombia, Mexico, Peru and the United States.

improvement in the three main stages of the research process: planning, execution and dissemination.

Most BIS research is published in *BIS Working Papers*, the *BIS Quarterly Review* and *BIS Papers*, in both print and online versions. It also informs the discussion of policy challenges outlined in the Annual Report. BIS economists present their research at international conferences and publish in professional journals and other external publications.

BIS research: www.bis.org/forum/research.htm

Research topics

Reflecting the Bank's mission, BIS research centres on monetary and financial stability. The main areas of research are currently changes in financial intermediation; new frameworks for monetary and financial stability policy; and the global economy and spillovers. Within these broad areas, research projects span a broad range of topics and analytical angles.

The research on financial intermediation aims at understanding the behaviour of financial institutions and their interaction with financial markets. Analysing the way different intermediaries operate and markets function is an important foundation for this work. The perspectives gained help policymakers evaluate changes in the financial system, monitor financial vulnerabilities, and inform the design of financial stability and monetary policies.

In the past year, work in this area included research on the impact of regulatory changes on the behaviour of banks; determinants of cash holdings by asset managers; the risk-taking channel of the exchange rate; the drivers of low long-term interest rates; and the determinants and implications of recent pricing anomalies in global financial markets.

Research on post-crisis monetary and financial stability policy frameworks aims to strengthen the analytical foundations of central bank policy. The gap between the theory and practice of central bank policy remains large as central banks continue to operate in uncharted territory, and the role of financial stability considerations in monetary policy remains the subject of intense debate.

During the past year, specific projects in this area studied the impact of commodity price cycles on credit growth and resource allocation; the relationship between household debt and private consumption; and how the characteristics of credit booms and busts affect cost-benefit assessments of monetary policies that lean against the build-up of financial imbalances.

Research on the global economy and spillovers focuses on the implications of the tight real and financial integration of the global economy for monetary and financial stability. Understanding these linkages is of particular importance for policymakers in an environment where the benefits of globalisation are under increased scrutiny.

One focus of research in this area during the year was the evolution of global value chains and their impact on inflation dynamics. Others included cross-border effects of macroprudential policies, and the global role of the US dollar as a funding currency. The BIS international banking statistics provide key information for these studies.

Research at the Asian Office is carried out under staggered two-year programmes. In 2016, the Office completed one on "Financial systems and the real economy". It also started the 2016–17 programme on "The price, real and financial effects of exchange rates", which covers topics such as the effect of currency movements on output and inflation and the risk-taking channel of exchange rates.

For the 2017–18 programme, the chosen theme is "Fixed income markets in Asia and the Pacific: structure, participation and pricing", which will cover topics such as the international role of Asia-Pacific fixed income assets, the price and liquidity dynamics in these markets, the interaction between bond and foreign exchange market volatility, and the implications for monetary and financial stability policy of global interest rate shocks.

In the Americas, the research network on "The commodity cycle: macroeconomic and financial stability implications" culminated in a conference hosted by the Americas Office in Mexico City in August 2016. A new research network on exchange rates, with a focus on exchange rate pass-through analysis using disaggregated data, started in early 2017. A working group analysed the effectiveness of macroprudential policies using credit registry data. Using the same type of data, a new initiative is studying the impact of the changes of funding on bank business models and monetary policy transmission.

International statistical initiatives

The BIS's unique set of international banking and financial statistics underpins the Basel Process by supporting the analysis of global financial stability. This involves close cooperation with other financial international organisations, especially through the BIS's participation in the Inter-Agency Group on Economic and Financial Statistics (IAG).[6] This is the international body tasked with coordinating and monitoring the implementation of the recommendations to address the data gaps revealed by the financial crisis, in accord with the FSB and IMF proposals to the G20. Following the completion of the initiative's first phase in 2015, a second five-year phase is now under way with the aim of implementing the regular collection and dissemination of comparable, timely, integrated, high-quality and standardised statistics for policy use.

To close the data gaps related to international banking activities, the BIS has continued to expand its key international banking statistics (IBS) data set, reported by central banks under the guidance of the CGFS. In the past year, this expansion included the publication of additional detail in the locational banking statistics, shedding further light on the geography of international banking, specifically the claims and liabilities of banks in each reporting country on counterparties in more than 200 countries. In parallel, data reported for banks located in China and Russia were published for the first time. The BIS has been also working with all reporting countries to address remaining data gaps, to review options for improving the consistency between the consolidated IBS and supervisory data, and to support efforts to make data more widely available.

In addition to banking statistics, the BIS publishes a variety of other statistics on its website, including property prices, debt securities, debt service ratios, credit to the private and public sectors, global liquidity, effective exchange rates, foreign exchange markets, derivatives and payment systems. Last year, new time series on credit-to-GDP gaps and commercial property price indicators as well as historical time series on consumer prices were added to this offering. The BIS also started to publish daily data on nominal effective exchange rates.

These data appear in the *BIS Statistical Bulletin*, published concurrently with the *BIS Quarterly Review* and accompanied by explanatory charts illustrating the

[6] The IAG comprises the BIS, the ECB, Eurostat, the IMF, the OECD, the United Nations and the World Bank Group (www.principalglobalindicators.org). These organisations also sponsor the Statistical Data and Metadata eXchange (SDMX), whose standards the BIS uses for its collection, processing and dissemination of statistics (www.sdmx.org).

latest developments. They are also available in the *BIS Statistics Warehouse*, an interactive search tool for customised queries, and the *BIS Statistics Explorer,* a simpler search tool that allows for pre-defined views of the most current data.

The BIS's statistical work also focuses on long-term financial stability indicators to support its own research agenda as well as the initiatives of the Basel Process and the G20. It relies extensively on the BIS Data Bank, which contains, in particular, key economic indicators shared among BIS member central banks.

Finally, the BIS hosts the International Data Hub, where information about systemically important financial institutions is stored and analysed on behalf of a limited number of participating supervisory authorities. The analysis supports participating supervisors in their engagement with reporting firms and enriches the dialogue between supervisors across jurisdictions. The first phase of this FSB-led initiative, covering firms' credit exposures, was completed in 2013. The second phase involved the gathering of data covering these institutions' funding dependencies, and was completed in 2015. The third phase, to be implemented in 2017–18, involves the collection of additional information about reporting institutions' consolidated balance sheets, and greater information-sharing with international financial institutions that hold a financial stability mandate.

BIS statistics: www.bis.org/statistics

Other areas of international cooperation

The BIS participates in international forums such as the G20 and collaborates with key international financial institutions such as the International Monetary Fund and the World Bank Group. The BIS also contributes to the activities of central banks and regional central bank organisations by participating in their events as well as occasionally hosting joint events. During the past year, it co-organised events or collaborated with the following regional organisations on the topics outlined below:

- CEMLA (Center for Latin American Monetary Studies) – banking regulation and supervision;
- EMEAP (Executives' Meeting of East Asia-Pacific Central Banks) – monetary and financial stability, financial markets, banking regulation and supervision;
- MEFMI (Macroeconomic and Financial Management Institute of Eastern and Southern Africa) – reserves management, bank regulation and supervision, payment and settlement systems; and
- SEACEN (South East Asian Central Banks) Research and Training Centre – banking regulation and supervision, payment and settlement systems, central bank governance, monetary policy.

Financial services

Through its Banking Department, the BIS offers a wide range of financial services designed to support the reserves management activities of central banks and other official monetary authorities, and to foster international cooperation in this area. Some 140 institutions, as well as a number of international organisations, make use of these services.

Safety and liquidity are the key features of BIS credit intermediation, which is supported by rigorous internal risk management. Independent control units reporting directly to the BIS Deputy General Manager monitor and control the related risks. A compliance unit monitors compliance risk, while financial risks – ie credit, market

and liquidity risks – and operational risk are overseen by a risk management unit that is also responsible for ensuring an integrated approach to risk management.

BIS financial services are provided from two linked trading rooms: one in Basel, at the Bank's head office; and one in Hong Kong SAR, at its Representative Office for Asia and the Pacific.

Scope of services

As an institution owned and governed by central banks, the BIS is well placed to understand the needs of reserves managers – their primary focus on safety and liquidity as well as the evolving need to diversify their exposures. To meet those needs, the BIS offers investments that vary by currency, maturity and liquidity. In addition, the Bank provides short-term liquidity facilities and extends credit to central banks, usually on a collateralised basis. Moreover, the Bank can act as trustee and collateral agent in connection with international financial operations.

Tradable instruments are available in maturities ranging from one week to five years, in the form of Fixed-Rate Investments at the BIS (FIXBIS), Medium-Term Instruments (MTIs) and products with embedded optionality (Callable MTIs). These instruments can be bought or sold throughout the Bank's dealing hours. Also offered are money market placements, such as sight/notice accounts and fixed-term deposits.

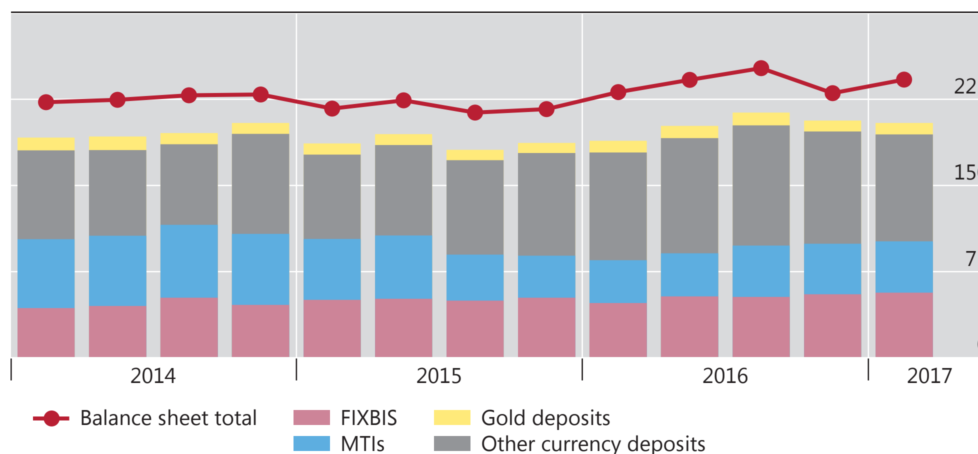
On 31 March 2017, total deposits stood at SDR 204 billion, of which about 95% were denominated in currencies and the remainder in gold (see graph).

The Bank transacts foreign exchange and gold on behalf of its customers, thereby providing access to a large liquidity base in the context of their rebalancing of reserve portfolios. The Bank's foreign exchange services encompass spot transactions in major currencies and Special Drawing Rights (SDR), as well as swaps, outright forwards, options and dual currency deposits (DCDs). In addition, the Bank provides gold services that include buying and selling, sight accounts, fixed-term deposits, earmarked accounts, quality upgrading, refining and location exchanges.

The BIS provides asset management products in the form of (i) dedicated portfolio management mandates tailored to each customer's preferences; or (ii) BIS Investment Pools (BISIPs), which are open-end fund structures that allow customers

Balance sheet total and deposits by product

End-quarter figures, in billions of SDR



The sum of the bars indicates total deposits.

to invest in a common pool of assets. The BISIP structure is also used for the Asian Bond Fund (ABF) initiative sponsored by EMEAP to foster the development of local currency bond markets. Also based on this structure are the following initiatives developed with a group of advising central banks: the BISIP ILF1 (a US inflation-protected government securities fund); the BISIP CNY (a domestic Chinese sovereign fixed income fund); and the BISIP KRW (a domestic Korean sovereign fixed income fund).

The BIS Banking Department hosts global and regional meetings, as well as seminars and workshops on reserves management issues. These gatherings facilitate the exchange of knowledge and experience among reserves managers and promote the development of investment and risk management capabilities in central banks and international organisations. The Department also occasionally supports central banks in reviewing and assessing their reserves management practices.

Representative Offices

The BIS has a Representative Office for Asia and the Pacific (the Asian Office), located in Hong Kong SAR, and a Representative Office for the Americas (the Americas Office), located in Mexico City. The Representative Offices promote cooperation and foster the exchange of information and data within each region by supporting regional institutions and Basel-based committees, and conducting research. The offices also organise outreach meetings.

The Asian Office

The Asian Consultative Committee (ACC) guides the activities of the Asian Office. The Chair of the ACC is currently Graeme Wheeler, Governor of the Reserve Bank of New Zealand. In addition to supporting cooperative activities and conducting research, the Asian Office provides banking services to the region's monetary authorities. It is also through the office in Hong Kong that the Financial Stability Institute delivers a programme of meetings and seminars in the region that are closely tailored to local priorities.

As well as the research activities mentioned above, the Asian Office organised eight high-level BIS meetings during the year. Most of these were organised jointly with a central bank or a regional central banking organisation, especially the Executives' Meeting of East Asia-Pacific Central Banks (EMEAP) and the South East Asian Central Banks (SEACEN). These meetings included the Working Party on Monetary Policy in Asia, held in Sydney in May 2016; the Research Conference on Financial Inclusion and Central Banks, jointly organised in Cebu by the BIS and Bangko Sentral ng Pilipinas in June; the workshop in Hong Kong in August for the research programme on exchange rate effects; a conference in Kuala Lumpur in October that presented the results of the Office's research programme on "Financial systems and the real economy"; the SEACEN-BIS High-level Seminar held in Manila in September; the 11th Meeting on Monetary Policy Operating Procedures, held in Hong Kong in November; and two meetings of the EMEAP-BIS Forum on Financial Markets, one in Auckland in June and the other in Beijing in December.

BIS Asian Office: www.bis.org/about/repoffice_asia.htm

The Americas Office

The cooperative activities of the Office are conducted under the guidance of the Consultative Council for the Americas (CCA). The CCA is currently chaired by Stephen S Poloz, Governor of the Bank of Canada. The CCA met four times in the year under review. The CCA also convened its third Roundtable with chief executive officers of large financial institutions, which was held in October 2016 in Washington DC, hosted by the Bank of Canada.

Cooperative activities beyond research are also organised under two functional groups. The Consultative Group of Directors of Operations (CGDO) holds regular teleconferences to exchange views on financial market developments and central bank operations. A CGDO study group produced a report on foreign exchange liquidity in the Americas. The Consultative Group of Directors of Financial Stability (CGDFS), which focuses on financial stability issues, held its annual meeting in Viña del Mar in September 2016, hosted by the Central Bank of Chile.

As for outreach activities, the Americas Office co-organised with the Center for Latin American Monetary Studies (CEMLA) a roundtable in Santo Domingo on inflation measurement, expectations and monetary policy. Jointly with the Inter-American Development Bank (IDB), a workshop on macroprudential policy was organised in Buenos Aires in November 2016, hosted by the Central Bank of Argentina. Finally, two sessions were sponsored and organised at the Annual Meeting of the Latin American and Caribbean Economic Association (LACEA) in Medellín, Colombia.

BIS Americas Office: www.bis.org/about/repoffice_americas.htm

Governance and management of the BIS

The governance and management of the Bank are conducted at three principal levels: the General Meeting of BIS member central banks; the BIS Board of Directors; and BIS Management.

The General Meeting of BIS member central banks

Sixty central banks and monetary authorities are currently members of the BIS and have rights of voting and representation at General Meetings. The Annual General Meeting (AGM) is held no later than four months after 31 March, the end of the BIS financial year. The AGM approves the annual report and the accounts of the Bank, decides on the distribution of a dividend and elects the Bank's auditor.

BIS member central banks

- Bank of Algeria
- Central Bank of Argentina
- Reserve Bank of Australia
- Central Bank of the Republic of Austria
- National Bank of Belgium
- Central Bank of Bosnia and Herzegovina
- Central Bank of Brazil
- Bulgarian National Bank
- Bank of Canada
- Central Bank of Chile
- People's Bank of China
- Bank of the Republic (Colombia)
- Croatian National Bank
- Czech National Bank
- Danmarks Nationalbank (Denmark)
- Bank of Estonia
- European Central Bank
- Bank of Finland
- Bank of France
- Deutsche Bundesbank (Germany)
- Bank of Greece
- Hong Kong Monetary Authority
- Magyar Nemzeti Bank (Hungary)
- Central Bank of Iceland
- Reserve Bank of India
- Bank Indonesia
- Central Bank of Ireland
- Bank of Israel
- Bank of Italy
- Bank of Japan
- Bank of Korea
- Bank of Latvia
- Bank of Lithuania
- Central Bank of Luxembourg
- National Bank of the Republic of Macedonia
- Central Bank of Malaysia
- Bank of Mexico
- Netherlands Bank
- Reserve Bank of New Zealand
- Central Bank of Norway
- Central Reserve Bank of Peru
- Bangko Sentral ng Pilipinas (Philippines)
- Narodowy Bank Polski (Poland)
- Bank of Portugal
- National Bank of Romania
- Central Bank of the Russian Federation
- Saudi Arabian Monetary Authority
- National Bank of Serbia
- Monetary Authority of Singapore
- National Bank of Slovakia
- Bank of Slovenia
- South African Reserve Bank
- Bank of Spain
- Sveriges Riksbank (Sweden)
- Swiss National Bank
- Bank of Thailand
- Central Bank of the Republic of Turkey
- Central Bank of the United Arab Emirates
- Bank of England
- Board of Governors of the Federal Reserve System (United States)

The BIS Board of Directors

The Board is responsible for determining the strategic and policy direction of the BIS, supervising Management and fulfilling the specific tasks given to it by the Bank's Statutes. The Board meets at least six times a year.

Pursuant to Article 27 of the BIS Statutes, the Board may have up to 21 members, including six ex officio Directors comprising the central bank Governors of Belgium, France, Germany, Italy, the United Kingdom and the United States. Each ex officio member may appoint another member of the same nationality. Nine Governors of other member central banks may be elected to the Board.[7] The Board elects a Chairman from among its members for a three-year term and may elect a Vice-Chairman. The present Chairman is Jens Weidmann, President of the Deutsche Bundesbank.

Changes to Article 27 of the BIS Statutes regarding Board composition

At its meeting on 12 September 2016, the BIS Board of Directors decided to summon an Extraordinary General Meeting (EGM) on 7 November 2016 to adopt, among other changes, the following amendments to Article 27 of the Bank's Statutes:

- The total number of Directors would be reduced from 21 to 18 to further enhance the functioning of the Board.
- The number of Directors to be appointed by the six ex officio Directors (Article 27(2)) would be reduced from six to one. It was agreed that the President of the Federal Reserve Bank of New York would be appointed.
- The number of elected Directors would be raised accordingly from nine to 11.

With the reduction of the number of appointed Directors from six to one, the representation of European and non-European regions would become more balanced. This change, together with the increase in the number of elected Directors, would also allow for more flexibility in the Board's composition.

On 7 November 2016, the EGM of BIS shareholders adopted the changes to Article 27 (and to Articles 28 and 29).①

Article 27 is one of the few articles whose change requires approval by the "Signatory Governments to the Convention respecting the BIS of 20 January 1930", ie the governments of Belgium, France, Germany, Italy, the United Kingdom and Switzerland. These governments were therefore approached after the EGM and, by letter dated 3 May 2017, the Swiss government notified the BIS that the new Article 27 had been finally approved by all these six governments.

At its meeting on 8 May 2017, the BIS Board of Directors further decided that the new Article 27 would come into effect on 1 January 2019, by when the running terms of the Directors who were appointed under Article 27(2) will have expired.

① Changes to Articles 28 and 29 of the BIS Statutes are more of a technical nature. The change to Article 28 related to the possibility of electing a new Director for a full term of three years instead of just for the remainder of the predecessor's term. Article 29 was deleted (the desirability for Directors to reside in Europe had become obsolete).

Four advisory committees, established pursuant to Article 43 of the Bank's Statutes, assist the Board in its work:

- The Administrative Committee reviews key areas of the Bank's administration, such as budget and expenditures, human resources policies and information technology. The Committee meets at least four times a year. Its Chairman is Haruhiko Kuroda.
- The Audit Committee meets with internal and external auditors, as well as with the Compliance unit. Among its duties is the examination of matters related to

[7] In addition, one member of the Economic Consultative Committee (see page ■■) serves as an observer to BIS Board meetings on a rotating basis.

the Bank's internal control systems and financial reporting. The Committee meets at least four times a year and is chaired by Stephen S Poloz.

- The Banking and Risk Management Committee reviews and assesses the Bank's financial objectives, the business model for BIS banking operations and the risk management frameworks of the BIS. The Committee meets at least once a year. Its Chairman is Stefan Ingves.
- The Nomination Committee deals with the appointment of members of the BIS Executive Committee and meets on an ad hoc basis. It is chaired by the Board's Chairman, Jens Weidmann.

In memoriam

It was with great sadness that the Bank learned of the deaths of:

- Luc Coene on 5 January 2017 at the age of 69. A former Governor of the National Bank of Belgium (2011–15), Mr Coene was a BIS Director from April 2011 to March 2015. He was again appointed to the BIS Board from January 2016. He chaired the BIS Audit Committee from 2013 to 2015.
- Hans Tietmeyer on 27 December 2016 at the age of 85. Mr Tietmeyer was President of the Deutsche Bundesbank (1993–99) and served as a BIS Director from October 1993 until December 2010. He chaired the BIS Consultative Committee and its successor, the BIS Administrative Committee (2003–10), and also the BIS Audit Committee (2003–07). He was the Bank's Vice-Chairman from 2003 to 2010.
- Carlo Azeglio Ciampi on 16 September 2016 at the age of 95. Mr Ciampi was Governor of the Bank of Italy (1979–93) and served as a BIS Director from November 1979 to April 1993. He again served as a BIS Director from July 1994 to May 1996, when he was also the Bank's Vice-Chairman.

Board of Directors[8]

Chairman: Jens Weidmann, Frankfurt am Main
Mark Carney, London
Agustín Carstens, Mexico City
Andreas Dombret, Frankfurt am Main
Mario Draghi, Frankfurt am Main
William C Dudley, New York
Ilan Goldfajn, Brasília
Stefan Ingves, Stockholm
Thomas Jordan, Zurich
Klaas Knot, Amsterdam
Haruhiko Kuroda, Tokyo
Anne Le Lorier, Paris
Fabio Panetta, Rome
Urjit R Patel, Mumbai
Stephen S Poloz, Ottawa
Jan Smets, Brussels
François Villeroy de Galhau, Paris
Ignazio Visco, Rome
Pierre Wunsch, Brussels

[8] As at 1 June 2017. The list includes the rotating observer mentioned above.

Janet L Yellen, Washington
Zhou Xiaochuan, Beijing

Alternates

Jon Cunliffe, London
Stanley Fischer, Washington
Jean Hilgers, Brussels
Paolo Marullo Reedtz, Rome
Marc-Olivier Strauss-Kahn, Paris
Joachim Wuermeling, Frankfurt am Main

BIS Management

BIS Management is under the overall direction of the General Manager, who is responsible to the Board of Directors for the conduct of the Bank. The General Manager is assisted by the Deputy General Manager and advised by the Executive Committee of the BIS. The Executive Committee, chaired by the General Manager, further comprises the Deputy General Manager; the Heads of the three BIS departments – the General Secretariat, the Banking Department and the Monetary and Economic Department; the Economic Adviser and Head of Research; and the General Counsel. Other senior officials are the Deputy Heads of the departments, the Chairman of the Financial Stability Institute and the Head of Risk Management.

General Manager	Jaime Caruana
Deputy General Manager	Luiz Awazu Pereira da Silva
Secretary General and Head of General Secretariat	Monica Ellis
Head of Banking Department	Peter Zöllner
Head of Monetary and Economic Department	Claudio Borio
Economic Adviser and Head of Research	Hyun Song Shin
General Counsel	Diego Devos
Deputy Head of Banking Department	Jean-François Rigaudy
Deputy Head of Monetary and Economic Department	Dietrich Domanski
Deputy Secretary General	Bertrand Legros
Chairman, Financial Stability Institute	Fernando Restoy
Head of Risk Management	Jens Ulrich

Compliance

The Board of Directors and Management attach the highest importance to compliance. The Bank's compliance charter, adopted by the Board in 2005 and available on the Bank's website, calls for the activities of the institution and its staff to be conducted in accordance with the highest ethical standards and all applicable laws and regulations, as well as internal rules, policies and procedures. The Chief Compliance Officer leads an independent compliance function and assists Management in identifying and assessing compliance issues and in guiding and educating staff on related matters. The Chief Compliance Officer reports to the Deputy General Manager and has direct access to the Audit Committee.

BIS budget policy

Management prepares the annual BIS expenditure budget by establishing an overall business plan consistent with the strategic direction and financial framework agreed with the BIS Board of Directors. Within that context, business areas specify their detailed plans and resource requirements. The process of reconciling detailed business plans, objectives and overall resources culminates in a draft budget, which must be approved by the Board. The budget distinguishes between administrative and capital expenditures.

The Bank's administrative expense in 2016/17 was CHF 275.4 million.[9] Of this, Management and staff expense, including remuneration, pensions, and health and accident insurance accounted for around 71%. New staff positions were added during the year in accordance with the Bank's business plan, which emphasised mainly economic research and the Basel Process as well the management of cyber-security risk. A further 27% of BIS administrative expense related to "office and other expense", including information technology, buildings and equipment, and general operational costs.

Capital expenditure can vary significantly from year to year, depending on projects in progress. For 2016/17, capital expenditure amounted to CHF 25.2 million, of which 60% related to IT investment and 40% to buildings and equipment.

BIS remuneration policy

At the end of the 2016/17 financial year, the BIS employed 633 staff members[10] from 61 countries. The jobs performed by staff members are classified into job grades associated with a structure of salary ranges. The salaries of individual staff members move within the ranges of the structure on the basis of performance.

Every three years, a comprehensive survey benchmarks BIS salaries against compensation in comparable institutions and market segments, with adjustments

9 The Bank's budget includes the costs of its post-employment benefit arrangements on a cash basis. The operating expense in the Bank's annual financial statements includes these costs in accordance with IAS 19. The IAS 19 expense for the next financial year depends on the actuarial valuations as at 31 March each year, which are only finalised in April after the budget has been discussed by the Board. As such, any additional IAS 19 charges are treated outside the scope of the budget. Total administrative expense in 2016/17 comprised administrative expense within the budget of CHF 291.0 million plus additional IAS 19 charges of CHF 83.1 million.

10 This corresponds to 610.3 full-time equivalent positions. At the end of the 2015/16 financial year, the Bank employed 632 staff members, corresponding to 602.1 full-time equivalent positions. Including positions related to hosted organisations and not funded by the Bank, the number of staff was 683 in 2015/16 and 689 in 2016/17.

taking place as of 1 July in the following year. In benchmarking, the Bank focuses on the upper half of market compensation in order to attract highly qualified staff. The analysis takes into account the differing rates of taxation on compensation at the surveyed institutions.

In years between comprehensive salary surveys, the salary structure is adjusted as of 1 July on the basis of Switzerland's inflation rate and the weighted average real wage development in advanced countries. As of 1 July 2016, this adjustment produced an increase of 0.28% in the salary structure.

The salaries of senior officials are also regularly benchmarked against compensation in comparable institutions and market segments. As of 1 July 2016, the annual remuneration of senior officials, before expatriation allowances, is based on the salary structure of CHF 732,260 for the General Manager;[11] CHF 619,600 for the Deputy General Manager; and CHF 563,270 for Heads of Department.

BIS staff members have access to a contributory health insurance plan and a contributory defined benefit pension plan. At the Bank's headquarters, non-Swiss staff members recruited from abroad, including senior officials, are entitled to an expatriation allowance as well as an education allowance for their children, subject to certain conditions.

The Annual General Meeting approves the remuneration of members of the Board of Directors, with adjustments taking place at regular intervals. The total fixed annual remuneration paid to the Board of Directors was CHF 1,147,128 as of 1 April 2017. In addition, Board members receive an attendance fee for each Board meeting in which they participate. Assuming that the full Board is represented in all Board meetings, the annual total of these attendance fees amounts to CHF 1,068,240.

Financial activities and results

The Bank's balance sheet

The Bank's balance sheet increased by SDR 10.9 billion over the year, following an increase of SDR 14.5 billion in 2015/16. The balance sheet total on 31 March 2017 was SDR 242.2 billion.

Deposits, primarily from central banks, constitute the largest share of the Bank's liabilities. About 95% of the deposits are denominated in currencies, with the remainder in gold. On 31 March 2017, total deposits amounted to SDR 204.4 billion, compared with SDR 189.0 billion at the end of March 2016.

Currency deposits at 31 March 2017 stood at SDR 194.4 billion, which was SDR 15.7 billion higher than at the previous year-end. The currency composition of deposits remained stable, with deposits in US dollars at 76%, in euros at 11% and in sterling at 6%. Gold deposits stood at SDR 9.9 billion on 31 March 2017, a decrease of SDR 0.3 billion over the financial year.

Funds received from deposit liabilities are invested in assets that are managed conservatively. At 31 March 2017, 39% of total assets comprised government and other securities or treasury bills. Sight account balances (mainly at central banks) were 20%, and reverse repurchase agreements (primarily with sovereign bonds as collateral) were 18%, while gold and gold loans made up a further 11%. The gold balance included 103 tonnes in the Bank's own investment portfolio.

[11] In addition to the basic salary, the General Manager receives an annual representation allowance and enhanced pension rights.

Financial performance

The net profit for 2016/17 was SDR 828 million, which was SDR 415 million higher than in 2015/16, due to three main factors.

First, the net interest and valuation income (SDR 1,034 million) was SDR 508 million higher than in the previous year due to an increase in the net interest on the currency banking portfolios, which reflected three developments: (a) average currency deposits were SDR 20 billion higher in 2016/17 than in the previous year. The higher volume contributed additional profit; (b) the intermediation profit earned during the year was higher than in the previous year, primarily because of higher earnings during periods of wide FX swap spreads; and (c) the spreads to Libor on government and other securities in the currency banking portfolios tightened during the year, producing a valuation gain, by comparison with valuation losses in 2015/16, when the spreads to Libor widened.

Second, the net gain on sales of available for sale securities (SDR 49 million) was SDR 30 million lower than in the previous year. These gains arise when portfolios are rebalanced to their benchmarks. Gains were lower in 2016/17 primarily because of the effects of the increase in the US dollar yield curve.

Third, the net gain on sales of gold investment assets (SDR 23 million) was SDR 61 million lower than in the previous year. This reflected the sale of 1 tonne, compared with the 4 tonnes sold in 2015/16.

The Bank's total comprehensive income also includes three valuation changes which are reflected directly in equity. First, the net movement on revaluation of available for sale securities (SDR –164 million) arose from revaluation losses due to an increase in SDR yield curves (in particular, the US dollar), along with the realisation of SDR 49 million of gains in profit. This compares with a gain of SDR 17 million when interest rates declined in the previous year. Second, the net movement on the revaluation of gold investment assets (SDR 111 million) reflected a 4.6 % rise in the gold price, partly offset by the realisation of SDR 23 million of gains into profit. This compares with a valuation loss of SDR 36 million in the previous year, when the gold price rose less (by only 1.9%) and more gold was sold (and hence more gains were realised). The final valuation change relates to the actuarial re-measurement of the Bank's post-employment defined benefit obligations. This resulted in a gain of SDR 64 million, mostly due to an increase in the value of pension fund assets. This compares with a loss of SDR 162 million the previous year, when the value of pension fund assets fell and the IAS 19 discount rate was reduced. The total comprehensive income for 2016/17 was SDR 839 million (2015/16: SDR 231 million).

Allocation and distribution of profit

Proposed dividend

The dividend policy of the Bank considers the Bank's capital adequacy and leverage ratio requirements. The policy incorporates a normal sustainable dividend, which increases by SDR 10 per share per annum, and a supplementary dividend, which is decided ex post, while keeping leverage and economic capital within the desired range. Consistent with the BIS's dividend policy, it is proposed to declare a normal dividend of SDR 225 per share for the financial year 2016/17 and a supplementary dividend of SDR 75 per share. The dividend is payable on 558,125 shares, and will result in a total payment of SDR 167.4 million.

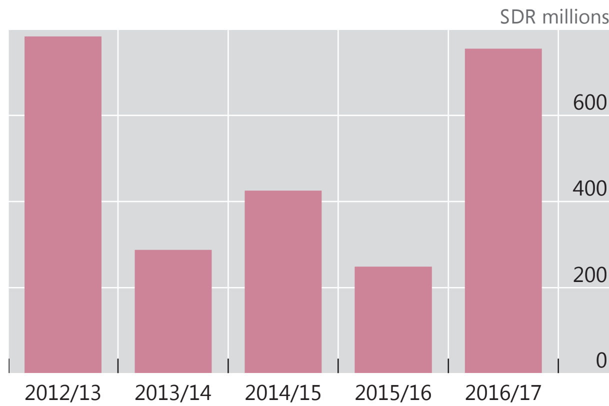
Proposed allocation of net profit for 2016/17

In accordance with Article 51 of the BIS Statutes, the Board of Directors recommends that the General Meeting allocate the 2016/17 net profit of SDR 827.6 million in the following manner:

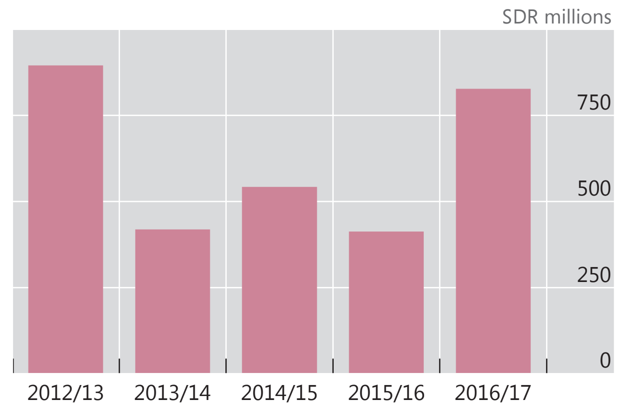
(a) SDR 167.4 million to be paid as a dividend of SDR 300 per share;
(b) SDR 33.0 million to be transferred to the general reserve fund; and
(c) SDR 627.2 million, representing the remainder of the available profit, to be transferred to the free reserve fund.

Five-year graphical summary

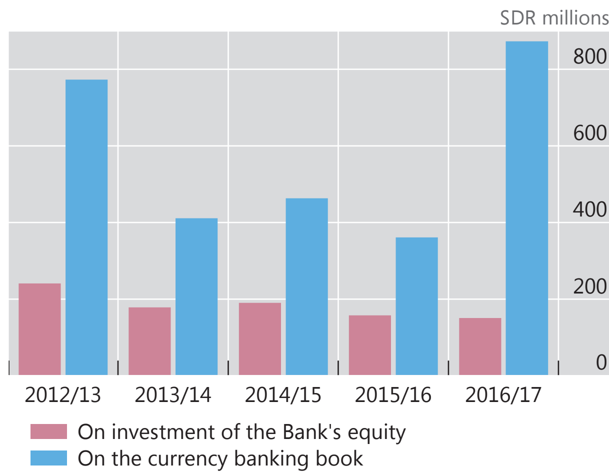
Operating profit



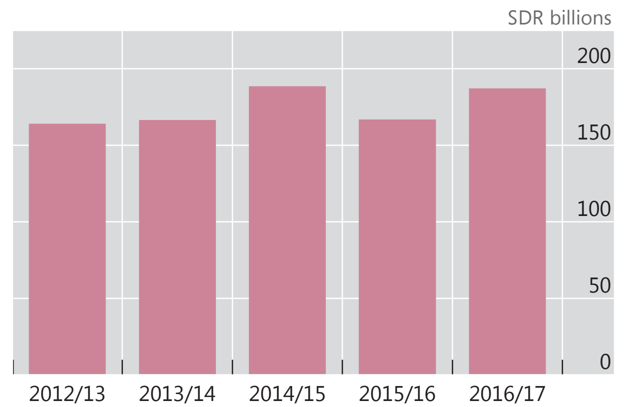
Net profit



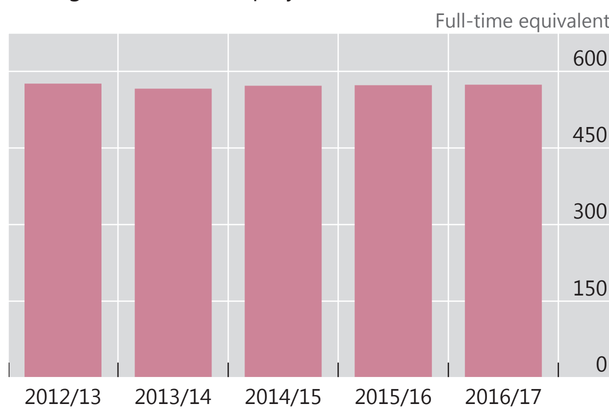
Net interest and valuation income



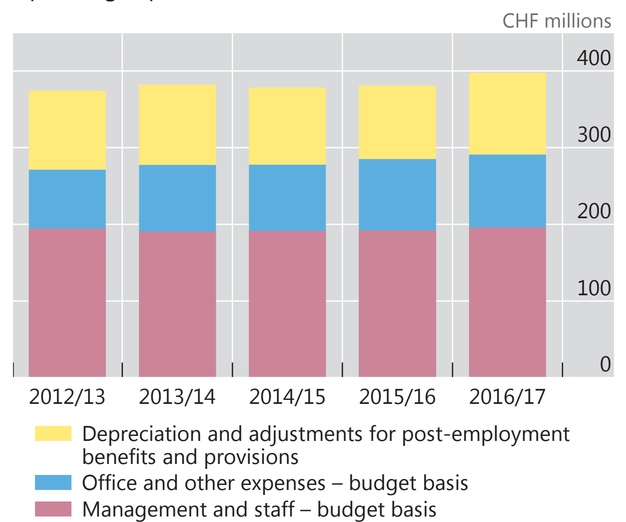
Average currency deposits (settlement date basis)



Average number of employees



Operating expense



Independent auditor

Election of the auditor

In accordance with Article 46 of the BIS Statutes, the Annual General Meeting is invited to elect an independent auditor for the ensuing year and to fix the auditor's remuneration. The Board policy is to rotate the auditor on a regular basis. The financial year ended 31 March 2017 was the fifth consecutive year of Ernst & Young's term as auditor.

Report of the auditor

The BIS financial statements for the year ended 31 March 2017 have been audited by Ernst & Young, who confirm that they give a true and fair view of the Bank's financial position and of its financial performance and its cash flows for the year then ended. The audit report can be found on page 248–9.

Financial statements

as at 31 March 2017

The financial statements on pages 179–247 for the financial year ended 31 March 2017 were approved on 8 May 2017 for presentation to the Annual General Meeting on 25 June 2017. They are presented in a form approved by the Board of Directors pursuant to Article 49 of the Bank's Statutes and are subject to approval by the shareholders at the Annual General Meeting.

Jaime Caruana	Luiz Awazu Pereira da Silva
General Manager	Deputy General Manager

Balance sheet

As at 31 March

SDR millions	Note	**2017**	2016
Assets			
Cash and sight accounts	1	48,295.5	25,847.0
Gold and gold loans	2	27,276.0	13,176.8
Treasury bills	3	36,163.6	39,578.6
Securities purchased under resale agreements	3	43,929.9	56,218.6
Loans and advances	3	21,136.8	17,337.4
Governments and other securities	3	57,402.5	67,128.4
Derivative financial instruments	4	2,220.7	1,685.3
Accounts receivable and other assets	5	5,626.5	10,215.9
Land, buildings and equipment	6	196.9	196.4
Total assets		**242,248.4**	231,384.4
Liabilities			
Gold deposits	7	9,934.5	10,227.6
Currency deposits	8	194,442.4	178,790.5
Securities sold under repurchase agreements	9	1,418.6	1,447.7
Derivative financial instruments	4	1,823.5	3,902.2
Accounts payable	10	14,443.5	17,548.8
Other liabilities	11	1,088.7	1,089.0
Total liabilities		**223,151.2**	213,005.8
Shareholders' equity			
Share capital	13	698.9	698.9
Less: shares held in treasury	13	(1.7)	(1.7)
Statutory reserves	14	15,289.9	14,997.0
Profit and loss account		827.6	412.9
Other equity accounts	15	2,282.5	2,271.5
Total equity		**19,097.2**	18,378.6
Total liabilities and equity		**242,248.4**	231,384.4

Profit and loss account

For the financial year ended 31 March

SDR millions	Note	**2017**	2016
Interest income	16	2,521.0	1,804.1
Interest expense	17	(1,558.6)	(975.3)
Net interest income		**962.4**	828.8
Net valuation movement	18	71.5	(302.9)
Net interest and valuation income		**1,033.9**	525.9
Net fee and commission income	19	4.0	5.1
Net foreign exchange movement	20	9.2	(1.2)
Total operating income		**1,047.1**	529.8
Operating expense	21	(292.3)	(280.9)
Operating profit		**754.8**	248.9
Net gain on sales of available for sale securities	22	49.4	79.7
Net gain on sales of gold investment assets	23	23.4	84.3
Net profit		**827.6**	412.9

Statement of comprehensive income

For the financial year ended 31 March

SDR millions	Note	**2017**	2016
Net profit		**827.6**	412.9
Other comprehensive income			
Items either reclassified to profit and loss during the year, or that will be reclassified subsequently when specific conditions are met			
Net movement on revaluation of available for sale securities	15A	(163.6)	16.8
Net movement on revaluation of gold investment assets	15B	111.0	(36.4)
Items that will not be reclassified subsequently to profit and loss			
Re-measurement of defined benefit obligations	15C	63.6	(162.2)
		11.0	(181.8)
Total comprehensive income		**838.6**	231.1

Statement of cash flows

For the financial year ended 31 March

SDR millions	Note	**2017**	2016
Cash flow from / (used in) operating activities			
Interest and similar income received		2,063.9	2,154.9
Interest and similar expenses paid		(908.4)	(581.1)
Net fee and commission income	19	4.0	5.1
Net foreign exchange transaction gain	20	5.5	13.9
Administrative expense	21	(275.1)	(265.4)
Non-cash flow items included in operating profit			
Net valuation movement	18	71.5	(302.9)
Net foreign exchange translation movement	20	3.7	(15.1)
Change in accruals and amortisation		(192.2)	(745.1)
Change in operating assets and liabilities			
Currency deposit liabilities held at fair value through profit and loss		28,902.6	(7,678.9)
Currency banking assets		19,913.8	8,860.3
Sight and notice deposit account liabilities		(10,187.2)	4,221.9
Gold deposits		(293.1)	370.3
Gold and gold loans		(13,995.5)	925.1
Accounts receivable		0.8	(4.3)
Accounts payable and other liabilities		63.1	30.7
Net derivative financial instruments		(2,614.1)	7,013.4
Net cash flow from operating activities		**22,563.3**	14,002.8
Cash flow from / (used in) investment activities			
Net change in currency investment assets available for sale		(761.5)	611.7
Securities sold under repurchase agreements		733.4	(97.7)
Net change in gold investment assets		30.5	101.6
Capital expenditure	6	(18.4)	(17.9)
Net cash flow from / (used in) investment activities		**(16.0)**	597.7

SDR millions	Notes	**2017**	2016
Cash flow from / (used in) financing activities			
Dividends paid		(120.0)	(125.6)
Net cash flow used in financing activities		**(120.0)**	(125.6)
Total net cash flow		**22,427.3**	14,474.9
Net effect of exchange rate changes on cash and cash equivalents		(220.5)	69.7
Net movement in cash and cash equivalents		22,647.8	14,405.2
Net change in cash and cash equivalents		**22,427.3**	14,474.9
Cash and cash equivalents, beginning of year	1	**26,378.9**	11,904.0
Cash and cash equivalents, end of year	1	**48,806.2**	26,378.9

Movements in the Bank's equity

SDR millions	Note	Share capital	Shares held in treasury	Statutory reserves	Profit and loss	Other equity accounts: Defined benefit obligations	Other equity accounts: Gold and securities revaluation	Movement in total equity
Balance as at 31 March 2015		**698.9**	**(1.7)**	**14,579.7**	**542.9**	**(249.0)**	**2,702.3**	**18,273.1**
Payment of 2014/15 dividend		–	–	–	(125.6)	–	–	(125.6)
Allocation of 2014/15 profit		–	–	417.3	(417.3)	–	–	–
Total comprehensive income	15	–	–	–	412.9	(162.2)	(19.6)	231.1
Balance as at 31 March 2016		**698.9**	**(1.7)**	**14,997.0**	**412.9**	**(411.2)**	**2,682.7**	**18,378.6**
Payment of 2015/16 dividend		–	–	–	(120.0)	–	–	(120.0)
Allocation of 2015/16 profit		–	–	292.9	(292.9)	–	–	–
Total comprehensive income	15	–	–	–	827.6	63.6	(52.6)	838.6
Balance as at 31 March 2017		**698.9**	**(1.7)**	**15,289.9**	**827.6**	**(347.6)**	**2,630.1**	**19,097.2**

Introduction

The Bank for International Settlements (BIS, "the Bank") is an international financial institution which was established pursuant to the Hague Agreements of 20 January 1930 as well as the Bank's Constituent Charter and its Statutes.

The headquarters of the Bank are at Centralbahnplatz 2, 4002 Basel, Switzerland. The Bank maintains representative offices in Hong Kong, Special Administrative Region of the People's Republic of China (for Asia and the Pacific), and in Mexico City, Mexico (for the Americas).

The objectives of the BIS, as laid down in Article 3 of its Statutes, are to promote cooperation among central banks, to provide additional facilities for international financial operations and to act as trustee or agent for international financial settlements. In the course of its activities, the Bank accepts deposits from customers, which it then invests. The Bank also invests its own equity.

Sixty central banks are currently members of the Bank. The governance and management of the BIS are discussed in "The BIS: mission, activities, governance and financial results" in this Annual Report

Accounting policies

The accounting policies set out below have been applied to both of the financial years presented unless otherwise stated.

1. Scope of the financial statements

These financial statements recognise all assets and liabilities that are controlled by the Bank and in respect of which the economic benefits, as well as any rights and obligations, lie with the Bank.

As part of its activities, the Bank undertakes financial transactions in its own name but for the economic benefit of other parties. These include transactions on a custodial or agency basis, such as those undertaken on behalf of investment entities operated by the Bank and on behalf of the staff pension fund, which do not have separate legal personality from the Bank. Unless otherwise stated, such transactions are not included in these financial statements.

The preparation of the financial statements requires the Bank's Management to make assumptions and use estimates to arrive at reported amounts. In doing so, Management exercises judgment based on reliable information. Actual results could differ significantly from these estimates.

The notes to the financial statements containing areas of estimation uncertainty considered to require critical judgment and which have the most significant effect on the amounts recognised in the financial statements are: note 12, "Post-employment obligations"; note 28, "Fair value hierarchy"; and note 31, "Contingent liabilities".

All figures in these financial statements are presented in SDR millions unless otherwise stated. Amounts are subject to rounding and consequently there may be small differences both within and between disclosures.

2. Functional and presentation currency

The functional and presentation currency of the Bank is the Special Drawing Right (SDR) as defined by the International Monetary Fund (IMF).

The composition of the SDR is subject to periodic review. Following such a review by the IMF during 2015, changes were be made to the SDR basket effective from 1 October 2016.

As currently calculated, one SDR is equivalent to the sum of USD 0.58252, EUR 0.38671, Renminbi 1.0174, JPY 11.9 and GBP 0.085946.

Monetary assets and liabilities are translated into SDR at the exchange rates ruling at the balance sheet date. Other assets and liabilities and profits and losses are translated into SDR at the exchange rates ruling at the date of the transaction. Exchange differences arising from the retranslation of monetary assets and liabilities and from the settlement of transactions are included as net foreign exchange gains or losses in the profit and loss account.

3. Presentation of interest

In the profit and loss account, interest income includes "negative" interest on liabilities while interest expense includes "negative" interest on assets. Interest on derivatives is presented as interest income. Notes to the financial statements separately analyse components of interest income and interest expense.

4. Classification of financial instruments

Upon initial recognition, the Bank classifies each financial instrument into one of the following categories:

- Loans and receivables
- Financial assets and financial liabilities held at fair value through profit and loss
- Available for sale financial assets
- Financial liabilities measured at amortised cost

The classification to these categories is dependent on the nature of the financial instrument and the purpose for which it was entered into, as described in Section 5 below.

The resulting classification of each financial instrument determines the accounting methodology that is applied, as described in the accounting policies below. Where the financial instrument is classified as held at fair value through profit and loss, the Bank does not subsequently change this classification.

5. Asset and liability structure

Assets and liabilities are organised into two sets of portfolios:

A. Banking portfolios

These comprise currency and gold deposit liabilities and related banking assets and derivatives.

The Bank operates a banking business in currency and gold on behalf of its customers. In this business, the Bank is exposed to credit and market risks. The extent of these exposures is limited by the Bank's risk management approach.

The Bank classifies all currency financial instruments in its banking portfolios (other than cash and sight and notice accounts with banks, and sight and notice deposit account liabilities) as held at fair value through profit and loss. The use of fair values in the currency banking portfolios is described in Section 9 below.

All gold financial assets in these portfolios are treated as loans and receivables, and all gold financial liabilities are treated as financial liabilities measured at amortised cost.

B. Investment portfolios

These comprise assets, liabilities and derivatives relating principally to the investment of the Bank's equity.

The Bank holds most of its equity in financial instruments denominated in the constituent currencies of the SDR, which are managed by comparison with a fixed duration benchmark of bonds.

Currency assets in investment portfolios, with the exception of cash and sight accounts and notice accounts (Sections 6 and 7 below), are classified as available for sale.

The remainder of the Bank's equity is held in gold. The Bank's own gold holdings are treated as available for sale.

6. Cash and sight accounts

Cash and sight accounts are included in the balance sheet at their principal value plus accrued interest where applicable.

7. Notice accounts

Notice accounts are short-term monetary assets, including balances at futures clearing brokers. These typically have notice periods of three days or less, and are included under the balance sheet heading "Loans and advances". They are considered cash equivalents for the purposes of the statement of cash flows.

These financial instruments are classified as loans and receivables because they are not quoted in an active market, and because they comprise fixed or determinable payments. They are included in the balance sheet at their principal value plus accrued interest. Interest is included under "Interest income" or "Interest expense" (negative interest) on an accruals basis.

8. Sight and notice deposit account liabilities

Sight and notice deposit accounts are short-term monetary liabilities. They typically have notice periods of three days or less and are included under the balance sheet heading "Currency deposits".

These financial instruments are classified as financial liabilities measured at amortised cost because they are not quoted in an active market and include fixed or determinable payments.

They are included in the balance sheet at their principal value plus accrued interest. Interest is included in interest expense on an accruals basis.

9. Use of fair values in the currency banking portfolios

In operating its currency banking business, the Bank acts as a market-maker in certain of its currency deposit liabilities. As a result of this activity, the Bank incurs realised profits and losses on these liabilities.

In accordance with the Bank's risk management policies, the market risk inherent in this activity is managed on an overall fair value basis, combining all the relevant assets, liabilities and derivatives in its currency banking portfolios. The realised and unrealised profits or losses on currency deposit liabilities are thus largely offset by realised and unrealised losses or profits on the related currency banking assets and derivatives, or on other currency deposit liabilities.

To reduce the accounting inconsistency that would otherwise arise from recognising realised and unrealised gains and losses on different bases, the Bank classifies the relevant assets, liabilities and derivatives in its currency banking portfolios as held at fair value through profit and loss.

10. Securities purchased under resale agreements

Securities purchased under resale agreements ("reverse repurchase agreements") are recognised as collateralised loan transactions by which the Bank lends cash and receives an irrevocable commitment from the counterparty to return the cash, plus interest, at a specified date in the future. As part of these agreements, the Bank receives collateral in the form of securities to which it has full legal title, but must return equivalent securities to the counterparty at the end of the agreement, subject to the counterparty's repayment of the cash. As the Bank does not acquire the risks or rewards associated with ownership of these collateral securities, they are not recognised as assets in the Bank's balance sheet.

The collateralised loans relating to securities purchased under resale agreements are currency assets. The accounting treatment is determined by whether the transaction involves currency assets held at fair value through profit and loss (Section 11 below) or currency investment assets available for sale (Section 13 below).

11. Currency assets classified at fair value through profit and loss

Currency assets include treasury bills, securities purchased under resale agreements, loans and advances, and government and other securities.

As described in Section 9 above, the Bank classifies all of the relevant assets in its currency banking portfolios as held at fair value through profit and loss. These currency assets are initially included in the balance sheet on a trade date basis. The accrual of interest and amortisation of premiums paid and discounts received are included in the profit and loss account under "Interest income" or "Interest expense" (negative interest) on an effective interest rate basis. After initial measurement, the currency assets are revalued to fair value, with all realised and unrealised movements in fair value included under "Net valuation movement".

12. Currency deposit liabilities classified at fair value through profit and loss

All currency deposit liabilities, with the exception of sight and notice deposit account liabilities, are classified as held at fair value through profit and loss.

These currency deposit liabilities are initially included in the balance sheet on a trade date basis. The accrual of interest to be paid and amortisation of premiums received and discounts paid are included under the profit and loss account heading "Interest expense" or "Interest income" (negative interest) on an effective interest rate basis.

After initial measurement, the currency deposit liabilities are revalued to fair value, with all realised and unrealised movements in fair value included under "Net valuation movement".

13. Currency investment assets available for sale

Currency assets include treasury bills, securities purchased under resale agreements, loans and advances, and government and other securities.

The Bank's currency investment assets are classified as available for sale investments and are initially included in the balance sheet on a trade date basis. The accrual of interest and amortisation of premiums paid and discounts received are included in the profit and loss account under "Interest income" on an effective interest rate basis.

After trade date, the currency investment assets are revalued to fair value, with unrealised movements included in the securities revaluation account, which is reported under the balance sheet heading "Other equity accounts". The movement in fair value is included in the statement of comprehensive income under the heading "Net movement on revaluation of available for sale securities". Realised profits on disposal are included in the profit and loss account under "Net gain on sales of available for sale securities".

14. Gold and gold loans

Gold comprises gold bar assets held in custody at central banks and sight accounts denominated in gold. Gold is considered by the Bank to be a financial instrument.

Gold is included in the balance sheet at its weight in gold (translated at the gold market price and USD exchange rate into SDR). Purchases and sales of gold are accounted for on a settlement date basis. Forward purchases or sales of gold are treated as derivatives prior to the settlement date.

The treatment of realised and unrealised gains or losses on gold is described in Section 15 below.

Gold loans comprise fixed-term gold loans. Gold loans are included in the balance sheet on a trade date basis at their weight in gold (translated at the gold market price and USD exchange rate into SDR) plus accrued interest.

Accrued interest on gold loans is included in the profit and loss account under "Interest income" on an effective interest rate basis.

15. Realised and unrealised gains or losses on gold

The treatment of realised and unrealised gains or losses on gold depends on the accounting treatment as described below:

A. Banking portfolios, comprising gold deposits and related gold banking assets

Gold derivatives included in the portfolios are held at fair value through profit and loss. Gains or losses on derivative transactions in gold are included in the profit and loss account under "Net foreign exchange movement" as net transaction gains or losses.

Gains or losses on the retranslation of the net position in gold in the banking portfolios are included under "Net foreign exchange movement" as net translation gains or losses.

B. Investment portfolios, comprising gold investment assets

The Bank's own holdings of gold are accounted for as available for sale assets.

Unrealised gains or losses on the Bank's gold investment assets over their deemed cost are taken to the gold revaluation account in equity, which is reported under the balance sheet heading "Other equity accounts". The movement in fair value is included in the statement of comprehensive income under the heading "Net movement on revaluation of gold investment assets".

For gold investment assets held on 31 March 2003 (when the Bank changed its functional and presentation currency from the gold franc to the SDR), the deemed cost is approximately SDR 151 per ounce, based on the value of USD 208 per ounce that was applied from 1979 to 2003 following a decision by the Bank's Board of Directors, translated at the 31 March 2003 exchange rate.

Realised gains or losses on disposal of gold investment assets are included in the profit and loss account as "Net gain on sales of gold investment assets".

16. Gold deposits

Gold deposits comprise unallocated sight and fixed-term deposits of gold from central banks.

Unallocated gold deposits provide customers with a general claim on the Bank for delivery of gold of the same weight and quality as that delivered by the customer to the Bank, but do not provide the right to specific gold bars. Unallocated gold deposits are included in the balance sheet on a trade date basis at their weight in gold (translated at the gold market price and USD exchange rate into SDR) plus accrued interest. Accrued interest on gold deposits is included in the profit and loss account under "Interest expense" on an effective interest rate basis.

Allocated (or "earmarked") gold deposits provide depositors with a claim for delivery of the specific gold bars deposited by the customer with the Bank on a custody basis. Beneficial ownership and risk remain with the customer. As such, allocated gold deposit liabilities and the related gold bar assets are not included on the Bank's balance sheet. They are disclosed as off-balance sheet items (see note 26, "Off-balance sheet items").

17. Securities sold under repurchase agreements

Securities sold under repurchase agreements ("repurchase agreements") are recognised as collateralised deposit transactions by which the Bank receives cash and provides an irrevocable commitment to return the cash, plus interest, at a specified date in the future. As part of these agreements, the Bank transfers legal title of collateral securities to the counterparty. At the end of the contract, the counterparty must return equivalent securities to the Bank, subject to the Bank's repayment of the cash. As the Bank retains the risks and rewards associated with ownership of these securities, they continue to be recognised as assets in the Bank's balance sheet.

Where the repurchase agreement is associated with currency assets available for sale, the collateralised deposit transaction is accounted for as a financial liability measured at amortised cost.

Where the repurchase agreement is associated with the management of currency assets held at fair value through profit and loss, the collateralised deposit transaction is classified as a financial instrument held at fair value through profit and loss.

The collateralised deposits relating to securities sold under repurchase agreements are initially included in the balance sheet on a trade date basis. The accrual of interest is included in the profit and loss account under "Interest expense" or "Interest income" (negative interest) on an effective interest rate basis. After initial measurement, the transactions classified as held at fair value through profit and loss are revalued to fair value with all unrealised movements in fair value included under "Net valuation movement."

18. Securities lending

The Bank participates in securities lending transactions in which it lends debt securities in exchange for a fee. The transactions are conducted under standard agreements employed by financial market participants. The securities which have been transferred are not de-recognised from the balance sheet since the risks and rewards of ownership are not transferred, even if the borrower has the right to sell or re-pledge the securities. Such Bank-owned securities transferred to a borrower are presented on the balance sheet as part of "Government and other securities" and "Treasury bills". Note 3 provides further details.

19. Derivatives

Derivatives are used either to manage the Bank's market risk or for trading purposes. They are accounted for as financial instruments held at fair value through profit and loss.

Derivatives are initially included in the balance sheet on a trade date basis. Where applicable, the accrual of interest and amortisation of premiums and discounts are included in the profit and loss account under "Interest income" on an effective interest rate basis.

After trade date, derivatives are revalued to fair value, with all realised and unrealised movements in value included under "Net valuation movement".

Derivatives are included as either assets or liabilities, depending on whether the contract has a positive or a negative fair value for the Bank.

Where a derivative contract is embedded within a host contract which is not accounted for as held at fair value through profit and loss, it is separated from the host contract for accounting purposes and treated as though it were a standalone derivative as described above.

20. Valuation policy

The Bank's classification of each financial instrument determines those instruments' valuation basis and accounting treatment. The majority of the financial instruments on the balance sheet are included at fair value. The Bank defines fair value as the exit price of an orderly transaction between market participants on the measurement date.

The Bank considers published price quotations in active markets as the best evidence of fair value. Where no published price quotations exist, the Bank determines fair values using a valuation technique appropriate to the particular financial instrument. Such valuation techniques may involve using market prices of recent arm's length market transactions in similar instruments or may make use of financial models. Where financial models are used, the Bank aims at making maximum use of observable market inputs as appropriate, and relies as little as possible on its own estimates. Such valuation models comprise discounted cash flow analyses and option pricing models.

The Bank values its positions at their exit price, so that assets are valued at the bid price and liabilities at the offer price. Derivative financial instruments are valued on a bid-offer basis, with valuation reserves, where necessary, included in derivative financial liabilities. Financial assets and liabilities that are not valued at fair value are included in the balance sheet at amortised cost.

21. Impairment of financial assets

Financial assets, other than those held at fair value through profit and loss, are assessed for indications of impairment at each balance sheet date. A financial asset is impaired when there is objective evidence that the estimated future cash flows of the asset have been reduced as a result of one or more events that occurred after the initial recognition of the asset. Evidence of impairment could include significant financial difficulty, default, or probable bankruptcy / financial reorganisation of the counterparty or issuer.

Impairment losses are recognised to the extent that a decline in fair value below amortised cost is considered significant or prolonged. Impairment of currency assets is included in the profit and loss account under "Net valuation movement", with impairment of gold loans included under "Interest income". If the amount of the impairment loss decreases in a subsequent period, the previously recognised impairment loss is reversed through profit and loss to the extent that the carrying amount of the investment does not exceed that which it would have been had the impairment not been recognised.

22. Accounts receivable and accounts payable

Accounts receivable and accounts payable are principally very short-term amounts relating to the settlement of financial transactions. They are recognised on a trade date basis and subsequently accounted for at amortised cost until their settlement.

23. Land, buildings and equipment

The cost of the Bank's buildings and equipment is capitalised and depreciated on a straight line basis over the estimated useful lives of the assets concerned, as follows:

- Buildings – 50 years
- Building installations and machinery – 15 years
- Information technology equipment – up to 4 years
- Other equipment – 4 to 10 years

The Bank's land is not depreciated. The Bank undertakes an annual review of impairment of land, buildings and equipment. Where the carrying amount of an asset is greater than its estimated recoverable amount, the asset is written down to the lower value.

24. Provisions

Provisions are recognised when the Bank has a present legal or constructive obligation as a result of events arising before the balance sheet date and it is probable that economic resources will be required to settle the obligation, provided that a reliable estimate can be made of the amount of the obligation. Best estimates and assumptions are used when determining the amount to be recognised as a provision.

25. Taxation

The Bank's special legal status in Switzerland is set out principally in its Headquarters Agreement with the Swiss Federal Council. Under the terms of this document, the Bank is exempted from virtually all direct and indirect taxes at both federal and local government level in Switzerland.

Similar agreements exist with the government of the People's Republic of China for the Asian Office in Hong Kong SAR and with the Mexican government for the Americas Office.

However, income and gains received by the Bank may be subject to tax imposed in the country of origin. Such income and gains are recognised on a gross basis, with the corresponding tax recognised as an expense.

26. Post-employment benefit obligations

The Bank operates three post-employment benefit arrangements, respectively, for staff pensions, Directors' pensions, and health and accident insurance for current and former staff members. An independent actuarial valuation is performed annually for each arrangement.

A. Staff pensions

The liability in respect of the staff pension fund is based on the present value of the defined benefit obligation less the fair value of the fund assets, both at the balance sheet date. The defined benefit obligation is calculated using the projected unit credit method. The present value of the defined benefit obligation is determined from the estimated future cash outflows. The rate used to discount the cash flows is determined by the Bank based on the market yield of highly rated corporate debt securities in Swiss francs which have a duration approximating that of the related liability.

The amount charged to the profit and loss account represents the sum of the current service cost of the benefits accruing for the year under the scheme, and interest at the discount rate on the net of the defined benefit obligation less the fair value of the fund assets. Past service costs from plan amendments are immediately recognised through profit or loss. Gains and losses arising from re-measurement of the obligations, such as experience adjustments (where the actual outcome is different from the actuarial assumptions previously made) and changes in actuarial assumptions are charged to other comprehensive income in the year in which the re-measurement is applied. They are not subsequently included in profit and loss in future years.

B. Directors' pensions and post-employment health and accident benefits

The liability, defined benefit obligation, amount charged to the profit and loss account, and gains and losses arising from re-measurement in respect of the Bank's other post-employment benefit arrangements are calculated on a similar basis to that used for the staff pension fund.

27. Statement of cash flows

The Bank's statement of cash flows is prepared using an indirect method. It is based on the movements in the Bank's balance sheet, adjusted for changes in financial transactions awaiting settlement.

Cash and cash equivalents consist of cash and sight and notice accounts with banks, which are very short-term financial assets that typically have notice periods of three days or less.

Notes to the financial statements

1. Cash and sight accounts

The Bank holds cash and sight accounts predominantly with central banks. Cash and cash equivalents as shown in the statement of cash flows comprise cash and sight accounts as well as notice accounts, which are disclosed under "Loans and advances". The balances are analysed in the table below:

As at 31 March

SDR millions	**2017**	2016
Balance at central banks	48,274.4	25,729.9
Balance at commercial banks	21.1	117.1
Total cash and sight accounts	**48,295.5**	25,847.0
Notice accounts	510.7	531.9
Total cash and cash equivalents	**48,806.2**	26,378.9

2. Gold and gold loans

The composition of the Bank's gold holdings was as follows:

As at 31 March

SDR millions	**2017**	2016
Gold	27,276.0	9,834.8
Gold loans	–	3,342.0
Total gold and gold loan assets	**27,276.0**	13,176.8
Comprising:		
Gold investment assets	3,048.5	2,944.6
Gold banking assets	24,227.5	10,232.2

Included in "Gold banking assets" is SDR 14,086.9 million (438 tonnes) of gold (2016: nil) that the Bank holds in connection with its gold swap contracts. See note 4 for more details.

3. Currency assets

Currency assets comprise the following products:

Treasury bills are short-term debt securities issued by governments on a discount basis.

Securities purchased under resale agreements ("reverse repurchase agreements") are recognised as collateralised loan transactions. Interest receivable on the transaction is fixed at the start of the agreement. During the term of the agreement, the Bank monitors the fair value of the loan and related collateral securities, and may call for additional collateral (or be required to return collateral) based on movements in market value.

Loans and advances comprise fixed-term loans to commercial banks, advances and notice accounts. Advances relate to committed and uncommitted standby facilities which the Bank provides for its customers. Notice accounts are very short-term financial assets, typically having a notice period of three days or less.

Government and other securities are debt securities issued by governments, international institutions, other public sector institutions, commercial banks and corporates. They include commercial paper, certificates of deposit, fixed and floating rate bonds, covered bonds and asset-backed securities.

The tables below analyse the Bank's holdings of currency assets:

As at 31 March 2017

SDR millions	Fair value through profit and loss	Available for sale	Amortised cost	Total
Treasury bills	**35,871.1**	**292.5**	**–**	**36,163.6**
Securities purchased under resale agreements	**42,520.8**	**1,409.1**	**–**	**43,929.9**
Loans and advances	**20,626.1**	**–**	**510.7**	**21,136.8**
Government and other securities				
Government	20,952.5	13,175.8	–	34,128.3
Financial institutions	9,473.3	1,100.9	–	10,574.2
Other	12,597.6	102.4	–	12,700.0
	43,023.4	**14,379.1**	**–**	**57,402.5**
Total currency assets	**142,041.4**	**16,080.7**	**510.7**	**158,632.8**

As at 31 March 2016

SDR million	Fair value through profit and loss	Available for sale	Amortised cost	Total
Treasury bills	39,578.6	–	–	39,578.6
Securities purchased under resale agreements	55,340.0	878.6	–	56,218.6
Loans and advances	16,805.5	–	531.9	17,337.4
Government and other securities				
Government	29,582.1	13,985.6	–	43,567.7
Financial institutions	10,966.0	692.2	–	11,658.2
Other	11,776.8	125.7	–	11,902.5
	52,324.9	14,803.5	–	67,128.4
Total currency assets	164,049.0	15,682.1	531.9	180,263.0

Note 15A provides further analysis of the securities revaluation account. Note 22 provides further analysis of the net gain on sales of available for sale securities.

The Bank lends some of its securities in exchange for a fee. Government and other securities and treasury bills which are transferred in securities lending transactions (and are not subject to de-recognition from the balance sheet to the extent of the Bank's continuing involvement) represented SDR 82.7 million as at 31 March 2017 (2016: nil).

4. Derivative financial instruments

The main types of derivative instruments used by the Bank for economic hedging and trading purposes are as follows:

Currency and gold options are contractual agreements under which the seller grants the purchaser the right, but not the obligation, to either buy (call option) or sell (put option), by or on a set date, a specific amount of a currency or gold at a predetermined price. In consideration, the seller receives a premium from the purchaser.

Currency and gold swaps, cross-currency swaps and interest rate swaps are contractual agreements to exchange cash flows related to currencies, gold or interest rates (for example, fixed rate for floating rate). Cross-currency interest rate swaps involve the exchange of cash flows related to a combination of interest rates and foreign exchange rates. Except for certain currency and gold swaps and cross-currency interest rate swaps, no exchange of principal takes place.

Currency and gold forwards are contractual agreements involving the exchange of foreign currencies or gold at a future date. This includes undelivered spot transactions.

Forward rate agreements are interest rate forward contracts that result in cash settlement at a future date for the difference between a contracted rate of interest and the prevailing market rate.

Futures contracts include bond and interest rate futures, which represent contractual agreements to receive or pay a net amount based on changes in bond prices or interest rates at a future date. Futures contracts are settled daily with the exchange. Associated margin payments are settled by cash or marketable securities.

Swaptions are contractual agreements under which the seller grants the purchaser the right, but not the obligation, to enter into a currency or interest rate swap at a predetermined price by or on a set date. In consideration, the seller receives a premium from the purchaser.

The Bank recognises all derivatives transacted in its name, including those for which the economic benefit lies with a third party. In such circumstances, the Bank recognises both the original derivative contract and an exactly offsetting derivative contract with the beneficial party.

As at 31 March	**2017**			2016		
	Notional amounts	Fair values		Notional amounts	Fair values	
SDR millions		Assets	Liabilities		Assets	Liabilities
Cross-currency swaps	1,231.0	36.6	(3.5)	1,251.0	4.8	(40.0)
Currency and gold forwards	1,391.7	8.3	(3.6)	4,380.7	21.9	(42.9)
Currency and gold options	620.9	–	(0.4)	1,170.4	0.2	(2.7)
Currency and gold swaps	163,218.0	1,585.8	(1,207.1)	124,721.0	486.0	(2,738.5)
Forward rate agreements	32,968.1	0.6	(1.3)	12,837.8	6.3	(1.9)
Futures contracts	9,206.1	2.3	(1.3)	13,116.5	0.9	(1.1)
Interest rate swaps	288,900.9	587.1	(598.2)	247,718.5	1,165.2	(1,075.1)
Swaptions	736.2	–	(8.1)	–	–	–
Total derivative financial instruments	**498,272.9**	**2,220.7**	**(1,823.5)**	405,195.9	1,685.3	(3,902.2)

5. Accounts receivable and other assets

As at 31 March

SDR millions	**2017**	2016
Financial transactions awaiting settlement	5,613.1	10,201.7
Other assets	13.4	14.2
Total accounts receivable and other assets	**5,626.5**	10,215.9

"Financial transactions awaiting settlement" relates to short-term receivables, typically due in three business days or less, where transactions have been effected but cash has not yet been received.

6. Land, buildings and equipment

For the financial year ended 31 March				**2017**	2016
SDR millions	Land	Buildings and installations	IT and other equipment	Total	Total
Historical cost					
Balance at beginning of year	**46.4**	**277.3**	**72.3**	**396.0**	386.3
Capital expenditure	–	6.7	11.7	18.4	18.1
Disposals and retirements	–	(1.3)	(6.4)	(7.7)	(8.4)
Balance at end of year	**46.4**	**282.7**	**77.6**	**406.7**	396.0
Depreciation					
Balance at beginning of year	**–**	**161.6**	**38.0**	**199.6**	192.2
Depreciation	–	8.8	8.4	17.2	15.5
Disposals and retirements	–	(0.9)	(6.1)	(7.0)	(8.1)
Balance at end of year	**–**	**169.5**	**40.3**	**209.8**	199.6
Net book value at end of year	**46.4**	**113.2**	**37.3**	**196.9**	196.4

The net book value of IT and other equipment at 31 March 2017 included intangible assets, comprising computer software, of SDR 26.4 million (2016: SDR 23.8 million).

7. Gold deposits

Gold deposit liabilities placed with the Bank originate entirely from central banks.

8. Currency deposits

Currency deposits comprise the following products:

Sight and notice deposit accounts are very short-term financial liabilities, typically having a notice period of three days or less.

Medium-Term Instruments (MTIs) are fixed rate investments at the Bank issued with initial maturities of between one and 10 years.

Callable MTIs (CMTIs) are MTIs that are callable at the option of the Bank at an exercise price of par. At 31 March 2017, one CMTI had a call date in December 2017. The other CMTIs at 31 March 2017 and all CMTIs at 2016 had options which had expired by the reporting date. The balance sheet total for CMTIs includes the fair value of the embedded interest rate option.

FIXBIS are fixed rate investments at the Bank for any maturities between one week and one year.

FRIBIS are floating rate investments at the Bank with maturities of one year or longer for which the interest rate is reset in line with prevailing market conditions.

Fixed-term deposits are fixed rate investments at the Bank, typically with an initial maturity of less than one year.

Dual Currency Deposits (DCDs) are fixed-term deposits that are repayable on the maturity date either in the original currency or at a fixed amount in a different currency at the option of the Bank. The balance sheet total for DCDs includes the fair value of the embedded foreign exchange option. These deposits all mature between April 2017 and June 2017 (2016: in April 2016 and May 2016).

The Bank acts as the sole market-maker in certain of its currency deposit liabilities and has undertaken to repay some of these financial instruments at fair value, in whole or in part, at one to two business days' notice.

The amount the Bank is contractually obliged to pay at maturity in respect of its total currency deposits, including interest accrued to 31 March 2017, is SDR 194,499.0 million (2016: SDR 178,433.9 million).

Sight and notice deposit accounts are included on an amortised cost basis, while all other deposits are included at their fair value.

As at 31 March

SDR millions	**2017**	2016
Repayable at one to three days' notice		
Sight and notice deposit accounts	15,989.7	26,176.9
Medium-Term Instruments (MTIs)	43,227.4	36,700.2
Callable MTIs (CMTIs)	1,487.4	730.6
Fixed Rate Investments at the BIS (FIXBIS)	56,689.0	47,626.5
	117,393.5	111,234.2
Other currency deposits		
Floating Rate Investments of the BIS (FRIBIS)	81.2	121.0
Fixed-term deposits	76,702.0	67,028.3
Dual Currency Deposits (DCDs)	265.7	407.0
	77,048.9	67,556.3
Balance at end of year	**194,442.4**	178,790.5

9. Securities sold under repurchase agreements

Securities sold under repurchase agreements ("repurchase agreements") are analysed in the table below:

As at 31 March

SDR millions	**2017**	2016
Amortised cost	1,409.0	878.6
Fair value through profit and loss	9.6	569.1
Total securities sold under repurchase agreements	**1,418.6**	1,447.7

Further information on the collateral related to repurchase agreements is provided in the "Risk management" section, note 3C, "Credit risk mitigation".

10. Accounts payable

Accounts payable consist of financial transactions awaiting settlement, relating to short-term payables where transactions have been effected but cash has not yet been transferred.

11. Other liabilities

The Bank's other liabilities consist of:

As at 31 March

SDR millions	**2017**	2016
Post-employment benefit obligations (see note 12)		
Staff pensions	461.3	503.2
Directors' pensions	11.2	10.8
Health and accident benefits	590.0	555.0
Other liabilities	26.2	20.0
Balance at end of year	**1,088.7**	1,089.0

12. Post-employment benefit obligations

The Bank operates three post-employment arrangements:

1. A defined benefit pension arrangement for its staff in the event of retirement, disability or death. Under this arrangement, benefits accrue according to years of participation and pensionable remuneration. These benefits are paid out of a fund, without separate legal personality. Contributions are made to this fund by the Bank and by staff. The fund is the beneficial owner of assets on which it receives a return. These assets are administered by the Bank for the sole benefit of participants in the arrangement. Except as shown in this note and as described in note 4, "Derivative financial instruments", these assets are not recognised as assets of the Bank. The Bank remains ultimately liable for all benefits due under the arrangement.

2. An unfunded defined benefit arrangement for its Directors, whose entitlement is based on a minimum service period of 49 months.

3. An unfunded post-employment health and accident benefit arrangement for its staff and their dependants. Employees who leave the Bank after becoming eligible for early retirement benefits from the pension arrangement are eligible for post-employment health and accident benefits.

All three arrangements operate in Swiss francs and are valued annually by an independent actuary. During 2017/18, the Bank expects to make contributions of SDR 33.7 million to its post-employment arrangements.

A. Amounts recognised in the balance sheet

As at 31 March	Staff pensions			Directors' pensions			Post-employment health and accident benefits		
SDR millions	**2017**	2016	2015	**2017**	2016	2015	**2017**	2016	2015
Present value of obligations	(1,601.8)	(1,551.4)	(1,468.7)	(11.2)	(10.8)	(10.2)	(590.0)	(555.0)	(498.7)
Fair value of fund assets	1,140.5	1,048.2	1,121.1	–	–	–	–	–	–
Liability at end of year	**(461.3)**	(503.2)	(347.6)	**(11.2)**	(10.8)	(10.2)	**(590.0)**	(555.0)	(498.7)

B. Present value of defined benefit obligations

The reconciliation of the opening and closing amounts of the present value of the benefit obligations is as follows:

As at 31 March	Staff pensions			Directors' pensions			Post-employment health and accident benefits		
SDR millions	**2017**	2016	2015	**2017**	2016	2015	**2017**	2016	2015
Present value of obligations at beginning of year	(1,551.4)	(1,468.7)	(1,398.6)	(10.8)	(10.2)	(8.8)	(555.0)	(498.7)	(431.4)
Employee contributions	(6.9)	(6.7)	(6.6)	–	–	–	–	–	–
Benefit payments	47.7	41.8	49.4	0.5	0.5	0.4	3.1	3.0	2.9
Net current service cost	(59.0)	(56.3)	(61.5)	(0.6)	(0.6)	(0.4)	(27.8)	(24.3)	(12.1)
Interest cost on obligations at opening discount rate	(9.1)	(11.4)	(27.3)	–	(0.1)	(0.2)	(3.3)	(3.9)	(8.5)
Actuarial gain / (loss) arising from experience adjustments	13.0	12.5	30.3	–	–	–	3.7	(5.3)	(41.2)
Actuarial gain / (loss) arising from changes in demographic assumptions	(15.3)	(4.3)	19.5	(0.1)	–	(0.2)	(17.4)	(2.2)	30.9
Actuarial gain / (loss) arising from changes in financial assumptions	(29.4)	(70.7)	(45.0)	(0.2)	(0.6)	(0.8)	3.5	(27.7)	(30.3)
Foreign exchange differences	8.6	12.4	(28.9)	–	0.2	(0.2)	3.2	4.1	(9.0)
Present value of obligations at end of year	**(1,601.8)**	(1,551.4)	(1,468.7)	**(11.2)**	(10.8)	(10.2)	**(590.0)**	(555.0)	(498.7)

The following table shows the weighted average duration of the defined benefit obligations for the Bank's three post-employment benefit arrangements:

As at 31 March	Staff pensions			Directors' pensions			Post-employment health and accident benefits		
Years	**2017**	2016	2015	**2017**	2016	2015	**2017**	2016	2015
Weighted average duration	**18.4**	18.3	18.2	**13.9**	13.4	13.0	**26.4**	23.6	23.7

C. Amounts recognised in the profit and loss account

For the financial year ended 31 March	Staff pensions			Directors' pensions			Post-employment health and accident benefits		
SDR millions	**2017**	2016	2015	**2017**	2016	2015	**2017**	2016	2015
Net current service cost	(59.0)	(56.3)	(61.5)	(0.6)	(0.6)	(0.4)	(27.8)	(24.3)	(12.1)
Interest cost on net liability	(2.9)	(2.6)	(6.3)	–	(0.1)	(0.2)	(3.3)	(3.9)	(8.5)
Amounts recognised in operating expense	**(61.9)**	(58.9)	(67.8)	**(0.6)**	(0.7)	(0.6)	**(31.1)**	(28.2)	(20.6)

D. Re-measurement of defined benefit obligations recognised in other comprehensive income

For the financial year ended 31 March	Staff pensions			Directors' pensions			Post-employment health and accident benefits		
SDR millions	**2017**	2016	2015	**2017**	2016	2015	**2017**	2016	2015
Return on plan assets in excess of opening discount rate	103.0	(65.8)	30.5	–	–	–	–	–	–
Actuarial gain or loss arising from experience adjustments	13.0	12.5	30.3	–	–	–	3.7	(5.3)	(41.2)
Actuarial gain or loss arising from changes in demographic assumptions	(15.3)	(4.3)	19.5	(0.1)	–	(0.2)	(17.4)	(2.2)	30.9
Actuarial gain or loss arising from changes in financial assumptions	(29.4)	(70.7)	(45.0)	(0.2)	(0.6)	(0.8)	3.5	(27.7)	(30.3)
Foreign exchange gain or loss on items in other comprehensive income	1.7	0.6	(2.0)	–	0.1	–	1.1	1.2	(1.8)
Amounts recognised in other comprehensive income	**73.0**	(127.7)	33.3	**(0.3)**	(0.5)	(1.0)	**(9.1)**	(34.0)	(42.4)

E. Analysis of movement on fair value of fund assets for staff pensions

The reconciliation of the opening and closing amounts of the fair value of fund assets for the staff pension arrangement is as follows:

For the financial year ended 31 March

SDR millions	**2017**	2016	2015
Fair value of fund assets at beginning of year	1,048.2	1,121.1	1,062.1
Employer contributions	29.5	29.0	28.2
Employee contributions	6.9	6.7	6.6
Benefit payments	(47.7)	(41.8)	(49.4)
Interest income on plan assets calculated on opening discount rate	6.2	8.8	21.0
Return on plan assets in excess of opening discount rate	103.0	(65.8)	30.5
Foreign exchange differences	(5.6)	(9.8)	22.1
Fair value of fund assets at end of year	**1,140.5**	1,048.2	1,121.1

F. Composition and fair value of assets for the pension fund

The table below analyses the assets of the pension fund and the extent to which the fair values of those assets have been calculated using quoted prices in active markets. The pension fund does not invest in financial instruments issued by the Bank.

As at 31 March	**2017**			2016		
SDR millions	Quoted in active market	Unquoted	Total	Quoted in active market	Unquoted	Total
Cash and sight accounts (including margin accounts)	78.8	–	78.8	32.0	–	32.0
Debt securities	261.5	–	261.5	269.2	–	269.2
Fixed income funds	174.2	–	174.2	175.8	–	175.8
Equity funds	425.3	41.1	466.4	404.6	35.1	439.7
Real estate funds	63.6	45.8	109.4	17.7	41.8	59.5
Commodity-linked notes	–	51.5	51.5	–	50.3	50.3
Derivative instruments	(0.5)	(0.8)	(1.3)	–	21.7	21.7
Total	**1,002.9**	**137.6**	**1,140.5**	899.3	148.9	1,048.2

G. Principal actuarial assumptions used in these financial statements

As at 31 March	**2017**	2016
Applicable to staff pension and post-employment health and accident benefit arrangements		
Discount rate	0.70%	0.60%
Applicable to Directors' pension arrangements		
Discount rate	0.50%	0.40%
Applicable to staff and Directors' pension arrangements		
Assumed increase in pensions payable	1.00%	0.80%
Applicable to staff pension arrangement		
Assumed salary increase rate	3.00%	2.80%
Applicable to Directors' pension arrangement		
Assumed Directors' pensionable remuneration increase rate	1.00%	0.80%
Applicable to post-employment health and accident benefit arrangement		
Long-term medical cost inflation assumption	4.00%	4.00%

The assumed increases in staff salaries, Directors' pensionable remuneration and pensions payable incorporate an inflation assumption of 1.00% at 31 March 2017 (2016: 0.80%).

H. Life expectancies

The life expectancies, at age 65, used in the actuarial calculations for the staff pension arrangement are:

As at 31 March

Years	**2017**	2016
Current life expectancy of members aged 65		
Male	20.3	20.1
Female	22.4	22.4
Life expectancy of members aged 65 projected forward in 10 years' time		
Male	21.6	21.1
Female	23.5	23.3

I. Sensitivity analysis of significant actuarial assumptions

The Bank is exposed to risks from these obligations and arrangements including investment risk, interest rate risk, foreign exchange risk, longevity risk and salary risk.

Investment risk is the risk that plan assets will not generate returns at the expected level.

Interest rate risk is the exposure of the post-employment benefit obligations to adverse movements in interest rates, including credit spreads. A decrease in interest rates will increase the present value of these obligations. However, in the case of the staff pension arrangement this may be offset, either fully or partly, by an increase in value of the interest bearing securities held by the fund.

Foreign exchange risk is the exposure of the post-employment benefit obligations to adverse movements in exchange rates between the Swiss franc, which is the operating currency of the post-employment benefit arrangements, and the SDR, which is the functional currency of the Bank.

Longevity risk is the risk that actual outcomes differ from actuarial estimates of life expectancy.

Salary risk is the risk that higher than expected salary rises increase the cost of providing a salary-related pension.

The table below shows the estimated impact on the defined benefit obligations resulting from a change in key actuarial assumptions (see tables 12G and 12H):

As at 31 March	**Staff pensions** Increase / (decrease) in defined benefit obligation	
SDR millions	**2017**	2016
Discount rate		
Increase by 0.5%	(136.2)	(131.9)
Decrease by 0.5%	157.0	150.5
Rate of salary increase		
Increase by 0.5%	41.6	41.9
Decrease by 0.5%	(38.4)	(38.8)
Rate of pension payable increase		
Increase by 0.5%	105.7	100.8
Decrease by 0.5%	(96.1)	(91.5)
Life expectancy		
Increase by 1 year	62.5	60.5
Decrease by 1 year	(62.5)	(59.0)

As at 31 March	**Directors' pensions** Increase / (decrease) in defined benefit obligation	
SDR millions	**2017**	2016
Discount rate		
Increase by 0.5%	(0.7)	(0.7)
Decrease by 0.5%	0.8	0.8
Rate of pension payable increase		
Increase by 0.5%	0.7	0.6
Decrease by 0.5%	(0.6)	(0.6)
Life expectancy		
Increase by 1 year	0.6	0.6
Decrease by 1 year	(0.6)	(0.6)

As at 31 March	Post-employment health and accident benefits Increase / (decrease) in defined benefit obligation	
SDR millions	**2017**	2016
Discount rate		
Increase by 0.5%	(69.0)	(59.9)
Decrease by 0.5%	82.0	70.5
Medical cost inflation rate		
Increase by 1.0%	161.0	137.1
Decrease by 1.0%	(116.8)	(101.6)
Life expectancy		
Increase by 1 year	50.1	35.0
Decrease by 1 year	(46.6)	(33.3)

The above estimates were arrived at by changing each assumption individually, holding other variables constant. They do not include any correlation effects that may exist between variables.

13. Share capital

The Bank's share capital consists of:

As at 31 March

SDR millions	**2017**	2016
Authorised capital: 600,000 shares, each of SDR 5,000 par value, of which SDR 1,250 is paid up	3,000.0	3,000.0
Issued capital: 559,125 shares	2,795.6	2,795.6
Paid-up capital (25%)	**698.9**	698.9

The number of shares eligible for dividend is:

As at 31 March	**2017**	2016
Issued shares	559,125	559,125
Shares held in treasury	(1,000)	(1,000)
Outstanding shares eligible for dividend	**558,125**	558,125

Shares held in treasury consist of 1,000 shares of the Albanian issue which were suspended in 1977.

14. Statutory reserves

The Bank's Statutes provide for application of the Bank's annual net profit, by the Annual General Meeting at the proposal of the Board of Directors, to three specific reserve funds: the legal reserve fund, the general reserve fund and the special dividend reserve fund; the remainder of the net profit after payment of any dividend is generally allocated to the free reserve fund.

Legal reserve fund. This fund is currently fully funded at 10% of the Bank's paid-up capital.

General reserve fund. After payment of any dividend, 5% of the remainder of the Bank's annual net profit currently must be allocated to the general reserve fund.

Special dividend reserve fund. A portion of the remainder of the annual net profit may be allocated to the special dividend reserve fund, which shall be available, in case of need, for paying the whole or any part of a declared dividend. Dividends are normally paid out of the Bank's net profit.

Free reserve fund. After the above allocations have been made, any remaining unallocated net profit is generally transferred to the free reserve fund.

Receipts from the subscription of the Bank's shares are allocated to the legal reserve fund as necessary to keep it fully funded, with the remainder being credited to the general reserve fund.

The free reserve fund, general reserve fund and legal reserve fund are available, in that order, to meet any losses incurred by the Bank. In the event of liquidation of the Bank, the balances of the reserve funds (after the discharge of the liabilities of the Bank and the costs of liquidation) would be divided among the Bank's shareholders.

The table below analyses the movements in the Bank's statutory reserves over the last two years:

SDR millions	Legal reserve fund	General reserve fund	Special dividend reserve fund	Free reserve fund	Total statutory reserves
Balance at 31 March 2015	**69.8**	**3,621.0**	**184.0**	**10,704.9**	**14,579.7**
Allocation of 2014/15 profit	–	20.9	–	396.4	417.3
Balance at 31 March 2016	**69.8**	**3,641.9**	**184.0**	**11,101.3**	**14,997.0**
Allocation of 2015/16 profit	–	14.6	–	278.3	292.9
Balance at 31 March 2017	**69.8**	**3,656.5**	**184.0**	**11,379.6**	**15,289.9**

At 31 March 2017, statutory reserves included share premiums of SDR 1,059.6 million (2016: SDR 1,059.6 million).

In accordance with Article 51 of the Bank's Statutes, the following profit allocation will be proposed at the Bank's Annual General Meeting:

SDR millions	**2017**
Net profit	**827.6**
Proposed dividend:	
SDR 300 per share on 558,125 shares	(167.4)
Profit available for allocation	**660.2**
Proposed transfers to reserves:	
General reserve fund	(33.0)
Free reserve fund	(627.2)
Balance after allocation to reserves	–

15. Other equity accounts

Other equity accounts comprise the revaluation accounts for available for sale assets (gold and currency investment assets) as well as the re-measurement gains or losses on defined benefit obligations.

As at 31 March

SDR millions	**2017**	2016
Securities revaluation account	88.1	251.7
Gold revaluation account	2,542.0	2,431.0
Re-measurement of defined benefit obligations	(347.6)	(411.2)
Total other equity accounts	**2,282.5**	2,271.5

A. Securities revaluation account

This account contains the difference between the fair value and the amortised cost of the Bank's currency investment assets. The movements in the securities revaluation account were as follows:

For the financial year ended 31 March

SDR millions	**2017**	2016
Balance at beginning of year	251.7	234.9
Net gain on sales	(49.4)	(79.7)
Fair value and other movements	(114.2)	96.5
Net movement on revaluation of currency investment assets	**(163.6)**	16.8
Balance at end of year	**88.1**	251.7

The table below analyses the balance in the securities revaluation account, which relates to government and other securities:

SDR millions	Fair value of assets	Historical cost	Securities revaluation account	Gross gains	Gross losses
As at 31 March 2017	16,080.7	15,992.6	**88.1**	126.7	(38.6)
As at 31 March 2016	15,682.1	15,430.4	251.7	252.7	(1.0)

B. Gold revaluation account

The movements in the gold revaluation account were as follows:

For the financial year ended 31 March

SDR millions	**2017**	2016
Balance at beginning of year	2,431.0	2,467.4
Net gain on sales	(23.4)	(84.3)
Gold price movement	134.4	47.9
Net movement on revaluation of gold investment assets	**111.0**	(36.4)
Balance at end of year	**2,542.0**	2,431.0

C. Re-measurement of defined benefit obligations

This account contains the gains and losses from re-measurement of the Bank's post-employment benefit obligations.

For the financial year ended 31 March

SDR millions	**2017**	2016
Balance at beginning of year	(411.2)	(249.0)
Staff pensions	73.0	(127.7)
Directors' pensions	(0.3)	(0.5)
Post-employment health and accident insurance	(9.1)	(34.0)
Net movement on the re-measurement of defined benefit obligations	**63.6**	(162.2)
Balance at end of year	**(347.6)**	(411.2)

Note 12D provides further analysis of the re-measurement of the Bank's post-employment benefit obligations.

16. Interest income

For the financial year ended 31 March

SDR millions	**2017**	2016
Currency assets available for sale		
Securities purchased under resale agreements	0.3	1.8
Government and other securities	150.6	162.3
	150.9	164.1
Currency assets held at fair value through profit and loss		
Treasury bills	57.7	80.9
Securities purchased under resale agreements	46.2	62.6
Loans and advances	137.5	91.2
Government and other securities	491.4	548.6
	732.8	783.3
Assets designated as loans and receivables		
Sight and notice accounts	8.3	0.4
Gold investment assets	9.9	6.7
Gold banking assets	0.4	0.2
	18.6	7.3
Derivative financial instruments held at fair value through profit and loss	**1,501.8**	818.0
Interest income on liabilities	**116.9**	31.4
Total interest income	**2,521.0**	1,804.1

17. Interest expense

For the financial year ended 31 March

SDR millions	**2017**	2016
Liabilities held at fair value through profit and loss		
Currency deposits	**1,004.6**	748.3
Liabilities designated as financial liabilities measured at amortised cost		
Sight and notice deposit accounts	79.3	46.1
Securities sold under repurchase agreements	0.5	1.4
	79.8	47.5
Interest expense on assets	**474.2**	179.5
Total interest expense	**1,558.6**	975.3

18. Net valuation movement

The net valuation movement arises entirely on financial instruments classified as held at fair value through profit and loss. There were no credit losses due to restructuring or default in the financial years ended 31 March 2017 and 31 March 2016.

For the financial year ended 31 March

SDR millions	**2017**	2016
Currency assets		
Unrealised valuation movements on currency assets	(211.0)	(188.8)
Realised gains on currency assets	27.6	63.0
	(183.4)	(125.8)
Currency liabilities		
Unrealised valuation movements on financial liabilities	341.0	118.8
Realised losses on financial liabilities	(12.2)	(104.2)
	328.8	14.6
Valuation movements on derivative financial instruments	**(73.9)**	(191.7)
Net valuation movement	**71.5**	(302.9)

19. Net fee and commission income

For the financial year ended 31 March

SDR millions	**2017**	2016
Net third-party asset management fee income	12.7	12.7
Other fee income	3.3	2.3
Other fees, withholding taxes and commission expenses	(12.0)	(9.9)
Net fee and commission income	**4.0**	5.1

20. Foreign exchange movement

For the financial year ended 31 March

SDR millions	**2017**	2016
Net transaction gain	5.5	13.9
Net translation movement	3.7	(15.1)
Net foreign exchange movement	**9.2**	(1.2)

21. Operating expense

The following table analyses the Bank's operating expense in Swiss francs (CHF), the currency in which most expenditure is incurred:

For the financial year ended 31 March

CHF millions	**2017**	2016
Board of Directors		
Directors' fees	2.1	2.1
Pensions to former Directors	0.9	0.9
Travel, external Board meetings and other costs	1.2	1.9
	4.2	4.9
Management and staff		
Remuneration	131.9	129.4
Pensions	84.2	79.7
Other personnel-related expense	62.5	57.4
	278.6	266.5
Office and other expense	**75.7**	73.2
BIS administrative expense	**358.5**	344.6
Direct contributions to hosted organisations	15.6	15.2
Total administrative expenses	**374.1**	359.8
Administrative expense in SDR millions	275.1	265.4
Depreciation in SDR millions	17.2	15.5
Operating expense in SDR millions	**292.3**	280.9

The average number of full-time equivalent employees during the financial year ended 31 March 2017 was 574 (2016: 573). In addition, at 31 March 2017, the Bank was the legal employer of 75 staff members (2016: 67) working in the secretariats of the Financial Stability Board (FSB), the International Association of Deposit Insurers (IADI) and the International Association of Insurance Supervisors (IAIS).

The Bank makes direct contributions, which include salary and post-employment costs and other related expenses, towards the operational costs of the FSB, IADI and the IAIS, and these amounts are shown under "Direct contributions to hosted organisations". The Bank also provides logistical, administrative and staffing-related support for these organisations, the cost of which is included within the Bank's regular administrative expense categories.

22. Net gain on sales of available for sale securities

For the financial year ended 31 March

SDR millions	**2017**	2016
Disposal proceeds	6,383.9	7,041.9
Amortised cost	(6,334.5)	(6,962.2)
Net gain on sales of available for sale securities	**49.4**	79.7
Comprising:		
Gross realised gains	66.7	80.8
Gross realised losses	(17.3)	(1.1)

23. Net gain on sales of gold investment assets

For the financial year ended 31 March

SDR millions	**2017**	2016
Disposal proceeds	28.2	103.7
Deemed cost	(4.8)	(19.4)
Net gain on sales of gold investment assets	**23.4**	84.3

24. Dividend per share

For the financial year ended 31 March	**2017**	2016
Net profit for the financial year (SDR millions)	827.6	412.9
Weighted average number of shares entitled to dividend	558,125	558,125
Dividend per share (SDR per share)		
Normal	225.0	215.0
Supplementary	75.0	
Total dividend per share	300.0	215.0
Total dividend (SDR millions)	**167.4**	120.0

The Bank's dividend policy requires that the dividend be set at a sustainable level which should vary over time in a predictable fashion. The policy also requires that the dividend reflect the Bank's capital needs and its prevailing financial circumstances, with a payout ratio of between 20% and 30% in most years.

In line with the Bank's dividend policy, it is proposed to declare a normal dividend for 2016/17 of SDR 225 per share, SDR 10 per share higher than for the previous year. The medium-term guidance of the dividend policy allows for the possibility that a supplementary dividend could also be paid in years where profits are high, and the Bank's financial circumstances allow. A supplementary dividend of SDR 75 per share is also proposed for the 2016/17 financial year. Therefore, the total proposed dividend for 2016/17 is SDR 300 per share.

The proposed dividend for 2017 represents a payout ratio of 20% of net profit (2016: 29%).

25. Exchange rates

The following table shows the principal exchange rates and prices used to translate balances in foreign currency and gold into SDR:

	Spot rate as at 31 March		Average rate for the financial year	
	2017	2016	**2017**	2016
USD	**0.736**	0.710	**0.724**	0.717
EUR	**0.787**	0.808	**0.795**	0.791
JPY	**0.0066**	0.00632	**0.0067**	0.00597
GBP	**0.922**	1.022	**0.946**	1.081
Renminbi	**0.107**	0.110	**0.108**	0.112
CHF	**0.736**	0.740	**0.733**	0.737
Gold (per ounce)	**917.3**	876.9	**910.7**	824.9

26. Off-balance sheet items

The following items are not included in the Bank's balance sheet:

As at 31 March

SDR millions	**2017**	2016
Gold bars held under earmark arrangements	11,703.3	12,487.5
Nominal value of securities:		
Securities held under safe custody arrangements	3,349.6	4,977.2
Securities held under collateral pledge agreements	39.5	38.1
Net asset value of portfolio management mandates:		
BISIPs	10,792.5	11,041.0
Dedicated mandates	4,225.5	4,187.6

Gold bars held under earmark arrangements comprise specific gold bars which have been deposited with the Bank on a custody basis. They are included at their weight in gold (translated at the gold market price and the USD exchange rate into SDR). At 31 March 2017, gold bars held under earmark amounted to 397 tonnes of gold (2016: 443 tonnes).

Portfolio management mandates include BIS Investment Pools (BISIPs) and dedicated mandates.

The BISIPs are a range of open-ended investment funds created by the Bank and managed using entities that do not have a separate legal personality from the Bank. The Bank has an agency relationship with the BISIPs, such that the assets of the BISIPs are held in the name of the BIS, but the economic benefit lies with central bank customers. The Bank does not invest for its own account in the BISIPs.

Dedicated mandates are portfolios which are managed by the Bank in accordance with investment guidelines set by the customer. They are held for the financial benefit of the customer.

For both the BISIPs and the dedicated mandates, the Bank is remunerated by a management fee which is included under "Net fee and commission income" in the profit and loss account.

27. Commitments

The Bank provides a number of committed standby facilities for its customers on a collateralised or uncollateralised basis. At 31 March 2017, SDR 2,451.4 million of the outstanding commitments were collateralised (2016: SDR 3,121.6 million) and SDR 220.9 million were uncollateralised (2016: SDR 212.9 million). As at 31 March 2017, total outstanding commitments amounted to SDR 2,672.3 million (2016: SDR 3,334.5 million).

The BIS is committed to supporting the operations of the Financial Stability Board (FSB), the International Association of Deposit Insurers (IADI) and the International Association of Insurance Supervisors (IAIS). In each case, the Bank has a separate agreement specifying the terms of support and commitment. The Bank is the legal employer of FSB, IADI and IAIS staff, with the regular ongoing staff costs borne by each association. The commitment by the BIS to IADI is subject to an annual budgetary decision of the Board. The agreement with the FSB currently ends in January 2023. The agreement with the IAIS currently ends in 2019.

28. Fair value hierarchy

The Bank categorises its financial instrument fair value measurements using a hierarchy that reflects the observability of inputs used in measuring that value. A valuation level is assigned according to the least observable input that is significant to the fair value measurement in its entirety. The fair value hierarchy used by the Bank comprises the following levels:

Level 1 – Instruments valued using unadjusted quoted prices in active markets for identical financial instruments.

Level 2 – Instruments valued with valuation techniques using inputs which are observable for the financial instrument either directly (ie as a price) or indirectly (ie derived from prices for similar financial instruments). This includes observable interest rates, spreads and volatilities.

Level 3 – Instruments valued using valuation techniques where the inputs are not observable in financial markets.

At 31 March 2017, the Bank had no financial instruments categorised as level 3 (31 March 2016: nil).

As at 31 March 2017

SDR millions	Level 1	Level 2	Total
Financial assets held at fair value through profit and loss			
Treasury bills	30,741.2	5,129.9	35,871.1
Securities purchased under resale agreements	–	42,520.8	42,520.8
Fixed-term loans	–	20,626.1	20,626.1
Government and other securities	31,347.8	11,675.6	43,023.4
Derivative financial instruments	2.6	2,218.1	2,220.7
Financial assets designated as available for sale			
Treasury bills	255.6	36.9	292.5
Government and other securities	13,799.5	579.6	14,379.1
Securities purchased under resale agreements	–	1,409.1	1,409.1
Total financial assets accounted for at fair value	**76,146.7**	**84,196.1**	**160,342.8**
Financial liabilities held at fair value through profit and loss			
Currency deposits	–	(178,452.7)	(178,452.7)
Securities sold under repurchase agreements	–	(9.6)	(9.6)
Derivative financial instruments	(1.5)	(1,822.0)	(1,823.5)
Total financial liabilities accounted for at fair value	**(1.5)**	**(180,284.3)**	**(180,285.8)**

As at 31 March 2016

SDR millions	Level 1	Level 2	Total
Financial assets held at fair value through profit and loss			
Treasury bills	31,792.1	7,786.5	39,578.6
Securities purchased under resale agreements	–	55,340.0	55,340.0
Fixed-term loans	–	16,805.5	16,805.5
Government and other securities	40,077.9	12,247.0	52,324.9
Derivative financial instruments	1.9	1,683.4	1,685.3
Financial assets designated as available for sale			
Government and other securities	14,395.9	407.6	14,803.5
Securities purchased under resale agreements	–	878.6	878.6
Total financial assets accounted for at fair value	86,267.8	95,148.6	181,416.4
Financial liabilities held at fair value through profit and loss			
Currency deposits	–	(152,613.6)	(152,613.6)
Securities sold under resale agreements	–	(569.1)	(569.1)
Derivative financial instruments	(2.1)	(3,900.1)	(3,902.2)
Total financial liabilities accounted for at fair value	(2.1)	(157,082.8)	(157,084.9)

A. Transfers between levels in the fair value hierarchy

Of the assets categorised as level 1 at 31 March 2017, SDR 935.3 million related to assets that were categorised as level 2 at 31 March 2016. Of the assets categorised as level 2 at 31 March 2017, SDR 1,132.1 million related to assets that had been categorised as level 1 at 31 March 2016. The transfer of assets between levels 1 and 2 reflected specific market conditions existing at the reporting dates that affected the observability of the market prices as defined above. No liabilities were transferred between fair value hierarchy levels.

B. Assets and liabilities measured at fair value level 3

During the financial years ended 31 March 2017 and 31 March 2016, the Bank did not classify any assets or liabilities as level 3 in the fair value hierarchy.

C. Financial instruments not measured at fair value

In accordance with its accounting policies, the Bank does not account for certain financial instruments at fair value. Using the same valuation techniques as used for fair valued financial instruments, the Bank estimates that the fair values of these financial instruments would be materially the same as the carrying values shown in these financial statements for both 31 March 2017 and 31 March 2016. If these instruments were included in the fair value hierarchy, the valuation of "Gold loans" and "Securities sold under repurchase agreements" would be considered level 2. All other amortised cost financial instruments would be considered level 1.

D. Impact of changes in the Bank's creditworthiness

The fair value of the Bank's liabilities may be affected by any change in its creditworthiness. If the Bank's creditworthiness deteriorated, the value of its liabilities should decrease, and the change in value would be reflected as a valuation movement in the profit and loss account. The Bank regularly assesses its creditworthiness as part of its risk management processes. The Bank's assessment of its creditworthiness did not indicate a change which could have had an impact on the fair value of the Bank's liabilities during the period under review.

E. The valuation of financial assets and liabilities

Certain of the Bank's financial assets and financial liabilities are valued using valuation techniques which require estimation of appropriate valuation parameters. Changes in estimates of these parameters could significantly affect the reported fair values. The valuation impact of a 1 basis point change in interest rate assumptions of key financial instruments is shown in the table below:

For the financial year ended 31 March

SDR millions	**2017**	2016
Treasury bills	1.1	1.4
Securities purchased under resale agreements	0.3	0.2
Loans and advances	0.3	0.3
Government and other securities	9.7	10.8
Currency deposits	8.7	8.8
Derivative financial instruments	0.9	0.8

29. Geographical analysis

A. Total liabilities

As at 31 March

SDR millions	**2017**	2016
Africa and Europe	78,594.2	76,999.3
Asia-Pacific	107,454.7	100,801.6
Americas	23,975.6	23,762.9
International organisations	13,126.7	11,442.0
Balance at end of year	**223,151.2**	213,005.8

B. Off-balance sheet items

As at 31 March

SDR millions	**2017**			2016		
	Gold bars held under earmark	Nominal value of securities	Net asset value of portfolio management mandates	Gold bars held under earmark	Nominal value of securities	Net asset value of portfolio management mandates
Africa and Europe	4,791.0	–	3,535.5	4,579.8	–	3,379.1
Asia-Pacific	3,155.5	3,349.6	9,561.2	4,724.8	4,977.2	9,637.8
Americas	3,756.8	39.5	1,921.3	3,182.9	38.1	2,211.7
Total	**11,703.3**	**3,389.1**	**15,018.0**	12,487.5	5,015.3	15,228.6

C. Credit commitments

As at 31 March

SDR millions	**2017**	2016
Africa and Europe	236.2	242.4
Asia-Pacific	2,436.1	2,879.2
Total	**2,672.3**	3,121.6

A geographical analysis of the Bank’s assets by default risk is provided in the “Risk management” section in note 3B under “Default risk by geographical region”.

30. Related parties

The Bank considers the following to be its related parties:

- the members of the Board of Directors;
- the senior officials of the Bank;
- close family members of the above individuals;
- the Bank's post-employment benefit arrangements; and
- central banks whose Governor is a member of the Board of Directors and institutions that are connected with these central banks.

A listing of the members of the Board of Directors and senior officials is shown in the sections of the Annual Report entitled "Board of Directors" and "BIS Management". Note 12 provides details of the Bank's post-employment benefit arrangements.

A. Related party individuals

Note 21 provides details of the total compensation of the Board of Directors.

The total compensation of the senior officials recognised in the profit and loss account amounted to:

For the financial year ended 31 March

CHF millions	**2017**	2016
Salaries, allowances and medical cover	7.5	8.0
Post-employment benefits	2.1	2.2
Total compensation	**9.6**	10.2
SDR equivalent	7.1	7.5

The Bank offers personal deposit accounts for staff members and Directors. The accounts bear interest at a rate determined by the Bank based on the rate offered by the Swiss National Bank on its staff accounts. The movements and total balance on personal deposit accounts relating to members of the Board of Directors and the senior officials of the Bank were as follows:

For the financial year ended 31 March

CHF millions	**2017**	2016
Balance at beginning of year	14.6	18.9
Deposits taken and other inflows	4.1	3.7
Withdrawals and other outflows	(7.2)	(8.0)
Balance at end of year	**11.5**	14.6
SDR equivalent	8.5	10.8
Interest expense on deposits in CHF millions	**0.1**	0.1
SDR equivalent	0.1	0.1

Balances related to individuals who are appointed as members of the Board of Directors or as senior officials of the Bank during the financial year are included in the table above as other inflows. Balances related to individuals who ceased to be members of the Board of Directors or senior officials of the Bank during the financial year are included in the table above as other outflows.

In addition, the Bank operates a blocked personal deposit account for certain staff members who were previously members of the Bank's savings fund, which closed on 1 April 2003. The terms of these blocked accounts are such that staff members cannot make further deposits or withdrawals and the balances are paid out when they leave the Bank. The accounts bear interest at a rate determined by the Bank based on the rate offered by the Swiss National Bank on its staff accounts plus 1%. The total balance of blocked accounts at 31 March 2017 was SDR 10.6 million (2016: SDR 12.9 million). They are reported under the balance sheet heading "Currency deposits".

B. Related party customers

The BIS provides banking services to its customers, which are predominantly central banks, monetary authorities and international financial institutions. In fulfilling this role, the Bank, in the normal course of business, enters into transactions with customers which are related parties (as defined above). These transactions include making advances, and taking currency and gold deposits. It is the Bank's policy to enter into transactions with related party customers on similar terms and conditions to transactions with other, non-related party customers. The following tables show balances relating to these transactions, which are representative of the general level of business undertaken with related party customers during the year.

Balances with related party customers

As at 31 March	**2017**			2016		
	Balance sheet total	Balance with related parties		Balance sheet total	Balance with related parties	
SDR millions / percentages	*SDR millions*	*SDR millions*	*%*	*SDR millions*	*SDR millions*	*%*
Assets						
Cash and sight accounts	48,295.5	**47,843.7**	99.1	25,847.0	25,538.7	98.8
Gold and gold loans	27,276.0	**27,257.6**	99.9	13,176.8	12,067.2	91.6
Securities purchased under resale agreements	43,929.9	**2,011.7**	4.6	56,218.6	1,609.3	2.9
Government and other securities	57,402.5	**295.5**	0.5	67,128.4	1,227.6	1.8
Derivative assets	2,220.7	**13.7**	0.6	1,685.3	11.6	0.7
Liabilities						
Currency deposits	(194,442.4)	**(85,320.8)**	43.9	(178,790.5)	(70,537.9)	39.5
Gold deposits	(9,934.5)	**(7,685.7)**	77.4	(10,227.6)	(7,491.2)	73.2
Derivative liabilities	(1,823.5)	**(7.3)**	0.4	(3,902.2)	(64.1)	1.6

Main profit and loss items arising from transactions with related party customers

For the financial year ended 31 March	**2017**			2016		
	Profit and loss total	Balance with related parties		Profit and loss total	Balance with related parties	
SDR millions / percentages	*SDR millions*	*SDR millions*	*%*	*SDR millions*	*SDR millions*	*%*
Interest income	2,521.0	**111.6**	4.4	1,804.1	38.1	2.1
Interest expense	(1,558.6)	**(647.5)**	41.5	(975.3)	(395.7)	40.6

31. Contingent liabilities

In the opinion of the Bank's Management, there were no significant contingent liabilities at 31 March 2017 (31 March 2016: nil).

Capital adequacy

1. Capital adequacy frameworks

As an international financial institution that is overseen by a Board composed of Governors of major central banks and that has no national supervisor, the Bank is committed to maintaining its superior credit quality and financial strength, in particular in situations of financial stress.

The Bank assesses its capital adequacy on a continuous basis throughout the year. It operates an annual capital planning process that focuses on two elements: an economic capital framework and a financial leverage framework. The disclosures in this section relating to credit, market, operational and liquidity risk are based on the Bank's own assessment of capital adequacy derived in accordance with these two BIS frameworks.

Regulatory capital ratios are not used as indicators of BIS capital adequacy because key aspects of the business model for the BIS banking activities are not adequately captured. In the main, these relate to the high level of solvency targeted by the Bank as well as the way regulatory capital ratios reflect portfolio concentrations and interest rate risk in the banking book.

To facilitate comparability, the Bank has implemented a framework that is consistent with the revised *International Convergence of Capital Measurement and Capital Standards* (Basel II framework) issued by the Basel Committee on Banking Supervision (BCBS) in June 2006. Following that framework, the Bank discloses a Tier 1 capital ratio (Pillar 1), risk-weighted assets and more detailed related information. In addition, the Bank calculates for reference a Common Equity Tier 1 capital ratio, leverage ratio and liquidity coverage ratio taking account of banking supervisory recommendations related to Basel III.

The Bank maintains a capital position substantially in excess of the regulatory minimum requirement in order to ensure its superior credit quality.

2. Economic capital

The Bank's economic capital methodology relates its risk-taking capacity to the amount of economic capital needed to absorb potential losses arising from its exposures. The risk-taking capacity is defined as allocatable economic capital that is derived following a prudent assessment of the components of the Bank's equity, which are set out in the following table:

As at 31 March

SDR millions	**2017**	2016
Share capital	698.9	698.9
Statutory reserves per balance sheet	15,289.9	14,997.0
Less: shares held in treasury	(1.7)	(1.7)
Share capital and reserves	**15,987.1**	15,694.2
Securities revaluation account	88.1	251.7
Gold revaluation account	2,542.0	2,431.0
Re-measurement of defined benefit obligations	(347.6)	(411.2)
Other equity accounts	**2,282.5**	2,271.5
Profit and loss account	**827.6**	412.9
Total equity	**19,097.2**	18,378.6

Allocatable economic capital is determined following a prudent evaluation of the Bank's equity components for their loss absorption capacity and sustainability. The components of capital with long-term risk-bearing capacity are the Bank's Tier 1 capital and the sustainable portion of the securities and gold revaluation accounts ("sustainable supplementary capital"). Only this "allocatable capital" is available for allocation to the various categories of risk. The portion of revaluation accounts that is considered more transitory in nature is assigned to the "capital filter" together with the profit accrued during the financial period.

As at 31 March

SDR millions	**2017**	2016
Share capital and reserves	15,987.1	15,694.2
Re-measurement of defined benefit obligations	(347.6)	(411.2)
Tier 1 capital	**15,639.5**	15,283.0
Sustainable supplementary capital	1,660.5	1,917.0
Allocatable capital	**17,300.0**	17,200.0
Capital filter	1,797.2	1,178.6
Total equity	**19,097.2**	18,378.6

As part of the annual capital planning process, Management allocates economic capital to risk categories within the amount of allocatable capital. As a first step, capital is assigned to an "economic capital cushion" that provides an additional margin of safety and is sufficient to sustain a potential material loss without the need to reduce the capital allocation to individual risk categories or to liquidate any holdings of assets. The level of the economic capital cushion is determined based on stress tests that explore extreme but still plausible default events. Allocations are then made to each category of financial risk (ie credit, market and "other risks") as well as operational risk. "Other risks" are risks that have been identified but that are not taken into account in the economic capital utilisation calculations, and include model risk and residual basis risk. Reflecting the high level of solvency targeted by the Bank, the economic capital framework measures economic capital to a 99.995% confidence level assuming a one-year horizon, except for FX settlement risk (included in the utilisation for credit risk) and "other risks". The amount of economic capital set aside for FX settlement risk and other risks is based on an assessment by Management. The Bank's economic capital framework is subject to regular review and calibration.

The following table summarises the Bank's economic capital allocation and utilisation for credit risk, market risk, operational risk and other risks:

As at 31 March

	2017		2016	
SDR millions	Allocation	Utilisation	Allocation	Utilisation
Insolvency and transfer risk	9,200.0	8,715.5	9,100.0	7,789.1
FX settlement risk	300.0	300.0	300.0	300.0
Credit risk	9,500.0	9,015.5	9,400.0	8,089.1
Market risk	4,000.0	3,326.1	4,000.0	3,491.1
Operational risk	1,200.0	1,200.0	1,200.0	1,200.0
Other risks	300.0	300.0	300.0	300.0
Economic capital cushion	2,300.0	2,300.0	2,300.0	2,300.0
Total economic capital	**17,300.0**	**16,141.6**	17,200.0	15,380.2

3. Financial leverage

The Bank complements its capital adequacy assessment with a prudently managed financial leverage framework. The Bank monitors its financial leverage using a ratio that compares the BIS adjusted common equity with its total exposure. However, to reflect the scope and nature of its banking activities, the definition of the BIS adjusted common equity limits the recognition of revaluation accounts to the proportion of the gold and securities revaluation accounts that is considered sustainable ("sustainable supplementary capital"). Further, the exposure measure is supplemented by the inclusion of committed and uncommitted facilities, and pension fund assets.

The following table shows the calculation of the Bank's financial leverage ratio:

As at 31 March

SDR millions	**2017**	2016
Share capital and reserves	15,987.1	15,694.2
Sustainable supplementary capital	1,660.5	1,917.0
Share capital, reserves and sustainable supplementary capital	**17,647.6**	17,611.2
Re-measurement losses on defined benefit obligations	(347.6)	(411.2)
Intangible assets	(26.4)	(23.8)
Prudential adjustments	**(374.0)**	(435.0)
Total BIS adjusted common equity (A)	**17,273.6**	17,176.2
Total balance sheet assets	**242,248.4**	231,384.4
Derivatives	(232.9)	(498.1)
Securities purchased under resale agreements	5.1	–
Committed and uncommitted facilities	4,424.9	4,427.2
Pension fund assets	1,140.5	1,048.2
Exposure adjustments	**5,337.6**	4,977.3
Total BIS exposure (B)	**247,586.0**	236,361.7
BIS leverage ratio (A) / (B)	**7.0%**	7.3%

The Bank also calculates a leverage ratio that is consistent with Basel III recommendations. The Bank's Basel III leverage ratio differs from the BIS leverage ratio in using Common Equity Tier 1 as its capital measure instead of BIS adjusted common equity as defined above. The calculation of Common Equity Tier 1 capital is included in section 4B. At 31 March 2017, the Bank's Basel III leverage ratio stood at 7.4% (2016: 7.6%).

4. Capital ratios

The economic capital framework and the financial leverage framework described above are the main tools used for assessing the Bank's capital adequacy. Risk-weighted assets, minimum capital requirements and capital ratios are disclosed to facilitate comparability. Guidance issued by the BCBS includes several approaches for calculating risk-weighted assets and the corresponding minimum capital requirements. In principle, the minimum capital requirements are determined by taking 8% of the risk-weighted assets.

For credit risk, the Bank has adopted the advanced internal ratings-based approach for the majority of its exposures. Under this approach, the risk weighting for a transaction is determined by the relevant Basel II risk weight function using the Bank's own estimates for key inputs. Expected loss is calculated for credit risk exposures subject to the advanced internal ratings-based approach. The expected loss is calculated at the balance sheet date taking into account any impairment provision which is reflected in the Bank's financial statements. The Bank had no impaired financial assets at 31 March 2017 (2016: nil). In accordance with the requirements of the Basel frameworks, the expected loss is compared with the impairment provision and any shortfall is deducted from the Bank's Tier 1 capital. For securitisation exposures and relevant other assets, the Bank has adopted the standardised approach. Under this approach, risk weightings are mapped to exposure types.

Risk-weighted assets for market risk are derived following an internal models approach. For operational risk, the advanced measurement approach is used. Both these approaches rely on value-at-risk (VaR) methodologies.

More details on the assumptions underlying the calculations are provided in the sections on credit risk, market risk and operational risk.

A. Tier 1 capital ratio

The following table summarises the relevant exposure types and approaches as well as the risk-weighted assets and related minimum capital requirements for credit risk, market risk and operational risk under the Basel II framework:

As at 31 March		**2017**			2016		
SDR millions	Approach used	Amount of exposure	Risk-weighted assets (A)	Minimum capital requirement (B)	Amount of exposure	Risk-weighted assets (A)	Minimum capital requirement (B)
Credit risk							
Exposure to sovereigns, banks and corporates	Advanced internal ratings-based approach, where (B) is derived as (A) x 8%	166,485.1	14,574.9	1,166.0	155,351.0	11,244.4	899.6
Securitisation exposures and other assets	Standardised approach, where (B) is derived as (A) x 8%	282.7	220.9	17.7	540.1	277.0	22.2
Market risk							
Exposure to foreign exchange risk and gold price risk	Internal models approach, where (A) is derived as (B) / 8%	–	8,906.4	712.5	–	8,226.0	658.1
Operational risk							
	Advanced measurement approach, where (A) is derived as (B) / 8%	–	10,802.9	864.2	–	10,476.9	838.2
Total			**34,505.1**	**2,760.4**		30,224.3	2,418.1

The capital ratio measures capital adequacy by comparing the Bank's Tier 1 capital with its risk-weighted assets. The Tier 1 capital ratio, consistent with the Basel II framework, is provided in the following table:

As at 31 March

SDR millions	**2017**	2016
Share capital and reserves	15,987.1	15,694.2
Re-measurement losses on defined benefit obligations	(347.6)	(411.2)
Tier 1 capital	**15,639.5**	15,283.0
Expected loss	(32.3)	(22.7)
Tier 1 capital net of expected loss (A)	**15,607.2**	15,260.3
Total risk-weighted assets (B)	**34,505.1**	30,224.3
Tier 1 capital ratio (A) / (B)	**45.2%**	50.5%

B. Common Equity Tier 1 capital ratio

To facilitate comparability, information on risk-weighted assets and related minimum capital requirements calculated under the Basel III framework is provided in the following table. Credit risk-weighted assets differ, mainly due to the asset value correlation multiplier for large financial institutions. Relating to market risk, Basel III risk-weighted assets are calculated as the sum of the Basel II market risk-weighted assets (presented in the previous section) and market risk-weighted assets derived from a stressed VaR.

As at 31 March		**2017**			2016		
SDR millions	Approach used	Amount of exposure	Risk-weighted assets (A)	Minimum capital requirement (B)	Amount of exposure	Risk-weighted assets (A)	Minimum capital requirement (B)
Credit risk							
Exposure to sovereigns, banks and corporates	Advanced internal ratings-based approach, where (B) is derived as (A) x 8%	166,486.6	16,433.1	1,314.6	155,351.0	12,415.2	993.2
Securitisation exposures and other assets	Standardised approach, where (B) is derived as (A) x 8%	282.7	220.9	17.7	540.1	277.0	22.2
Market risk							
Exposure to foreign exchange risk and gold price risk	Internal models approach, where (A) is derived as (B) / 8%	–	23,727.9	1,898.2	–	24,639.7	1,971.2
Operational risk							
	Advanced measurement approach, where (A) is derived as (B) / 8%	–	10,802.9	864.2	–	10,476.9	838.2
Total			**51,184.8**	**4,094.7**		47,808.8	3,824.8

The Common Equity Tier 1 capital ratio calculated under the Basel III framework is set out in the following table:

As at 31 March

SDR millions	**2017**	2016
Share capital and reserves	15,987.1	15,694.2
Revaluation accounts	2,630.1	2,682.7
Share capital, reserves and revaluation accounts	**18,617.2**	18,376.9
Re-measurement losses on defined benefit obligations	(347.6)	(411.2)
Expected loss	(32.3)	(22.7)
Intangible assets	(26.4)	(23.8)
Prudential adjustments	**(406.3)**	(457.7)
Total Common Equity Tier 1 capital (A)	**18,210.9**	17,919.2
Total risk-weighted assets (B)	**51,184.8**	47,808.8
Common Equity Tier 1 capital ratio (A) / (B)	**35.6%**	37.5%

Risk management

1. Risks faced by the Bank

The Bank supports its customers, predominantly central banks, monetary authorities and international financial institutions, in the management of their reserves and related financial activities.

Banking activities form an essential element of meeting the Bank's objectives and ensure its financial strength and independence. The BIS engages in banking activities that are customer-related as well as activities that are related to the investment of its equity, each of which may give rise to financial risk comprising credit risk, market risk and liquidity risk. The Bank is also exposed to operational risk.

Within the risk frameworks defined by the Board of Directors, the Management of the Bank has established risk management policies designed to ensure that risks are identified, appropriately measured and controlled as well as monitored and reported.

2. Risk management approach and organisation

The Bank maintains superior credit quality and adopts a prudent approach to financial risk-taking, by:

- maintaining an exceptionally strong capital position;
- investing its assets predominantly in high credit quality financial instruments;
- seeking to diversify its assets across a range of sectors;
- adopting a conservative approach to its tactical market risk-taking and carefully managing market risk associated with the Bank's strategic positions, which include its gold holdings; and
- maintaining a high level of liquidity.

A. Organisation

Under Article 39 of the Bank's Statutes, the General Manager is responsible to the Board for the management of the Bank, and is assisted by the Deputy General Manager. The Deputy General Manager is responsible for the Bank's independent risk management and compliance functions. The General Manager and the Deputy General Manager are supported by senior management advisory committees.

The key advisory committees are the Executive Committee, the Finance Committee and the Compliance and Operational Risk Committee. The first two committees are chaired by the General Manager and the third by the Deputy General Manager, and all include other senior members of the Bank's Management. The Executive Committee advises the General Manager primarily on the Bank's strategic planning and the allocation of resources, as well as on decisions related to the broad financial objectives for the banking activities and strategic operational risk management issues. The Finance Committee advises the General Manager on the financial management and policy issues related to the banking business, including the allocation of economic capital to risk categories. The Compliance and Operational Risk Committee, chaired by the Deputy General Manager, provides a forum for considering important compliance and operational risk matters, ensures the coordination of compliance matters and operational risk management throughout the Bank and informs or advises the Executive Committee as appropriate.

The risk management functions for financial risks and operational risks are performed by the Risk Management unit. The Head of Risk Management reports to the Deputy General Manager. The Head of the Operational Risk Management unit within Risk Management has reporting lines to the Deputy General Manager and the Head of Risk Management.

The Bank's compliance function is performed by the Compliance unit. The objective of this function is to assist Management in ensuring that all activities of the BIS and its staff are conducted in accordance with compliance laws, rules and standards. The Chief Compliance Officer reports to the Deputy General Manager and also has a right of direct access to the Audit Committee on compliance matters. The Audit Committee is an advisory committee to the Board of Directors.

The Finance unit and the Legal Service complement the Bank's risk management. The Finance unit operates a valuation control function, produces the Bank's financial statements and controls the Bank's expenditure by setting and monitoring the annual budget. The objective of the valuation control function is to ensure that the Bank's valuations comply with its valuation policy and procedures. The Finance unit reports to the Deputy General Manager and the Secretary General.

The Legal Service provides legal advice and support covering a wide range of issues relating to the Bank's activities. The Legal Service reports to the General Manager.

The Internal Audit function evaluates and improves the effectiveness of risk management, control, and governance systems and processes. Internal Audit provides an independent, objective assurance function, and advises on best practice. Internal Audit has reporting lines to the General Manager and the Deputy General Manager, and to the Audit Committee.

B. Risk monitoring and reporting

The Bank's financial and operational risk profile, position and performance are monitored on an ongoing basis by the relevant units. Financial risk and compliance reports aimed at various management levels are provided regularly to enable Management to adequately assess the Bank's risk profile and financial condition.

Management reports financial and risk information to the Board of Directors on a monthly and a quarterly basis. Furthermore, the Audit Committee receives regular reports from Internal Audit, and the Compliance, Finance and Operational Risk Management units. The Banking and Risk Management Committee, another advisory committee to the Board, receives regular reports from the Risk Management unit. The preparation of reports is subject to comprehensive policies and procedures, thus ensuring strong controls.

C. Risk methodologies

The Bank revalues virtually all of its financial instruments to fair value on a daily basis and reviews its valuations monthly, taking into account necessary adjustments for impairment. It uses a comprehensive range of quantitative methodologies for valuing financial instruments and for measuring risk to its net profit and equity. The Bank reassesses its quantitative methodologies in the light of its changing risk environment and evolving best practice.

The Bank's model validation policy defines the roles and responsibilities and processes related to the implementation of new or materially changed risk and valuation models.

A key methodology used by the Bank to measure and manage risk is the calculation of economic capital based on value-at-risk (VaR) techniques. VaR expresses the statistical estimate of the maximum potential loss on the current positions of the Bank measured to a specified level of confidence and a specified time horizon. VaR models depend on statistical assumptions and the quality of available market data and, while forward-looking, they extrapolate from past events. VaR models may underestimate potential losses if changes in risk factors fail to align with the distribution assumptions. VaR figures do not provide any information on losses that may occur beyond the assumed confidence level.

The Bank's economic capital framework covers credit risk, market risk, operational risk and other risks. As part of the annual capital planning process, the Bank allocates economic capital to the above risk categories commensurate with principles set by the Board and taking account of the business strategy. Reflecting the high level of solvency targeted by the Bank, the economic capital framework measures economic capital to a 99.995% confidence level assuming a one-year holding period. An additional amount of economic capital is set aside for FX settlement risk (included in the utilisation for credit risk) and "other risks" based on Management's assessment of risks which are not reflected in the economic capital calculations. Moreover, capital is also allocated to an "economic capital cushion" that is based on stress tests that explore extreme but still plausible default events. The economic capital cushion provides an additional margin of safety to sustain a potential material loss without the need to reduce the capital allocated to individual risk categories or to liquidate any holdings of assets.

The management of the Bank's capital adequacy is complemented by a comprehensive stress testing framework, and a prudent financial leverage framework. The stress testing framework supplements the Bank's risk assessment, including its VaR and economic capital calculations for financial risk. The Bank's key market risk factors and credit exposures are stress-tested. The stress testing includes the analysis of severe historical and adverse hypothetical macroeconomic scenarios, as well as sensitivity tests of extreme but still plausible movements of the key risk factors identified. The Bank also performs stress tests related to liquidity risk. The financial leverage framework focuses on a ratio that sets the BIS adjusted common equity in relation to its total balance sheet exposure.

3. Credit risk

Credit risk arises because a counterparty may fail to meet its obligations in accordance with the agreed contractual terms and conditions. A financial asset is considered past due when a counterparty fails to make a payment on the contractual due date.

The Bank manages credit risk within a framework and policies set by the Board of Directors and Management. These are complemented by more detailed guidelines and procedures at the level of the independent risk management function.

A. Credit risk assessment

Credit risk is continuously controlled at both a counterparty and an aggregated level. The independent risk management function performs individual counterparty credit assessments following a well defined internal rating process. As part of this process, counterparty financial statements and market information are analysed. The rating methodologies depend on the nature of the counterparty. Based on the internal rating and specific counterparty features, the Bank sets a series of credit limits covering individual counterparties and countries. Internal ratings are assigned to all counterparties. In principle, the ratings and related limits are reviewed at least annually. The main assessment criterion in these reviews is the ability of the counterparties to meet interest and principal repayment obligations in a timely manner.

Credit risk limits at the counterparty level are approved by the Bank's Management and fit within a framework set by the Board of Directors.

On an aggregated level, credit risk, including default and country transfer risk, is measured, monitored and controlled based on the Bank's economic capital calculation for credit risk. To calculate economic capital for credit risk, the Bank uses a portfolio VaR model. Management limits the Bank's overall exposure to credit risk by allocating an amount of economic capital to credit risk.

B. Default risk

The following tables show the exposure of the Bank to default risk, without taking into account any collateral held or other credit enhancements available to the Bank. Credit risk is mitigated through the use of collateral and legally enforceable netting or setoff agreements. The corresponding assets and liabilities are not offset on the balance sheet.

The exposures set out in the tables below are based on the carrying value of the assets on the balance sheet as categorised by sector, geographical region and credit quality. The carrying value is the fair value of the financial instruments, except in the case of very short-term financial instruments (sight and notice accounts) and gold. Commitments are reported at their notional amounts. Gold and gold loans exclude gold bar assets held in custody, and accounts receivable do not include unsettled liabilities issued, because these items do not represent credit exposures of the Bank.

The vast majority of the Bank's assets are invested in securities issued by governments and financial institutions rated A– or above by at least one of the major external credit assessment institutions. Limitations on the number of high-quality counterparties in these sectors mean that the Bank is exposed to single-name concentration risk.

The Bank conducts an annual review for impairment at the date of each balance sheet. At 31 March 2017, the Bank did not have any financial assets that were considered to be impaired (2016: nil). At 31 March 2017, no financial assets were considered past due (2016: nil). No credit loss was recognised in the current period (2016: nil).

Default risk by asset class and issuer type

The following tables show the exposure of the Bank to default risk by asset class and issuer type, without taking into account any collateral held or other credit enhancements available to the Bank. "Public sector" includes international and other public sector institutions.

As at 31 March 2017

SDR millions	Sovereign and central banks	Public sector	Banks	Corporate	Securitisation	Total
On-balance sheet exposures						
Cash and sight accounts	48,274.4	–	21.1	–	–	48,295.5
Gold and gold loans	–	–	18.5	–	–	18.5
Treasury bills	34,081.2	2,082.4	–	–	–	36,163.6
Securities purchased under resale agreements	2,011.7	–	37,166.9	4,751.3	–	43,929.9
Loans and advances	942.4	542.1	19,652.3	–	–	21,136.8
Governments and other securities	34,230.0	9,154.7	5,565.4	8,375.1	77.3	57,402.5
Derivative financial instruments	142.4	16.9	2,059.8	1.6	–	2,220.7
Accounts receivable	1.1	6.2	178.9	5.6	–	191.8
Total on-balance sheet exposure	**119,683.2**	**11,802.3**	**64,662.9**	**13,133.6**	**77.3**	**209,359.3**
Commitments						
Undrawn unsecured facilities	220.9	–	–	–	–	220.9
Undrawn secured facilities	2,451.4	–	–	–	–	2,451.4
Total commitments	**2,672.3**	**–**	**–**	**–**	**–**	**2,672.3**
Total exposure	**122,355.5**	**11,802.3**	**64,662.9**	**13,133.6**	**77.3**	**212,031.6**

As at 31 March 2016

SDR millions	Sovereign and central banks	Public sector	Banks	Corporate	Securitisation	Total
On-balance sheet exposures						
Cash and sight accounts with banks	25,729.9	–	117.1	–	–	25,847.0
Gold and gold loans	2,246.7	–	1,109.6	–	–	3,356.3
Treasury bills	37,533.9	2,044.7	–	–	–	39,578.6
Securities purchased under resale agreements	1,609.3	–	46,077.8	8,531.5	–	56,218.6
Loans and advances	491.1	514.3	16,332.0	–	–	17,337.4
Government and other securities	43,567.5	10,415.9	5,123.6	7,692.5	328.9	67,128.4
Derivative financial instruments	177.5	11.9	1,495.2	0.7	–	1,685.3
Accounts receivable	6.1	0.5	27.7	7.5	–	41.8
Total on-balance sheet exposure	111,362.0	12,987.3	70,283.0	16,232.2	328.9	211,193.4
Commitments						
Undrawn unsecured facilities	212.9	–	–	–	–	212.9
Undrawn secured facilities	3,121.6	–	–	–	–	3,121.6
Total commitments	3,334.5		–		–	3,334.5
Total exposure	114,696.5	12,987.3	70,283.0	16,232.2	328.9	214,527.9

Default risk by geographical region

The following tables represent the exposure of the Bank to default risk by asset class and geographical region, without taking into account any collateral held or other credit enhancements available to the Bank. Exposures are allocated to regions based on the country of incorporation of each legal entity.

As at 31 March 2017

SDR millions	Africa and Europe	Asia-Pacific	Americas	International institutions	Total
On-balance sheet exposures					
Cash and sight accounts	39,887.0	8,371.0	37.5	–	48,295.5
Gold and gold loans	18.5	–	–	–	18.5
Treasury bills	7,976.6	20,512.5	5,592.1	2,082.4	36,163.6
Securities purchased under resale agreements	41,182.1	–	2,747.8	–	43,929.9
Loans and advances	13,794.2	4,433.7	2,366.8	542.1	21,136.8
Government and other securities	28,523.6	9,873.2	13,961.4	5,044.3	57,402.5
Derivative financial instruments	1,448.3	324.1	431.4	16.9	2,220.7
Accounts receivable and other assets	178.8	1.2	7.8	4.0	191.8
Total on-balance sheet exposure	**133,009.1**	**43,515.7**	**25,144.8**	**7,689.7**	**209,359.3**
Commitments					
Undrawn unsecured facilities	–	220.9	–	–	220.9
Undrawn secured facilities	236.2	2,215.2	–	–	2,451.4
Total commitments	**236.2**	**2,436.1**	**–**	**–**	**2,672.3**
Total exposure	**133,245.3**	**45,951.8**	**25,144.8**	**7,689.7**	**212,031.6**

As at 31 March 2016

SDR millions	Africa and Europe	Asia-Pacific	Americas	International institutions	Total
On-balance sheet exposures					
Cash and sight accounts with banks	21,876.7	3,963.7	6.6	–	25,847.0
Gold and gold loans	3,300.2	–	56.1	–	3,356.3
Treasury bills	10,472.6	20,111.5	6,949.8	2,044.7	39,578.6
Securities purchased under resale agreements	52,975.8	–	3,242.8	–	56,218.6
Loans and advances	11,623.3	4,436.2	763.7	514.2	17,337.4
Government and other securities	33,494.2	7,883.6	19,216.1	6,534.5	67,128.4
Derivative financial instruments	1,280.8	217.2	179.9	7.4	1,685.3
Accounts receivable	39.9	1.7	0.2	–	41.8
Total on-balance sheet exposure	135,063.5	36,613.9	30,415.2	9,100.8	211,193.4
Commitments					
Undrawn unsecured facilities		212.9			212.9
Undrawn secured facilities	242.4	2,879.2	–	–	3,121.6
Total commitments	242.4	3,092.1	–	–	3,334.5
Total exposure	135,305.9	39,706.0	30,415.2	9,100.8	214,527.9

Default risk by counterparty / issuer rating

The following tables show the exposure of the Bank to default risk by class of financial asset and counterparty / issuer rating, without taking into account any collateral held or other credit enhancements available to the Bank. The ratings shown reflect the Bank's internal ratings expressed as equivalent external ratings.

As at 31 March 2017

SDR millions	AAA	AA	A	BBB	BB and below	Unrated	Total
On-balance sheet exposures							
Cash and sight accounts	29,400.3	7,424.4	10,134.2	1,336.5	0.1	–	48,295.5
Gold and gold loans	–	–	18.5	–	–	–	18.5
Treasury bills	1,455.1	10,037.6	21,984.2	2,686.7	–	–	36,163.6
Securities purchased under resale agreements	–	6,762.9	30,304.2	6,862.8	–	–	43,929.9
Loans and advances	854.8	335.7	18,576.4	780.5	589.4	–	21,136.8
Government and other securities	9,657.0	30,464.4	16,218.0	1,063.1	–	–	57,402.5
Derivative financial instruments	–	57.8	2,031.2	15.9	106.4	9.4	2,220.7
Accounts receivable	7.9	0.3	133.7	37.8	0.4	11.7	191.8
Total on-balance sheet exposure	**41,375.1**	**55,083.1**	**99,400.4**	**12,783.3**	**696.3**	**21.1**	**209,359.3**
Commitments							
Undrawn unsecured facilities	–	–	–	220.9	–	–	220.9
Undrawn secured facilities	–	622.2	584.6	1,008.4	236.2	–	2,451.4
Total commitments	**–**	**622.2**	**584.6**	**1,229.3**	**236.2**	**–**	**2,672.3**
Total exposure	**41,375.1**	**55,705.3**	**99,985.0**	**14,012.6**	**932.5**	**21.1**	**212,031.6**

As at 31 March 2016

SDR millions	AAA	AA	A	BBB	BB and below	Unrated	Total
On-balance sheet exposures							
Cash and sight accounts with banks	19,153.4	1,492.9	5,200.1	0.3	0.3	–	25,847.0
Gold and gold loans	–	2,246.7	1,109.6	–	–	–	3,356.3
Treasury bills	2,568.7	11,919.2	21,630.2	3,460.5	–	–	39,578.6
Securities purchased under resale agreements	–	10,140.8	35,739.1	10,338.7	–	–	56,218.6
Loans and advances	721.4	–	15,622.1	497.1	496.8	–	17,337.4
Government and other securities	15,385.6	37,181.1	13,416.9	1,112.2	32.6	–	67,128.4
Derivative financial instruments	0.5	53.7	1,589.8	26.4	3.8	11.1	1,685.3
Accounts receivable	–	0.2	28.2	0.6	1.1	11.7	41.8
Total on-balance sheet exposure	37,829.6	63,034.6	94,336.0	15,435.8	534.6	22.8	211,193.4
Commitments							
Undrawn unsecured facilities	–	–	–	212.9	–	–	212.9
Undrawn secured facilities	–	930.8	952.4	996.0	242.4	–	3,121.6
Total commitments	–	930.8	952.4	1,208.9	242.4	–	3,334.5
Total exposure	37,829.6	63,965.4	95,288.4	16,644.7	777.0	22.8	214,527.9

C. Credit risk mitigation

Netting

Netting agreements give the Bank a legally enforceable right to net transactions with counterparties under potential future conditions, notably an event of default. Such master netting or similar agreements apply to counterparties with which the Bank conducts most of its derivative transactions, as well as to counterparties used for repurchase and reverse repurchase agreement transactions. Where required, netting is applied when determining the amount of collateral to be requested or provided, but the Bank does not settle assets and liabilities on a net basis during the normal course of business. As such, the amounts shown on the Bank's balance sheet are the gross amounts.

Collateral

The Bank mitigates credit risk by requiring counterparties to provide collateral. The Bank receives collateral in respect of most derivative contracts and reverse repurchase agreements and for advances made under collateralised facility agreements. During the term of these transactions, further collateral may be called or collateral may be released based on the movements in value of both the underlying instrument and the collateral that has been received. The Bank is required to provide collateral in respect of repurchase agreements.

For derivative contracts and reverse repurchase agreements, the Bank accepts as collateral high-quality sovereign, state agency and supranational securities and, in a limited number of cases, cash. For advances made under collateralised facility agreements, collateral accepted includes currency deposits with the Bank, units in the BIS Investment Pools and gold.

Under the terms of its collateral arrangements, the Bank is permitted to sell ("re-hypothecate") collateral received on derivative contracts and reverse repurchase agreements, but upon expiry of the transaction must return equivalent financial instruments to the counterparty. At 31 March 2017, the Bank had lent out SDR 0.1 million of the collateral it held (2016: nil).

The fair value of collateral held which the Bank had the right to sell was:

As at 31 March

SDR millions	**2017**	2016
Collateral held in respect of:		
Derivatives	170.9	247.6
Securities purchased under resale agreements	28,919.2	40,423.5
Total	**29,090.1**	40,671.1

Financial assets and liabilities subject to netting or collateralisation

The tables below show the categories of assets and liabilities which are either subject to collateralisation, or for which netting agreements would apply under potential future conditions such as the event of default of a counterparty.

The amount of collateral required is usually based on valuations performed on the previous business day, whereas the Bank's balance sheet reflects the valuations of the reporting date. Due to this timing difference, the valuation of collateral can be higher than the valuation of the underlying contract in the Bank's balance sheet. The amount of the collateral obtained is also impacted by thresholds, minimum transfer amounts and valuation adjustments ("haircuts") specified in the contracts. In these tables, the mitigating effect of collateral has been limited to the balance sheet value of the underlying net asset.

As at 31 March 2017		Effect of risk mitigation				Analysed as:	
SDR millions	Gross carrying amount as per balance sheet	Adjustments for settlement date effects	Enforceable netting agreements	Collateral (received) / provided (limited to balance sheet value)	Exposure after risk mitigation	Amounts not subject to risk mitigation agreements	Amounts subject to risk mitigation agreements
Financial assets							
Securities purchased under resale agreements	43,929.9	(13,356.4)	–	(30,571.3)	2.2	–	2.2
Advances	589.4	–	–	(589.4)	–	–	–
Derivative financial assets	2,220.7	–	(1,525.1)	(240.6)	455.0	20.6	434.4
Financial liabilities							
Securities sold under repurchase agreements	(1,418.6)	–	–	1,417.8	.	.	.
Derivative financial liabilities	(1,823.5)	–	1,525.1	–	.	.	.

As at 31 March 2016		Effect of risk mitigation				Analysed as:	
SDR millions	Gross carrying amount as per balance sheet	Adjustments for settlement date effects	Enforceable netting agreements	Collateral (received) / provided (limited to balance sheet value)	Exposure after risk mitigation	Amounts not subject to risk mitigation agreements	Amounts subject to risk mitigation agreements
Financial assets							
Securities purchased under resale agreements	56,218.6	(14,456.4)	–	(41,762.2)	–	–	–
Advances	496.8	–	–	(496.8)	–	–	–
Derivative financial assets	1,685.3	–	(1,357.8)	(168.6)	158.9	106.9	52.0
Financial liabilities							
Securities sold under repurchase agreements	(1,447.7)	203.0	–	1,244.7	.	.	.
Derivative financial liabilities	(3,902.2)	–	1,357.8	–	.	.	.

D. Economic capital for credit risk

The Bank determines economic capital for credit risk (except for FX settlement risk, which is included in the utilisation for credit risk) using a VaR methodology on the basis of a portfolio VaR model, assuming a one-year time horizon and a 99.995% confidence level. The amount of economic capital set aside for FX settlement risk reflected in the Bank's economic capital calculations is based on an assessment by Management.

For the financial year	2017				2016			
SDR millions	Average	High	Low	At 31 March	Average	High	Low	At 31 March
Economic capital utilisation for credit risk	7,825.4	9,015.5	7,100.1	**9,015.5**	8,498.9	9,182.0	7,785.6	8,089.1

E. Minimum capital requirements for credit risk

Exposure to sovereigns, banks and corporates

For the calculation of risk-weighted assets for exposures to sovereigns, banks and corporates, the Bank has adopted an approach that is consistent with the advanced internal ratings-based approach.

As a general rule, under this approach risk-weighted assets are determined by multiplying the credit risk exposures with risk weights derived from the relevant Basel II risk weight function using the Bank's own estimates for key inputs. These estimates for key inputs are also relevant to the Bank's economic capital calculation for credit risk.

The credit risk exposure for a transaction or position is referred to as the exposure at default (EAD). The Bank determines the EAD as the notional amount of on- and off-balance sheet credit exposures, except for securities and derivative contracts. The EAD for derivatives is calculated using an approach consistent with the internal models method proposed under the Basel II framework. In line with this methodology, the Bank calculates effective expected positive exposures that are then multiplied by a factor alpha as set out in the framework.

Key inputs to the risk weight function are a counterparty's estimated one-year probability of default (PD) as well as the estimated loss-given-default (LGD) and maturity for each transaction.

Due to the high credit quality of the Bank's investments and the conservative credit risk management process at the BIS, the Bank is not in a position to estimate PDs and LGDs based on its own default experience. The Bank calibrates each counterparty PD estimate through a mapping of internal rating grades to external credit assessments taking external default data into account. Similarly, LGD estimates are derived from external data. Where appropriate, these estimates are adjusted to reflect the risk-reducing effects of collateral obtained giving consideration to market price volatility, re-margining and revaluation frequency. The recognition of the risk-reducing effects of collateral obtained for derivative contracts, reverse repurchase agreements and collateralised advances is accounted for in calculating the EAD.

The table below details the calculation of risk-weighted assets. The exposures are measured taking netting and collateral benefits into account. The total amount of exposures reported in the table as at 31 March 2017 includes SDR 142.2 million for interest rate contracts (2016: SDR 118.9 million) and SDR 435.0 million for FX and gold contracts (2016: SDR 283.5 million). In line with the Basel II framework, the minimum capital requirement is determined as 8% of risk-weighted assets.

As at 31 March 2017

Internal rating grades expressed as equivalent external rating grades *SDR millions / percentages*	Amount of exposure *SDR millions*	Exposure-weighted PD *%*	Exposure-weighted average LGD *%*	Exposure-weighted average risk weight *%*	Risk-weighted assets *SDR millions*
AAA	40,818.0	0.01	37.0	1.9	788.5
AA	50,913.9	0.02	44.0	7.8	3,957.7
A	68,510.2	0.04	53.8	10.3	7,068.4
BBB	6,233.8	0.28	58.7	44.1	2,751.0
BB and below	9.2	1.72	59.0	100.7	9.3
Total	**166,485.1**				**14,574.9**

As at 31 March 2016

Internal rating grades expressed as equivalent external rating grades *SDR millions / percentages*	Amount of exposure *SDR millions*	Exposure-weighted PD *%*	Exposure-weighted average LGD *%*	Exposure-weighted average risk weight *%*	Risk-weighted assets *SDR millions*
AAA	37,006.0	0.01	35.7	2.4	879.5
AA	54,277.8	0.02	39.6	6.4	3,496.3
A	58,498.3	0.04	48.4	9.1	5,296.6
BBB	5,518.4	0.17	51.1	27.6	1,525.0
BB and below	50.5	1.20	53.4	93.1	47.0
Total	155,351.0				11,244.4

At 31 March 2017, the minimum capital requirement for credit risk related to exposures to sovereigns, banks and corporates was SDR 1,166.0 million (2016: SDR 899.6 million).

The following table summarises the impact of collateral arrangements on the amount of credit exposure after taking netting into account:

SDR millions	Amount of exposure after taking netting into account	Benefits from collateral arrangements	Amount of exposure after taking into account netting and collateral arrangements
As at 31 March 2017	212,369.1	45,884.0	**166,485.1**
As at 31 March 2016	213,873.1	58,522.1	155,351.0

Securitisation exposures

The Bank invests in highly rated securitisation exposures based on traditional, ie non-synthetic, securitisation structures. Given the scope of the Bank's activities, risk-weighted assets under the Basel II framework are determined according to the standardised approach for securitisation. Under this approach, external credit assessments of the securities are used to determine the relevant risk weights. External credit assessment institutions used for this purpose are Moody's Investors Service, Standard & Poor's and Fitch Ratings. Risk-weighted assets are then derived as the product of the market values of the exposures and the associated risk weights. In line with the Basel II framework, the minimum capital requirement is determined as 8% of risk-weighted assets.

The following table shows the Bank's investments in securitisation analysed by type of securitised assets:

As at 31 March 2017

SDR millions	External rating	Amount of exposures	Risk weight	Risk-weighted assets
Securities backed by other receivables (government-sponsored)	AAA	77.3	20%	15.5
Total		**77.3**		**15.5**

As at 31 March 2016

SDR millions	External rating	Amount of exposures	Risk weight	Risk-weighted assets
Securities backed by other receivables (government-sponsored)	AAA	328.9	20%	65.8
Total		328.9		65.8

At 31 March 2017, the minimum capital requirement for securitisation exposures was SDR 1.2 million (2016: SDR 5.3 million).

4. Market risk

The Bank is exposed to market risk through adverse movements in market prices. The main components of the Bank's market risk are gold price risk, interest rate risk and foreign exchange risk. The Bank measures market risk and calculates economic capital based on a VaR methodology using a Monte Carlo simulation technique. Risk factor volatilities and correlations are estimated, subject to an exponential weighting scheme, over a six-year observation period. Furthermore, the Bank computes sensitivities to certain market risk factors.

In line with the Bank's objective of maintaining its superior credit quality, economic capital is measured at the 99.995% confidence level assuming a one-year holding period. The Bank calculates the economic capital utilisation for market risk on the basis of a stressed market data set. The Bank's Management manages market risk economic capital usage within a framework set by the Board of Directors. VaR limits are supplemented by operating limits.

To ensure that models provide a reliable measure of potential losses over the one-year time horizon, the Bank has established a comprehensive regular backtesting framework, comparing daily performance with corresponding VaR estimates. The results are analysed and reported to Management.

The Bank also supplements its market risk measurement based on VaR modelling and related economic capital calculations with a series of stress tests. These include severe historical scenarios, adverse hypothetical macroeconomic scenarios and sensitivity tests of gold price, interest rate and foreign exchange rate movements.

A. Gold price risk

Gold price risk is the exposure of the Bank's financial condition to adverse movements in the price of gold.

The Bank is exposed to gold price risk principally through its holdings of gold investment assets. These gold investment assets are held in custody or placed on deposit with commercial banks. At 31 March 2017, the Bank's net gold investment assets were 103 tonnes with a value of SDR 3,048.5 million (2016: 104 tonnes, SDR 2,944.6 million), approximately 16% of its equity (2016: 16%). The Bank sometimes also has small exposures to gold price risk arising from its banking activities with central and commercial banks. Gold price risk is measured within the Bank's VaR methodology, including its economic capital framework and stress tests.

B. Interest rate risk

Interest rate risk is the exposure of the Bank's financial condition to adverse movements in interest rates including credit spreads. The Bank is exposed to interest rate risk through the interest-bearing assets relating to the management of its equity held in its investment portfolios and investments relating to its banking portfolios. The investment portfolios are managed using a fixed-duration benchmark of bonds.

The Bank measures and monitors interest rate risk using a VaR methodology and sensitivity analyses taking into account movements in relevant money market rates, government bond yields, swap rates and credit spreads.

The following tables show the impact on the Bank's equity of a 1% upward shift in the relevant yield curve per time band:

As at 31 March 2017

SDR millions	Up to 6 months	6 to 12 months	1 to 2 years	2 to 3 years	3 to 4 years	4 to 5 years	Over 5 years	Total
Euro	13.0	(8.7)	(18.5)	(26.7)	(21.8)	(41.4)	(63.8)	(167.9)
Japanese yen	8.9	0.8	0.1	(0.1)	–	–	–	9.7
Pound sterling	(3.0)	(0.5)	(7.2)	(13.9)	(10.1)	(3.0)	10.8	(26.9)
Renminbi	(2.8)	(4.1)	(5.4)	(2.3)	–	–	–	(14.6)
Swiss franc	8.5	(0.5)	(0.2)	(0.3)	(0.9)	(1.1)	(3.6)	1.9
US dollar	11.8	(19.1)	(43.8)	(34.5)	(68.5)	(48.5)	(18.0)	(220.6)
Other currencies	(0.6)	(0.2)	(0.5)	(0.3)	(1.3)	1.1	0.1	(1.7)
Total	**35.8**	**(32.3)**	**(75.5)**	**(78.1)**	**(102.6)**	**(92.9)**	**(74.5)**	**(420.1)**

As at 31 March 2015

SDR millions	Up to 6 months	6 to 12 months	1 to 2 years	2 to 3 years	3 to 4 years	4 to 5 years	Over 5 years	Total
Euro	(1.3)	(5.5)	(33.5)	1.5	(45.6)	(48.3)	(74.0)	(206.7)
Japanese yen	1.5	(0.3)	0.2	(0.2)	–	–	–	1.2
Pound sterling	(1.6)	(0.8)	(10.4)	(17.0)	(19.7)	(5.8)	–	(55.3)
Renminbi	–	0.1	–	–	–	(0.5)	(0.2)	(0.6)
Swiss franc	7.5	(0.4)	(0.8)	(0.2)	–	–	1.4	7.5
US dollar	(2.7)	(12.2)	(37.8)	(56.5)	(51.3)	(59.2)	(7.7)	(227.4)
Other currencies	1.0	0.1	(1.2)	(1.0)	(1.0)	(0.1)	0.3	(1.9)
Total	4.4	(19.0)	(83.5)	(73.4)	(117.6)	(113.9)	(80.2)	(483.2)

C. Foreign exchange risk

The Bank's functional currency, the SDR, is a composite currency comprising fixed amounts of USD, EUR, JPY, GBP and Renminbi. Currency risk is the exposure of the Bank's financial condition to adverse movements in exchange rates. The Bank is exposed to foreign exchange risk primarily through the assets relating to the management of its equity. The Bank is also exposed to foreign exchange risk through managing its customer deposits and through acting as an intermediary in foreign exchange transactions. The Bank reduces its foreign exchange exposures by matching the relevant assets to the constituent currencies of the SDR on a regular basis, and by limiting currency exposures arising from customer deposits and foreign exchange transaction intermediation.

The following tables show the Bank's assets and liabilities by currency and gold exposure. The net foreign exchange and gold position in these tables therefore includes the Bank's gold investments. To determine the Bank's net foreign exchange exposure, the gold amounts need to be removed. The SDR-neutral position is then deducted from the net foreign exchange position excluding gold to arrive at the net currency exposure of the Bank on an SDR-neutral basis.

As at 31 March 2017

SDR millions	SDR	USD	EUR	GBP	JPY	RMB	CHF	Gold	Other currencies	Total
Assets										
Cash and sight accounts	–	6.8	29,976.5	818.9	8,354.4	1.5	8,659.3	–	478.1	48,295.5
Gold and gold loans	–	–	–	–	–	–	–	27,276.0	–	27,276.0
Treasury bills	–	4,985.8	8,149.6	322.5	19,394.4	36.9	55.3	–	3,219.1	36,163.6
Securities purchased under resale agreements	–	3,199.1	25,654.4	10,720.8	4,355.6	–	–	–	–	43,929.9
Loans and advances	498.6	10,434.2	6,398.5	1,146.8	5.8	–	272.9	–	2,380.0	21,136.8
Government and other securities	–	25,847.6	16,033.4	6,102.9	2,494.2	2,272.9	101.6	–	4,549.9	57,402.5
Derivative financial instruments	2,091.0	49,267.9	(35,776.0)	(448.0)	(2,147.6)	1,244.4	(3,802.2)	(7,925.8)	(283.0)	2,220.7
Accounts receivable	–	4,791.8	71.4	37.3	–	1.1	9.5	–	715.4	5,626.5
Land, buildings and equipment	182.1	–	–	–	–	–	14.8	–	–	196.9
Total assets	**2,771.7**	**98,533.2**	**50,507.8**	**18,701.2**	**32,456.8**	**3,556.8**	**5,311.2**	**19,350.2**	**11,059.5**	**242,248.4**
Liabilities										
Gold deposits	–	–	–	–	–	–	–	(9,934.5)	–	(9,934.5)
Currency deposits	(2,875.2)	(147,534.4)	(21,788.8)	(11,348.0)	(1,451.4)	(2,249.0)	(359.9)	–	(6,835.7)	(194,442.4)
Securities sold under repurchase agreements	–	(9.6)	(1,244.0)	(165.0)	–	–	–	–	–	(1,418.6)
Derivative financial instruments	–	56,660.6	(11,338.9)	(4,925.4)	(28,435.2)	478.1	(4,534.7)	(6,366.2)	(3,361.8)	(1,823.5)
Accounts payable	–	(167.5)	(11,120.7)	(948.3)	(1,320.4)	–	–	–	(886.6)	(14,443.5)
Other liabilities	–	(0.4)	–	–	–	–	(1,087.0)	–	(1.3)	(1,088.7)
Total liabilities	**(2,875.2)**	**(91,051.3)**	**(45,492.4)**	**(17,386.7)**	**(31,207.0)**	**(1,770.9)**	**(5,981.6)**	**(16,300.7)**	**(11,085.4)**	**(223,151.2)**
Net currency and gold position	**(103.5)**	**7,481.9**	**5,015.4**	**1,314.5**	**1,249.8**	**1,785.9**	**(670.4)**	**3,049.5**	**(25.9)**	**19,097.2**
Adjustment for gold	–	–	–	–	–	–	–	(3,049.5)	–	(3,049.5)
Net currency position	**(103.5)**	**7,481.9**	**5,015.4**	**1,314.5**	**1,249.8**	**1,785.9**	**(670.4)**	**–**	**(25.9)**	**16,047.7**
SDR-neutral position	103.5	(6,926.2)	(4,916.6)	(1,279.4)	(1,268.9)	(1,760.1)	–	–	–	**(16,047.7)**
Net currency exposure on SDR-neutral basis	**–**	**555.7**	**98.8**	**35.1**	**(19.1)**	**25.8**	**(670.4)**	**–**	**(25.9)**	**–**

As at 31 March 2016

SDR millions	SDR	USD	EUR	GBP	JPY	CHF	Gold	Other currencies	Total
Assets									
Cash and sight accounts	–	5.6	13,066.4	3.6	3,842.9	8,606.0	–	322.5	25,847.0
Gold and gold loans	–	2.8	–	–	–	–	13,174.0	–	13,176.8
Treasury bills	–	6,486.4	10,900.5	507.6	19,660.0	–	–	2,024.1	39,578.6
Securities purchased under resale agreements	–	4,821.6	39,462.2	10,103.7	1,831.1	–	–	–	56,218.6
Loans and advances	514.2	7,453.0	5,158.2	1,476.1	5.6	(2.6)	–	2,732.9	17,337.4
Government and other securities	–	31,211.5	22,081.3	6,323.8	1,328.0	–	–	6,183.8	67,128.4
Derivative financial instruments	(1,035.6)	(2,773.4)	5,017.6	(852.7)	3.1	639.2	–	687.1	1,685.3
Accounts receivable	–	7,971.2	211.5	87.5	–	9.0	–	1,936.7	10,215.9
Land, buildings and equipment	184.5	–	–	–	–	11.9	–	–	196.4
Total assets	(336.9)	55,178.7	95,897.7	17,649.6	26,670.7	9,263.5	13,174.0	13,887.1	231,384.4
Liabilities									
Gold deposits	–	–	–	–	–	–	(10,227.6)	–	(10,227.6)
Currency deposits	(2,048.6)	(135,519.5)	(19,604.2)	(11,849.9)	(1,791.2)	(359.1)	–	(7,618.0)	(178,790.5)
Securities sold under repurchase agreements	–	(569.1)	(878.6)	–	–	–	–	–	(1,447.7)
Derivative financial instruments	3,588.4	89,641.8	(57,575.9)	(3,820.3)	(22,362.5)	(8,297.1)	(0.1)	(5,076.5)	(3,902.2)
Accounts payable	–	(1,810.2)	(12,811.7)	(301.6)	(1,421.1)	–	–	(1,204.2)	(17,548.8)
Other liabilities	–	(0.5)	–	–	–	(1,087.4)	–	(1.1)	(1,089.0)
Total liabilities	1,539.8	(48,257.5)	(90,870.4)	(15,971.8)	(25,574.8)	(9,743.6)	(10,227.7)	(13,899.8)	(213,005.8)
Net currency and gold position	1,202.9	6,921.2	5,027.3	1,677.8	1,095.9	(480.1)	2,946.3	(12.7)	18,378.6
Adjustment for gold	–	–	–	–	–	–	(2,946.3)	–	(2,946.3)
Net currency position	1,202.9	6,921.2	5,027.3	1,677.8	1,095.9	(480.1)	–	(12.7)	15,432.3
SDR-neutral position	(1,202.9)	(6,661.9)	(4,864.5)	(1,615.0)	(1,088.0)	–	–	–	(15,432.3)
Net currency exposure on SDR-neutral basis	–	259.3	162.8	62.8	7.9	(480.1)	–	(12.7)	–

D. Economic capital for market risk

The Bank measures market risk based on a VaR methodology using a Monte Carlo simulation technique taking correlations between risk factors into account. Economic capital for market risk is also calculated following this methodology measured to the 99.995% confidence level and assuming a one-year holding period. The Bank calculates the economic capital utilisation for market risk on the basis of a stressed market data set. The stressed data set is subject to regular review and calibrated to take account of the Bank's key market risk exposures and market risk drivers.

The Bank measures its gold price risk relative to changes in the USD value of gold. The foreign exchange risk component, resulting from changes in the USD exchange rate versus the SDR, is included in the measurement of foreign exchange risk. The following table shows the key figures of the Bank's exposure to market risk in terms of economic capital utilisation over the past two financial years:

For the financial year	**2017**				2016			
SDR millions	Average	High	Low	At 31 March	Average	High	Low	At 31 March
Economic capital utilisation for market risk	3,442.7	3,716.2	3,162.9	**3,326.1**	3,310.7	3,539.6	3,132.9	3,491.1

The following table provides a further analysis of the Bank's economic capital utilisation for market risk by category of risk:

For the financial year	**2017**				2016			
SDR millions	Average	High	Low	At 31 March	Average	High	Low	At 31 March
Gold price risk	2,297.3	2,477.9	2,123.5	**2,318.8**	2,030.8	2,323.6	1,871.2	2,227.1
Interest rate risk	2,276.4	2,545.0	2,058.4	**2,090.8**	2,485.8	2,662.9	2,311.9	2,402.2
Foreign exchange risk	682.1	1,089.7	567.5	**761.9**	843.3	973.2	653.8	669.1
Diversification effects	(1,813.1)	(2,173.7)	(1,617.9)	**(1,845.4)**	(2,049.2)	(2,346.9)	(1,782.3)	(1,807.3)
Total				**3,326.1**				3,491.1

E. Minimum capital requirements for market risk

For the calculation of minimum capital requirements for market risk under the Basel II framework, the Bank has adopted a banking book approach consistent with the scope and nature of its business activities. Consequently, market risk-weighted assets are determined for gold price risk and foreign exchange risk, but not for interest rate risk. The related minimum capital requirement is derived using the VaR-based internal models method. Under this method, VaR calculations are performed using the Bank's VaR methodology, assuming a 99% confidence level and a 10-day holding period.

The actual minimum capital requirement is derived as the higher of the VaR on the calculation date and the average of the daily VaR measures on each of the preceding 60 business days (including the calculation date) subject to a multiplication factor of three plus a potential add-on depending on backtesting results. For the period under consideration, the number of backtesting outliers observed remained within the range where no add-on is required. The following table summarises the market risk development relevant to the calculation of minimum capital requirements and the related risk-weighted assets over the reporting period.

As at 31 March	**2017**			2016		
SDR millions	VaR	Risk-weighted assets (A)	Minimum capital requirement (B)	VaR	Risk-weighted assets (A)	Minimum capital requirement (B)
Market risk, where (A) is derived as (B) / 8%	237.5	8,906.4	**712.5**	219.4	8,226.0	658.1

5. Operational risk

Operational risk is defined by the Bank as the risk of financial loss, or damage to the Bank's reputation, or both, resulting from one or more risk causes, as outlined below:

- Human factors: insufficient personnel, lack of requisite knowledge, skills or experience, inadequate training and development, inadequate supervision, loss of key personnel, inadequate succession planning, or lack of integrity or ethical standards.
- Failed or inadequate processes: a process is poorly designed or unsuitable, or is not properly documented, understood, implemented, followed or enforced.
- Failed or inadequate systems: a system is poorly designed, unsuitable or unavailable, or does not operate as intended.
- External events: the occurrence of an event having an adverse impact on the Bank but outside its control.

Operational risk includes legal risk, but excludes strategic risk.

The Bank's operational risk management framework, policies and procedures comprise the management and measurement of operational risk, including the determination of the relevant key parameters and inputs, business continuity planning and the monitoring of key risk indicators.

The Bank has established a procedure of immediate reporting for operational risk-related incidents. The Operational Risk Management unit develops action plans with the respective units and follows up on their implementation on a regular basis.

For the measurement of operational risk economic capital and operational risk-weighted assets, the Bank has adopted a VaR approach using a Monte Carlo simulation technique that is consistent with the advanced measurement approach proposed under the Basel II framework. In line with the assumptions of the Basel II framework, the quantification of operational risk does not take reputational risk into account. Internal and external loss data, scenario estimates and control self-assessments to reflect changes in the business and control environment of the Bank are key inputs in the calculations. In quantifying its operational risk, the Bank does not take potential protection it may obtain from insurance into account.

A. Economic capital for operational risk

Consistent with the parameters used in the calculation of economic capital for financial risk, the Bank measures economic capital for operational risk to the 99.995% confidence level assuming a one-year holding period. The following table shows the key figures of the Bank's exposure to operational risk in terms of economic capital utilisation over the past two financial years:

For the financial year	**2017**				2016			
SDR millions	Average	High	Low	At 31 March	Average	High	Low	At 31 March
Economic capital utilisation for operational risk	1,200.0	1,200.0	1,200.0	**1,200.0**	1,200.0	1,200.0	1,200.0	1,200.0

B. Minimum capital requirements for operational risk

In line with the key parameters of the Basel II framework, the calculation of the minimum capital requirement for operational risk is determined assuming a 99.9% confidence level and a one-year time horizon. The following table shows the minimum capital requirements for operational risk, and the related risk-weighted assets:

For the financial year	**2017**			2016		
SDR millions	VaR	Risk-weighted assets (A)	Minimum capital requirement (B)	VaR	Risk-weighted assets (A)	Minimum capital requirement (B)
Operational risk, where (A) is derived as (B) / 8%	864.2	10,802.9	**864.2**	838.2	10,476.9	838.2

6. Liquidity risk

Liquidity risk arises when the Bank may not be able to meet expected or unexpected current or future cash flows and collateral needs without affecting its daily operations or its financial condition.

The Bank's currency and gold deposits, principally from central banks and international institutions, comprise 92% (2016: 89%) of its total liabilities. At 31 March 2017, currency and gold deposits originated from 169 depositors (2016: 167 depositors). Within these deposits, there are significant individual customer concentrations, with four customers each contributing in excess of 5% of the total on a settlement date basis (2016: five customers).

Outstanding balances in the currency and gold deposits from central banks, international organisations and other public institutions are the key drivers of the size of the Bank's balance sheet. The Bank is exposed to funding liquidity risk mainly because of the short-term nature of its deposits and because it undertakes to repurchase at fair value certain of its currency deposit instruments at one or two business days' notice. In line with the Bank's objective to maintain a high level of liquidity, it has developed a liquidity management framework, including a ratio, based on conservative assumptions for estimating the liquidity available and the liquidity required.

A. Maturity profile of cash flows

The following tables show the maturity profile of cash flows for assets and liabilities. The amounts disclosed are the undiscounted cash flows to which the Bank is committed. Options are included in the table at fair value and are shown in the "Up to 1 month" category.

As at 31 March 2017

SDR millions	Up to 1 month	1 to 3 months	3 to 6 months	6 to 12 months	1 to 2 years	2 to 5 years	5 to 10 years	Over 10 years	Total
Assets									
Cash and sight accounts	48,295.5	–	–	–	–	–	–	–	48,295.5
Gold and gold loans	27,276.0	–	–	–	–	–	–	–	27,276.0
Treasury bills	8,920.1	11,922.8	6,886.6	8,432.2	–	–	–	–	36,161.7
Securities purchased under resale agreements	16,715.8	13,850.4	–	–	–	–	–	–	30,566.2
Loans and advances	9,926.9	6,980.4	4,159.0	–	–	–	–	–	21,066.3
Government and other securities	3,950.3	2,390.5	5,606.5	11,217.3	11,386.6	21,891.6	2,038.9	–	58,481.7
Total assets	**115,084.6**	**35,144.1**	**16,652.1**	**19,649.5**	**11,386.6**	**21,891.6**	**2,038.9**	**–**	**221,847.4**
Liabilities									
Gold deposits	(9,934.5)	–	–	–	–	–	–	–	(9,934.5)
Currency deposits									
Deposit instruments repayable at 1–2 days' notice	(13,589.5)	(30,328.4)	(16,378.7)	(17,801.8)	(16,647.6)	(5,767.9)	(17.1)	–	(100,531.0)
Other currency deposits	(47,793.2)	(19,446.3)	(12,072.1)	(10,809.8)	–	–	–	–	(90,121.4)
Securities sold under repurchase agreements	(1,269.2)	(148.9)	–	–	–	–	–	–	(1,418.1)
Total liabilities	**(72,586.4)**	**(49,923.6)**	**(28,450.8)**	**(28,611.6)**	**(16,647.6)**	**(5,767.9)**	**(17.1)**	**–**	**(202,005.0)**
Derivatives									
Net settled cash flows									
Options and interest rate contracts	(4.4)	(11.6)	(10.7)	20.0	32.9	(30.8)	(0.5)	–	(5.1)
Gross settled cash flows									
Interest rate contracts									
Inflows	179.8	371.2	3.1	6.9	651.4	36.8	–	–	1,249.2
Outflows	(178.4)	(353.2)	–	(1.3)	(628.8)	(36.7)	–	–	(1,198.4)
Subtotal	1.4	18.0	3.1	5.6	22.6	0.1	–	–	50.8
Currency and gold contracts									
Inflows	47,504.0	40,805.6	14,300.0	17,527.3	3.9	–	–	–	120,140.8
Outflows	(47,149.2)	(40,792.9)	(13,990.1)	(17,431.3)	(2.4)	–	–	–	(119,365.9)
Subtotal	354.8	12.7	309.9	96.0	1.5	–	–	–	774.9
Total derivatives	**351.8**	**19.1**	**302.3**	**121.6**	**57.0**	**(30.7)**	**(0.5)**	**–**	**820.6**
Total future undiscounted cash flows	**42,850.0**	**(14,760.4)**	**(11,496.4)**	**(8,840.5)**	**(5,204.0)**	**16,093.0**	**2,021.3**	**–**	**20,663.0**

As at 31 March 2016

SDR millions	Up to 1 month	1 to 3 months	3 to 6 months	6 to 12 months	1 to 2 years	2 to 5 years	5 to 10 years	Over 10 years	Total
Assets									
Cash and sight accounts	25,847.0	–	–	–	–	–	–	–	25,847.0
Gold and gold loans	10,846.2	585.1	–	1,755.6	–	–	–	–	13,186.9
Treasury bills	6,209.4	13,918.6	8,710.5	9,846.8	–	–	–	–	38,685.3
Securities purchased under resale agreements	33,583.8	7,933.9	242.1	–	–	–	–	–	41,759.8
Loans and advances	5,406.9	9,111.1	2,614.2	27.6	–	–	–	–	17,159.8
Government and other securities	2,622.7	3,482.1	12,018.0	14,778.3	10,389.7	21,898.0	2,550.4	40.6	67,779.8
Total assets	84,516.0	35,030.8	23,584.8	26,408.3	10,389.7	21,898.0	2,550.4	40.6	204,418.6
Liabilities									
Gold deposits	(10,198.7)	(28.9)	–	–	–	–	–	–	(10,227.6)
Currency deposits									
Deposit instruments repayable at 1–2 days' notice	(14,238.8)	(18,088.1)	(10,620.8)	(14,592.2)	(13,238.7)	(12,219.5)	(66.1)	–	(83,064.2)
Other currency deposits	(58,332.2)	(13,950.4)	(6,417.8)	(8,436.4)	(650.1)	–	–	–	(87,786.9)
Securities sold under repurchase agreements	(1,041.6)	(202.9)	–	–	–	–	–	–	(1,244.5)
Total liabilities	(83,811.3)	(32,270.3)	(17,038.6)	(23,028.6)	(13,888.8)	(12,219.5)	(66.1)	–	(182,323.2)
Derivatives									
Net settled cash flows									
Options and interest rate contracts	(3.0)	22.9	(5.5)	113.8	13.7	(38.1)	(6.0)	–	97.8
Gross settled cash flows									
Interest rate contracts									
Inflows	80.2	29.9	3.4	77.3	536.9	510.9	–	–	1,238.6
Outflows	(75.5)	(28.7)	–	(74.9)	(544.8)	(524.5)	–	–	(1,248.4)
Subtotal	4.7	1.2	3.4	2.4	(7.9)	(13.6)	–	–	(9.8)
Currency and gold contracts									
Inflows	73,473.9	36,669.6	12,211.7	14,267.4	–	–	–	–	136,622.6
Outflows	(74,426.1)	(37,186.8)	(12,485.2)	(14,605.9)	–	–	–	–	(138,704.0)
Subtotal	(952.2)	(517.2)	(273.5)	(338.5)	–	–	–	–	(2,081.4)
Total derivatives	(950.5)	(493.1)	(275.6)	(222.3)	5.8	(51.7)	(6.0)	–	(1,993.4)
Total future undiscounted cash flows	(245.8)	2,267.4	6,270.6	3,157.4	(3,493.3)	9,626.8	2,478.3	40.6	20,102.0

The following table shows the contractual expiry date of the credit commitments as at the balance sheet date:

Contractual expiry date

SDR millions	Up to 1 month	1 to 3 months	3 to 6 months	6 to 12 months	1 to 2 years	2 to 5 years	5 to 10 years	Maturity undefined	Total
As at 31 March 2017	–	2,215.2	236.2	220.9	–	–	–	–	**2,672.3**
As at 31 March 2016	–	–	242.4	212.9	–	–	–	2,879.2	3,334.5

B. Liquidity ratio

The Bank has adopted a liquidity risk framework taking into account regulatory guidance issued by the Basel Committee on Banking Supervision related to the Liquidity Coverage Ratio (LCR). The framework is based on a liquidity ratio that compares the Bank's available liquidity with a liquidity requirement over a one-month time horizon assuming a stress scenario. In line with the Basel III liquidity framework, the underlying stress scenario combines an idiosyncratic and a market crisis. However, the liquidity ratio differs in construction from the LCR to reflect the nature and scope of the BIS banking activities – in particular, the short-term nature of the Bank's assets and liabilities. Within the Bank's liquidity framework, the Board of Directors has set a limit for the Bank's liquidity ratio which requires the liquidity available to be at least 100% of the potential liquidity requirement.

The following table provides information on the development of the Bank's liquidity ratio for the last two years:

For the financial year	**2017**				2016			
Percentages	Average	High	Low	At 31 March	Average	High	Low	At 31 March
Liquidity ratio	139.1%	156.5%	120.8%	**151.0%**	140.0%	164.2%	112.6%	140.2%

The liquidity available is determined as the cash inflow from financial instruments over a one-month horizon, along with potential additional liquidity which could be generated from the disposal of highly liquid securities, or by entering into sale and repurchase agreements for a part of the Bank's remaining unencumbered high-quality liquid securities. In calculating the amount of potential additional liquidity, an assessment is performed to identify securities which are of high credit quality and highly liquid. This is followed by a projection of the amounts that could reasonably be generated through selling these securities or entering into repurchase transactions.

The Bank determines the liquidity required as the sum of the cash outflow from financial instruments over a one-month horizon, the estimated early withdrawal of currency deposits, and the estimated drawings of undrawn facilities. As regards currency deposits, it is assumed that all deposits that mature within the time horizon are not rolled over and that a proportion of non-maturing currency deposits is withdrawn from the Bank prior to contractual maturity. At 31 March 2017, the estimated outflow of currency deposits in response to the stress scenario amounted to 44.6% (2016: 49.8%) of the total stock of currency deposits. Moreover, it is assumed that undrawn facilities committed by the Bank would be fully drawn by customers, along with a proportion of undrawn uncommitted facilities.

The following table shows the Bank's estimated liquidity available, the liquidity required and the resulting liquidity ratio:

As at 31 March

SDR billions	**2017**	2016
Liquidity available		
Estimated cash inflows	94.0	74.1
Estimated liquidity from sales of highly liquid securities	35.8	51.7
Estimated sale and repurchase agreements	5.9	3.0
Total liquidity available (A)	**135.7**	128.8
Liquidity required		
Estimated withdrawal of currency deposits	84.3	84.5
Estimated drawings of facilities	4.6	5.1
Estimated other outflows	1.1	2.3
Total liquidity required (B)	**90.0**	91.9
Liquidity ratio (A) / (B)	**151.0%**	140.2%

For reference, the Bank also calculates an LCR following the principles set out in the guidance issued by the BCBS. At 31 March 2017, the Bank's LCR stood at 198.2% (2016: 208.5%).

Independent auditor's report

To the Board of Directors and to the General Meeting
of the Bank for International Settlements, Basel

Report on the audit of the financial statements

Opinion

We have audited the financial statements of the Bank for International Settlements, which comprise the statement of financial position as at 31 March 2017, the statement of comprehensive income, statement of changes in equity and statement of cash flows for the year then ended, and notes to the financial statements, including a summary of significant accounting policies.

In our opinion, the accompanying financial statements give a true and fair view of the financial position of the Bank for International Settlements as at 31 March 2017 and of its financial performance and its cash flows for the year then ended in accordance with the accounting principles described in the financial statements and the Statutes of the Bank.

Basis for opinion

We conducted our audit in accordance with International Standards on Auditing (ISAs). Our responsibilities under those standards are further described in the Auditor's responsibilities for the audit of the financial statements section of our report. We are independent of the Bank for International Settlements in accordance with the International Ethics Standards Board for Accountants' Code of Ethics for Professional Accountants (IESBA Code) together with the ethical requirements that are relevant to our audit of the financial statements in Switzerland, and we have fulfilled our other ethical responsibilities in accordance with these requirements and the IESBA Code. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Responsibilities of management and those charged with governance for the financial statements

Management is responsible for the preparation and fair presentation of the financial statements in accordance with the accounting principles described in the financial statements and the Statutes of the Bank, and for such internal control as management determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, management is responsible for assessing the Bank for International Settlement's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless management either intends to liquidate the Bank for International Settlement or to cease operations, or has no realistic alternative but to do so.

Those charged with governance are responsible for overseeing the Bank for International Settlement's financial reporting process.

Auditor's responsibilities for the audit of the financial statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with ISAs will always detect a material misstatement when it exists.

Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

As part of an audit in accordance with ISAs, we exercise professional judgment and maintain professional skepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.

- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Bank for International Settlement's internal control.

- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by management.

- Conclude on the appropriateness of management's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Bank for International Settlement's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the Bank for International Settlements to cease to continue as a going concern.

- Evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and whether the financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

We communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

Basel, 8 May 2017

Ernst & Young Ltd

Victor Veger John Alton

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