

Annexes

BIS Statistics: Charts

The statistics published by the BIS are a unique source of information about the structure of and activity in the global financial system. BIS statistics are presented in graphical form in this annex and in tabular form in the *BIS Statistical Bulletin*, which is published concurrently with the *BIS Quarterly Review*. For introductions to the BIS statistics and a glossary of terms used in this annex, see the *BIS Statistical Bulletin*.

The data shown in the charts in this annex can be downloaded from the *BIS Quarterly Review* page on the BIS website (www.bis.org/publ/quarterly.htm). Data may have been revised or updated subsequent to the publication of this annex. For the latest data and to download additional data, see the statistics pages on the BIS website (www.bis.org/statistics/index.htm). A release calendar provides advance notice of publication dates (www.bis.org/statistics/relcal.htm).

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A Locational banking statistics

Cross-border claims, by sector, currency and instrument

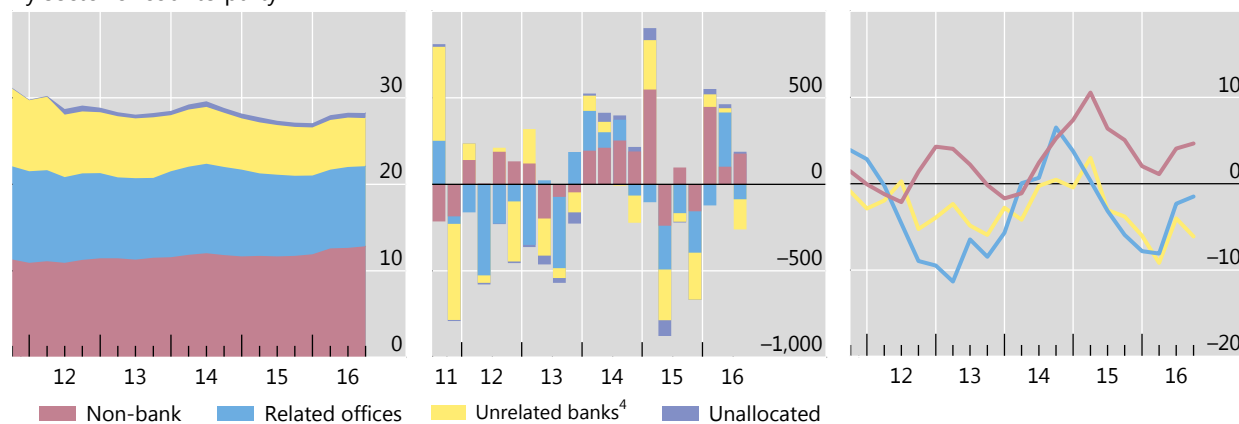
Graph A.1

Amounts outstanding, in USD trn¹

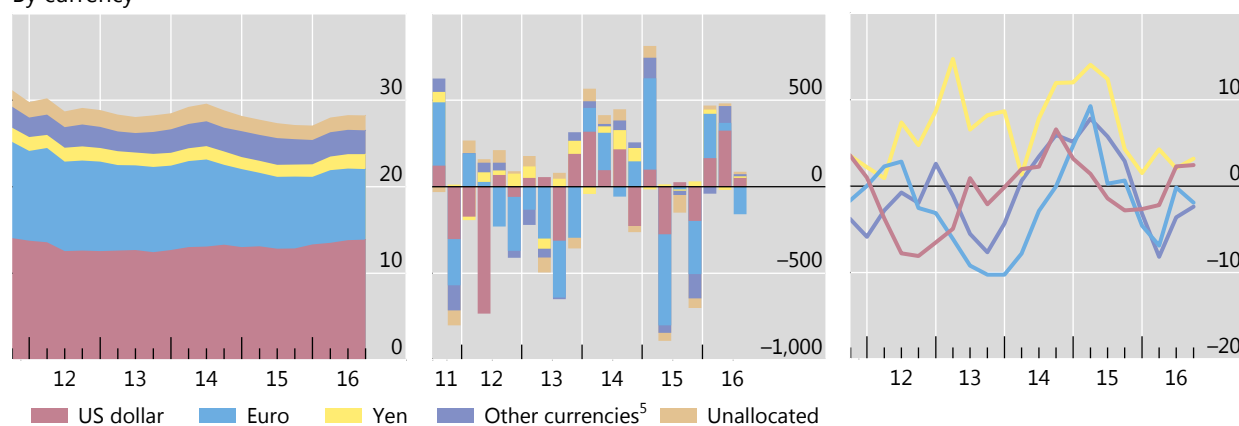
Adjusted changes, in USD bn²

Annual change, in per cent³

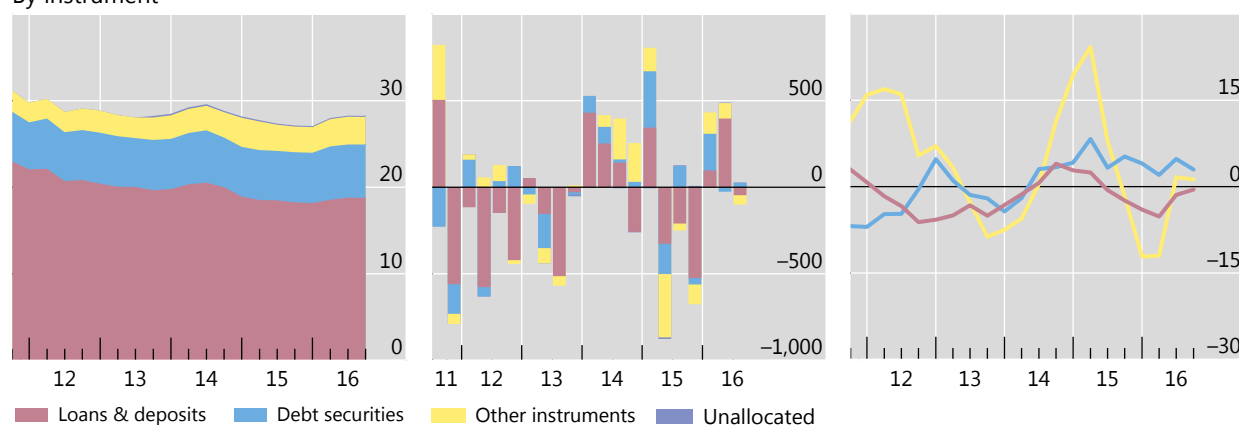
By sector of counterparty



By currency



By instrument



Further information on the BIS locational banking statistics is available at www.bis.org/statistics/bankstats.htm.

¹ At quarter-end. Amounts denominated in currencies other than the US dollar are converted to US dollars at the exchange rate prevailing on the reference date. ² Quarterly changes in amounts outstanding, adjusted for the impact of exchange rate movements between quarter-ends and methodological breaks in the data. ³ Geometric mean of quarterly percentage adjusted changes. ⁴ Includes central banks and banks unallocated by subsector between intragroup and unrelated banks. ⁵ Other reported currencies, calculated as all currencies minus US dollar, euro, yen and unallocated currencies. The currency is known but reporting is incomplete.

Source: BIS locational banking statistics.

Cross-border claims, by borrowing region

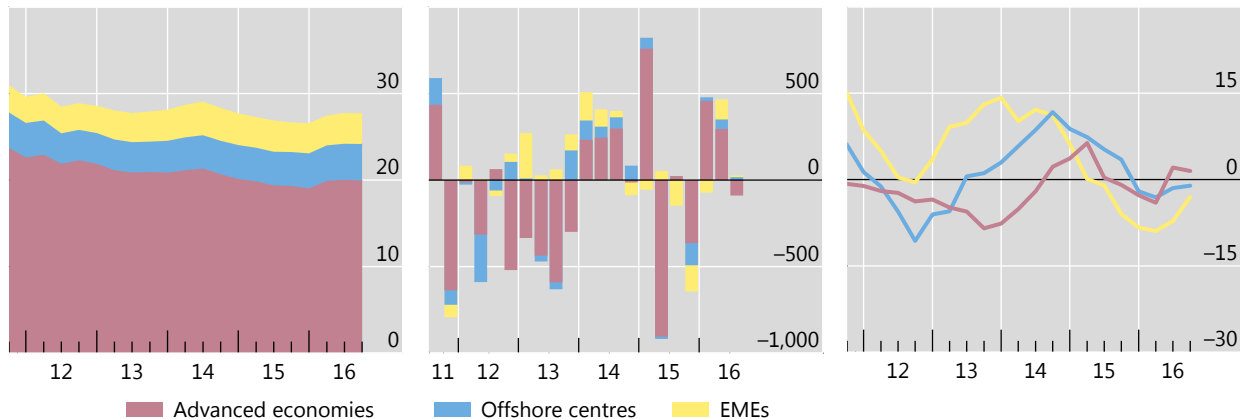
Graph A.2

Amounts outstanding, in USD trn¹

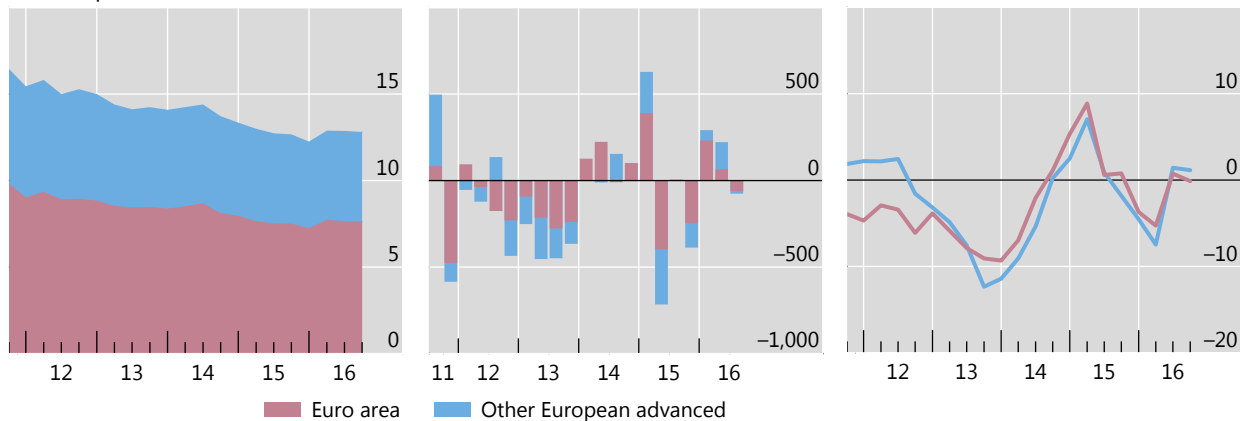
Adjusted changes, in USD bn²

Annual change, in per cent³

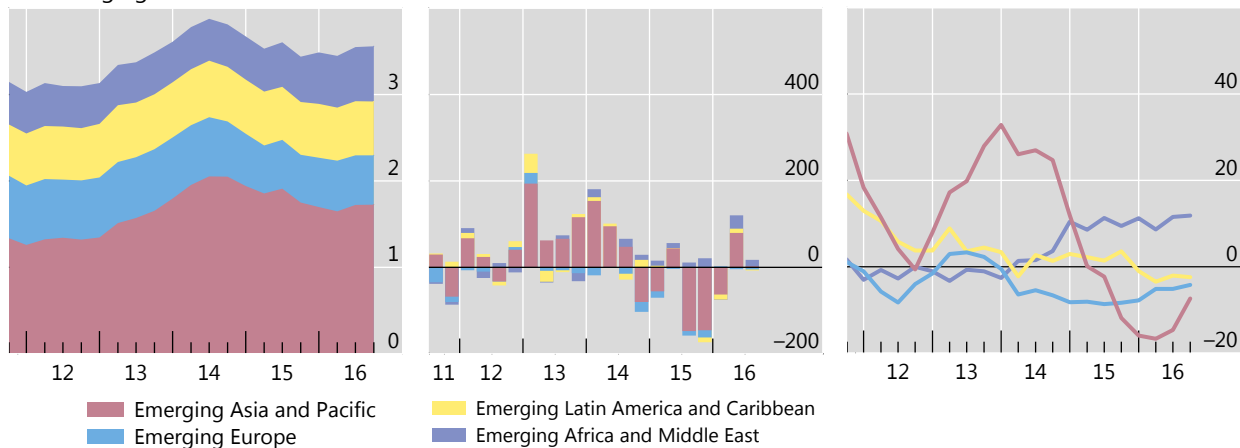
On all countries



On Europe



On emerging market economies



Further information on the BIS locational banking statistics is available at www.bis.org/statistics/bankstats.htm.

¹ At quarter-end. Amounts denominated in currencies other than the US dollar are converted to US dollars at the exchange rate prevailing on the reference date. ² Quarterly changes in amounts outstanding, adjusted for the impact of exchange rate movements between quarter-ends and methodological breaks in the data. ³ Geometric mean of quarterly percentage adjusted changes.

Source: BIS locational banking statistics.

Cross-border claims, by borrowing country

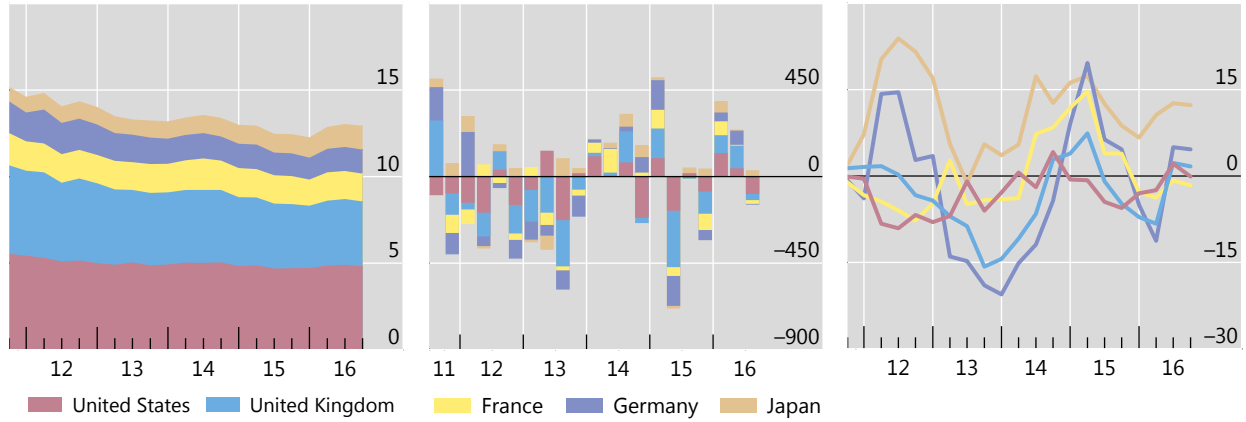
Graph A.3

Amounts outstanding, in USD trn¹

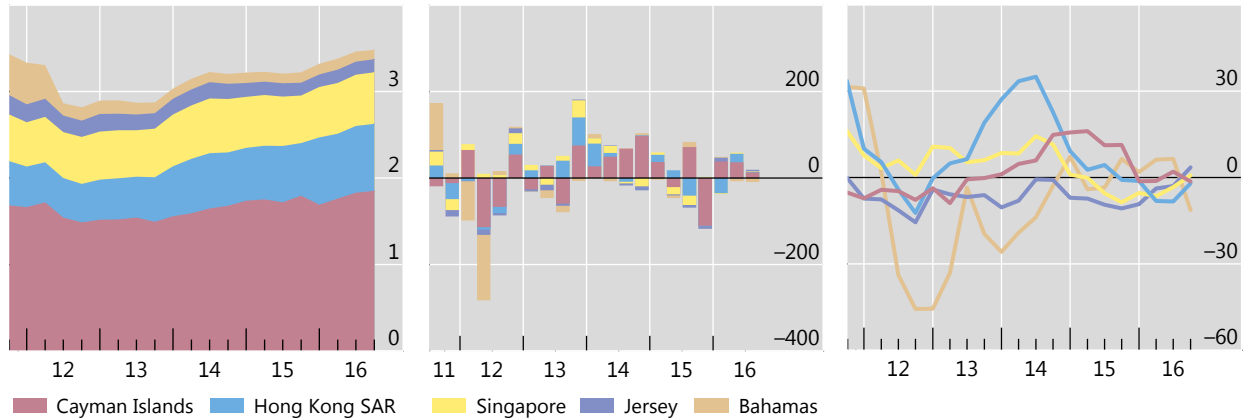
Adjusted changes, in USD bn²

Annual change, in per cent³

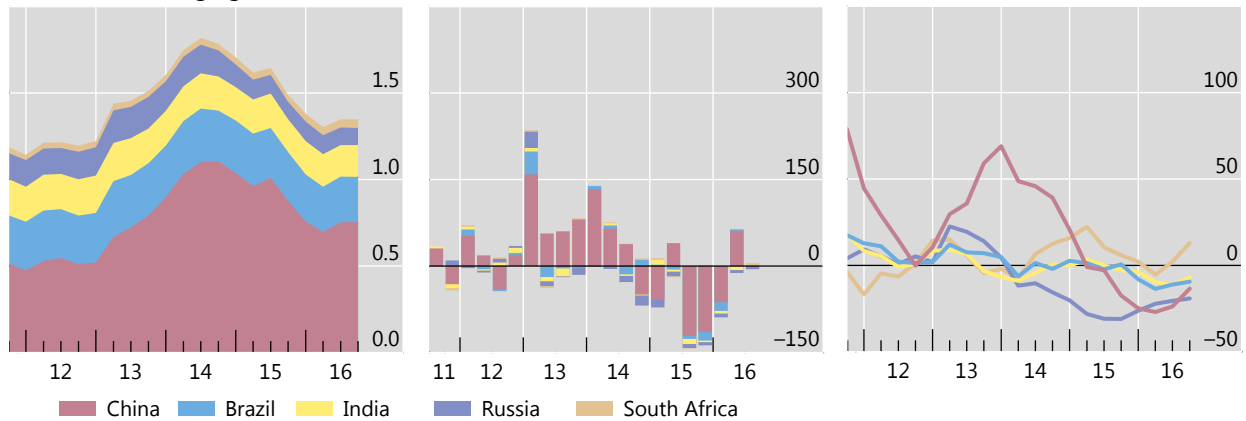
On selected advanced economies



On selected offshore centres



On selected emerging market economies

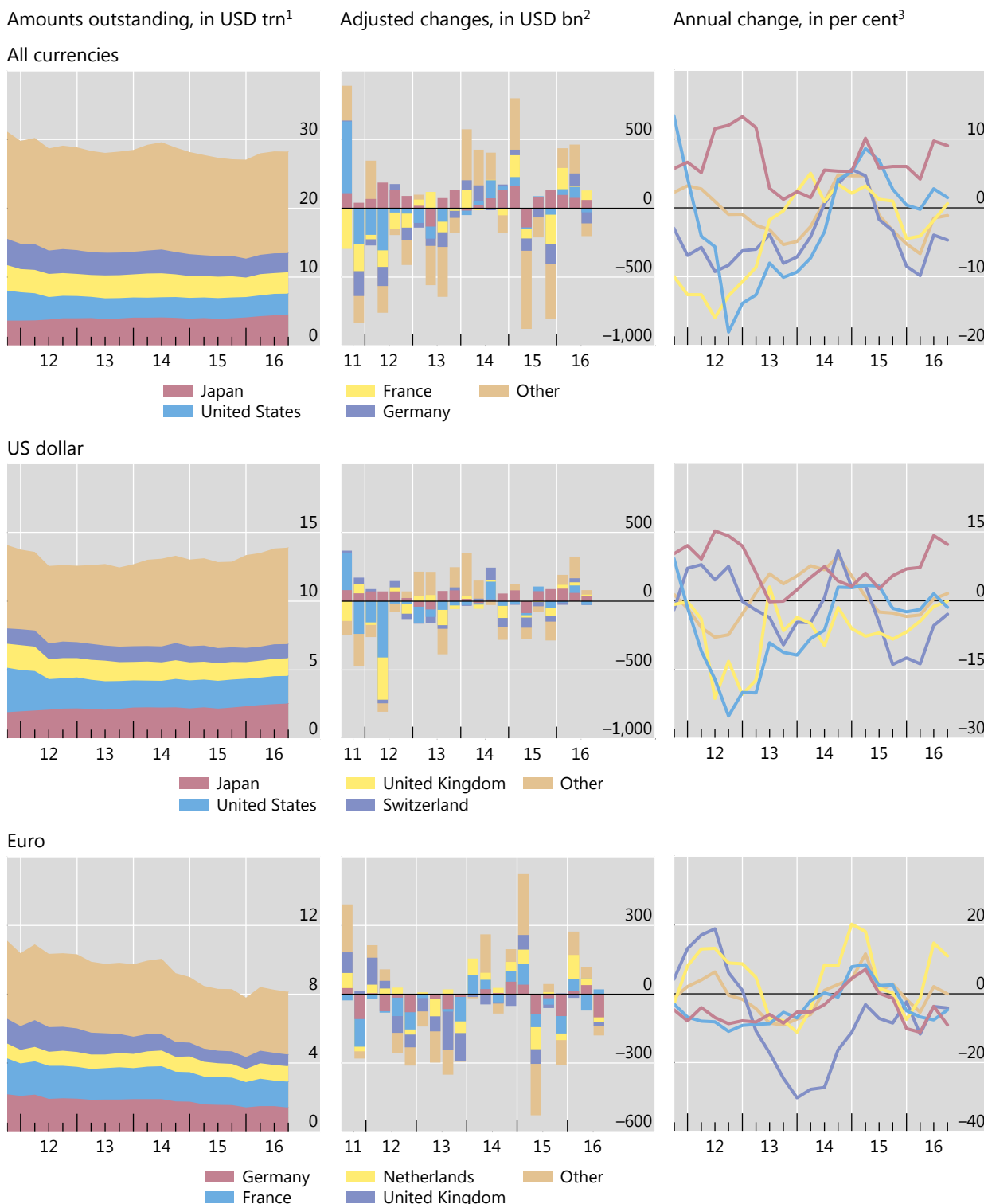


Further information on the BIS locational banking statistics is available at www.bis.org/statistics/bankstats.htm.

¹ At quarter-end. Amounts denominated in currencies other than the US dollar are converted to US dollars at the exchange rate prevailing on the reference date. ² Quarterly changes in amounts outstanding, adjusted for the impact of exchange rate movements between quarter-ends and methodological breaks in the data. ³ Geometric mean of quarterly percentage adjusted changes.

Source: BIS locational banking statistics.

Cross-border claims, by nationality of reporting bank and currency of denomination Graph A.4



Further information on the BIS locational banking statistics is available at www.bis.org/statistics/bankstats.htm.

¹ At quarter-end. Amounts denominated in currencies other than the US dollar are converted to US dollars at the exchange rate prevailing on the reference date. ² Quarterly changes in amounts outstanding, adjusted for the impact of exchange rate movements between quarter-ends and methodological breaks in the data. ³ Geometric mean of quarterly percentage adjusted changes.

Source: BIS locational banking statistics.

Cross-border liabilities of reporting banks

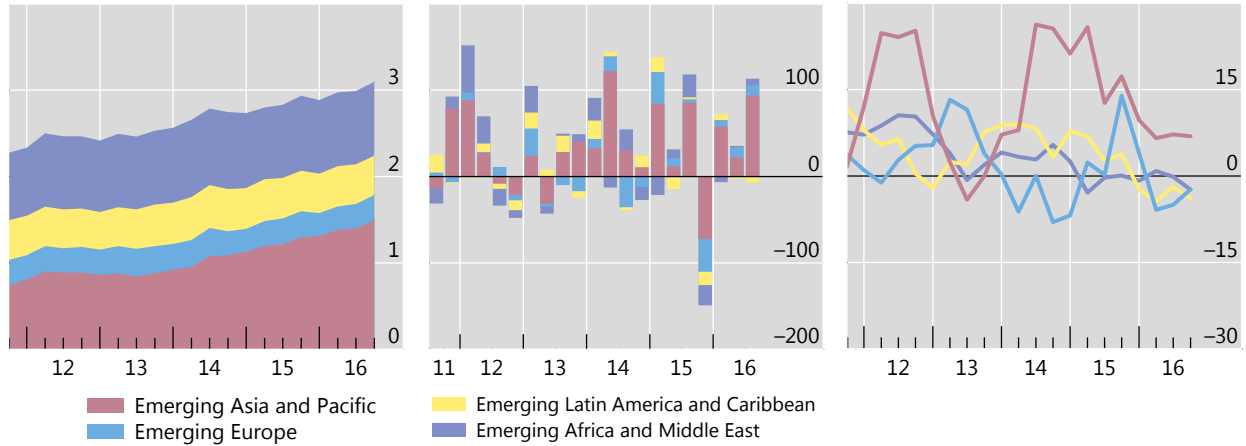
Graph A.5

Amounts outstanding, in USD trn¹

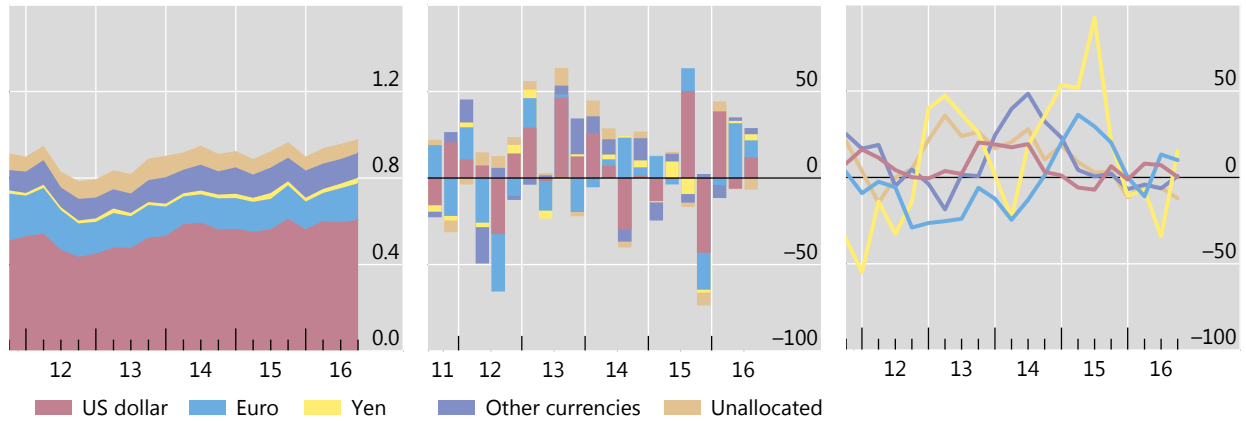
Adjusted changes, in USD bn²

Annual change, in per cent³

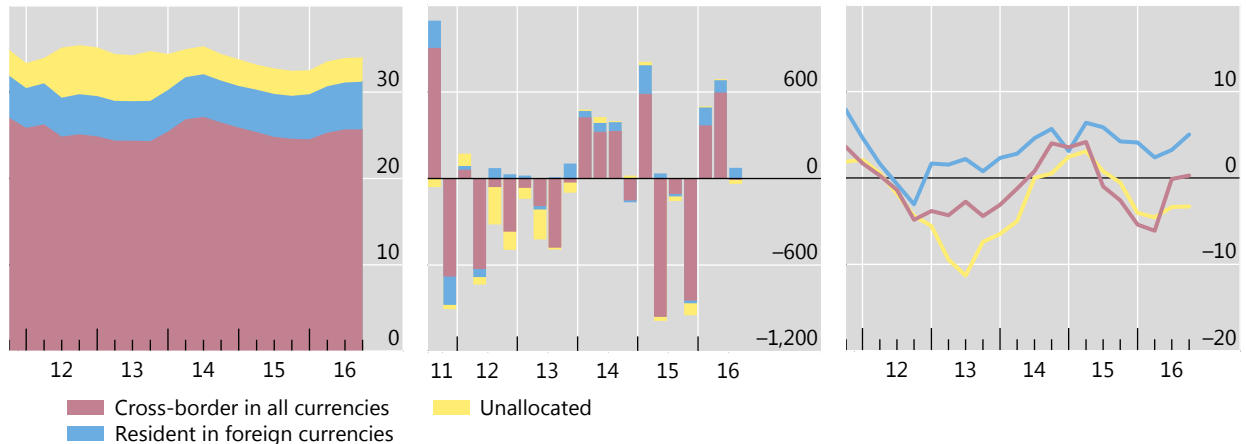
To emerging market economies



To central banks



By currency type and location



Further information on the BIS locational banking statistics is available at www.bis.org/statistics/bankstats.htm.

¹ At quarter-end. Amounts denominated in currencies other than the US dollar are converted to US dollars at the exchange rate prevailing on the reference date. ² Quarterly changes in amounts outstanding, adjusted for the impact of exchange rate movements between quarter-ends and methodological breaks in the data. ³ Geometric mean of quarterly percentage adjusted changes.

Source: BIS locational banking statistics.

B Consolidated banking statistics

Consolidated claims of reporting banks on advanced economies

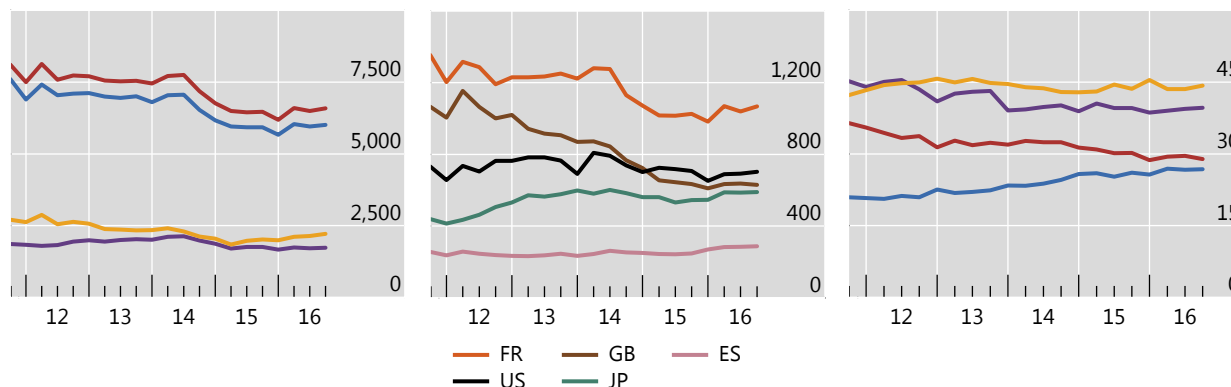
Graph B.1

Foreign claims and local positions, in USD bn^{1,2}

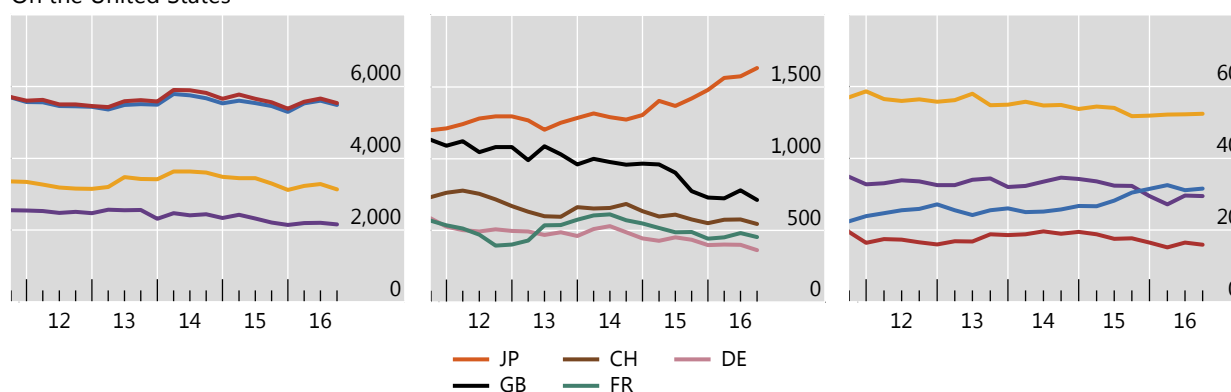
Foreign claims of selected creditors, in USD bn^{1,3}

International claims, by sector and maturity, in per cent⁴

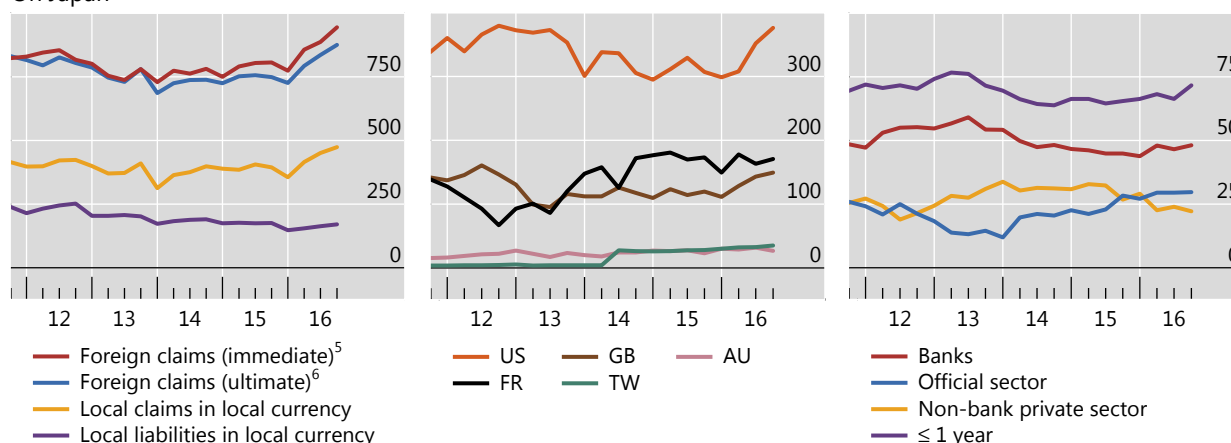
On the euro area



On the United States



On Japan



AU = Australia; CH = Switzerland; DE = Germany; FR = France; GB = United Kingdom; JP = Japan; NL = Netherlands; US = United States.

Further information on the BIS consolidated banking statistics is available at www.bis.org/statistics/bankstats.htm.

¹ Amounts outstanding at quarter-end. Amounts denominated in currencies other than the US dollar are converted to US dollars at the exchange rate prevailing on the reference date. ² Excludes domestic claims, ie claims on residents of a bank's home country. ³ Foreign claims on an ultimate risk basis, by nationality of reporting bank. The banking systems shown are not necessarily the largest foreign bank creditors on each reference date. ⁴ As a percentage of international claims outstanding. ⁵ On an immediate counterparty basis. Includes the unconsolidated claims of banks headquartered outside but located inside CBS-reporting countries. ⁶ On an ultimate risk basis.

Source: BIS consolidated banking statistics (CBS).

Consolidated claims of reporting banks on emerging market economies

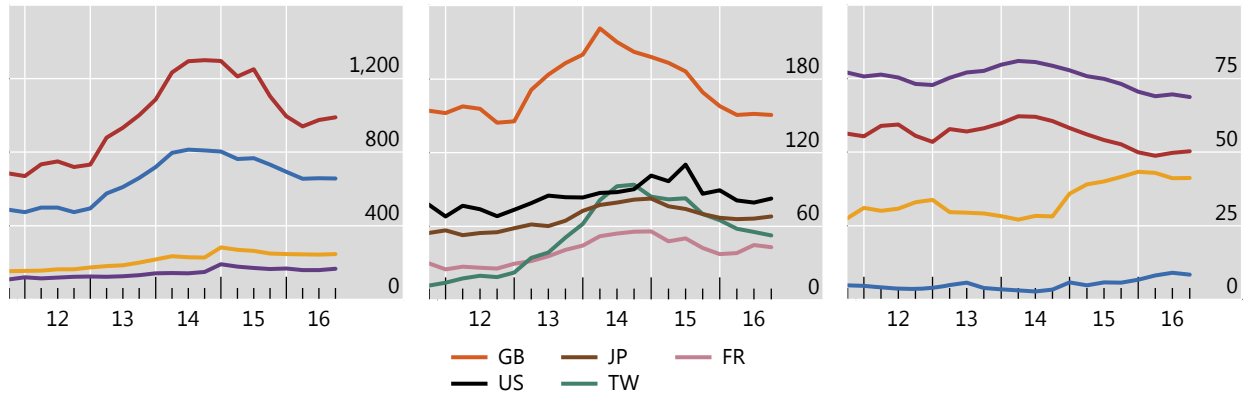
Graph B.2

Foreign claims and local positions, in USD bn^{1,2}

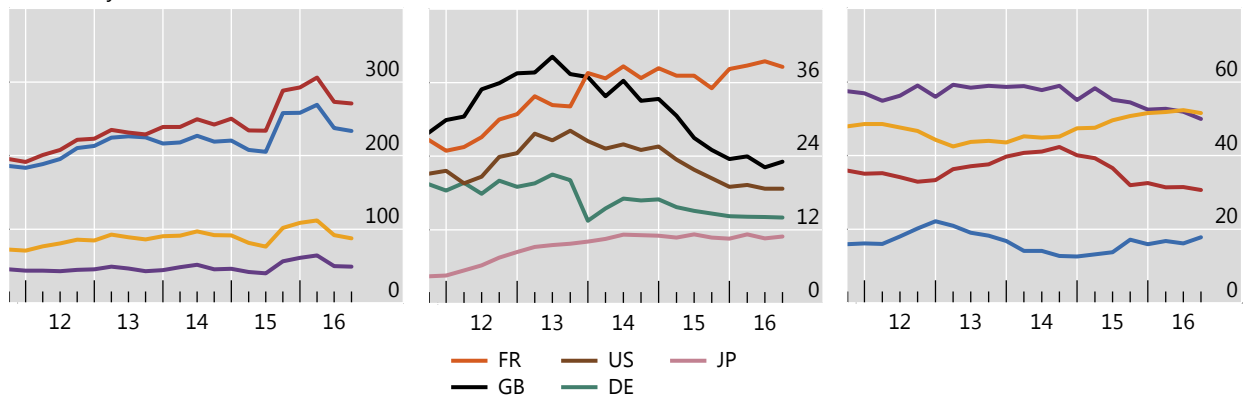
Foreign claims of selected creditors, in USD bn^{1,3}

International claims, by sector and maturity, in per cent⁴

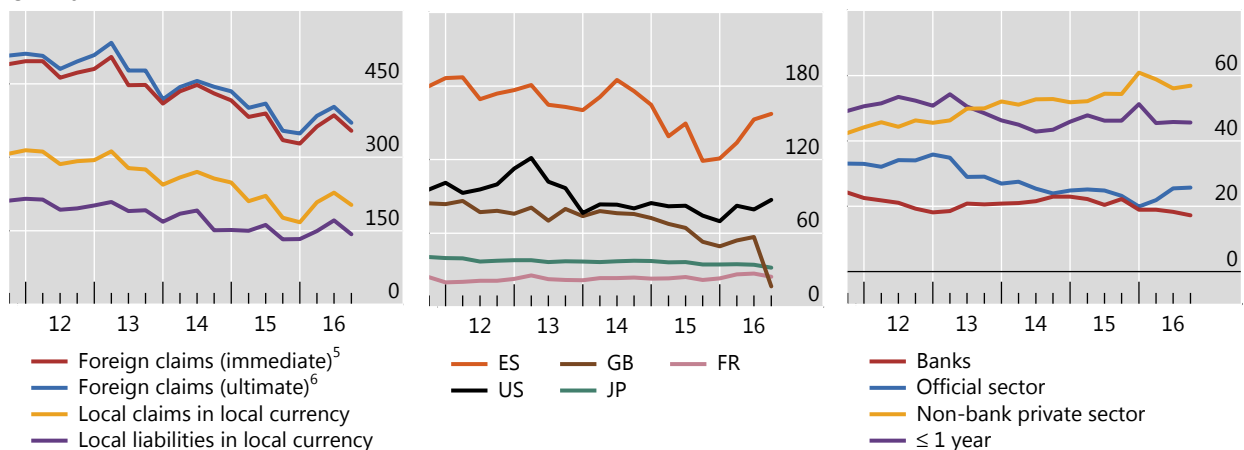
On China



On Turkey



On Brazil



AU = Australia; DE = Germany; ES = Spain; GB = United Kingdom; GR = Greece; JP = Japan; NL = Netherlands; TW = Chinese Taipei; US = United States.

Further information on the BIS consolidated banking statistics is available at www.bis.org/statistics/bankstats.htm.

¹ Amounts outstanding at quarter-end. Amounts denominated in currencies other than the US dollar are converted to US dollars at the exchange rate prevailing on the reference date. ² Excludes domestic claims, ie claims on residents of a bank's home country. ³ Foreign claims on an ultimate risk basis, by nationality of reporting bank. The banking systems shown are not necessarily the largest foreign bank creditors on each reference date. ⁴ As a percentage of international claims. ⁵ On an immediate counterparty basis. Includes the unconsolidated claims of banks headquartered outside but located inside CBS-reporting countries. ⁶ On an ultimate risk basis.

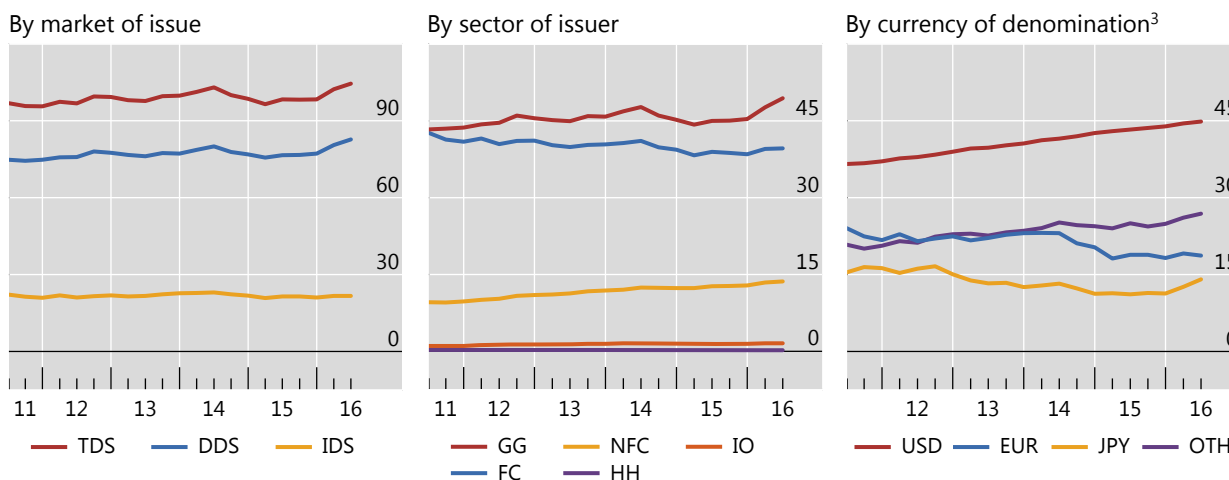
Source: BIS consolidated banking statistics (CBS).

C Debt securities statistics

Global debt securities markets¹

Amounts outstanding, in trillions of US dollars²

Graph C.1



DDS = domestic debt securities; IDS = international debt securities; TDS = total debt securities.

FC = financial corporations; GG = general government; HH = households and non-profit institutions serving households; IO = international organisations; NFC = non-financial corporations.

EUR = euro; JPY = yen; OTH = other currencies; USD = US dollar.

Further information on the BIS debt securities statistics is available at www.bis.org/statistics/secstats.htm.

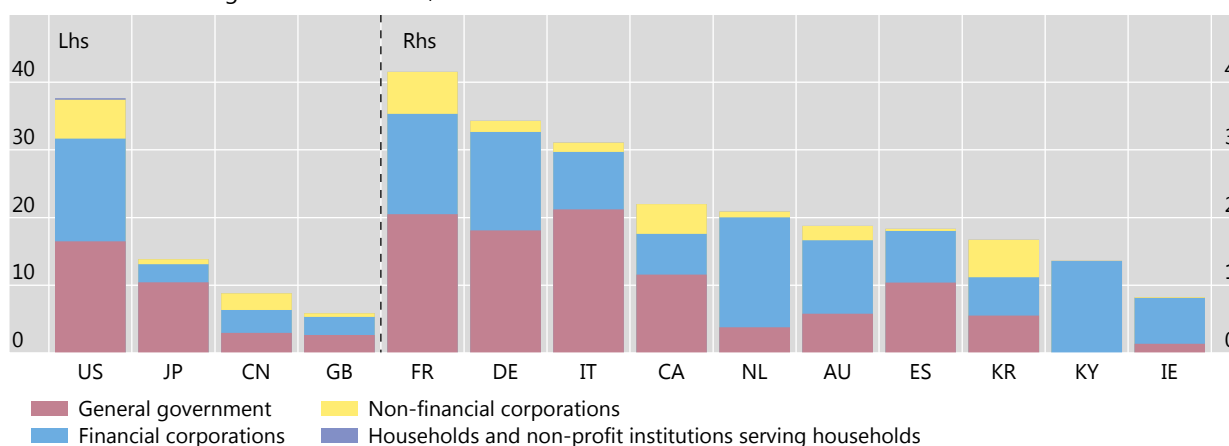
¹ Sample of countries varies across breakdowns shown. For countries that do not report TDS, data are estimated by the BIS as DDS plus IDS. For countries that do not report either TDS or DDS, data are estimated by the BIS as IDS. ² At quarter-end. Amounts denominated in currencies other than the US dollar are converted to US dollars at the exchange rate prevailing on the reference date. ³ Where a currency breakdown is not available, DDS are assumed to be denominated in the local currency.

Sources: IMF; Dealogic; Euroclear; Thomson Reuters; Xtrakter Ltd; national data; BIS debt securities statistics; BIS calculations.

Total debt securities, by residence and sector of issuer¹

Amounts outstanding at end-June 2016, in trillions of US dollars²

Graph C.2



AU = Australia; CA = Canada; CN = China; DE = Germany; ES = Spain; FR = France; GB = United Kingdom; IE = Ireland; IT = Italy; JP = Japan; KR = Korea; KY = Cayman Islands; NL = Netherlands; US = United States.

Further information on the BIS debt securities statistics is available at www.bis.org/statistics/secstats.htm.

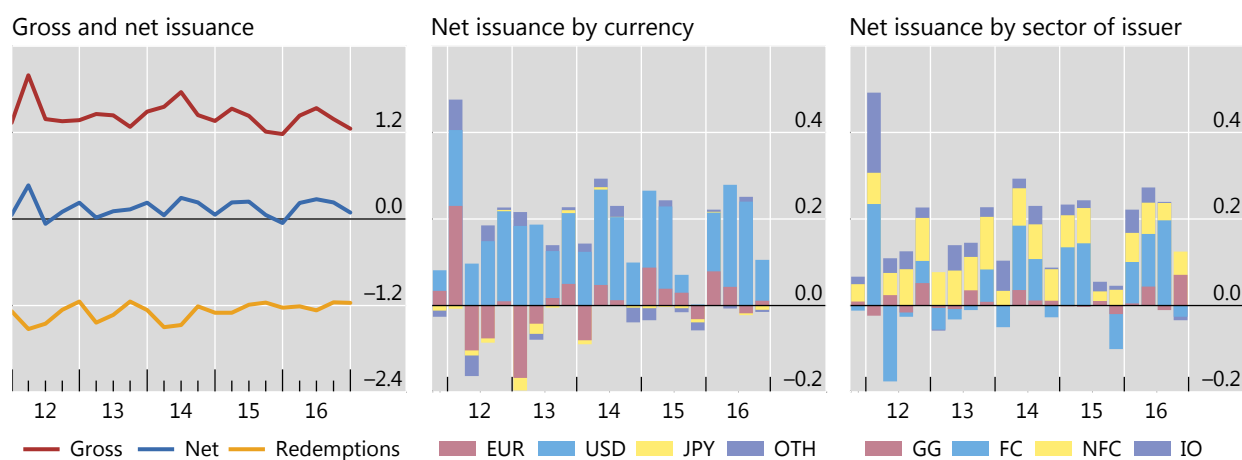
¹ For countries that do not report TDS, data are estimated by the BIS as DDS plus IDS. ² Amounts denominated in currencies other than the US dollar are converted to US dollars at the exchange rate prevailing on the reference date.

Sources: National data; BIS debt securities statistics.

International debt securities, by currency and sector

In trillions of US dollars

Graph C.3



EUR = euro; JPY = yen; OTH = other currencies; USD = US dollar.

FC = financial corporations; GG = general government; IO = international organisations; NFC = non-financial corporations.

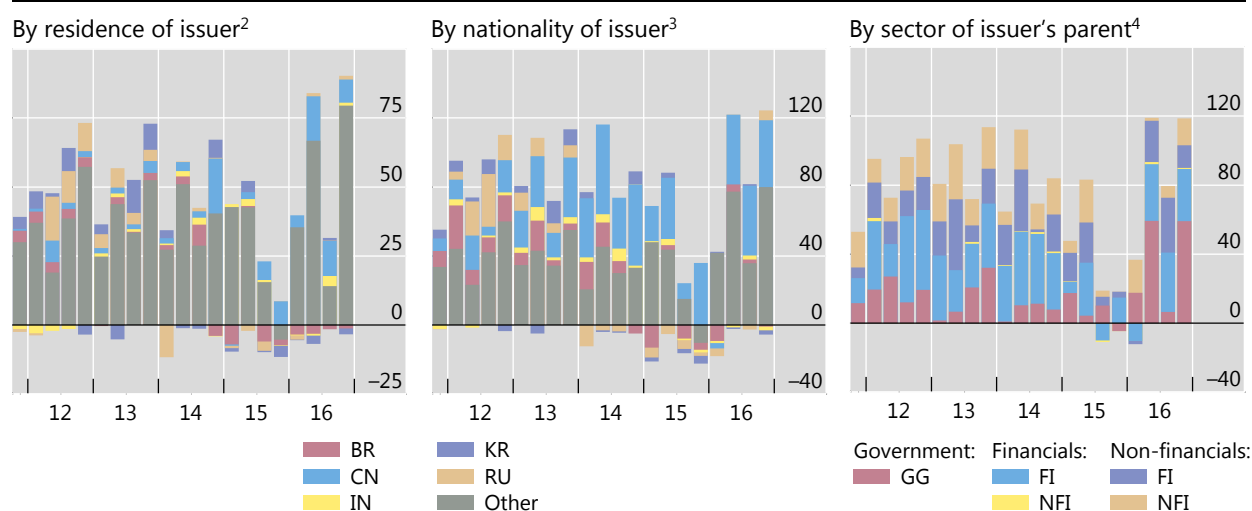
Further information on the BIS debt securities statistics is available at www.bis.org/statistics/secstats.htm.

Sources: IMF; Dealogic; Euroclear; Thomson Reuters; Xtrakter Ltd; BIS debt securities statistics.

International debt securities issued by borrowers from emerging market economies¹

Net issuance, in billions of US dollars

Graph C.4



BR = Brazil; CN = China; IN = India; KR = Korea; RU = Russia.

FI = financial corporations; GG = general government; NFI = non-financial corporations.

Further information on the BIS debt securities statistics is available at www.bis.org/statistics/secstats.htm.

¹ For the sample of countries comprising emerging market economies, see the glossary to the *BIS Statistical Bulletin*. ² Country where issuer resides. ³ Country where issuer's controlling parent is located. Includes issuance by financing vehicles incorporated in offshore financial centres with parents based in an emerging market economy. ⁴ By nationality, ie issuers with parents based in an emerging market economy. Issuers are grouped by sector of their parent.

Sources: IMF; Dealogic; Euroclear; Thomson Reuters; Xtrakter Ltd; BIS debt securities statistics.

D Derivatives statistics

Exchange-traded derivatives

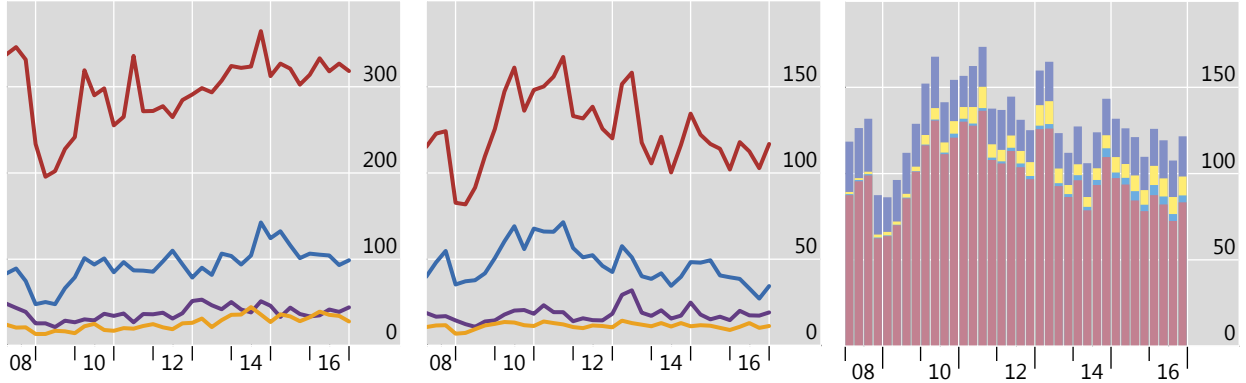
Graph D.1

Open interest, by currency¹

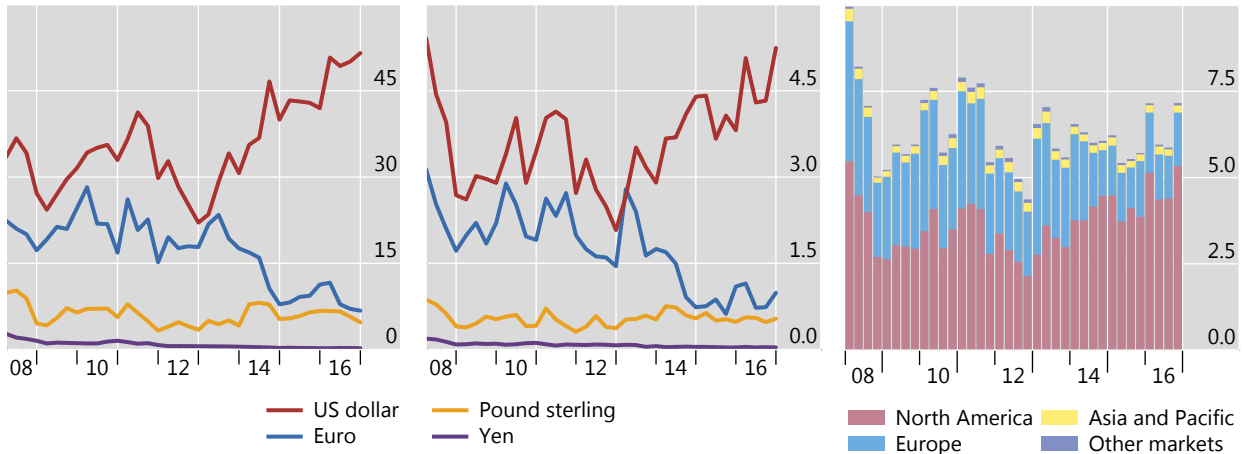
Daily average turnover, by currency²

Daily average turnover, by location of exchange²

Foreign exchange derivatives, USD bn³



Interest rate derivatives, USD trn³



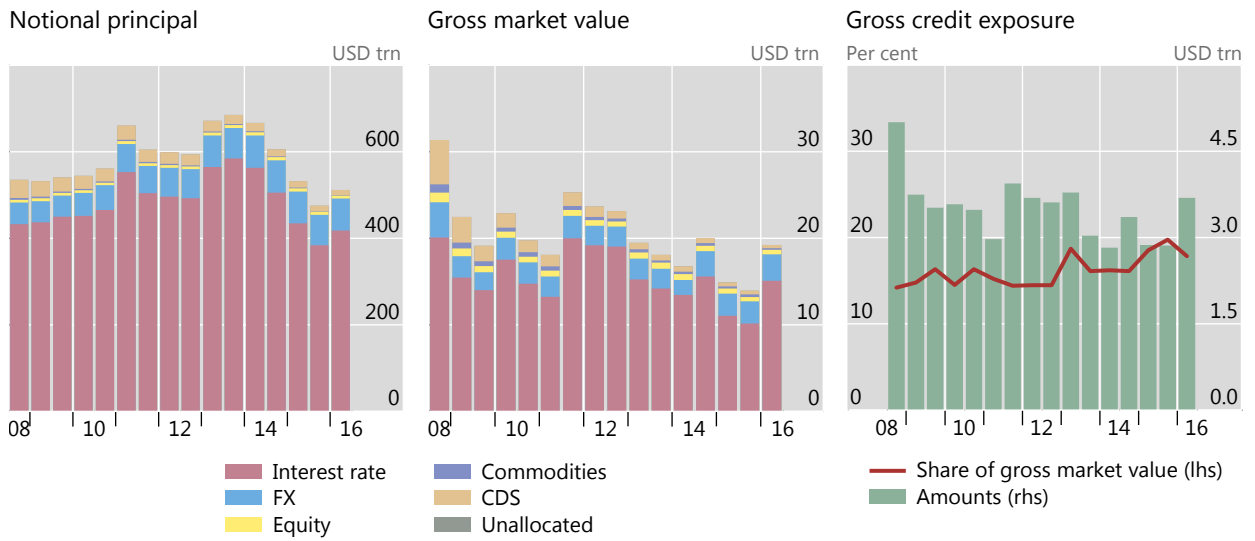
Further information on the BIS derivatives statistics is available at www.bis.org/statistics/extderiv.htm.

¹ At quarter-end. Amounts denominated in currencies other than the US dollar are converted to US dollars at the exchange rate prevailing on the reference date. ² Quarterly averages of daily turnover. ³ Futures and options.

Sources: Euromoney TRADEDATA; Futures Industry Association; The Options Clearing Corporation; BIS derivatives statistics.

Global OTC derivatives markets¹

Graph D.2



Further information on the BIS derivatives statistics is available at www.bis.org/statistics/derstats.htm.

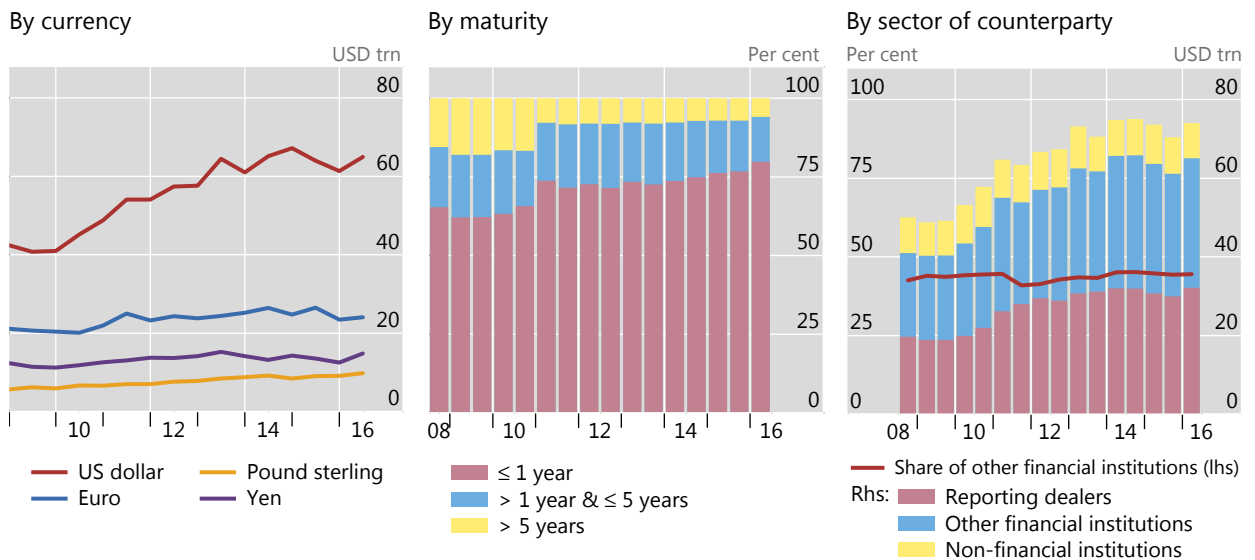
¹ At half-year end (end-June and end-December). Amounts denominated in currencies other than the US dollar are converted to US dollars at the exchange rate prevailing on the reference date.

Source: BIS derivatives statistics.

OTC foreign exchange derivatives

Notional principal¹

Graph D.3



Further information on the BIS derivatives statistics is available at www.bis.org/statistics/derstats.htm.

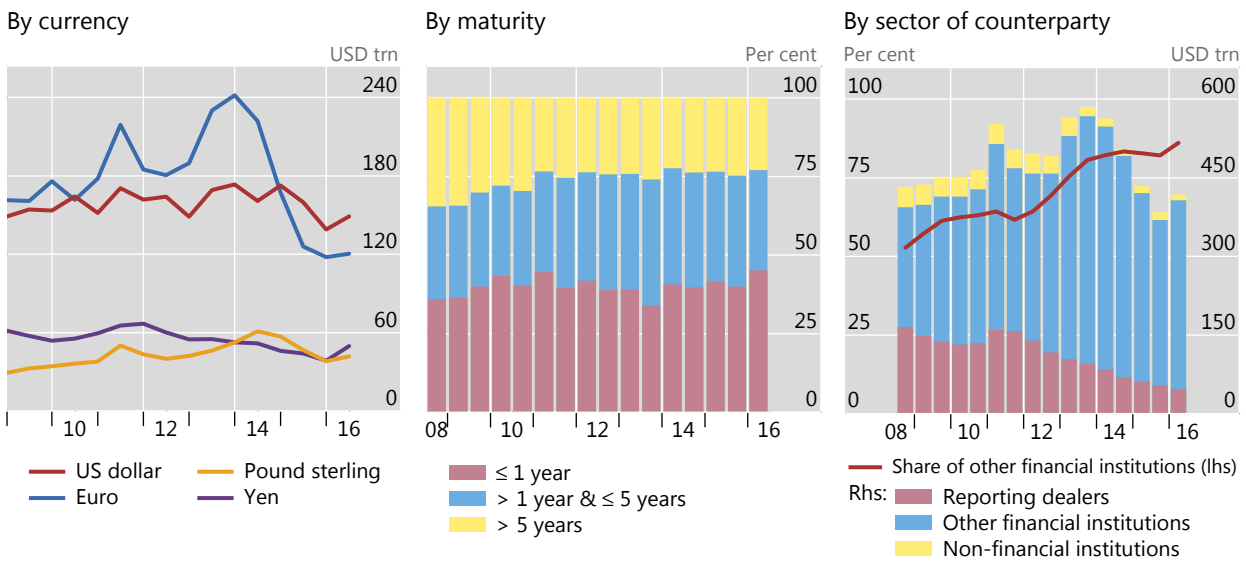
¹ At half-year end (end-June and end-December). Amounts denominated in currencies other than the US dollar are converted to US dollars at the exchange rate prevailing on the reference date.

Source: BIS derivatives statistics.

OTC interest rate derivatives

Notional principal¹

Graph D.4



Further information on the BIS derivatives statistics is available at www.bis.org/statistics/derstats.htm.

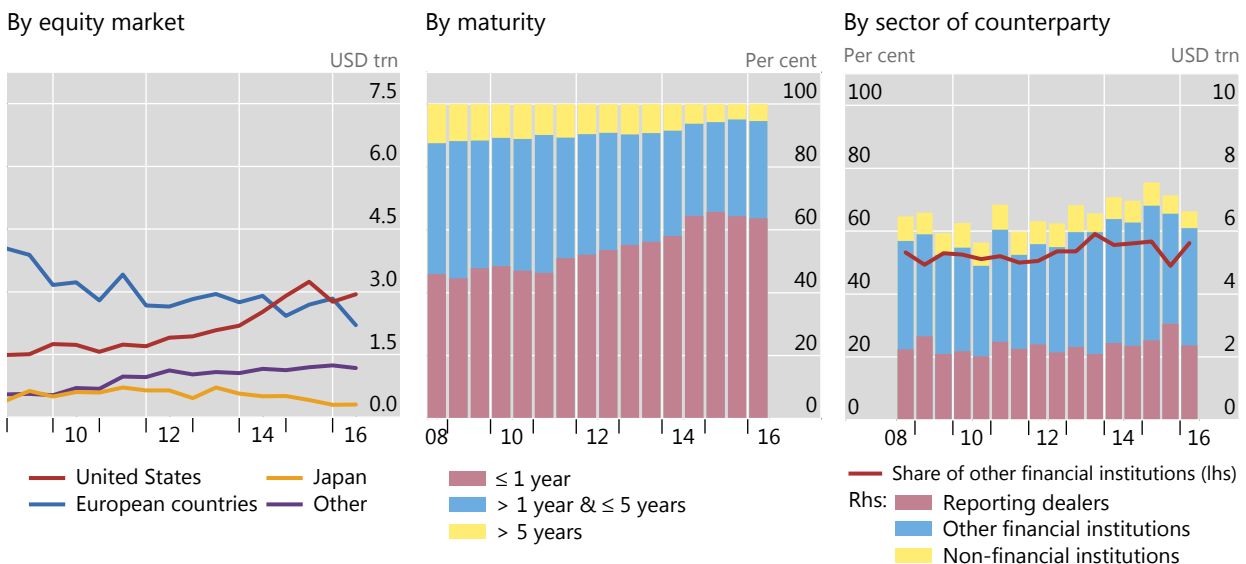
¹ At half-year end (end-June and end-December). Amounts denominated in currencies other than the US dollar are converted to US dollars at the exchange rate prevailing on the reference date.

Source: BIS derivatives statistics.

OTC equity-linked derivatives

Notional principal¹

Graph D.5



Further information on the BIS derivatives statistics is available at www.bis.org/statistics/derstats.htm.

¹ At half-year end (end-June and end-December). Amounts denominated in currencies other than the US dollar are converted to US dollars at the exchange rate prevailing on the reference date.

Source: BIS derivatives statistics.

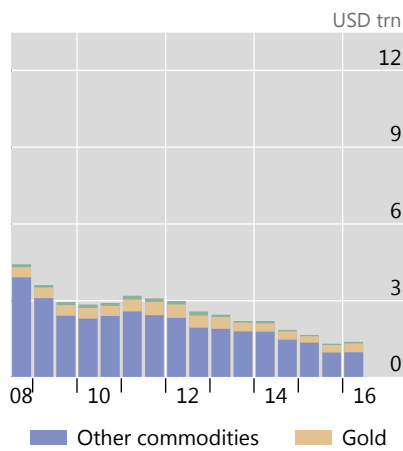
OTC commodity derivatives¹

Graph D.6

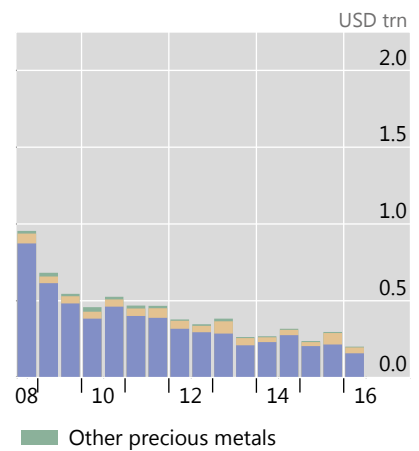
Notional principal, by instrument



Notional principal, by commodity



Gross market value, by commodity



Further information on the BIS derivatives statistics is available at www.bis.org/statistics/derstats.htm.

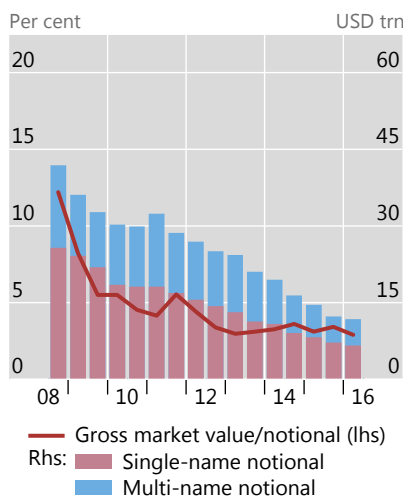
¹ At half-year end (end-June and end-December). Amounts denominated in currencies other than the US dollar are converted to US dollars at the exchange rate prevailing on the reference date.

Source: BIS derivatives statistics.

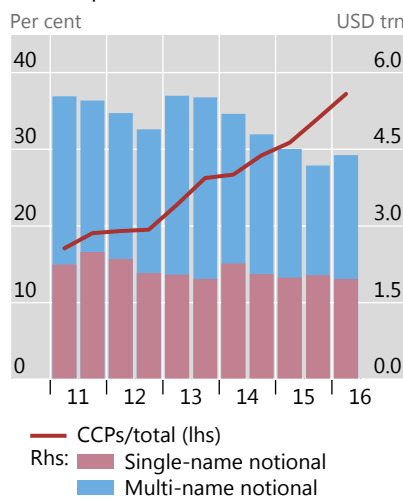
Credit default swaps¹

Graph D.7

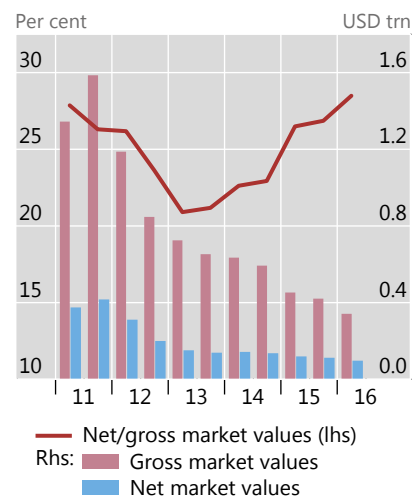
Notional principal



Notional principal with central counterparties (CCPs)



Impact of netting



Further information on the BIS derivatives statistics is available at www.bis.org/statistics/derstats.htm.

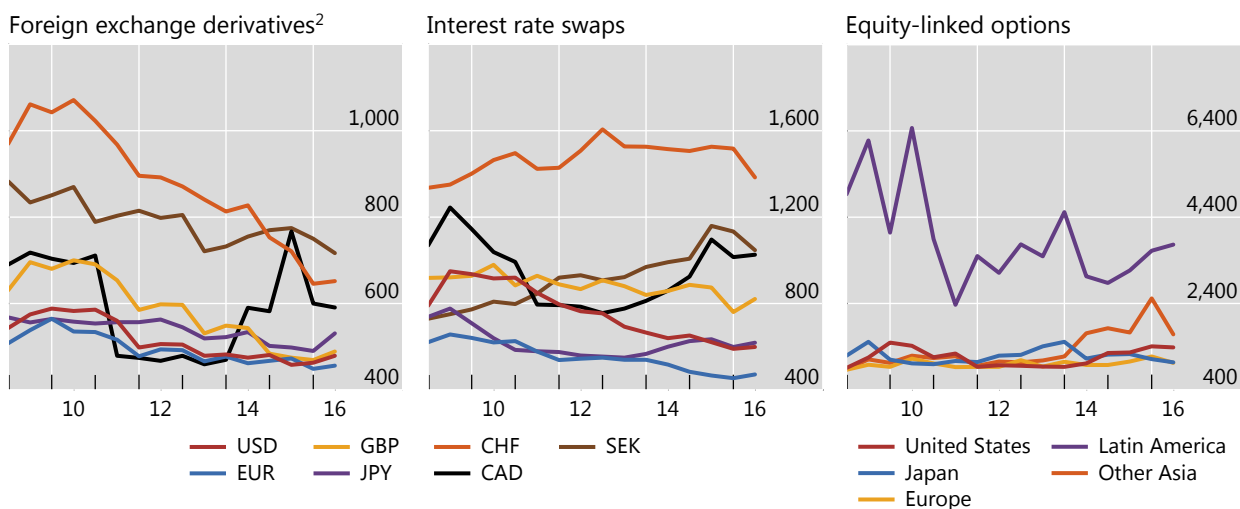
¹ At half-year end (end-June and end-December). Amounts denominated in currencies other than the US dollar are converted to US dollars at the exchange rate prevailing on the reference date.

Source: BIS derivatives statistics.

Concentration in global OTC derivatives markets

Herfindahl index¹

Graph D.8



CAD = Canadian dollar; CHF = Swiss franc; EUR = euro; GBP = pound sterling; JPY = yen; SEK = Swedish krona; USD = US dollar.

Further information on the BIS derivatives statistics is available at www.bis.org/statistics/derstats.htm.

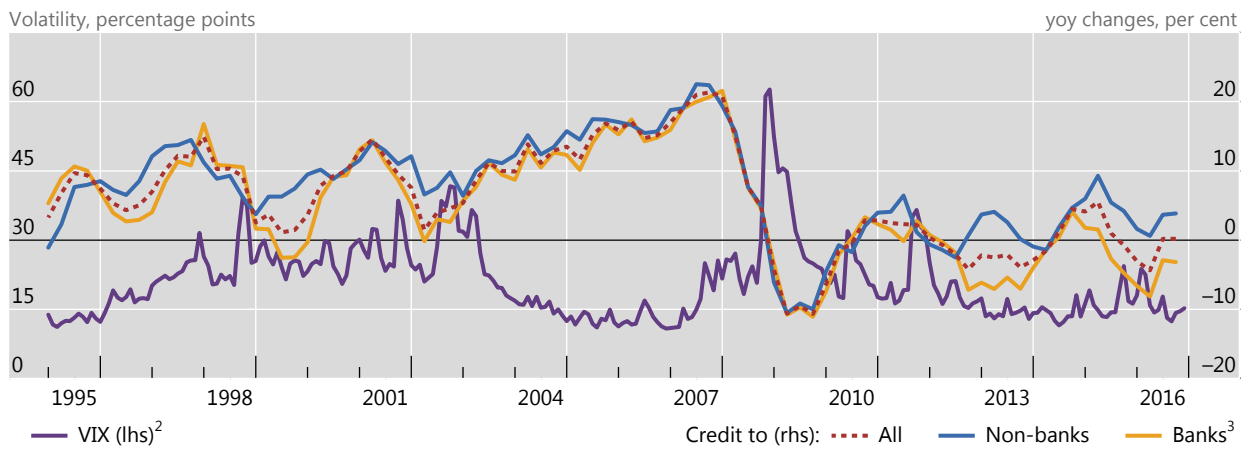
¹ The index ranges from 0 to 10,000, where a lower number indicates that there are many dealers with similar market shares (as measured by notional principal) and a higher number indicates that the market is dominated by a few reporting dealers. ² Foreign exchange forwards, foreign exchange swaps and currency swaps.

Source: BIS derivatives statistics.

E Global liquidity indicators

Growth of international bank credit¹

Graph E.1



Further information on the BIS global liquidity indicators is available at www.bis.org/statistics/gli.htm.

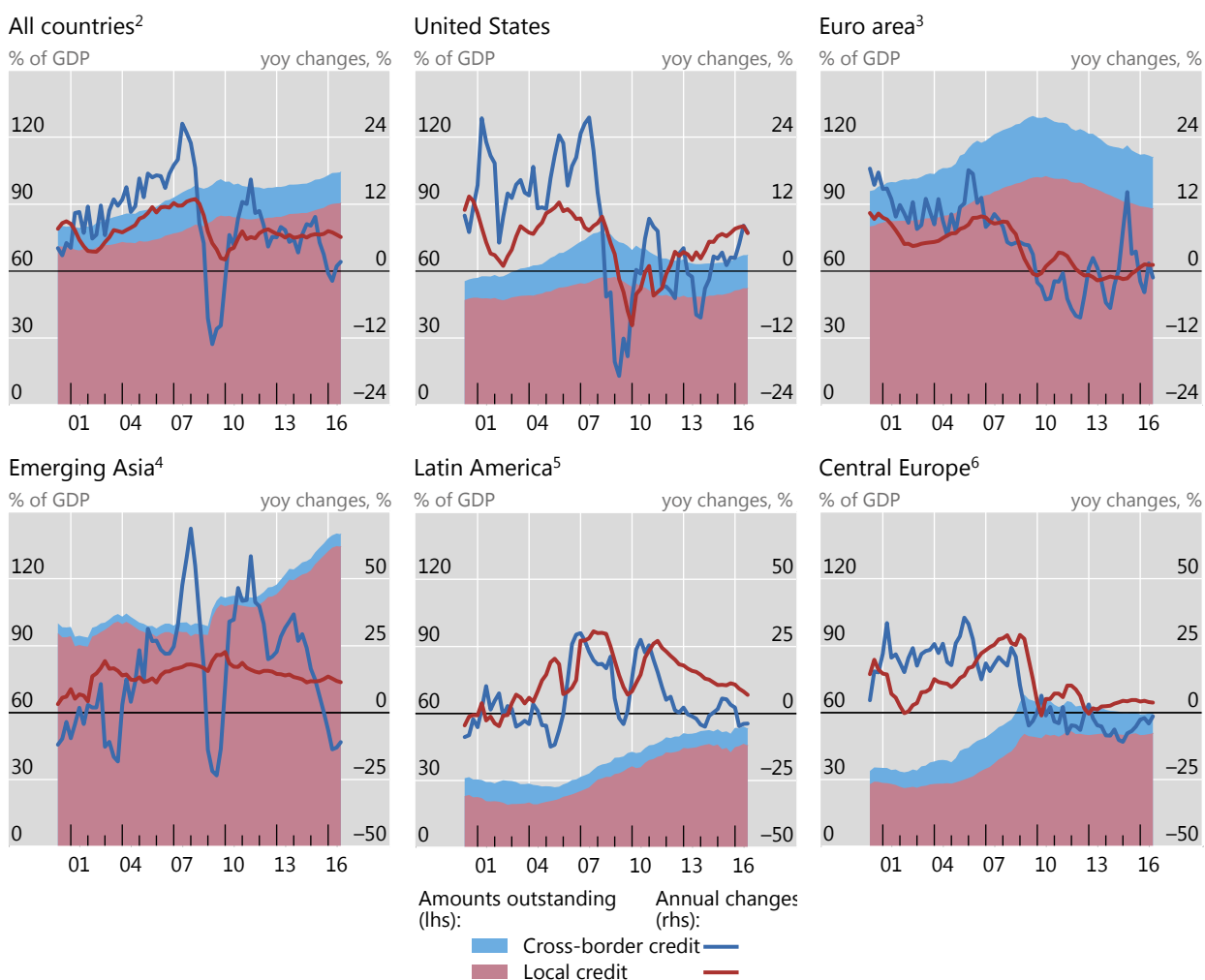
¹ LBS-reporting banks' cross-border claims plus local claims in foreign currencies. ² Chicago Board Options Exchange S&P 500 implied volatility index; standard deviation, in percentage points per annum. ³ Including intragroup transactions.

Sources: Bloomberg; BIS locational banking statistics (LBS).

Global bank credit to the private non-financial sector, by residence of borrower

Banks' cross-border credit plus local credit in all currencies¹

Graph E.2



Further information on the BIS global liquidity indicators is available at www.bis.org/statistics/gli.htm.

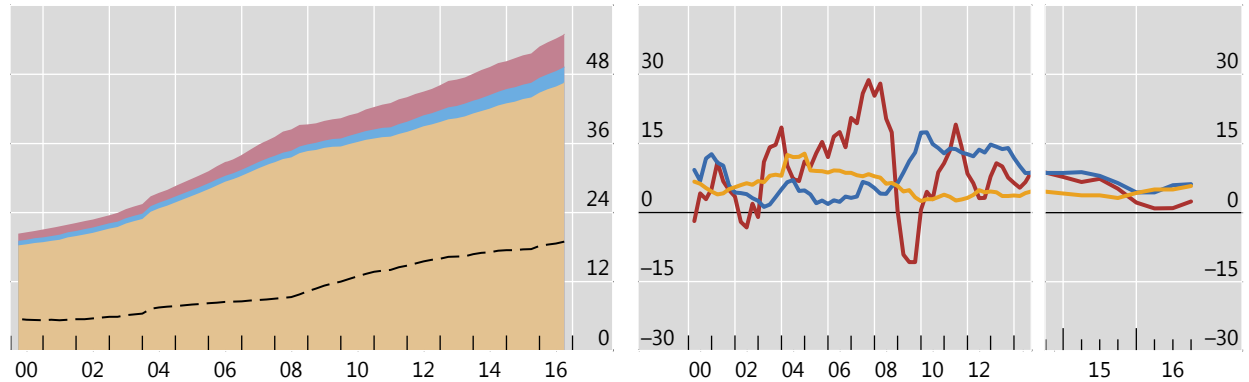
¹ Cross-border claims of LBS reporting banks to the non-bank sector plus local claims of all banks to the private non-financial sector. Weighted averages of the economies listed, based on four-quarter moving sums of GDP. ² Australia, Canada, Denmark, Japan, New Zealand, Norway, Russia, Saudi Arabia, South Africa, Sweden, Switzerland, Turkey and the United Kingdom, plus the countries in the other panels. ³ Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal and Spain. ⁴ China, Hong Kong SAR, India, Indonesia, Korea, Malaysia, Singapore and Thailand. ⁵ Argentina, Brazil, Chile and Mexico. ⁶ The Czech Republic, Hungary and Poland.

Sources: BIS credit to the non-financial sector and locational banking statistics (LBS); BIS calculations.

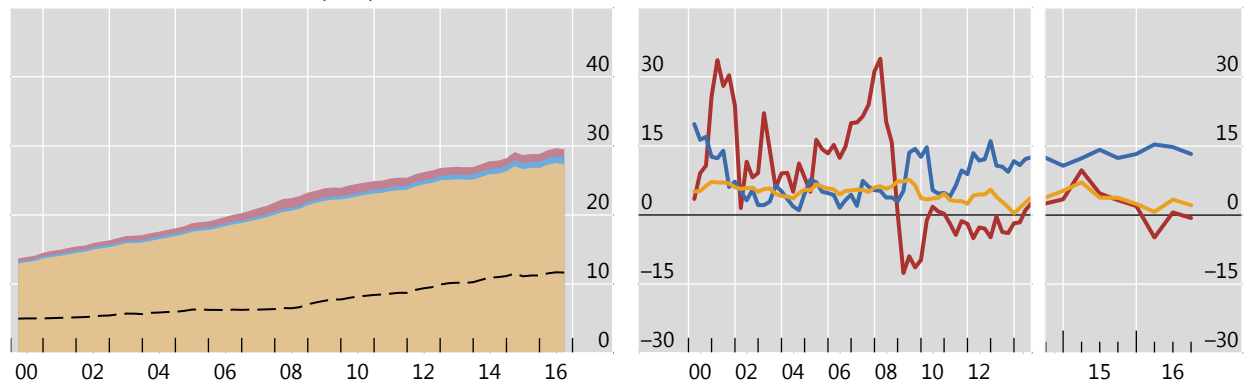
Amounts outstanding, in trn¹

Annual change, in per cent⁵

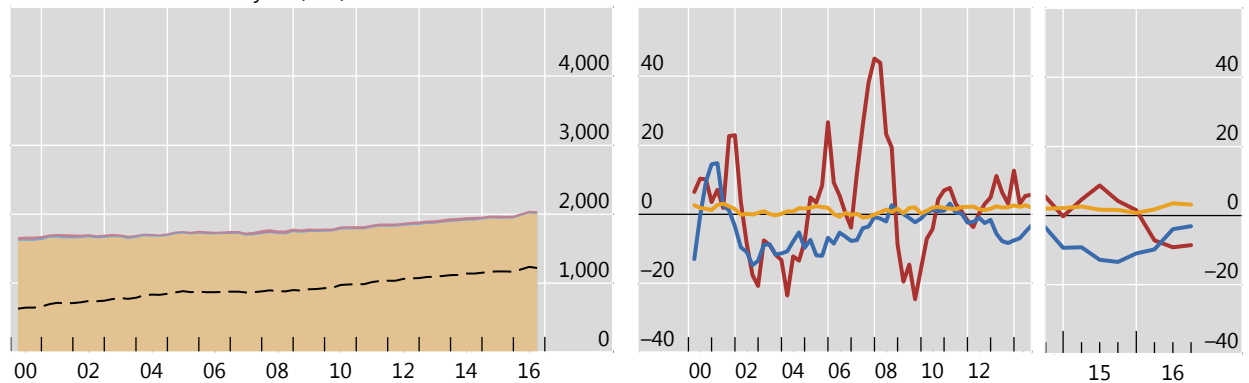
Credit denominated in US dollars (USD)



Credit denominated in euros (EUR)



Credit denominated in yen (JPY)



Credit to residents²
 Credit to non-residents:

 Of which:

 Credit to government

 Loans⁴
 Credit to residents²
 Credit to non-residents:

 Debt securities³
 Loans⁴

Further information on the BIS global liquidity indicators is available at www.bis.org/statistics/gli.htm.

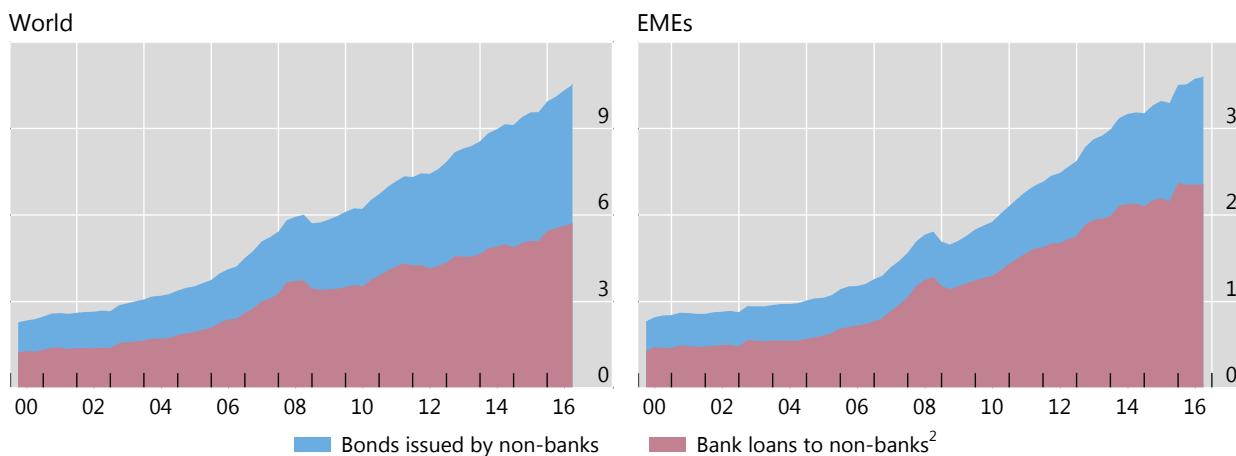
¹ Amounts outstanding at quarter-end, in national currency. ² Credit to non-financial borrowers residing in the United States/euro area/Japan. National financial accounts are adjusted using BIS banking and securities statistics to exclude credit denominated in non-local currencies. ³ Excluding debt securities issued by special purpose vehicles and other financial entities controlled by non-financial parents. EUR-denominated debt securities exclude those issued by institutions of the European Union. ⁴ Loans by LBS-reporting banks to non-bank borrowers, including non-bank financial entities, comprise cross-border plus local loans. For countries that do not report local positions, local loans in USD/EUR/JPY are estimated as follows: for China, local loans in foreign currencies are from national data and assumed to be composed of 80% USD, 10% EUR and 10% JPY; for other non-reporting countries, local loans to non-banks are set equal to LBS-reporting banks' cross-border loans to banks in the country (denominated in USD/EUR/JPY), on the assumption that these funds are onlent to non-banks. ⁵ Geometric mean of quarterly break- and exchange rate-adjusted changes.

Sources: IMF, *International Financial Statistics*; Datastream; BIS debt securities statistics and locational banking statistics (LBS).

US dollar-denominated credit to non-banks outside the United States¹

Amounts outstanding, in trillions of US dollars

Graph E.4



¹ Non-banks comprise non-bank financial entities, non-financial corporations, governments, households and international organisations. ² Loans by LBS-reporting banks to non-bank borrowers, including non-bank financial entities, comprise cross-border plus local loans. For countries that do not report local positions, local loans in USD are estimated as follows: for China, local loans in foreign currencies are from national data and are assumed to be composed of 80% USD; for other non-reporting countries, local loans to non-banks are set equal to LBS-reporting banks' cross-border loans to banks in the country (denominated in USD), on the assumption that these funds are onlent to non-banks.

Sources: Datastream; BIS debt securities statistics and locational banking statistics (LBS).

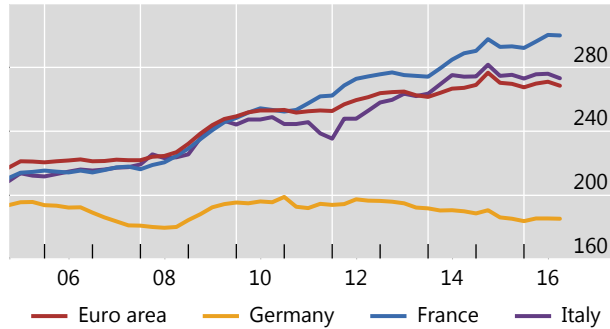
F Statistics on total credit to the non-financial sector

Total credit to the non-financial sector (core debt)

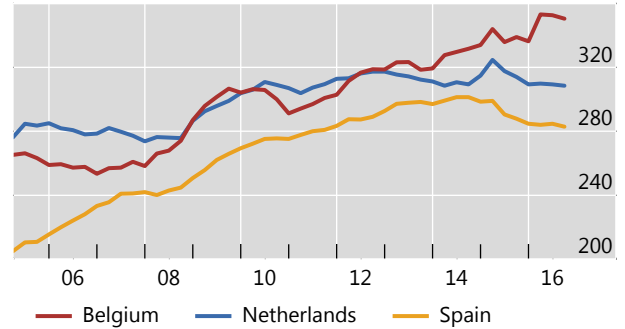
As a percentage of GDP

Graph F.1

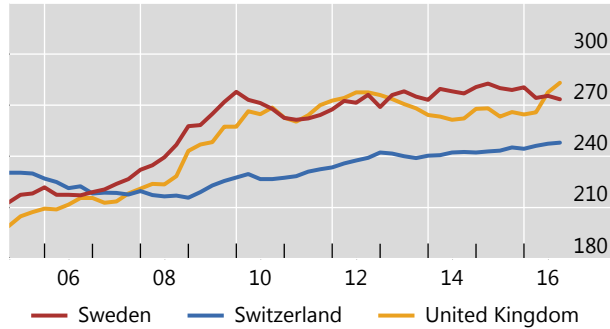
Euro area: aggregate and major countries



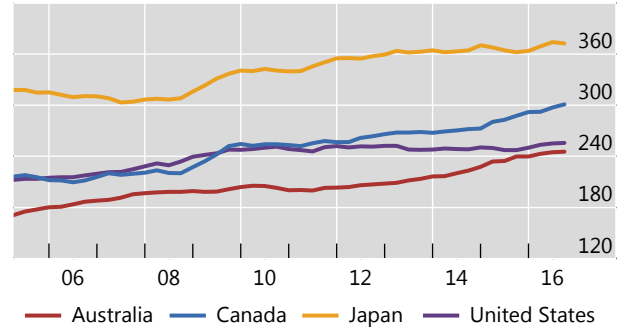
Euro area: other countries



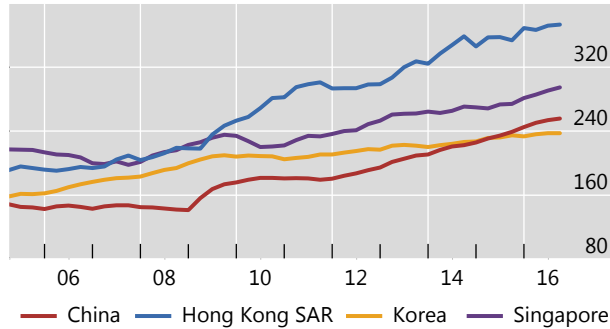
Other European countries



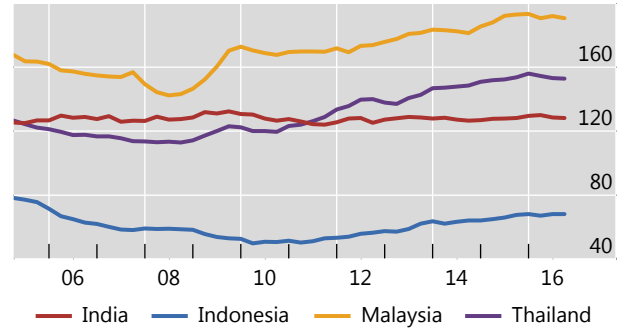
Major advanced economies



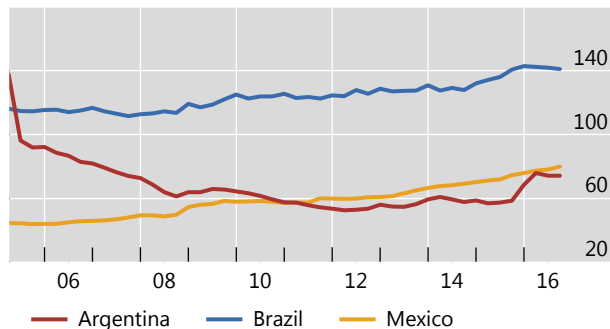
Emerging Asia



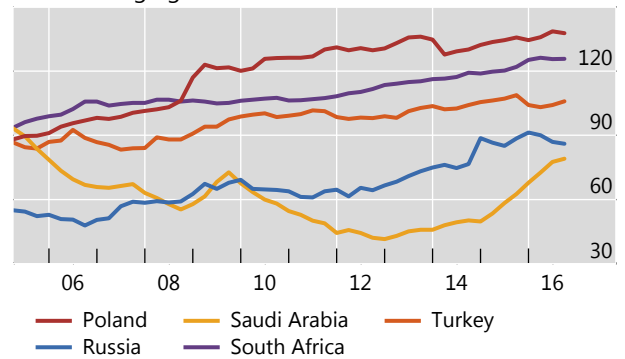
Other emerging Asia



Latin America



Other emerging market economies



Further information on the BIS credit statistics is available at www.bis.org/statistics/totcredit.htm.

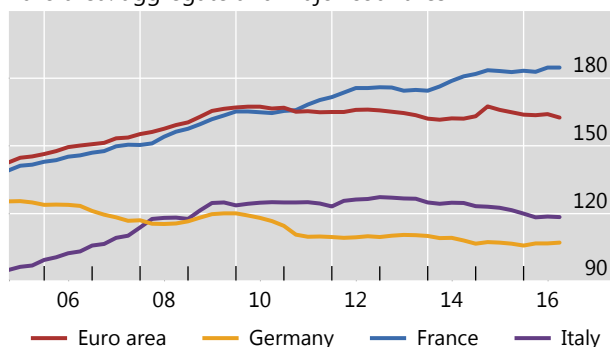
Source: BIS total credit statistics.

Total credit to the private non-financial sector (core debt)

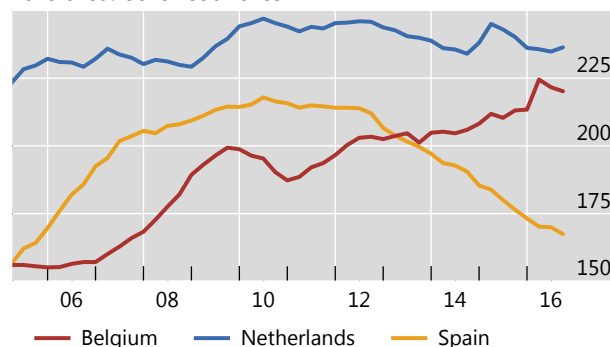
As a percentage of GDP

Graph F.2

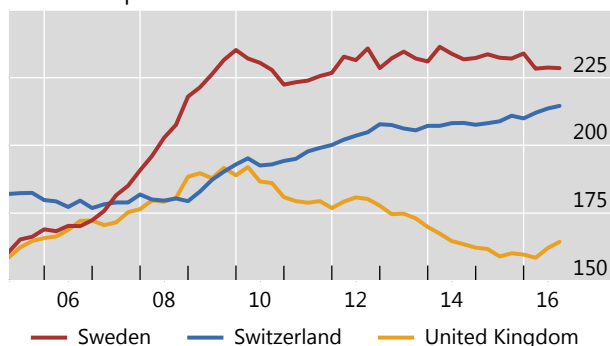
Euro area: aggregate and major countries



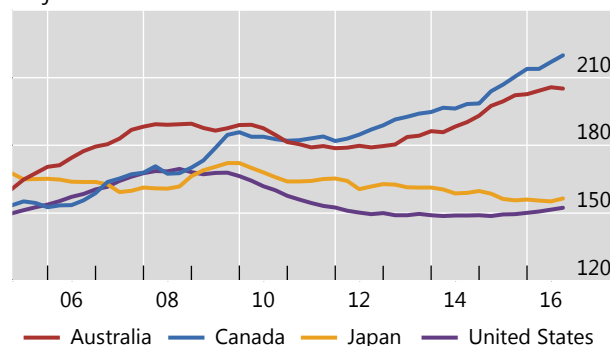
Euro area: other countries



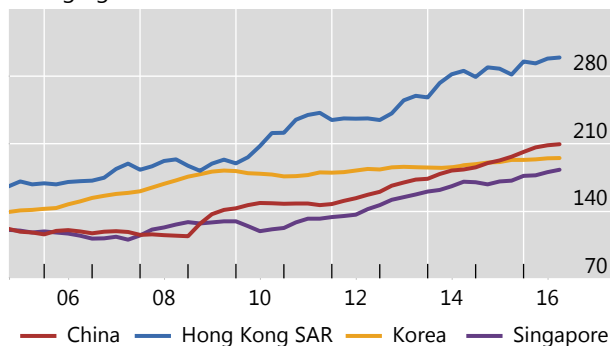
Other European countries



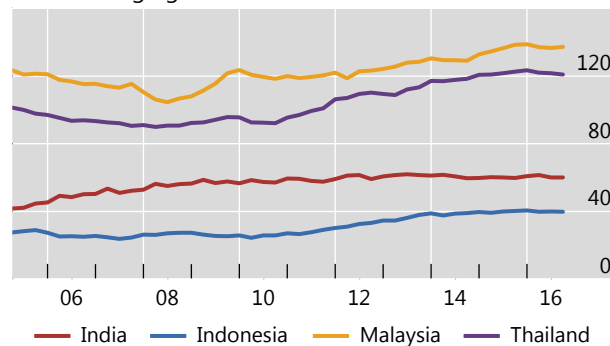
Major advanced economies



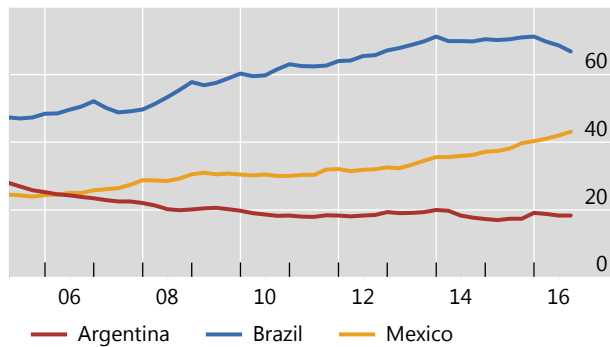
Emerging Asia



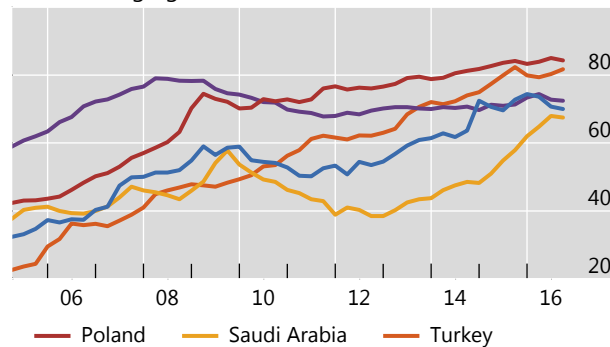
Other emerging Asia



Latin America



Other emerging market economies



Further information on the BIS credit statistics is available at www.bis.org/statistics/totcredit.htm.

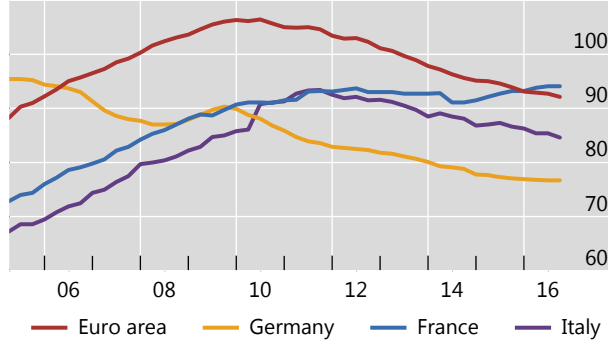
Source: BIS total credit statistics.

Bank credit to the private non-financial sector (core debt)

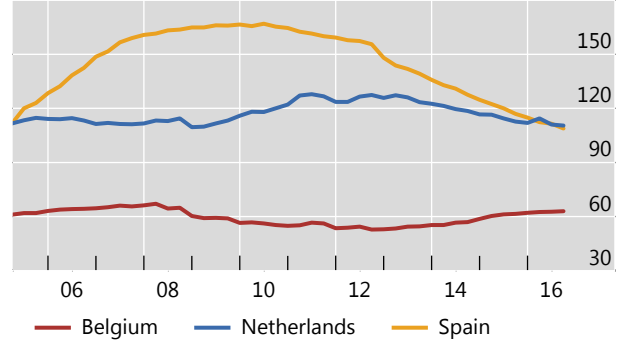
As a percentage of GDP

Graph F.3

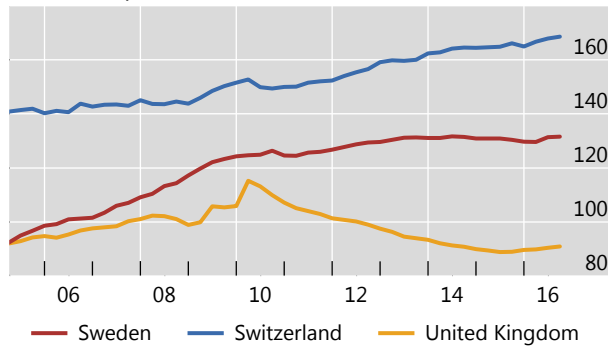
Euro area: aggregate and major countries



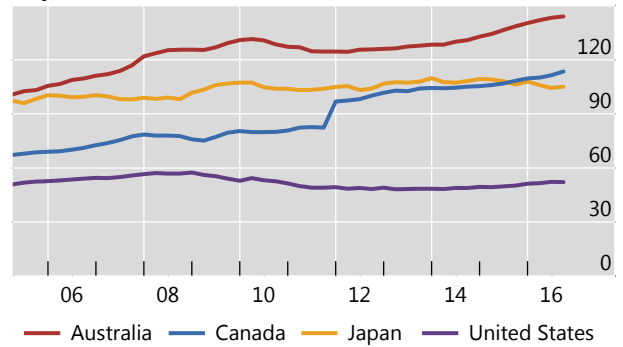
Euro area: other countries



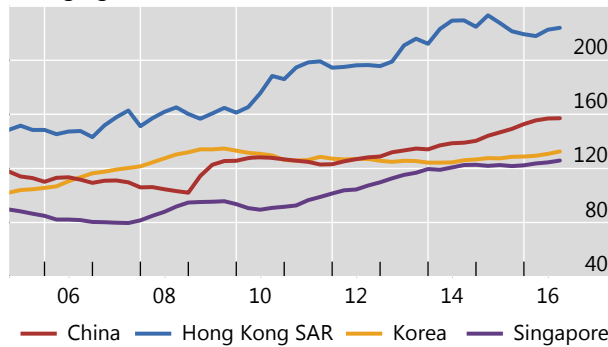
Other European countries



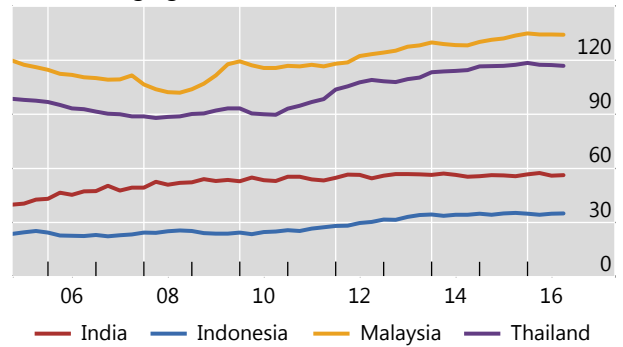
Major advanced economies



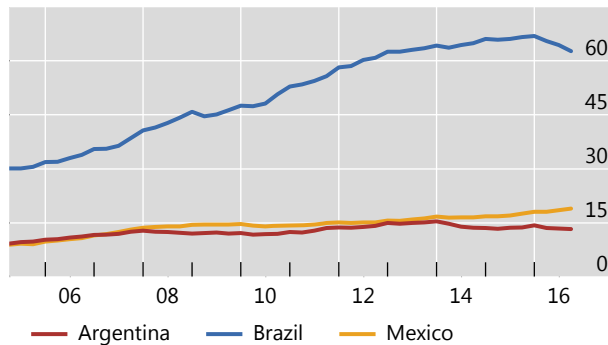
Emerging Asia



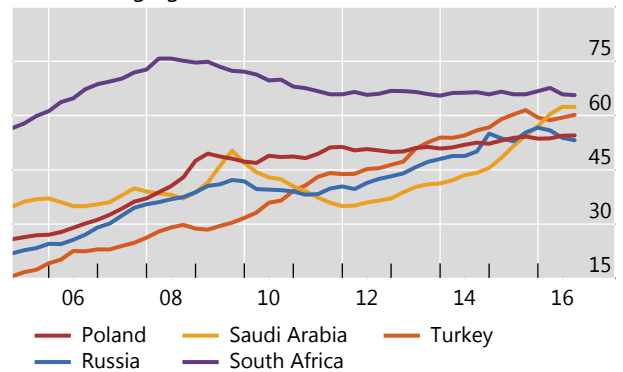
Other emerging Asia



Latin America



Other emerging market economies



Further information on the BIS credit statistics is available at www.bis.org/statistics/totcredit.htm.

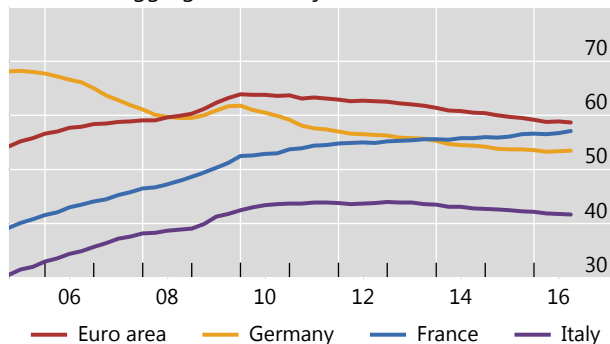
Source: BIS total credit statistics.

Total credit to households (core debt)

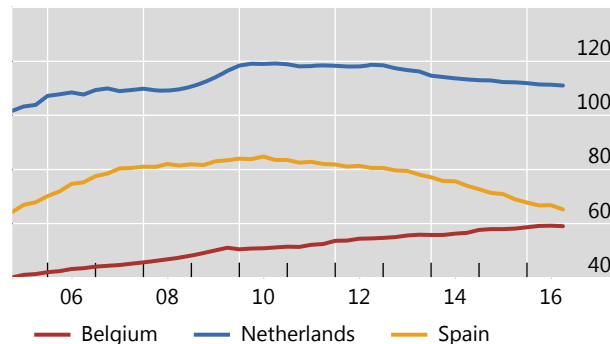
As a percentage of GDP

Graph F.4

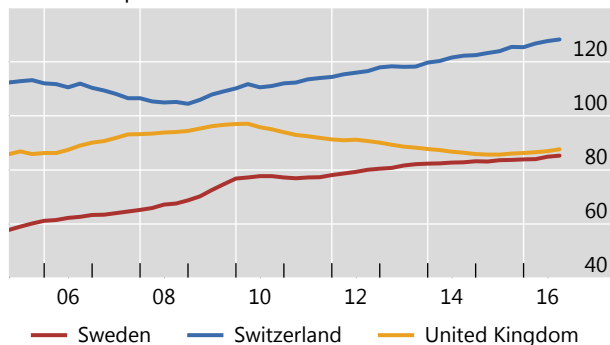
Euro area: aggregate and major countries



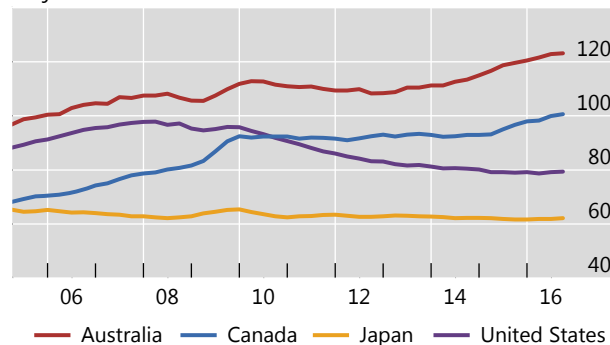
Euro area: other countries



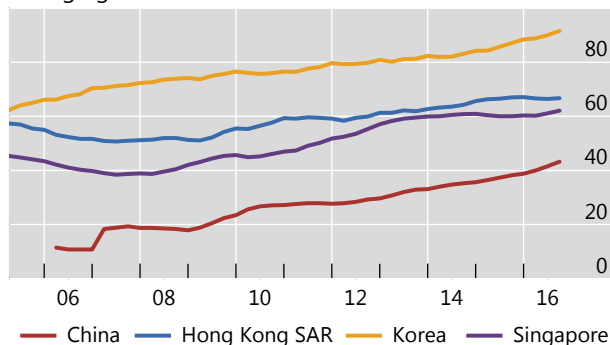
Other European countries



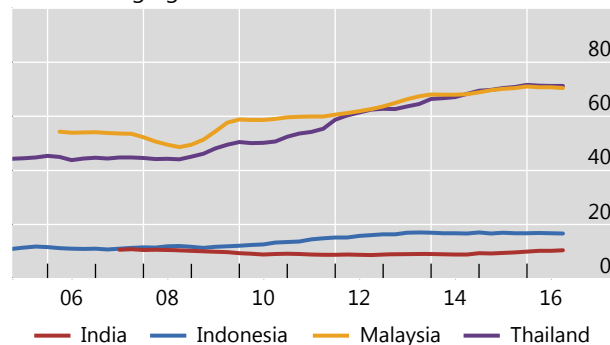
Major advanced economies



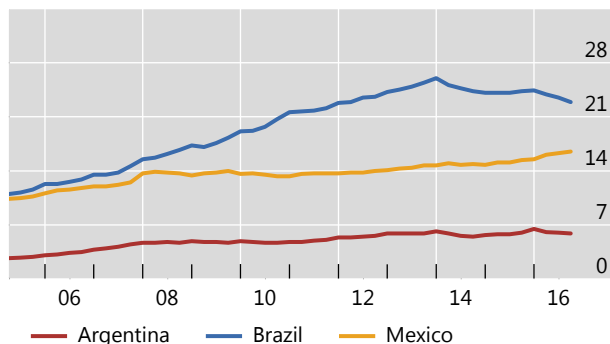
Emerging Asia



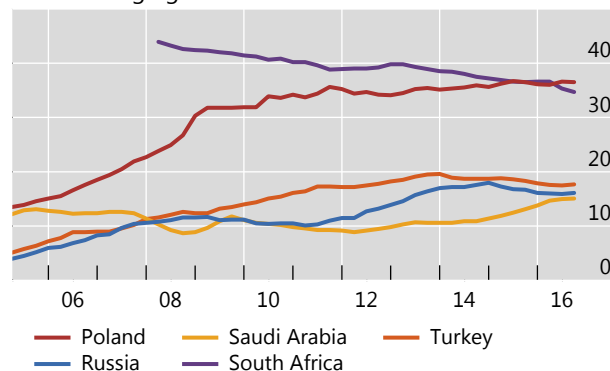
Other emerging Asia



Latin America



Other emerging market economies



Further information on the BIS credit statistics is available at www.bis.org/statistics/totcredit.htm.

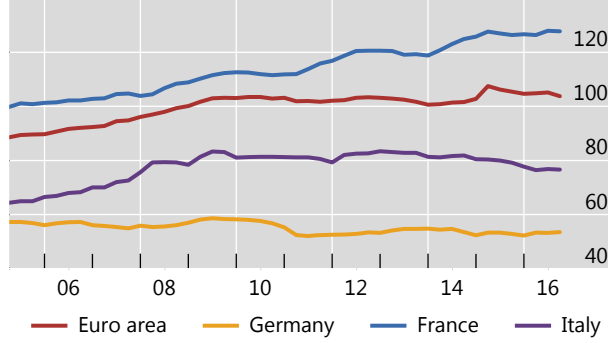
Source: BIS total credit statistics.

Total credit to non-financial corporations (core debt)

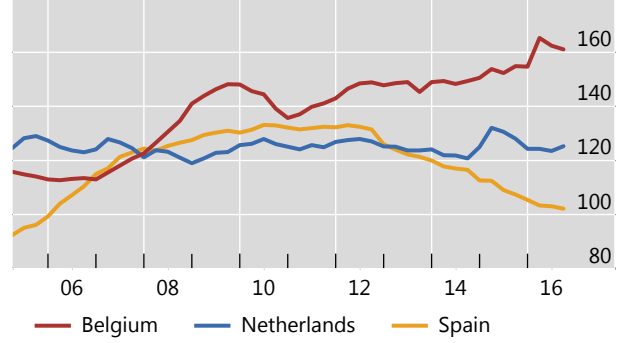
As a percentage of GDP

Graph F.5

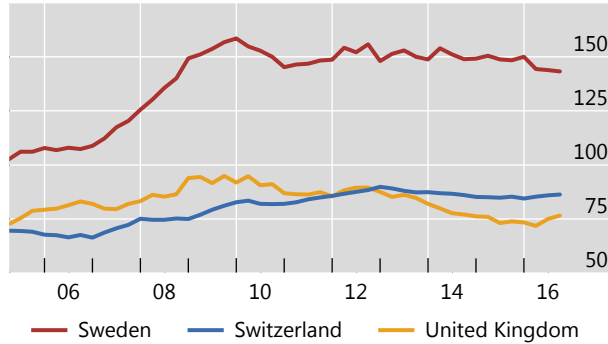
Euro area: aggregate and major countries



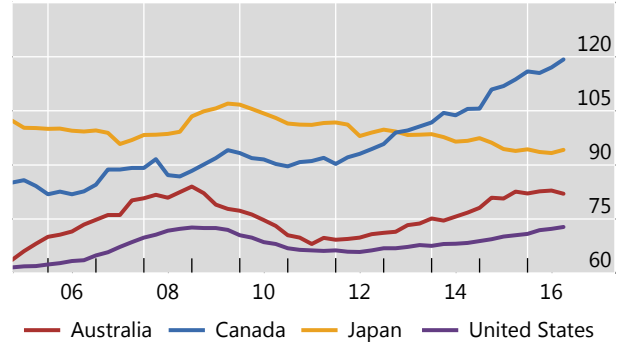
Euro area: other countries



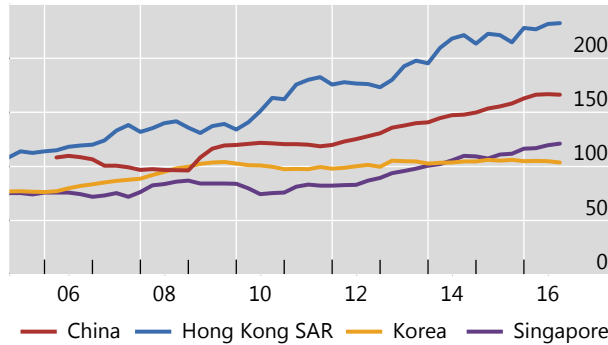
Other European countries



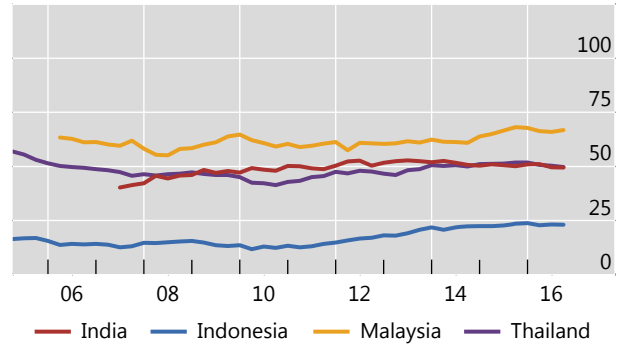
Major advanced economies



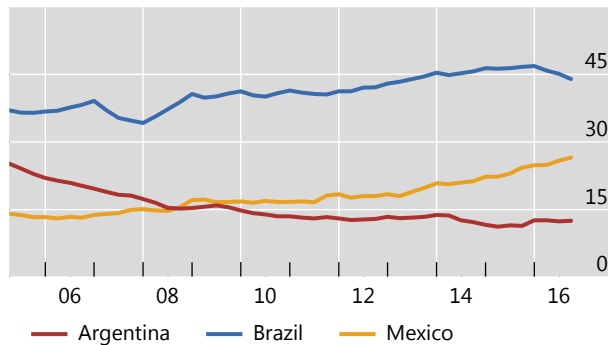
Emerging Asia



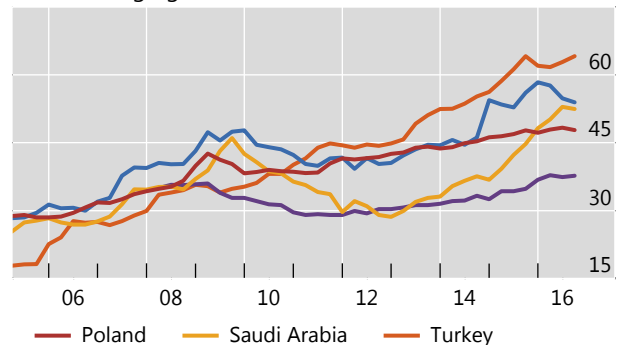
Other emerging Asia



Latin America



Other emerging market economies



Further information on the BIS credit statistics is available at www.bis.org/statistics/totcredit.htm.

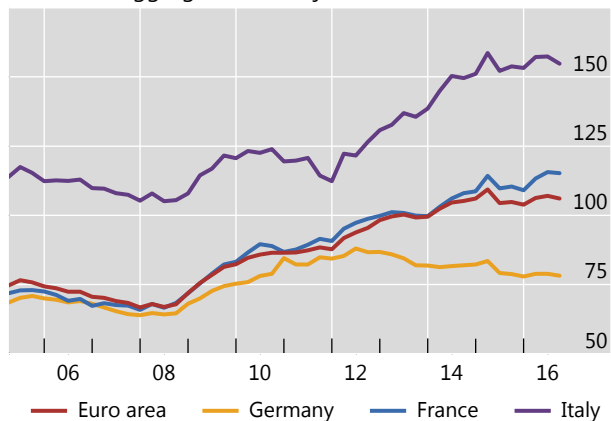
Source: BIS total credit statistics.

Total credit to the government sector at market value (core debt)¹

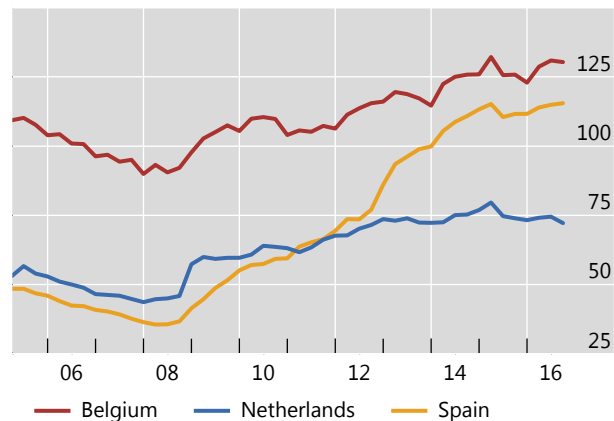
As a percentage of GDP

Graph F.6

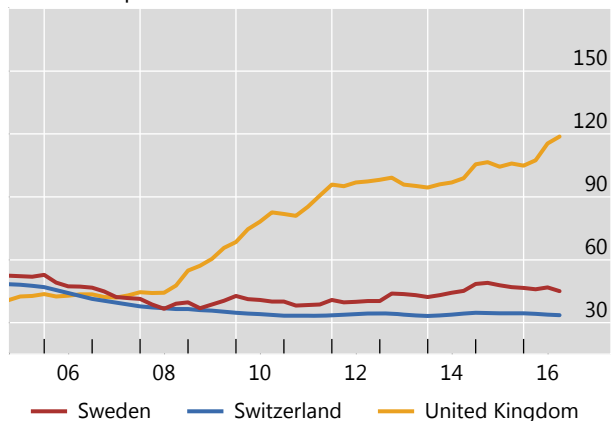
Euro area: aggregate and major countries



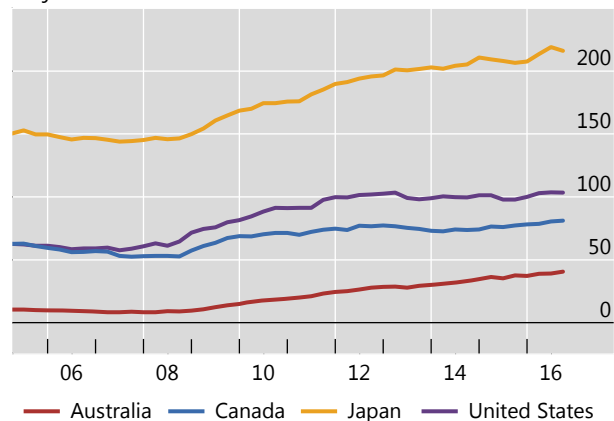
Euro area: other countries



Other European countries



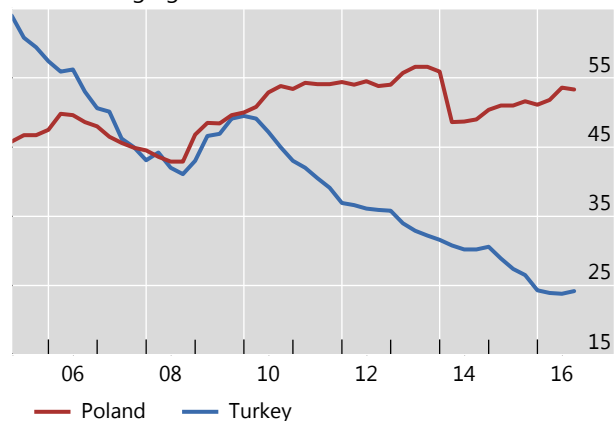
Major advanced economies



Emerging Asia



Other emerging market economies



Further information on the BIS credit statistics is available at www.bis.org/statistics/totcredit.htm.

¹ Consolidated data for the general government sector.

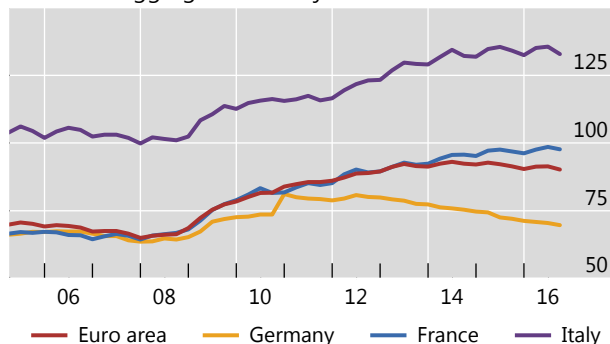
Source: BIS total credit statistics.

Total credit to the government sector at nominal value (core debt)¹

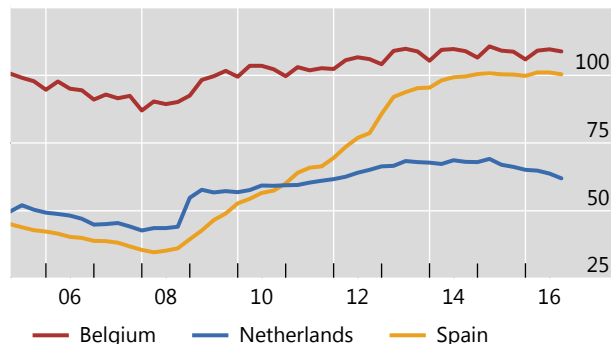
As a percentage of GDP

Graph F.7

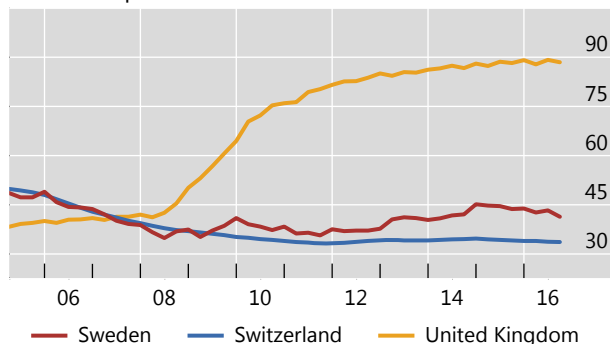
Euro area: aggregate and major countries



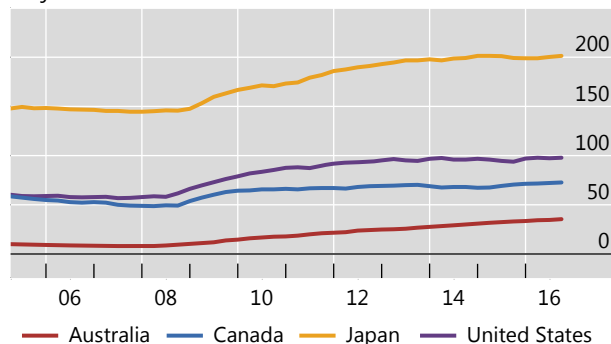
Euro area: other countries



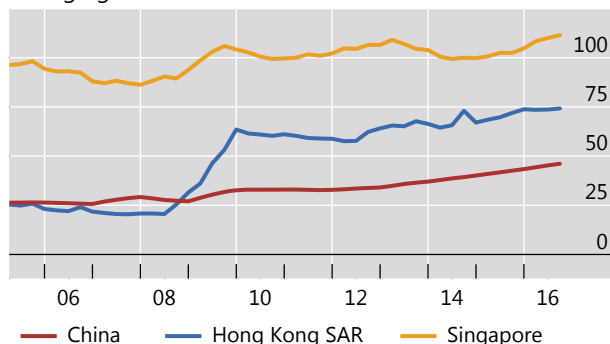
Other European countries



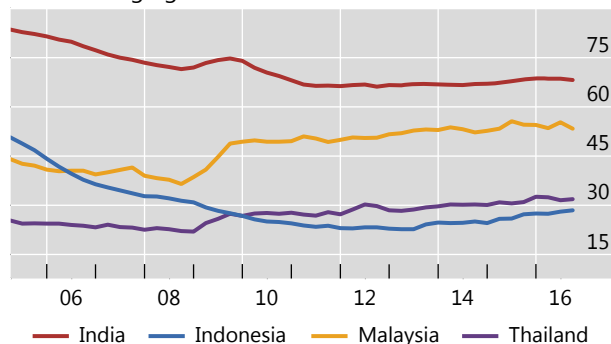
Major advanced economies



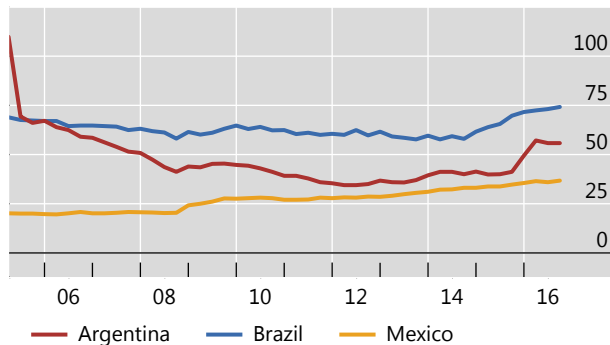
Emerging Asia



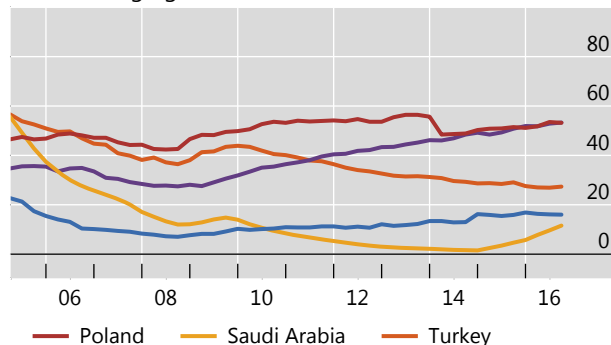
Other emerging Asia



Latin America



Other emerging market economies



Further information on the BIS credit statistics is available at www.bis.org/statistics/totcredit.htm.

¹ Consolidated data for the general government sector; central government for Argentina, Indonesia, Malaysia, Mexico, Saudi Arabia and Thailand.

Source: BIS total credit statistics.

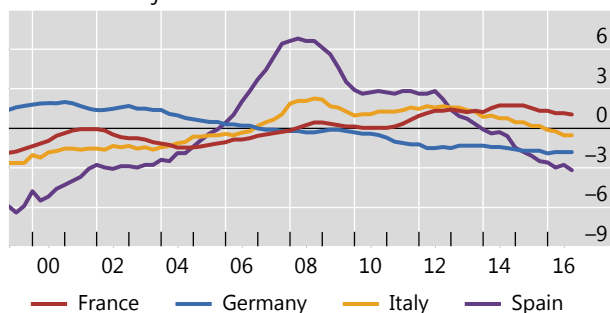
G Debt service ratios for the private non-financial sector

Debt service ratios of the private non-financial sector

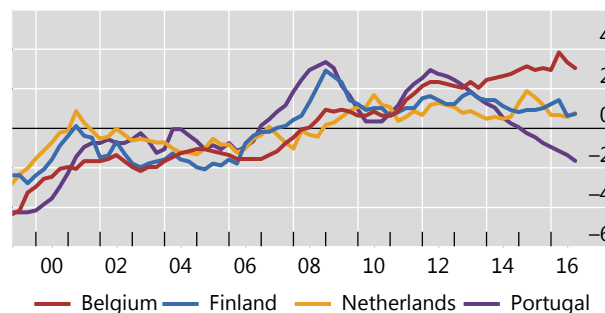
Deviation from country-specific mean, in percentage points¹

Graph G.1

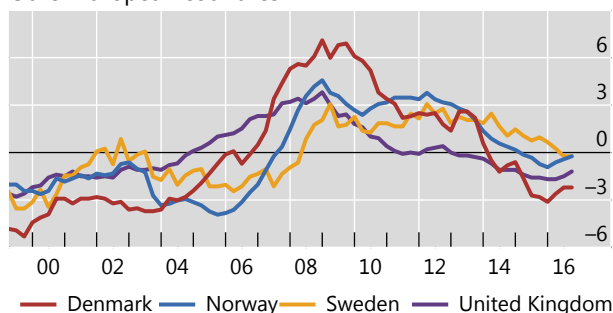
Euro area: major countries



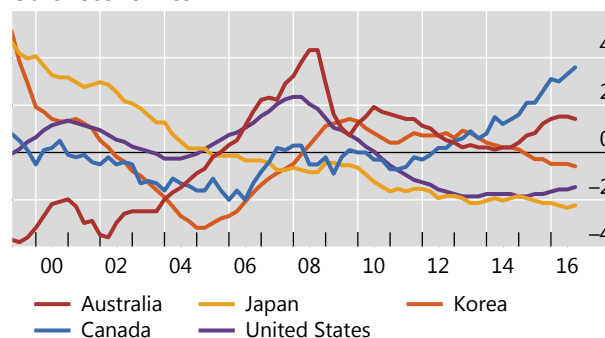
Euro area: other countries



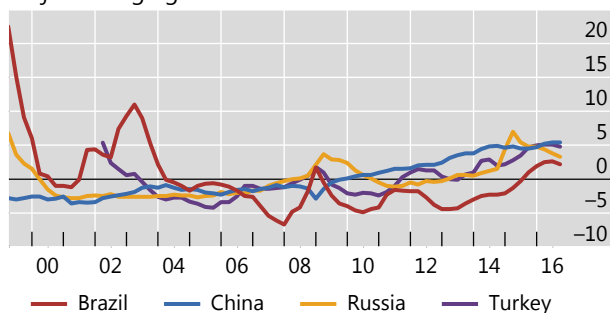
Other European countries



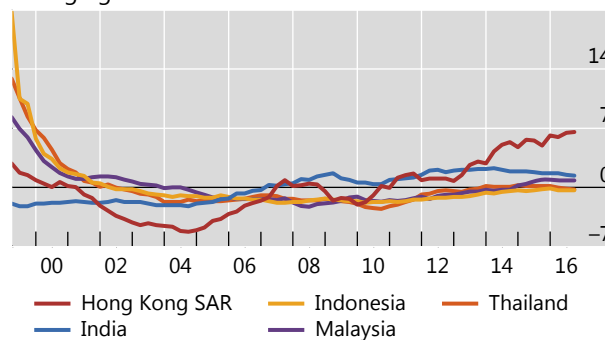
Other economies



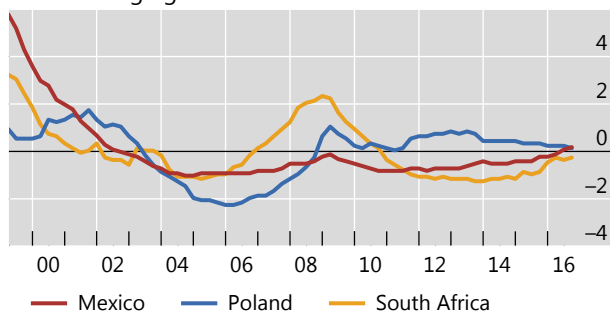
Major emerging markets²



Emerging Asia²



Other emerging markets²



Further information on the BIS debt service ratio statistics is available at www.bis.org/statistics/dsr.htm.

¹ Country-specific means are based on all available data from 1999 onwards. ² Countries which are using alternative measures of income and interest rates. Further information is available under "Methodology and data for DSR calculation" at www.bis.org/statistics/dsr.htm.

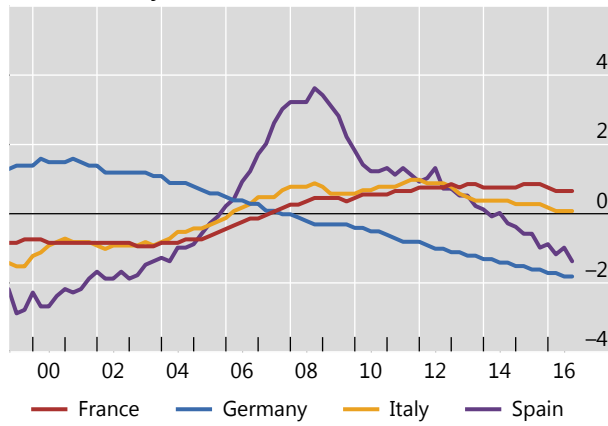
Source: BIS debt service ratios statistics.

Debt service ratios of households

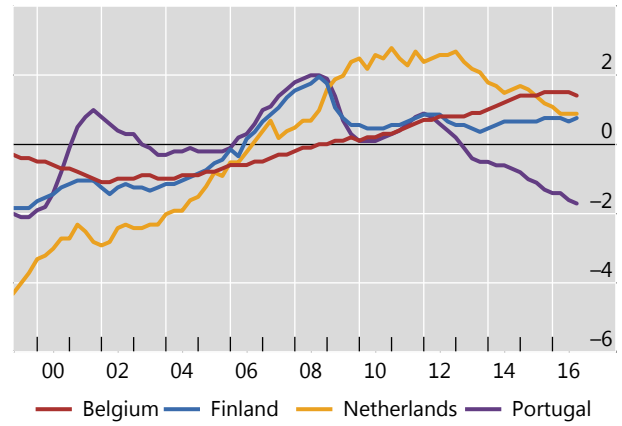
Deviation from country-specific mean, in percentage points¹

Graph G.2

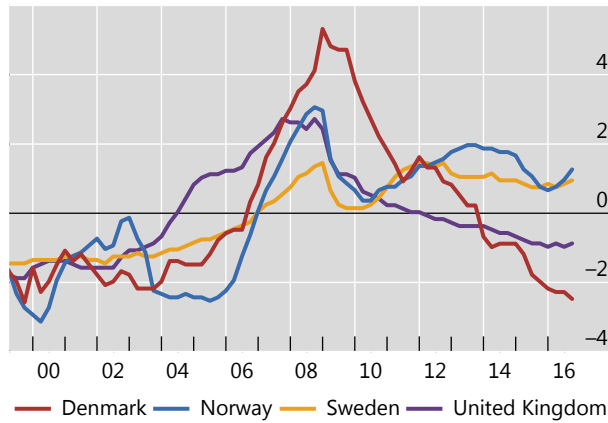
Euro area: major countries



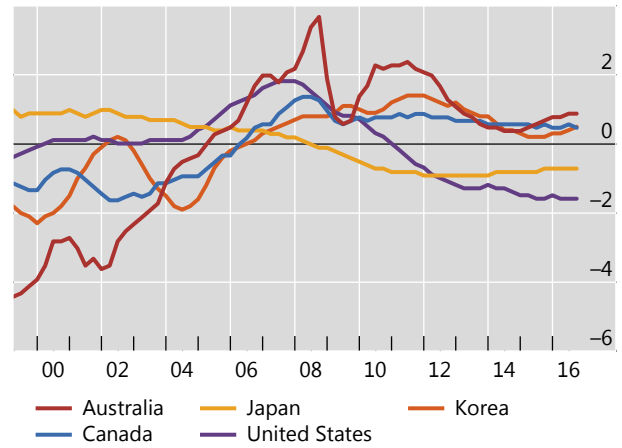
Euro area: other countries



Other European countries



Other economies



Further information on the BIS debt service ratio statistics is available at www.bis.org/statistics/dsr.htm.

¹ Country-specific means are based on all available data from 1999 onwards.

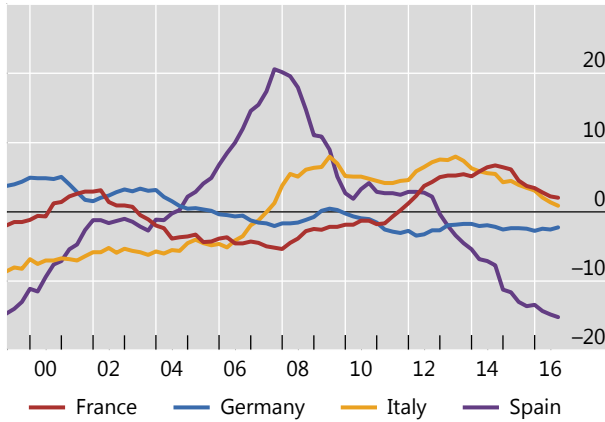
Source: BIS debt service ratios statistics.

Debt service ratios of non-financial corporations

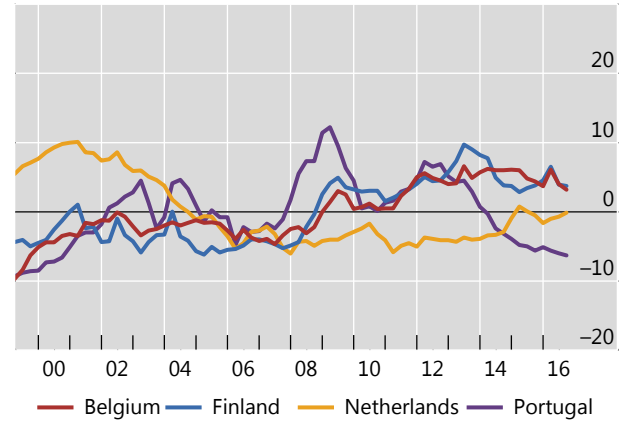
Deviation from country-specific mean, in percentage points¹

Graph G.3

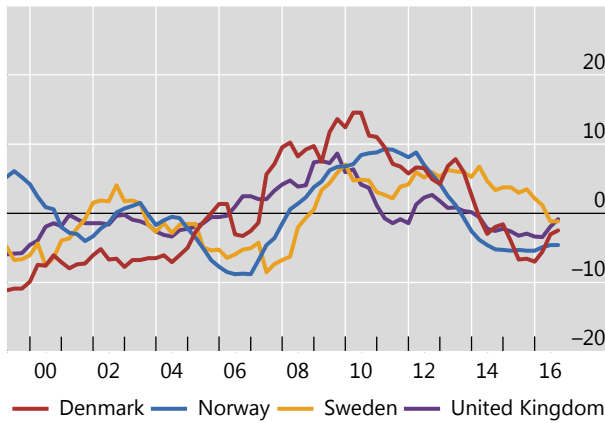
Euro area: major countries



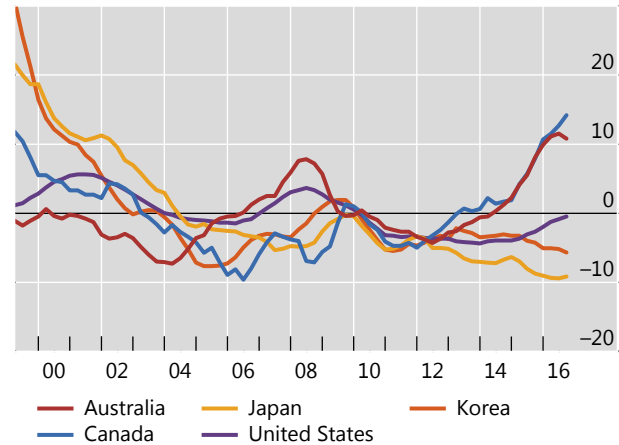
Euro area: other countries



Other European countries



Other economies



Further information on the BIS debt service ratio statistics is available at www.bis.org/statistics/dsr.htm.

¹ Country-specific means are based on all available data from 1999 onwards.

Source: BIS debt service ratios statistics.

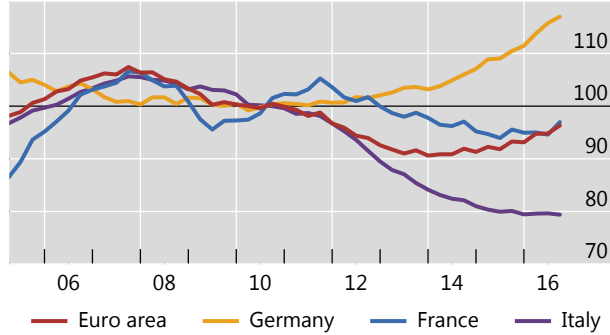
H Property price statistics

Real residential property prices

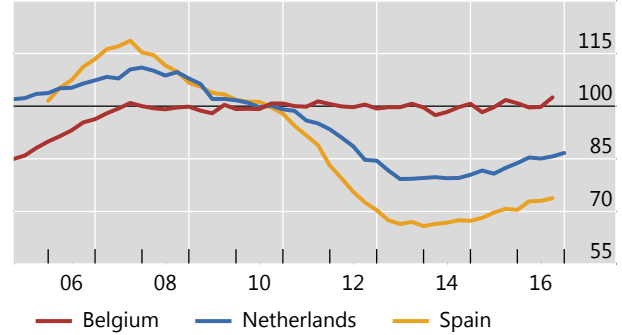
CPI-deflated, 2010 = 100

Graph H.1

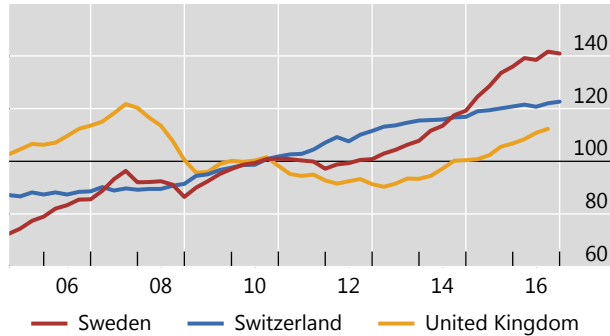
Euro area: aggregate and major countries



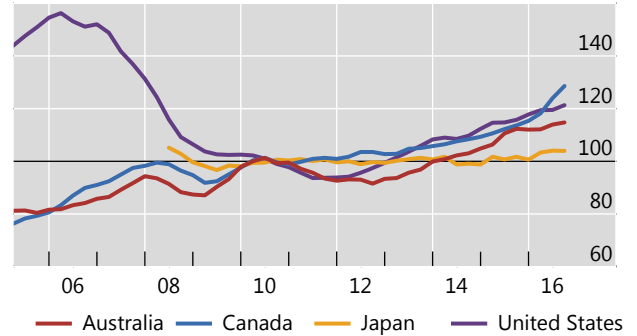
Euro area: other countries



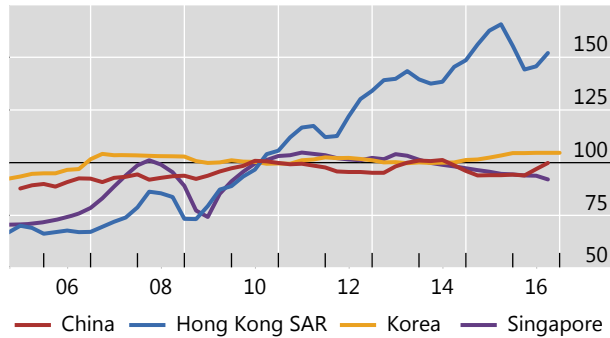
Other European countries



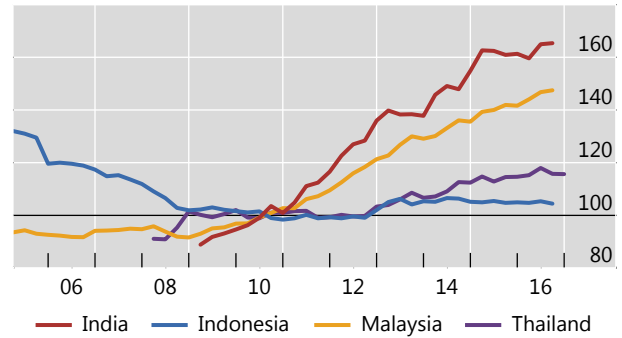
Major advanced economies



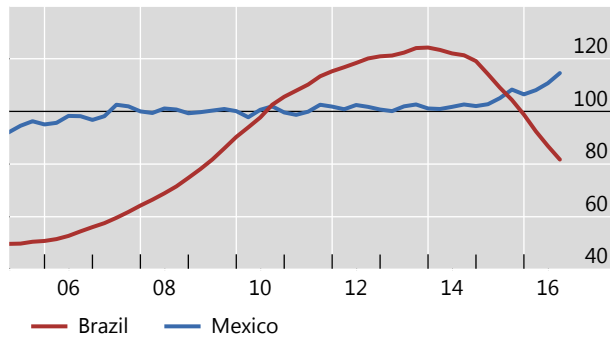
Emerging Asia



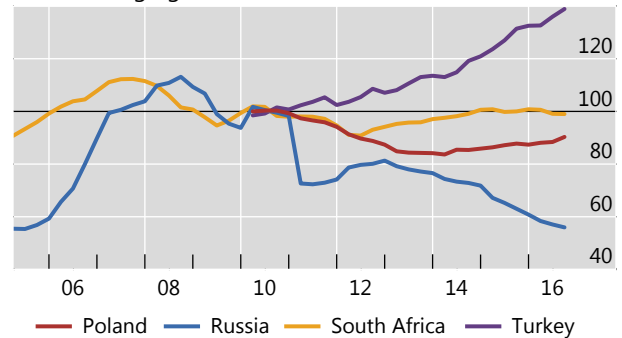
Other emerging Asia



Latin America



Other emerging market economies



Further information on the BIS property price statistics is available at www.bis.org/statistics/pp.htm.

Source: BIS property prices statistics.

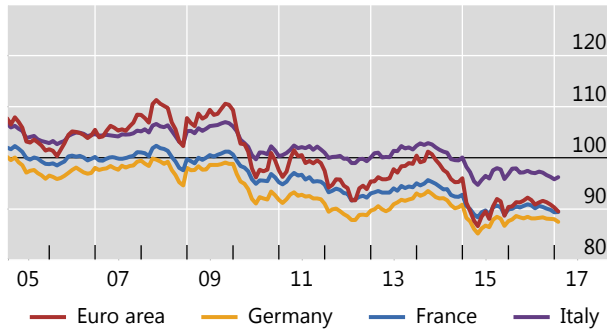
I Effective exchange rate statistics

Real effective exchange rates

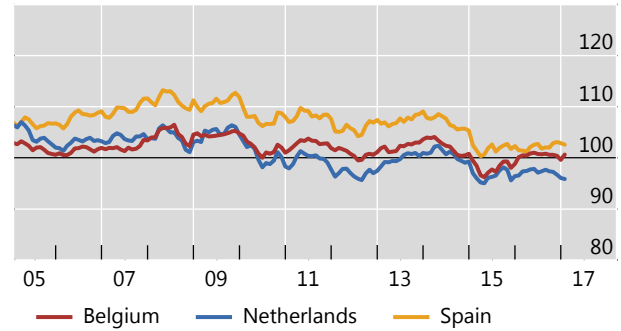
CPI-based, 1995–2005 = 100¹

Graph I.1

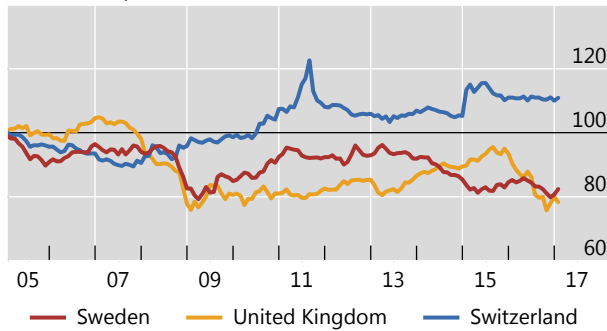
Euro area: aggregate and major countries



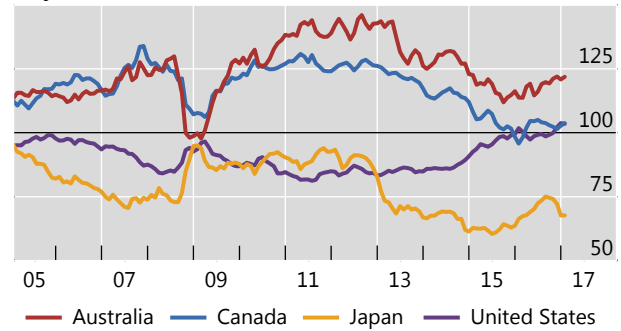
Euro area: other countries



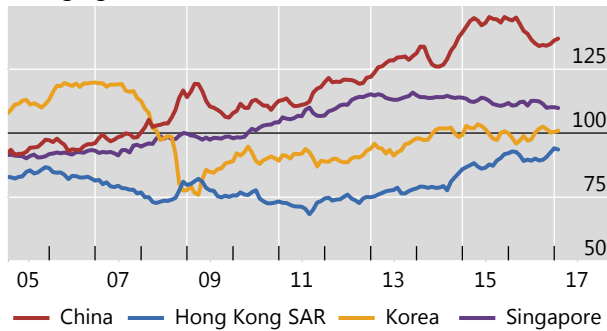
Other European countries



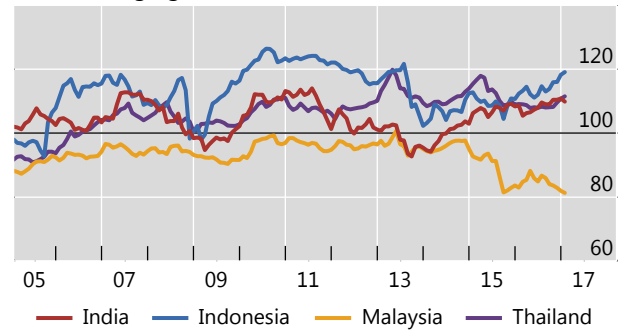
Major advanced economies



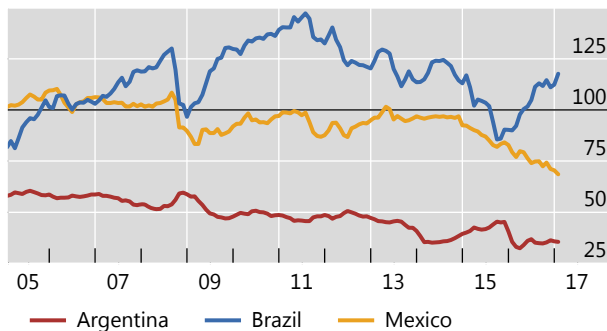
Emerging Asia



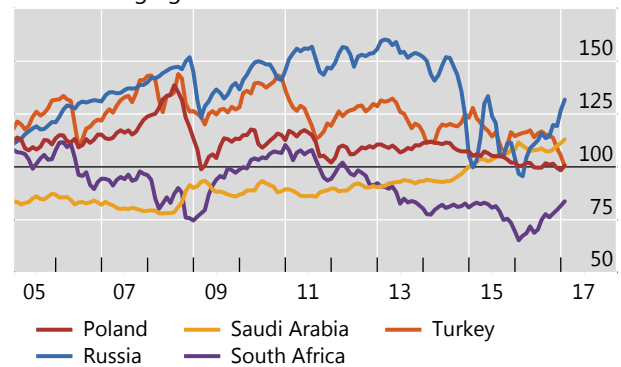
Other emerging Asia



Latin America



Other emerging market economies



Further information on the BIS effective exchange rate statistics is available at www.bis.org/statistics/eer.htm.

¹ An increase indicates a real-term appreciation of the local currency against a broad basket of currencies.

Source: BIS effective exchange rates statistics.

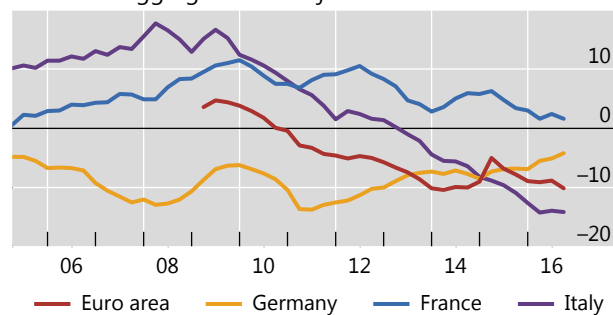
J Credit-to-GDP gaps

Credit-to-GDP gaps

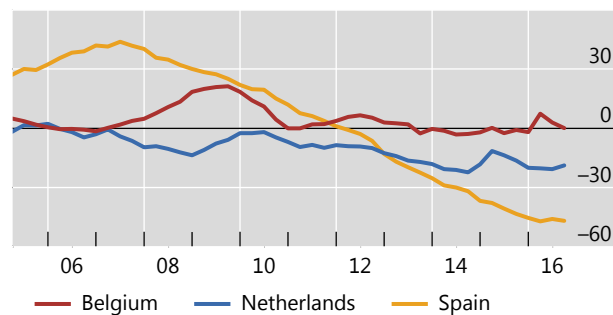
In percentage points of GDP

Graph J.1

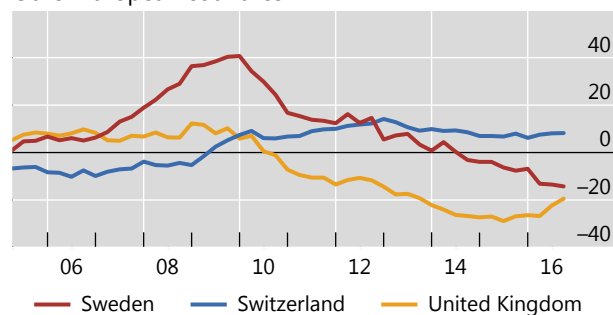
Euro area: aggregate and major countries



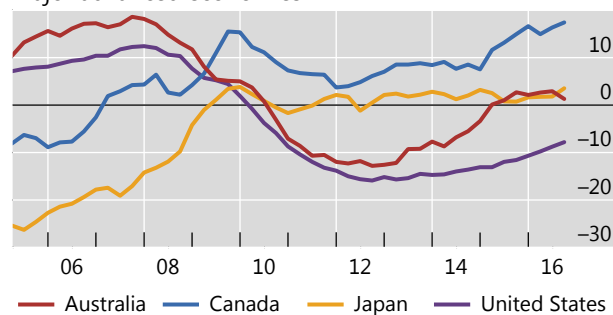
Euro area: other countries



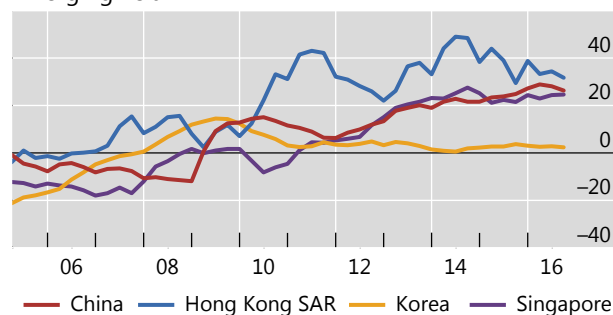
Other European countries



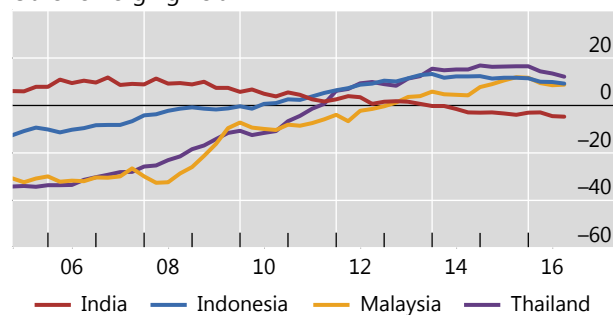
Major advanced economies



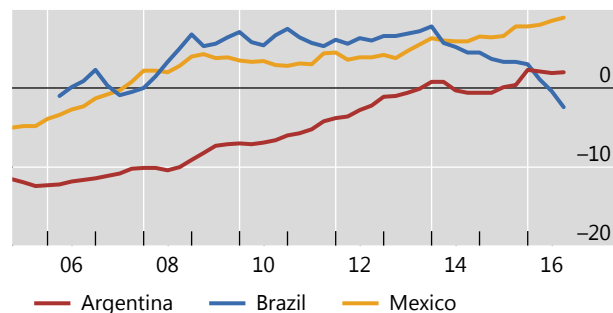
Emerging Asia



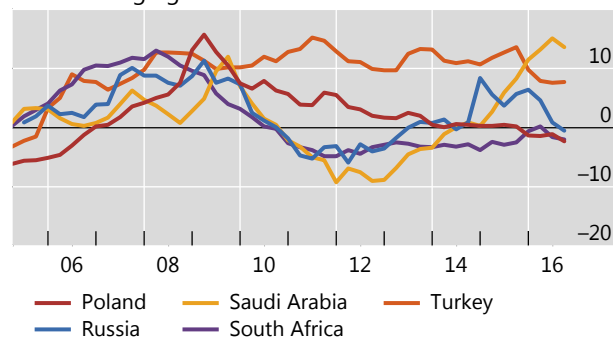
Other emerging Asia



Latin America



Other emerging market economies



¹ Estimates based on series on total credit to the private non-financial sector. The credit-to-GDP gap is defined as the difference between the credit-to-GDP ratio and its long-term trend; the long-term trend is calculated using a one-sided Hodrick-Prescott filter with a smoothing parameter of 400,000. Further information on the BIS credit-to-GDP gaps is available at www.bis.org/statistics/c_gaps.htm.

Source: BIS credit-to-GDP gaps statistics.

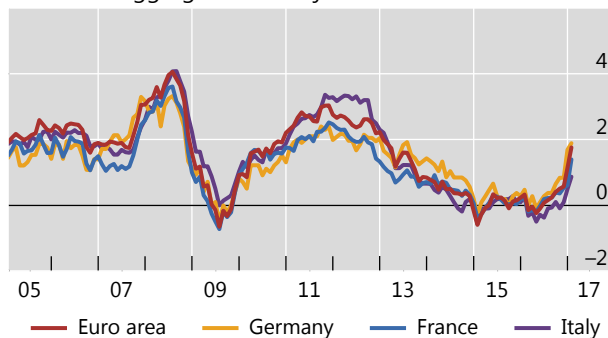
K Consumer prices

Consumer prices

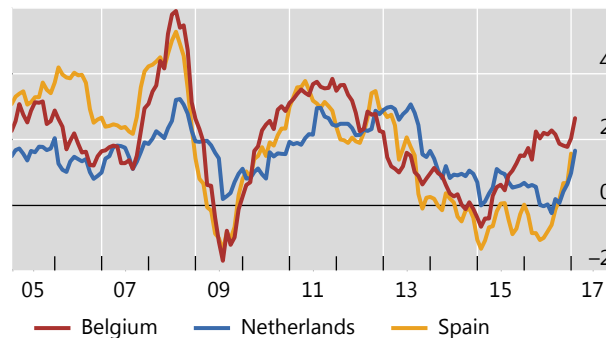
Year-on-year percentage changes

Graph K.1

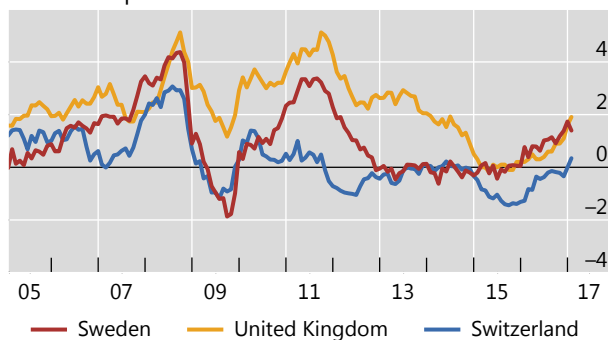
Euro area: aggregate and major countries



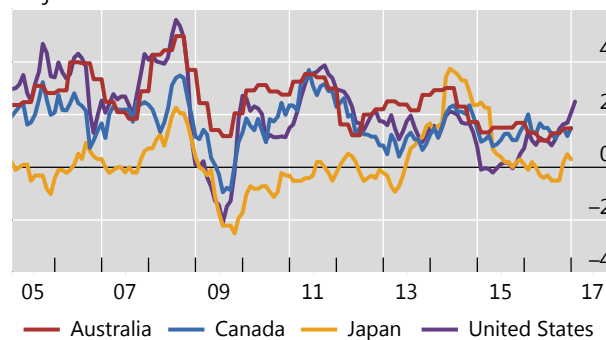
Euro area: other countries



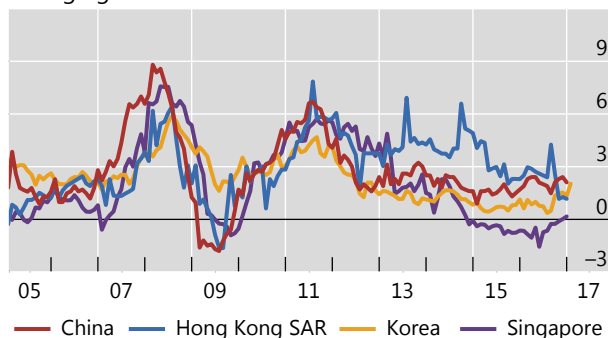
Other European countries



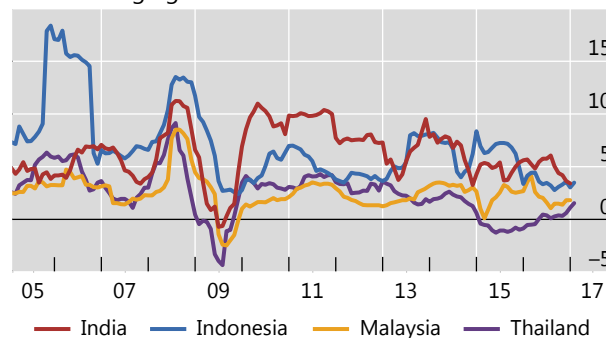
Major advanced economies



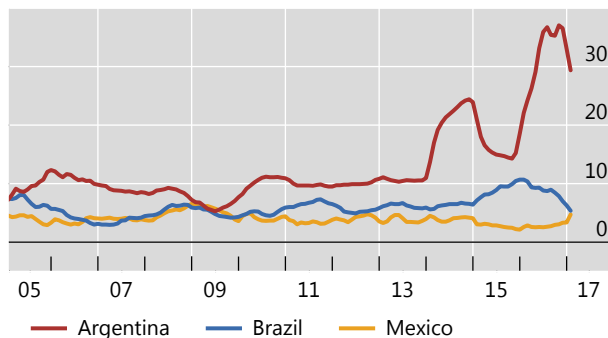
Emerging Asia



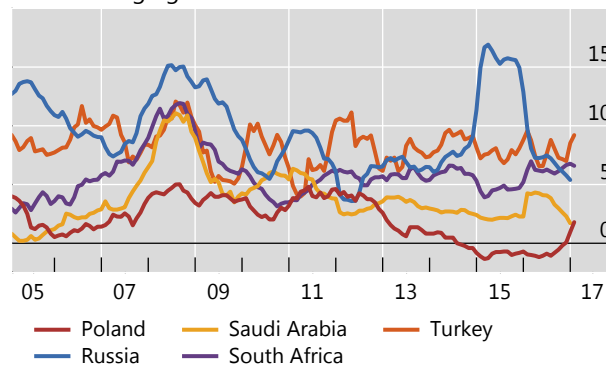
Other emerging Asia



Latin America



Other emerging market economies



Further information on the BIS consumer prices is available at www.bis.org/statistics/cp.htm.

Source: BIS consumer price statistics.

Special features in the BIS Quarterly Review

December 2016	Downsized FX markets: causes and implications	Michael Moore, Andreas Schrimpf and Vladyslav Sushko
December 2016	The changing shape of interest rate derivatives markets	Torsten Ehlers & Egemen Eren
December 2016	Emerging derivatives markets?	Christian Upper & Marcos Valli
December 2016	Non-deliverable forwards: impact of currency internationalisation and derivatives reform	Robert McCauley & Chang Shu
December 2016	Does the financial channel of exchange rates offset the trade channel?	Jonathan Kerns & Nikhil Patel
September 2016	Covered interest parity lost: understanding the cross-currency basis	Claudio Borio, Robert McCauley, Patrick McGuire & Vladyslav Sushko
September 2016	Foreign exchange market intervention in EMEs: what has changed?	Dietrich Domanski, Emanuel Kohlscheen & Ramon Moreno
September 2016	Domestic financial markets and offshore bond financing	Jose Maria Serena & Ramon Moreno
September 2016	The ECB's QE and euro cross-border bank lending	Stefan Avdjiev, Agne Subelyte & Elod Takats
March 2016	How have central banks implemented negative policy rates?	Morten Bech & Ayttek Malkhozov
March 2016	Wealth inequality and monetary policy	Dietrich Domanski, Michela Scatigna & Anna Zabai
March 2016	The resilience of banks' international operations	Patrick McGuire & Goetz Von Peter
March 2016	Hanging up the phone – electronic trading in fixed income markets and its implications	Morten Bech, Anamaria Illes, Ulf Lewrick & Andreas Schrimpf

Recent BIS publications¹

BIS Working Papers

The effects of tax on bank liability structure

Leonardo Gambacorta, Giacomo Ricotti, Suresh Sundaresan and Zhenyu Wang
February 2017, No 611

This paper examines the effects of taxation on the liability structure of banks. We derive testable predictions from a dynamic model of optimal bank liability structure that incorporates bank runs, regulatory closure and endogenous default. Using the supervisory data provided by the Bank of Italy, we empirically test these predictions by exploiting exogenous variations of the Italian tax rates on productive activities (IRAP) across regions and over time (especially since the global financial crisis). We show that banks endogenously respond to a reduction in tax rates by reducing non-deposit liabilities more than deposits in addition to lowering leverage. The response on the asset side depends on the financial strength of the bank: well-capitalized banks respond to a reduction in tax rates by increasing their assets, but poorly-capitalized banks respond by cleaning up their balance sheet.

Global impact of US and euro area unconventional monetary policies: a comparison

Qianying Chen, Marco Jacopo Lombardi, Alex Ross and Feng Zhu Rungcharoenkitkul
February 2017, No 610

The paper analyses and compares the domestic and cross-border effects of US and euro area unconventional monetary policy measures on 24 major advanced and emerging economies, based on an estimated global vector error-correction model (GVECM). Unconventional monetary policies are measured using shadow interest rates developed by Lombardi and Zhu (2014). Monetary policy shocks are identified using sign restrictions. The GVECM impulse responses suggest that US unconventional monetary policy generally has stronger domestic and cross-border impacts than euro area non-standard measures. Its spillovers to other economies are estimated to be more sizeable and persistent, especially in terms of output growth and inflation. There is evidence of diverse responses in the emerging economies in terms of exchange rate pressures, credit growth as well as monetary policy. In addition, the strength of cross-border transmission channels to the emerging economies appears to differ for US and euro area policies.

Revisiting the commodity curse: a financial perspective

Enrique Alberola-Ila and Gianluca Benigno
February 2017, No 609

We study the response of a three-sector commodity-exporter small open economy to a commodity price boom. When the economy has access to international borrowing and lending, a temporary commodity price boom brings about the standard wealth effect that stimulates demand and has long-run implications on the sectoral allocation of labor. If dynamic productivity gains are concentrated in the traded goods sector, the commodity boom crowds out the traded sector and delays convergence to the world technology frontier. Financial openness by stimulating current demand, amplifies the crowding out effect and may even lead to a growth trap, in which no resources are allocated to the traded sector. From a normative point of view, our analysis suggests that capital account management policies could be welfare improving in those circumstances.

¹ Requests for publications should be addressed to Bank for International Settlements, Press & Communications, Centralbahnplatz 2, CH-4002 Basel. These publications are also available on the BIS website (<http://www.bis.org/>).

Redemption risk and cash hoarding by asset managers

Stephen Morris, Ilhyock Shim and Hyun Song Shin

January 2017, No 608

Open-end mutual funds face redemptions by investors, but the sale of the underlying assets depends on the portfolio decision of asset managers. If asset managers use their cash holding as a buffer to meet redemptions, they can mitigate fire sales of the underlying asset. If they hoard cash in anticipation of redemptions, they will amplify fire sales. We present a global game model of investor runs and identify conditions under which asset managers hoard cash. In an empirical investigation of global bond mutual funds, we find that cash hoarding is the rule rather than the exception, and that less liquid bond funds display a greater tendency toward cash hoarding.

The real effects of household debt in the short and long run

Marco Jacopo Lombardi, Madhusudan Mohanty and Ilhyock Shim

January 2017, No 607

Household debt levels relative to GDP have risen rapidly in many countries over the past decade. We investigate the macroeconomic impact of such increases by employing a novel estimation technique proposed by Chudik et al (2016), which tackles the problem of endogeneity present in traditional regressions. Using data on 54 economies over 1990-2015, we show that household debt boosts consumption and GDP growth in the short run, mostly within one year. By contrast, a 1 percentage point increase in the household debt-to-GDP ratio tends to lower growth in the long run by 0.1 percentage point. Our results suggest that the negative long-run effects on consumption tend to intensify as the household debt-to-GDP ratio exceeds 60%. For GDP growth, that intensification seems to occur when the ratio exceeds 80%. Finally, we find that the degree of legal protection of creditors is able to account for the cross-country variation in the long-run impact.

Market volatility, monetary policy and the term premium

Sushanta K Mallick, Madhusudan Mohanty and Fabrizio Zampolli

January 2017, No 606

Based on empirical VAR models, we investigate the role of (option-implied) stock and bond market volatilities and monetary policy in the determination of the US 10-year term premium. Our preliminary findings are that an unexpected loosening of monetary policy - through a cut in the federal funds rate in the pre-crisis sample or an increase in bond purchases post-Lehman - typically leads to a decline in both expected stock and bond market volatilities and the term premium. However, while conventional monetary policy boosts economic activity in the precrisis period, bond purchases are found to have no statistically significant real effects postcrisis. Second, expected equity market volatility (VIX) is found to be more important than bond market volatility (MOVE). Pre-crisis, a shock to the VIX leads to a concomitant rise in the MOVE, a contraction of economic activity, a fall in broker-dealer leverage and a rise in the term premium, consistent with pro-cyclical swings in market liquidity. Post-crisis, an innovation to the VIX is instead associated with a drop in the term premium, suggesting the prevalence of flight to quality effects.

Wage and price setting: new evidence from Uruguayan firms

Fernando Borraz, Gerardo Licandro and Daniela Sola

January 2017, No 605

This paper presents new evidence on wage and price setting based on a survey of more than 300 Uruguayan firms in 2013. Most of the firms set prices considering costs and adding a profit margin; therefore, they have some degree of market power. The evidence indicates that price increases appear quite flexible in Uruguay (prices are downward rigid). Most of the firms adjust their prices without following a regular frequency which suggests that price changes in Uruguay are state-dependent, although wage changes are concentrated in January and July. Interestingly, the cost of credit is seen by companies as an irrelevant factor in explaining price increases. We also find that cost reduction is the principal strategy to a negative demand shock. Finally, the adjustment of prices to changes in wages is relatively fast.

Endogenous wage indexation and aggregate shocks

Julio A. Carrillo, Gert Peersman and Joris Wauters

January 2017, No 604

Empirical and institutional evidence finds considerable time variation in the degree of wage indexation to past inflation, a finding that is at odds with the assumption of constant indexation parameters in most New-Keynesian DSGE models. We build a DSGE model with endogenous wage indexation in which utility maximizing workers select a wage indexation rule in response to aggregate shocks and monetary policy. We show that workers index wages to past inflation when output fluctuations are driven by technology and permanent inflation-target shocks, whereas they index to trend inflation when aggregate demand shocks dominate output fluctuations. The model's equilibrium wage setting can explain the time variation in wage indexation found in post-WWII U.S. data.

Multiplex interbank networks and systemic importance - An application to European data

Iñaki Aldasoro and Ivan Alves

January 2017, No 603

Research on interbank networks and systemic importance is starting to recognise that the web of exposures linking banks' balance sheets is more complex than the single-layer-of-exposure approach suggests. We use data on exposures between large European banks, broken down by both maturity and instrument type, to characterise the main features of the multiplex (or multi-layered) structure of the network of large European banks. Banks that are well connected or important in one network, tend to also be well connected in other networks (i.e. the network features positively correlated multiplexity). The different layers exhibit a high degree of similarity, stemming both from standard similarity analyses as well as a core-periphery analyses at the layer level. We propose measures of systemic importance that fit the case in which banks are connected through an arbitrary number of layers (be it by instrument, maturity or a combination of both). Such measures allow for a decomposition of the global systemic importance index for any bank into the contributions of each of the sub-networks, providing a potentially useful tool for banking regulators and supervisors in identifying tailored policy responses. We use the dataset of exposures between large European banks to illustrate that both the methodology and the specific level of network aggregation may matter both in the determination of interconnectedness and in the policy making process.

The globalisation of inflation: the growing importance of global value chains

Raphael Auer, Claudio Borio and Andrew Filardo

January 2017, No 602

Greater international economic interconnectedness over recent decades has been changing inflation dynamics. This paper presents evidence that the expansion of global value chains (GVCs), ie cross-border trade in intermediate goods and services, is an important channel through which global economic slack influences domestic inflation. In particular, we document the extent to which the growth in GVCs explains the established empirical correlation between global economic slack and national inflation rates, both across countries and over time. Accounting for the role of GVCs, we also find that the conventional trade-based measures of openness used in previous studies are poor proxies for this transmission channel. The results support the hypothesis that as GVCs expand, direct and indirect competition among economies increases, making domestic inflation more sensitive to the global output gap. This can affect the trade-offs that central banks face when managing inflation.

Asymmetric information and the securitization of SME loans

Ugo Albertazzi, Margherita Bottero, Leonardo Gambacorta and Steven Ongena

January 2017, No 601

Using credit register data for loans to Italian firms we test for the presence of asymmetric information in the securitization market by looking at the correlation between the securitization (risk-transfer) and the default (accident) probability. We can disentangle the adverse selection from the moral hazard component for the many firms with multiple bank

relationships. We find that adverse selection is widespread but that moral hazard is confined to weak relationships, indicating that a strong relationship is a credible enough commitment to monitor after securitization. Importantly, the selection of which loans to securitize based on observables is such that it largely offsets the (negative) effects of asymmetric information, rendering the overall unconditional quality of securitized loans significantly better than that of non-securitized ones. Thus, despite the presence of asymmetric information, our results do not accord with the view that credit-risk transfer leads to lax credit standards.

The currency dimension of the bank lending channel in international monetary transmission

Előd Takáts and Judit Temesváry
December 2016, No 600

We investigate how the use of a currency transmits monetary policy shocks in the global banking system. We use newly available unique data on the bilateral crossborder lending flows of 27 BIS-reporting lending banking systems to over 50 borrowing countries, broken down by currency denomination (USD, EUR and JPY). We have three main findings. First, monetary shocks in a currency significantly affect cross-border lending flows in that currency, even when neither the lending banking system nor the borrowing country uses that currency as their own. Second, this transmission works mainly through lending to non-banks. Third, this currency dimension of the bank lending channel works similarly across the three currencies suggesting that the cross-border bank lending channel of liquidity shock transmission may not be unique to lending in USD.

Banking industry dynamics and size-dependent capital regulation

Tirupam Goel
December 2016, No 599

This paper presents a general equilibrium model with a dynamic banking sector to characterize optimal size-dependent bank capital regulation (CR). Bank leverage choices are subject to the risk-return trade-off: high leverage increases expected return on capital, but also increases return variance and bank failure risk. Financial frictions imply that bank leverage choices are socially inefficient, providing scope for a welfare-enhancing CR that imposes a cap on bank leverage. The optimal CR is tighter relative to the pre-crisis benchmark. Optimal CR is also bank specific, and tighter for large banks than for small banks. This is for three reasons. First, allowing small banks to take more leverage enables them to potentially grow faster, leading to a growth effect. Second, although more leverage by small banks results in a higher exit rate, these exits are by the less efficient banks, leading to a cleansing effect. Third, failures are more costly among large banks, because these are more efficient in equilibrium and intermediate more capital. Therefore, tighter regulation for large banks renders them less prone to failure, leading to a stabilization effect. In terms of industry dynamics, tighter CR results in a smaller bank exit rate and a larger equilibrium mass of better capitalized banks, even though physical capital stock and wages are lower. The calibrated model rationalizes various steady state moments of the US banking industry, and provides general support for the Basel III GSIB framework.

Did the founding of the Federal Reserve affect the vulnerability of the interbank system to contagion risk?

Mark A Carlson and David C Wheelock
December 2016, No 598

As a result of legal restrictions on branch banking, an extensive interbank system developed in the United States during the 19th century to facilitate interregional payments and flows of liquidity and credit. Vast sums moved through the interbank system to meet seasonal and other demands, but the system also transmitted shocks during banking panics. The Federal Reserve was established in 1914 to reduce reliance on the interbank market and correct other defects that caused banking system instability. Drawing on recent theoretical work on interbank networks, we examine how the Fed's establishment affected the system's resilience to solvency and liquidity shocks and whether these shocks might have been contagious. We find that the interbank system became more resilient to solvency shocks, but less resilient to liquidity shocks, as banks sharply reduced their liquidity after the Fed's founding. The

industry's response illustrates how the introduction of a lender of last resort can alter private behavior in a way that increases the likelihood that the lender may be needed.

Bank networks: contagion, systemic risk and prudential policy

Iñaki Aldasoro, Domenico Delli Gatti and Ester Faia

December 2016, No 597

We present a network model of the interbank market in which optimizing risk averse banks lend to each other and invest in non-liquid assets. Market clearing takes place through a tâtonnement process which yields the equilibrium price, while traded quantities are determined by means of an assortative matching process. Contagion occurs through liquidity hoarding, interbank interlinkages and fire sale externalities. The resulting network configuration exhibits a core-periphery structure, disassortative behavior and low density. Within this framework we analyse the effects of a stylized set of prudential policies on the stability/efficiency trade-off. Liquidity requirements unequivocally decrease systemic risk, but at the cost of lower efficiency (measured by aggregate investment in non-liquid assets). Equity requirements also tend to reduce risk (hence increase stability), though without reducing significantly overall investment. On this basis, our results provide general support for the Basel III approach based on complementary regulatory metrics.

Macroeconomics of bank capital and liquidity regulations

Frederic Boissay and Fabrice Collard

December 2016, No 596

We study the transmission mechanisms of liquidity and capital regulations as well as their effects on the economy and welfare. We propose a macro-economic model in which a regulator faces the following trade-off. On the one hand, banking regulations may reduce the aggregate supply of credit. On the other hand, they promote the allocation of credit to its best uses. Accordingly, in a regulated economy there is less, but more productive lending. Based on a version of the model calibrated on US data, we find that both liquidity and capital requirements are needed, and must be set relatively high. They also mutually reinforce each other, except when liquid assets are scarce. Our analysis thus provides broad support for Basel III's "multiple metrics" framework.

Bank lending and loan quality: the case of India

Pallavi Chavan and Leonardo Gambacorta

December 2016, No 595

This paper analyses how non-performing loans (NPLs) of Indian banks behave through the cycle. We find that a one-percentage point increase in loan growth is associated with an increase in NPLs over total advances (NPL ratio) of 4.3 per cent in the long run with the response being higher during expansionary phases. Furthermore, NPL ratios of banks are found to be sensitive to the interest rate environment and the overall growth of the economy. Notwithstanding differences in management and governance structures, there is a procyclical risk-taking response to credit growth in the case of both public and private banks with private banks being more reactive to changes in interest rate and business cycle conditions.

A quantitative case for leaning against the wind

Andrew Filardo and Phurichai Rungcharoenkitkul

December 2016, No 594

Should a monetary authority lean against the build-up of financial imbalances? We study this policy question in an environment in which there are recurring cycles of financial imbalances that develop over time and eventually collapse in a costly manner. The optimal policy reflects the trade-off between the short-run macroeconomic costs of leaning against the wind and the longer-run benefits of stabilising the financial cycle. We model the financial cycle as a nonlinear Markov regime-switching process, calibrate the model to US data and characterise the optimal monetary policy. Leaning systematically over the whole financial cycle is found to outperform policies of "benign neglect" and "late-in-the-cycle" discretionary interventions. This conclusion is robust to a wide range of alternative assumptions and supports an orientation shift in monetary policy frameworks away from narrow price stability to a joint consideration of price and financial stability.

The countercyclical capital buffer and the composition of bank lending

Raphael Auer and Steven Ongena

December 2016, No 593

Do macroprudential regulations on residential lending influence commercial lending behavior too? To answer this question, we identify the compositional changes in banks' supply of credit using the variation in their holdings of residential mortgages on which extra capital requirements were uniformly imposed by the countercyclical capital buffer (CCB) introduced in Switzerland in 2012. We find that the CCB's introduction led to higher growth in commercial lending, in particular to small firms, although this was unrelated to conditions in regional housing markets. The interest rates and fees charged to these firms concurrently increased. We rationalize these findings in a model featuring both private and firm-specific collateral. The corresponding imperfect substitutability between private and commercial credit for the entrepreneur's relationship bank is then shown to give rise to the compositional patterns we empirically document.

Basel Committee on Banking Supervision

Frequently asked questions on market risk capital requirements

January 2017

In January 2016, the Basel Committee on Banking Supervision published the standard Minimum capital requirements for market risk. To promote consistent global implementation of those requirements, the Committee has agreed to periodically review frequently asked questions (FAQs) and publish answers along with any technical elaboration of the standards text and interpretative guidance that may be necessary.

Regulatory Consistency Assessment Programme (RCAP) - Assessment of Basel III risk-based capital regulations - Indonesia

December 2016

This report presents the findings of the RCAP Assessment Team on the domestic adoption of the Basel risk-based capital standards in Indonesia and its consistency with the minimum requirements of the Basel III framework. The assessment focuses on the adoption of Basel standards applied to Indonesian banks that are internationally or regionally active and of significance to Indonesia's domestic financial stability.

The RCAP Assessment Team was led by Ms Kerstin af Jochnick, First Deputy Governor of Sveriges Riksbank. The Assessment Team comprised eight technical experts drawn from France, Georgia, Germany, India, Mexico, the Philippines and South Africa (Annex 1). The main counterparts for the assessment were the Indonesia Financial Services Authority (OJK) and Bank Indonesia (BI). The overall work was coordinated by the Basel Committee Secretariat with support from staff from Sveriges Riksbank.

Regulatory Consistency Assessment Programme (RCAP) - Assessment of Basel III LCR regulations - Indonesia

December 2016

This report presents the findings of the RCAP Assessment Team on the domestic adoption of the Basel Liquidity Coverage Ratio (LCR) standard in Indonesia and its consistency with the minimum requirements of the Basel III framework. The assessment focuses on the adoption of Basel standards applied to Indonesian banks that are internationally or regionally active and of significance to Indonesia's domestic financial stability.

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**Regulatory Consistency Assessment Programme (RCAP) - Follow-up assessment of Basel III risk-based capital regulations - Japan
December 2016**

This report summarises the findings of the RCAP Assessment Team on the domestic adoption of the Basel III loss absorbency and capital buffers standards in Japan. These standards were not assessed during the first assessment of risk-based capital standards in Japan, conducted in 2012, as they had not been implemented at that time. The report of that assessment¹ recommended that these components be assessed in a follow-up assessment. This report describes that follow-up assessment and presents a revised assessment of Japan's overall compliance with the Basel risk-based capital standards. The Japanese regulations implementing these standards were revised in 2012 and 2015 and came into effect in 2013 and 2016.

**Regulatory Consistency Assessment Programme (RCAP) - Assessment of Basel III LCR regulations - Japan
December 2016**

This report presents the findings of the RCAP Assessment Team on the domestic adoption of the Basel This Liquidity Coverage Ratio (LCR) standard in Japan and its consistency with the minimum requirements of the Basel III framework. The assessment focuses on the adoption of Basel standards applied to the Japanese banks that are internationally active and of significance to domestic financial stability.

The RCAP Assessment Team was led by Mr Luigi Federico Signorini, Deputy Governor of the Bank of Italy. The Assessment Team comprised three technical experts drawn from Denmark, Malaysia and the United States (Annex 1). The main counterparties for the assessment were the Japanese Financial Services Agency (FSA) and the Bank of Japan. The overall work was coordinated by the Basel Committee Secretariat with support from staff from the Bank of Italy

**Regulatory Consistency Assessment Programme (RCAP) - Assessment of Basel III LCR regulations -Singapore
December 2016**

This report presents the findings of the RCAP Assessment Team on the domestic adoption of the Basel Liquidity Coverage Ratio (LCR) framework in Singapore and its consistency with the minimum requirements of this framework. The assessment focuses on the adoption of the Basel LCR standards applied to the Singapore banks that are internationally active and of significance to domestic financial stability.

The RCAP Assessment Team was led by Mr Stephen Bland, Director & Strategic Policy Advisor at the UK Prudential Regulation Authority. The Assessment Team comprised two technical experts drawn from Brazil and Sweden (Annex 1). The main counterpart of the assessment was the Monetary Authority of Singapore (MAS). The overall work was coordinated by the Basel Committee Secretariat.

Committee on Payments and Market Infrastructures

**Payment, clearing and settlement systems in the Kingdom of Bahrain
January 2017 No 156**

The Committee on Payments and Market Infrastructures (CPMI) publishes - under the aegis of the Bank for International Settlements (BIS) - reference works on payment systems and other financial market infrastructures in both CPMI member and non-member countries. These publications are widely known as Red Books.

The present volume, the first edition of the Red Book for the Kingdom of Bahrain is another step towards increasing our understanding of the way payment, clearing and settlement systems work in different countries.

Financial market infrastructures that are resilient and effective enhance the stability of the financial system. They also reduce transaction costs in the economy, promote the efficient use of financial resources, improve financial market liquidity and facilitate the conduct of monetary policy.

Central banks have a strong interest in promoting safety and improving efficiency in financial market infrastructures. They play a key role in domestic payment system development and, in many cases, operate large-value payment systems. Central banks in many countries have been influential in improving public understanding of financial market infrastructures in their countries and public awareness of the various policy issues they raise.

Statistics on payment, clearing and settlement systems in the CPMI countries - Figures for 2015

December 2016 No 155

This is an annual publication that provides data on payments and payment, clearing and settlement systems in the CPMI countries.

This version of the statistical update contains data for 2015 and earlier years. There are detailed tables for each individual country as well as a number of comparative tables.

Markets Committee

The sterling 'flash event' of 7 October 2016

January 2017

This report investigates the events surrounding the so-called flash event in sterling during early Asian trading hours on October 7. Drawing on granular high-frequency data, it includes a forensic study of the event window, a comparison with similar historic episodes, and a discussion of the relevant policy implications.

The analysis points to a confluence of factors catalysing the move and places significant weight on the time of day and mechanistic amplifiers (including options-related hedging flows) as contributing factors. It notes that the 7 October event does not represent a new phenomenon, but rather a new data point in what appears to be a series of flash events that are now occurring in a broader range of markets than was previously the case. While such events have generally proved short-lived and without immediate consequences for financial stability, the report highlights the risk that flash events undermine confidence in financial markets and stresses the need for further analytical work in this area.

Market intelligence gathering at Central Banks

December 2016

'Market intelligence' (MI) refers to the information, primarily qualitative in nature, that central banks gather through direct interaction and dialogue with market participants. This descriptive paper seeks to increase understanding of the MI activities that are conducted by central banks. It demonstrates that MI gathering can be conducted via a number of different models dependent on the central bank, its remit, size and resources. The paper highlights the importance of market intelligence to central banks. A key focus of the paper is on the recent evolution of MI activity, both in terms of markets and institutions as well as in terms of the organisational models for the collection, synthesis and dissemination of MI. Furthermore, the paper describes what central banks do with the information they collect, including how it is recorded and distributed, as well as the treatment of sensitive or confidential information.

Speeches

International financial crises: new understandings, new data

Keynote speech by Mr Jaime Caruana, General Manager of the BIS, on the occasion of the launch of the book Alexandre Lamfalussy: selected essays at the National Bank of Belgium, Brussels, 6 February 2017.

Abstracts: Alexandre Lamfalussy championed better understanding of global financial vulnerabilities, better data collection to inform that understanding and, more generally, the macroprudential approach. This speech reviews the interaction between such understanding and data collection over the last 40 years. The 1982 international debt crisis demonstrated that governments do go bust, and the data collected on consolidated country exposures were subsequently improved. The Asian financial crisis demonstrated that not just government debt, but also that of overleveraged corporate sectors with currency and maturity mismatches could lead to crisis. Here too, the data were improved in response. The Great Financial Crisis of 2007-09 reminded us once more that private risk management is not enough, that low inflation is not enough and that prudent current accounts are not enough. And once more, the data were improved. As Lamfalussy emphasised, market participants often overlook data showing a build-up of stocks of debt that signal vulnerabilities. Nevertheless, production of data that allow market participants to recognise unsustainable developments remains an important macroprudential tool. This macroprudential perspective on financial statistics was strongly advocated by Lamfalussy throughout his career.

Rethinking development finance: towards a new "possible trinity" for growth?

Remarks by Mr Luiz Awazu Pereira da Silva, Deputy General Manager of the BIS, at the Atlantic Dialogues 2016, organised by OCP Policy Center and The German Marshall Fund of the United States, Marrakesh, December 2016.

Development finance is an issue that typically concerns developing countries where numerous, grave socio-economic problems persist, including - and not among the least - the need for stable development finance in higher quantity and of higher quality. However, development finance could also be used today as a growth-enhancing concept applicable to advanced economies, to boost their growth and help their social inclusion. It could contribute to rebalancing macroeconomic policies and move them towards a new "possible trinity": growth based on higher productivity, growth that favours stronger social inclusion and growth that is friendlier to the environment

Post-crisis financial safety net framework: lessons, responses and remaining challenges

Keynote address by Mr Jaime Caruana, General Manager of the BIS, at the FSI-IADI Conference on "Bank resolution, crisis management and deposit insurance issues", Basel, 6 December 2016.

Resolution arrangements: limiting the fallout from failures

Greater resilience can help banks withstand shocks, but one cannot rule out the possibility of failure. The question is: how well prepared are we for that?

Experience from the global financial crisis suggests that our preparedness on that front was also not as great as we would have liked. Many jurisdictions lacked the necessary powers and tools for resolving banks. They were left with the limited choice of either a disorderly liquidation or a bailout with public resources. The presence of systemically important banks, especially G-SIBs, posed special challenges for home and host authorities in terms of information and coordination. For their part, banks were also underprepared, with not enough loss-absorbing capacity to allow an orderly workout in case of failure and little advance planning on how to cope with such emergencies.

A key post-crisis response to these lessons was the development of the Financial Stability Board's Key Attributes of Effective Resolution Regimes for Financial Institutions.³ The Key Attributes set out the responsibilities, instruments and powers that national resolution regimes should have to enable orderly resolutions of failing financial firms, without exposing

the taxpayer. For global systemically important institutions, there are specific requirements for Crisis Management Groups (CMGs), institution-specific cross-border cooperation agreements between the home and host authorities, recovery and resolution planning, and resolvability assessments.

Complementing the Key Attributes is the new standard for G-SIBs on the adequacy of Total Loss-Absorbing Capacity - or TLAC, for short.⁴ It is designed to ensure that a failing G-SIB would have sufficient loss-absorbing and recapitalisation capacity available to implement a resolution that is orderly and avoids exposing public funds to loss.

How much of these have been put in place? The FSB's second annual report on the implementation of the agreed reforms notes that, as of end-August 2016, only a subset of the FSB membership - primarily the home jurisdictions of G-SIBs - has implemented bank resolution regimes with powers that are broadly in line with the Key Attributes. Elsewhere, there are considerable gaps in resolution regimes.

While there has been progress in reforming the resolution framework, there is scope for further refinements to ensure the legal certainty of resolution actions. Moreover, the new framework has not yet been tested.

CMGs have been established for all G-SIBs. But CMGs by themselves have no legal authority. Cross-border cooperation agreements still need to be put in place before the resolution plans can become operational.

Recovery and resolution planning processes are in place in many jurisdictions, but actually producing credible plans that are acceptable to supervisors is proving rather more challenging.⁶

Since the TLAC standard was released in November 2015, a majority of G-SIB home authorities have published policy proposals or consultation documents on TLAC implementation. Banks have issued substantial amounts of TLAC-eligible liabilities. The key question is: will TLAC instruments work as intended?

Observations from the market for contingent convertibles (CoCos) suggest some challenges on this front. CoCo instruments are meant to enhance loss absorption. Market tensions in early 2016 revealed that investors liked the fixed income component of these instruments but were not willing to sit still and take on losses. As soon as losses became a possibility, CoCo investors started hedging, undermining the value of banks' equity and increasing banks' costs of debt finance. Under market stress, such behaviour could generate a vicious spiral.⁷ Thus, with the improvements in loss-absorbing capacity, there are also new dynamics that we need to understand better.

Deposit insurance: protecting depositors and confidence

What about deposit insurance?

The global financial crisis illustrated the importance of maintaining depositor confidence and limiting contagion - and the key role that deposit protection plays in this regard. Indeed, one of the earliest and most widely adopted crisis responses in 2008 was the increase in deposit insurance coverage. In some jurisdictions, blanket guarantees were issued.

This experience also exposed some weaknesses in deposit insurance systems. These included depositors' limited understanding of the compensation schemes, delays in payment to depositors in some jurisdictions, and the lack of clear funding arrangements for the schemes.

To reflect the lessons from the crisis, the IADI Core Principles were revised in 2014.⁸ The revision strengthened several key areas, including speed of reimbursement, deposit insurance coverage, funding and governance.

Measures have also been taken to strengthen depositor protection in practice. Within the G20, almost all members have deposit insurance schemes in place. Two of the three FSB jurisdictions identified in the 2012 FSB peer review as not having such systems (China and Saudi Arabia) introduced them in 2015, while the third (South Africa) intends to follow suit in the near future. Outside the G20, new systems are being established, particularly in Africa.

These new systems are more aligned with the revised Core Principles, with explicit but limited coverage levels and financed by the industry through an ex ante premium.

Notwithstanding the progress, important challenges remain. In particular, the speed of payout needs to be accelerated in most jurisdictions. Currently, few systems can reimburse depositors within the seven-working-day objective recommended by the Core Principles. Emergency backup liquidity facilities, needed to ensure depositor confidence, can be enhanced and made more explicit. Finally, there is still room to strengthen the role of the deposit insurer in the safety net, especially as regards the communication and coordination with other authorities (prudential supervisors and resolution agencies) in the context of system-wide crisis preparedness and management.

Indeed, tackling these challenges in a focused manner is very much at the heart of the three current strategic priorities of IADI, namely: to promote compliance with the IADI Core Principles, to advance related research and policy development, and to support members with training and capacity building.

Closing thoughts on systemic risk: reasons to be cautious

To summarise, the global financial crisis exposed the gaps in our lines of defence. It is heartening to see the tremendous efforts made by both national and international authorities to apply the lessons learned. It is also encouraging to see the private sector on board to a great extent, even though tougher rules are understandably not what they like.

Much progress has indeed been made. But the task is big, and there is still a lot of pending work. Usually, we would finish here by emphasising that it is therefore crucial to complete the reform agenda and focus attention on implementation and monitoring.

But we should ask ourselves a deeper question: is the system as a whole safer now?

To address this question, we need a broader perspective. We need to look at stocks, in addition to flows. We need to look at balance sheets and incentives. Systemic risk is an elusive and dynamic concept. Since the crisis, financial intermediation has changed, balance sheets have changed, incentives have also changed. So where do we stand in terms of the whole system?

I will cite three reasons why we should be cautious and avoid being too sanguine.

Stocks of debt

One is that although banks have deleveraged since the crisis, the world as a whole is more leveraged today than when the crisis started in 2007.

We can think of the world as many interconnected balance sheets. This is how I think of the system. It goes well beyond the banking or even the financial system.

At a global level, credit extended to households, non-financial corporates and governments combined has been growing rapidly, though unevenly, since the crisis. As a consequence, the system of interconnected balance sheets I have just described has also grown rapidly.

The speed of credit growth has been shown to be a good indicator of risk, as it relates to the capacity of repayment of the whole economy and to the quality of the assets on the other side of the balance sheet.

As of mid-2016, the debt of households, non-financial corporates and governments as a percentage of GDP had reached 250%.

The reason to feel perturbed - or at least not be sanguine - is the combination of growing debt with the declining trend in productivity growth. This combination would indicate that there are some difficulties in generating sustainable income with which to repay the debt.

Persistent low rate environment

A second reason to be cautious is the persistent low interest rate environment. I would emphasise that my concern is about the persistence of low rates, rather than just low rates per se.

Interest rate is the cost of leverage; long periods of low rates could incentivise increased borrowing. The resulting accumulation of debt would render the whole system more sensitive to the future interest rate scenario, which affects the ability to repay or refinance the stock of debt. The longer that interest rates have stayed unusually low, the greater the risk of a sharp snapback of interest rates.

Low rates for long could also incentivise additional risk-taking through the search for yield. The valuation of financial assets would be boosted, flattering the assessment of their riskiness. This is often referred to as the risk-taking channel of monetary policy.⁹

Persistently low or even negative interest rates also make for a difficult environment for financial institutions, putting pressure on their earning capacity. Weaker profits would slow the build-up of equity over time, which would in turn affect banks' capacity to lend to the real economy. Indeed, pressure from the low rate environment is one of several challenges facing the banking sector in advanced economies. The relatively subdued performance of banks in capital markets reflects investor scepticism. For example, even with general stock market indices hitting all-time highs in recent years, the price-to-book ratios of European and Japanese banks are only at or below 0.5. This suggests that banks are still to varying extents burdened by unresolved issues in terms of asset quality, excess capacity, business model and profitability, making the return to normality more arduous than one would like.

Asset managers and search for yield

A third reason to be cautious is the changing nature of risks. With all the post-crisis efforts to improve the resilience of banks, it would not be a big stretch to conjecture that the next major crisis will originate not in the banking sector but somewhere else in the system.

Since the global financial crisis, bond market finance has surged, shifting international finance to non-bank intermediaries. This growth in market-based finance has partly filled the void left by declining international bank credit.

My colleague Hyun Song Shin refers to this as "the second phase of global liquidity", in which bond market finance dominates.¹⁰ In the first phase (roughly 2003 to 2008), the protagonists were global banks and the mechanism was leverage. In the second phase (starting from around 2010), the protagonists are asset managers and the search for yield is the driving force. And with the main action being in bond markets, movements in the term premium, ie the portion of bond yields not explained by the expected path of future short rates, play a key role in influencing the demand for bond financing.

There is much in this new phase that we do not yet understand well. There may be leverage-like behaviours that can create stress similar to that resulting from classic bank leverage. Specifically, even though asset managers are not themselves leveraged like banks, their lack of willingness or capacity to absorb temporary losses could still result in runs on capital markets. Recent policy initiatives - notably those coordinated by the FSB - are seeking an international response to these new sources of risk.¹¹

Of course, shocks from capital markets could also affect banks at some point. In a complex financial system, how shocks are transmitted or amplified is hard to predict. Therefore, being prepared *ex ante*, strengthening all three lines of defence, is still recommended and necessary.

The slippery fiscal space

English translation of speech in Spanish by Mr Jaime Caruana, General Manager of the BIS, at a conference hosted by the BIS Representative Office for the Americas, Mexico City, 30 November 2016.

There have been recent calls for expansionary fiscal policy to boost economic growth, but some caution is required. In particular, policymakers must interpret existing measures of fiscal space with care as these estimates are highly uncertain and fiscal space can suddenly be reduced by shifts in market sentiment. Private debt can also interact with public debt in a way that could further reduce fiscal space. In this setting, fiscal policy - and accompanying

structural reforms - could be designed to increase productivity and growth over the medium and long term.

Monetary policy has been stretched to its limits

Original quotes from interview with Mr Claudio Borio, Head of the Monetary and Economic Department, in Süddeutsche Zeitung, conducted by Mr Markus Zydra and published on 30 November 2016.

Mr Borio, the world is facing many problems. What is the root cause?

We do not know for sure. The big questions in economics have not quite been solved. But let me start by saying that the rhetoric about the global economy is worse than the reality. In terms of global growth, we are not that far away from historical averages, especially if we adjust for demographics. Moreover, unemployment has been declining, and in several cases is close to historical norms or measures of full employment.

So everything is fine?

It is the medium term that is our concern - what we have called the "risky trilogy". The long-term decline in productivity growth has accelerated since the crisis, so that the prospects for long-term growth are not bright. Debt levels, both private and public, are historically high and have been increasing since the crisis. And, most critically, the room for policy manoeuvre, both monetary and fiscal, is limited.

But can central banks help out?

Monetary policy has been stretched to its limits. In inflation-adjusted terms, interest rates have never been negative for so long and they are lower now than in the midst of the financial crisis, which is odd since the situation has improved. If you came from Mars and they told you that policymakers were struggling to reach price stability, you might be surprised, as inflation is not far from measures of stable prices. But since many central banks have inflation targets set at 2%, there is a lot at stake.

Why do we have low inflation?

We do not fully understand this. But I think we have underestimated the long-lasting impact of the globalisation of the real economy, notably the entry of China and former communist states into the world trading system. There has been persistent downward pressure on wages and prices, as competition has greatly increased, helped also by technological change. The pricing power of producers and, in particular, the bargaining power of workers have declined, making the wage-price spirals of the past less likely.

The ECB and other central banks fear deflation.

Building on previous work, we have analysed deflation across many countries since the 1870s. There is only a very weak link between deflation and slow growth. That finding has not received the attention it deserves.

What should central banks be doing?

The idea is to look carefully at what is driving disinflation and use all the flexibility available in the mandate to reach the 2% inflation target. To form a judgment is not easy, but is always necessary. Whether deflation is costly or not depends on its drivers. For instance, to the extent that it is globalisation, it is not costly, as it is supply-driven rather than the reflection of weak demand.

Where is the danger?

Around 2003, policymakers were also concerned with deflation, and as a result kept interest rates very low. But this contributed to a credit and property price boom that sowed the seeds of the bust that did so much damage later on. In the crisis years after 2008, it was essential to loosen monetary policy. But since then, monetary policy has been overburdened. On balance, too little has been done to repair balance sheets and to raise sustainable growth through structural reforms, such as by making markets more flexible and promoting entrepreneurship and innovation.

And more fiscal spending?

Only where there is room. Public debt in relation to GDP has never been so high in so many countries during peacetime. Fiscal space should not be overestimated. It is all too easy to end up with an even larger pile of debt.

The global debt is around \$90 trillion, and it is rising. How should one reduce it?

How to manage the debt burden is the hardest question. The best way, of course, is to grow out of it, which is why structural reforms are so important. Other forms are more painful.

Do you fear political populism?

I fear a return to trade and financial protectionism. We are seeing some worrying signs. The open global economy order has been remarkably resilient to the financial crisis; but it might not so easily survive another one. At that point, we could see a historic rupture. That is an endgame we should do all we can to avoid.

There are academics and politicians advocating the abolition of cash. What do you think of that?

Negative nominal interest rates, especially if persistent, are already problematic. Quite apart from the problems they generate for the financial system, they can be perceived as a desperate measure, paradoxically undermining confidence. Getting rid of cash would take all this one big step further, as it would signal that there is no limit to how far into negative territory nominal interest rates could be pushed. That would risk undermining the very essence of our monetary economy. It would be playing with fire. Also, it would be quite a challenge for communication, even in simply economic terms. It would be like saying: "We want to abolish cash in order to tax you with lower negative rates in order to - tax you even more in the future."

Why?

Because the reason for doing this would be to raise inflation - which is perceived as an unjust tax on savings. This would require people to have faith in the "model" which policymakers use to steer the economy. Quite a challenge!