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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I Effective and US dollar exchange rate statistics

J Credit-to-GDP gaps

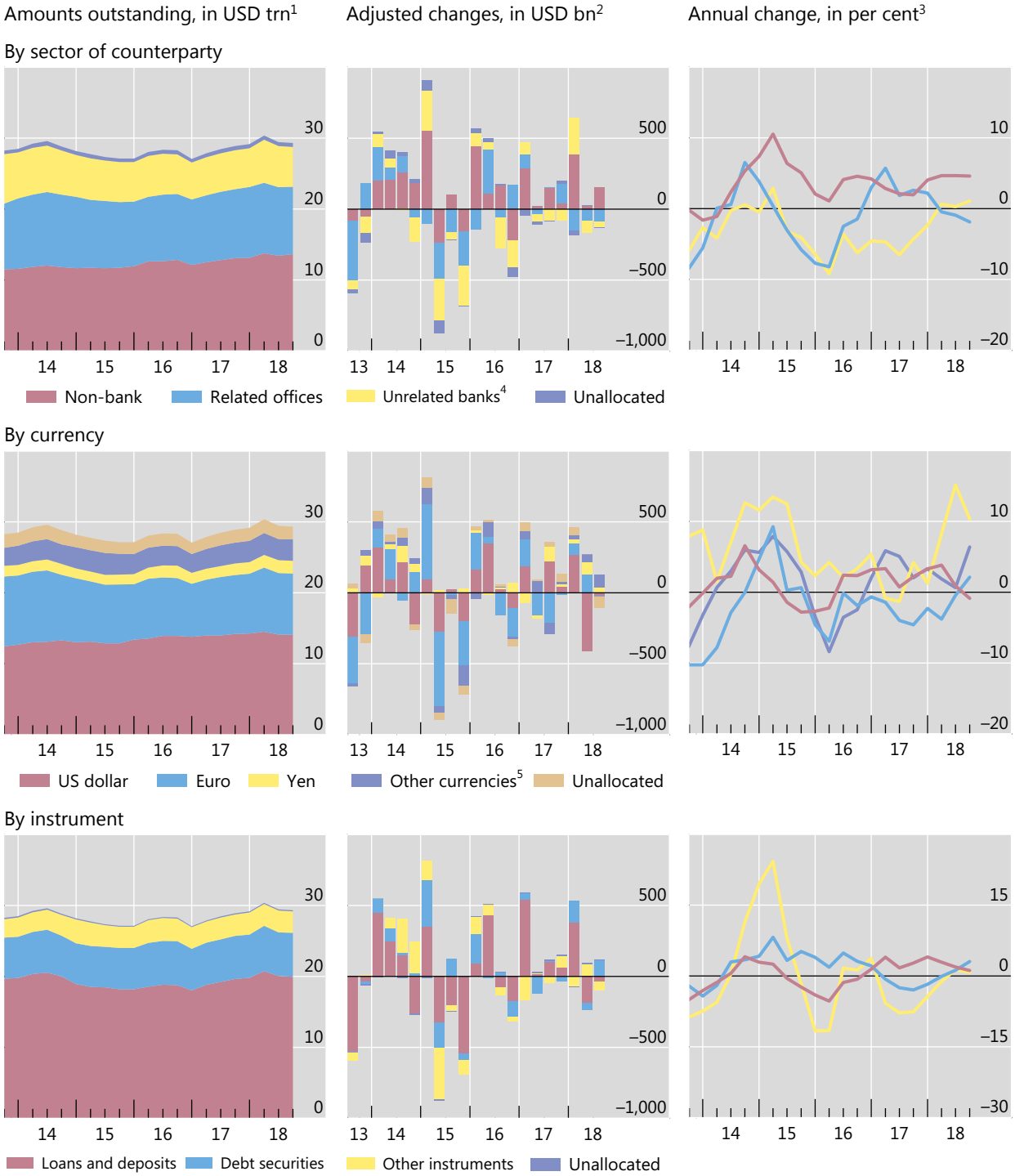
K Consumer price indices

L Central bank policy rates

A Locational banking statistics

Cross-border claims, by sector, currency and instrument

Graph A.1



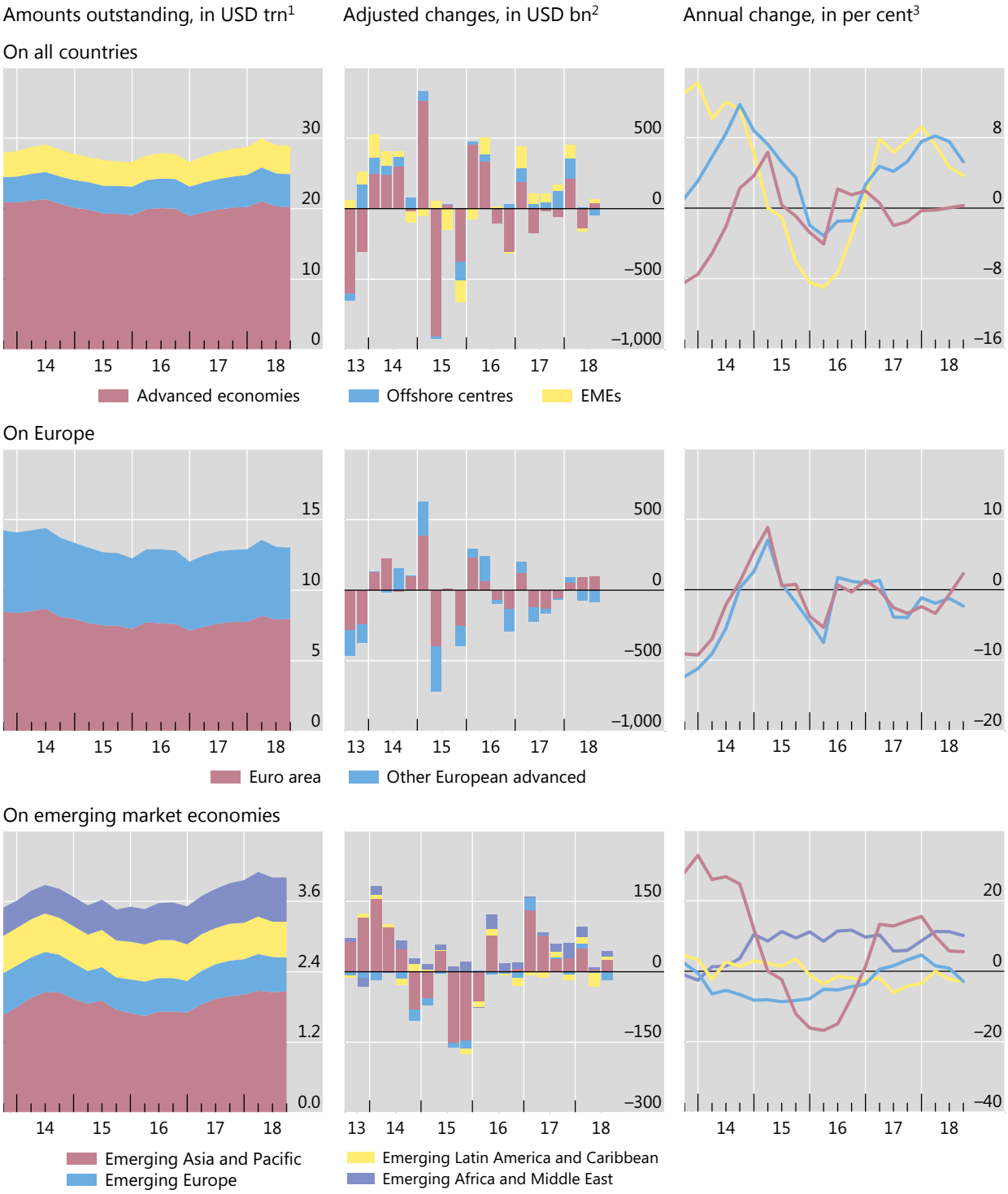
Further information on the BIS locational banking statistics is available at www.bis.org/statistics/bankstats.htm.

[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



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.

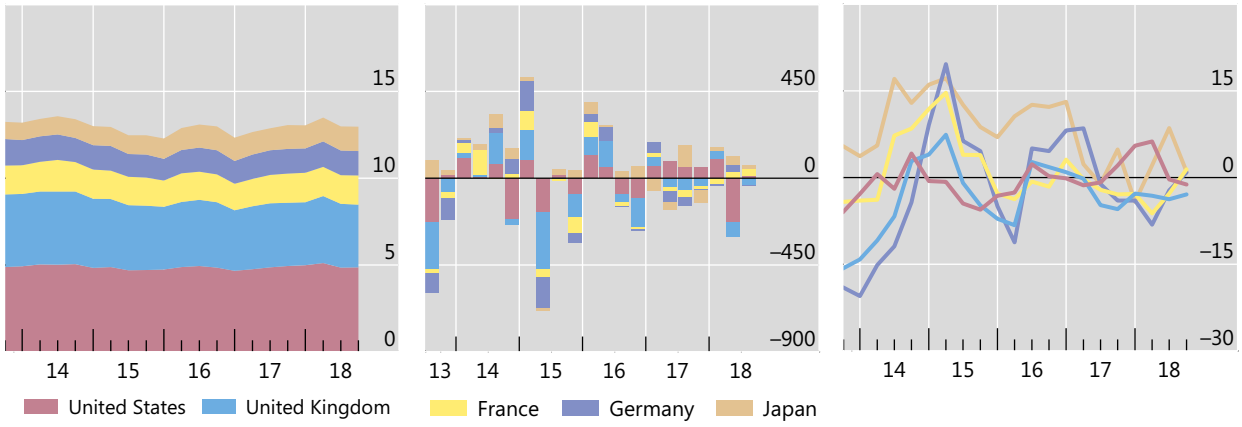
Source: BIS locational banking statistics.

Cross-border claims, by borrowing country

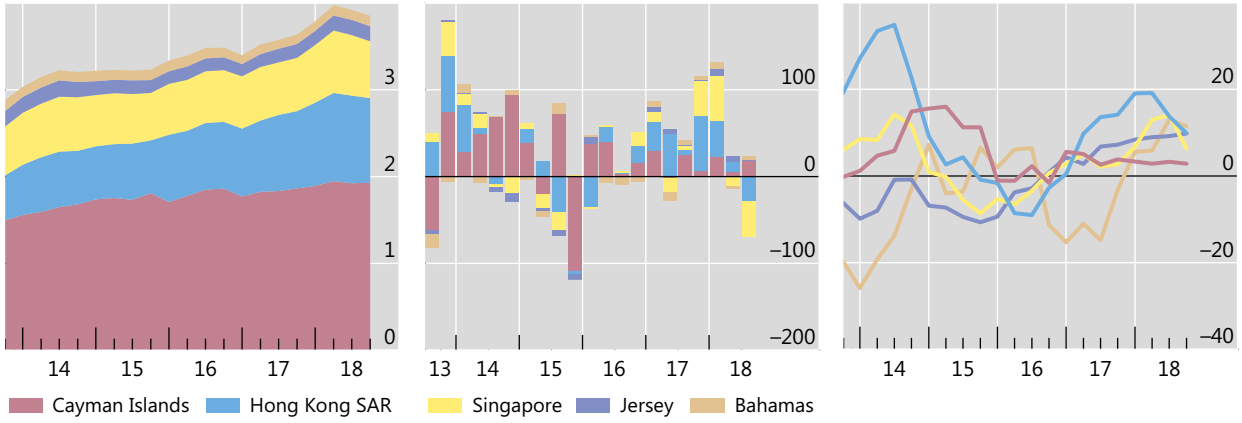
Graph A.3

Amounts outstanding, in USD trn[1] | Adjusted changes, in USD bn[2] | Annual change, in per cent[3]

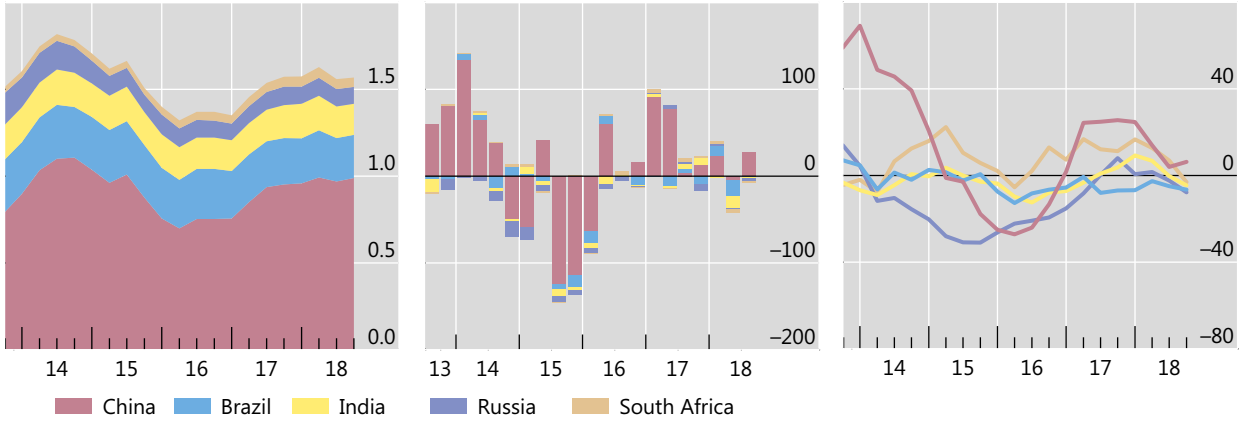
On selected advanced economies



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.

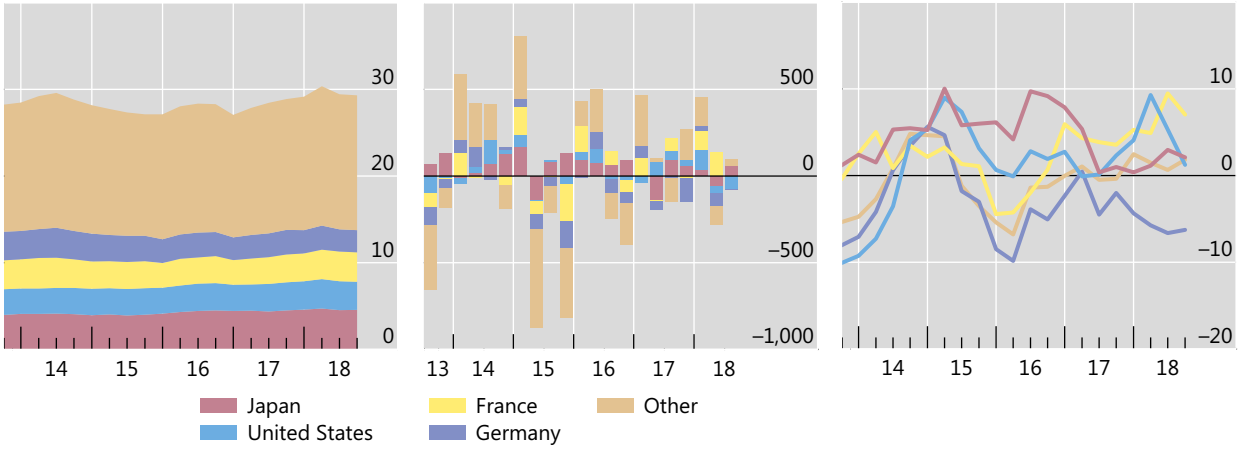
Source: BIS locational banking statistics.

Cross-border claims, by nationality of reporting bank and currency of denomination

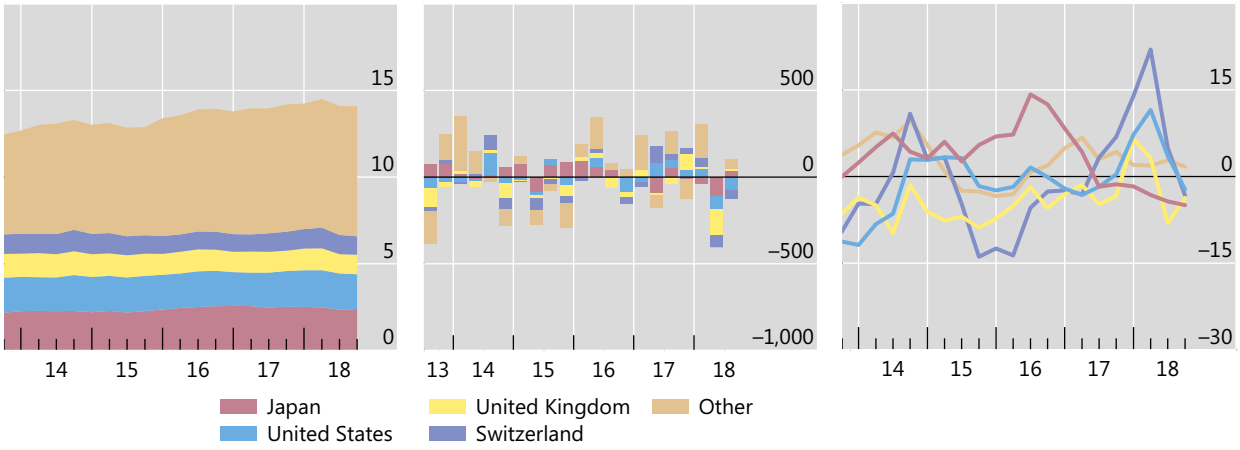
Graph A.4

Amounts outstanding, in USD trn[1] | Adjusted changes, in USD bn[2] | Annual change, in per cent[3]

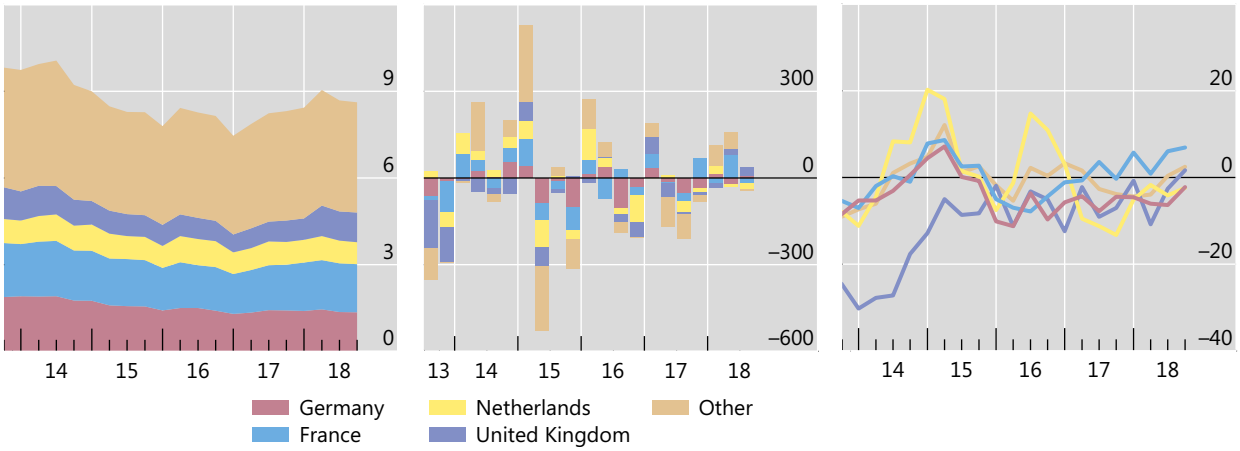
All currencies



US dollar



Euro



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.

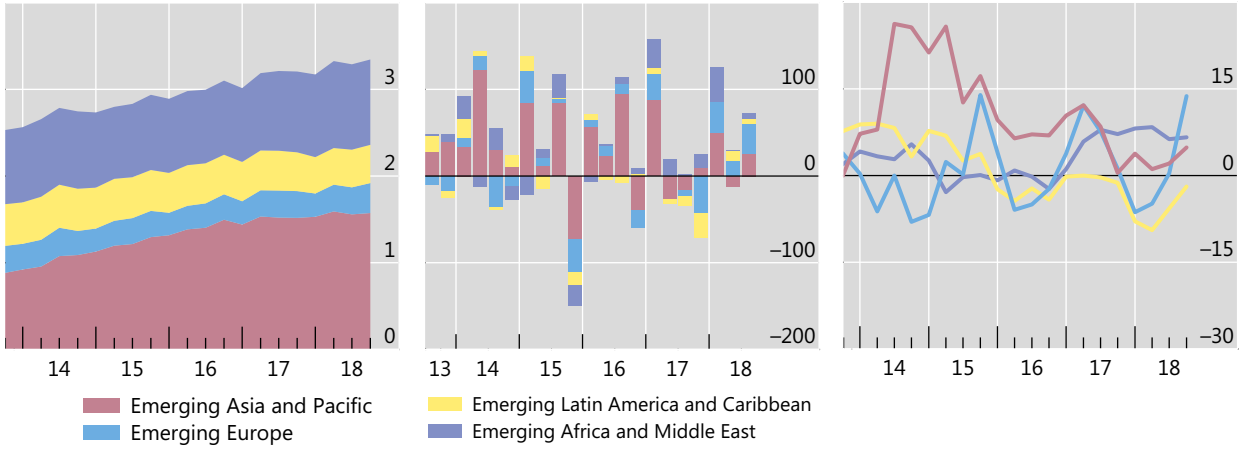
Source: BIS locational banking statistics.

Cross-border liabilities of reporting banks

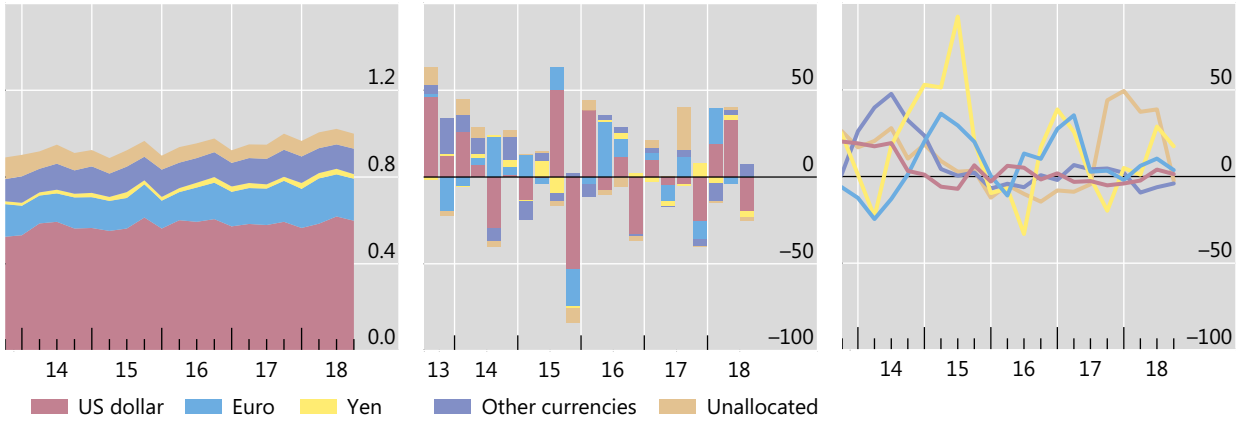
Graph A.5

Amounts outstanding, in USD trn[1] | Adjusted changes, in USD bn[2] | Annual change, in per cent[3]

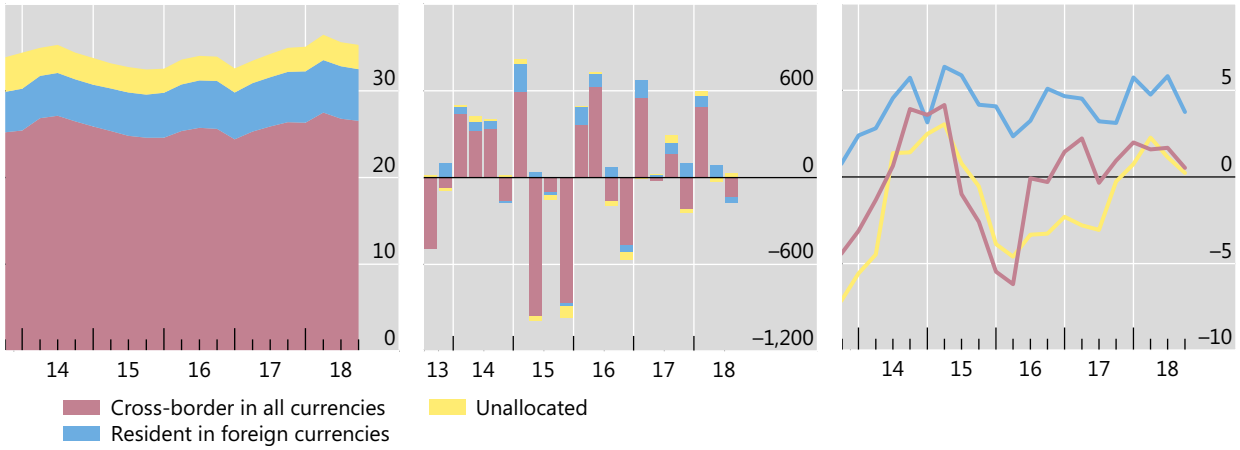
To emerging market economies



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

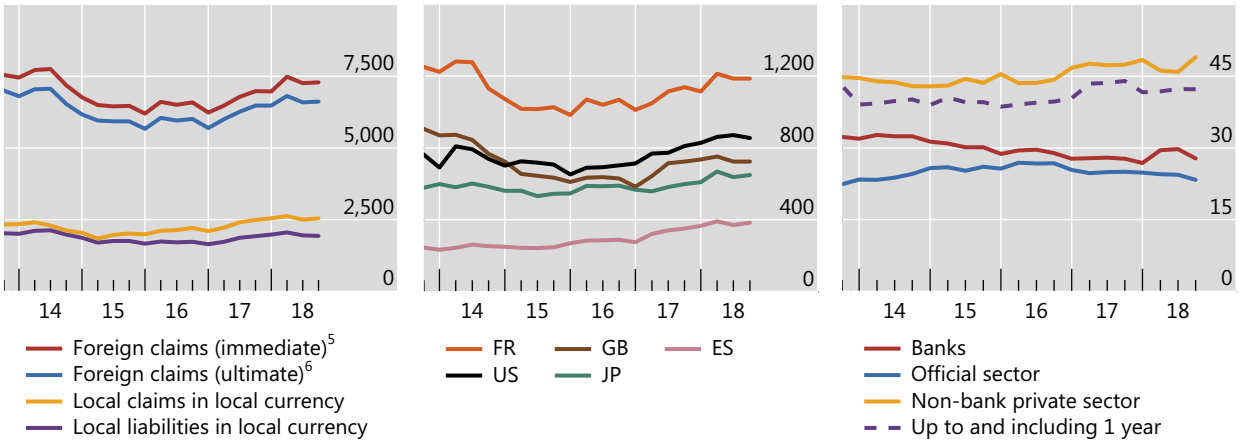
Graph B.1

Foreign claims and local positions, in USD bn[1, 2]

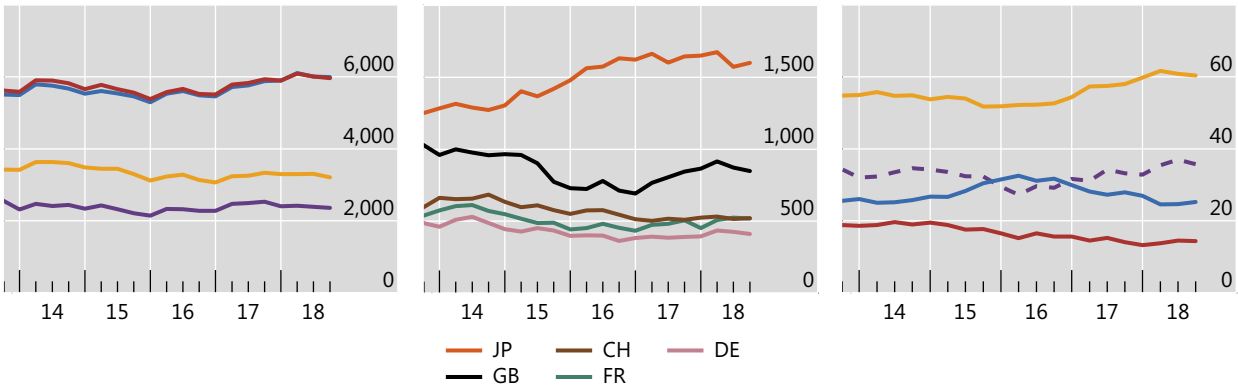
Foreign claims of selected creditors, in USD bn[1, 3]

International claims, by sector and maturity, in per cent[4]

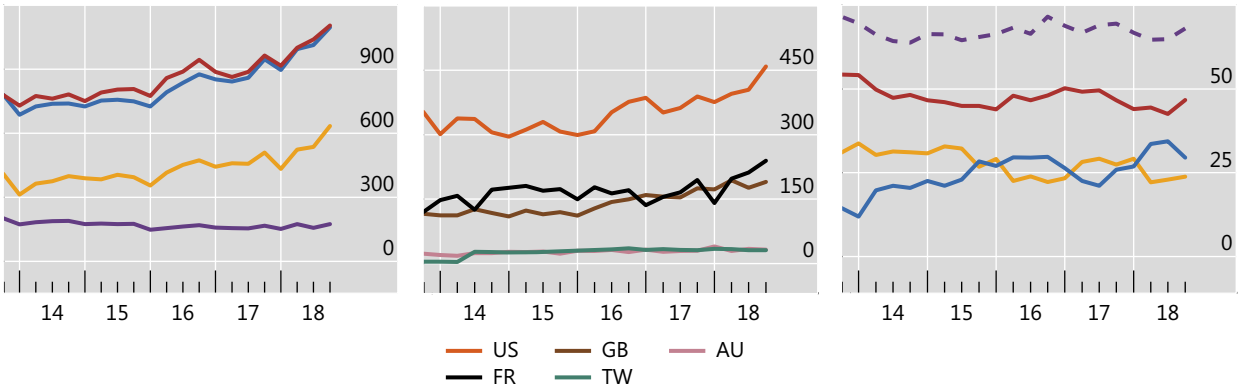
On the euro area



On the United States



On Japan



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

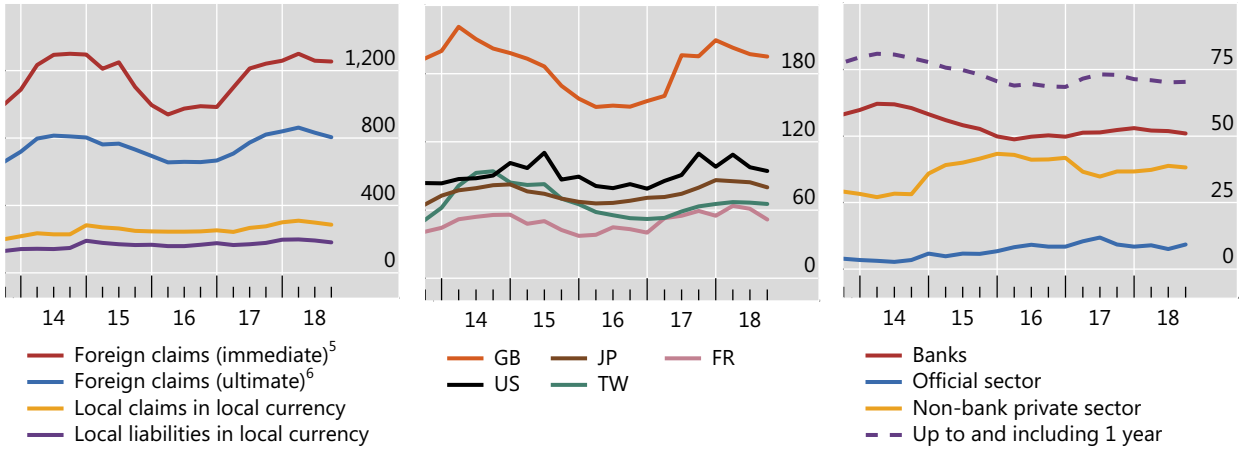
Graph B.2

Foreign claims and local positions, in USD bn[1, 2]

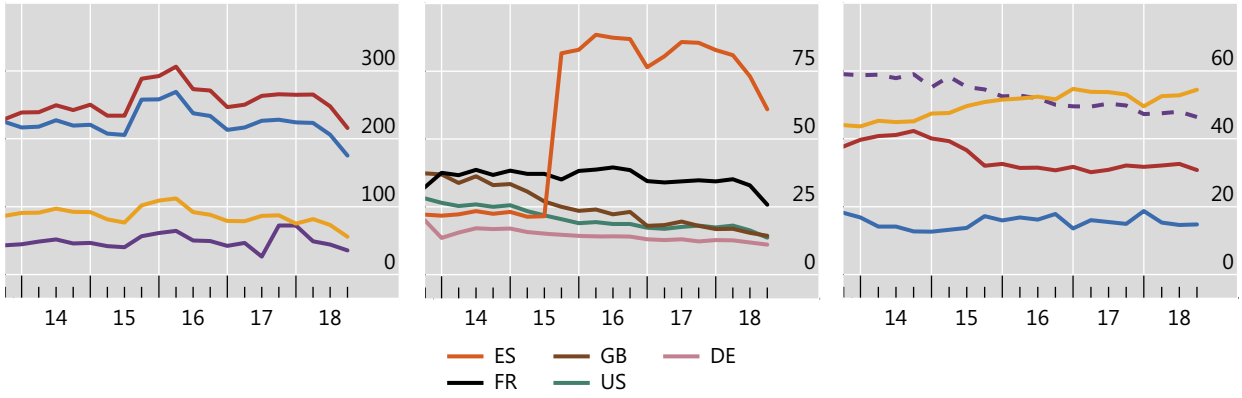
Foreign claims of selected creditors, in USD bn[1, 3]

International claims, by sector and maturity, in per cent[4]

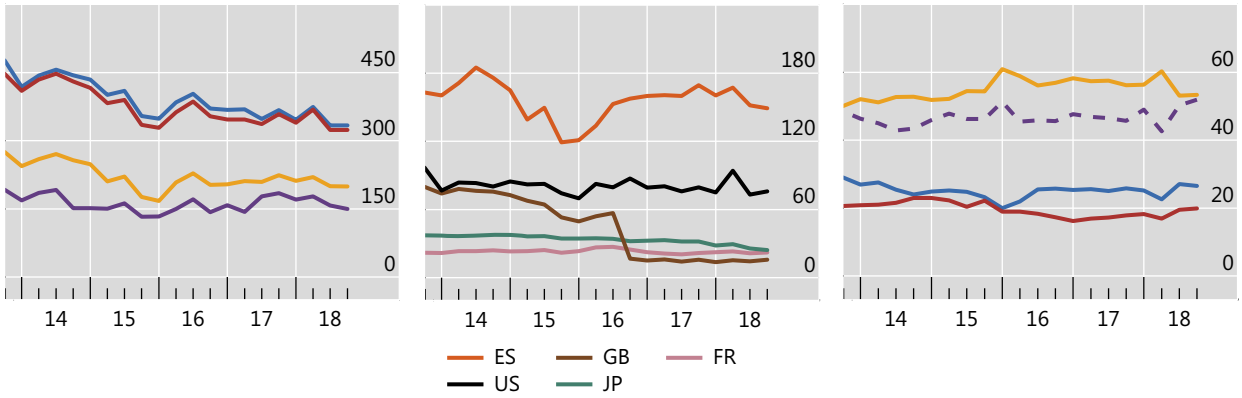
On China



On Turkey



On Brazil



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.

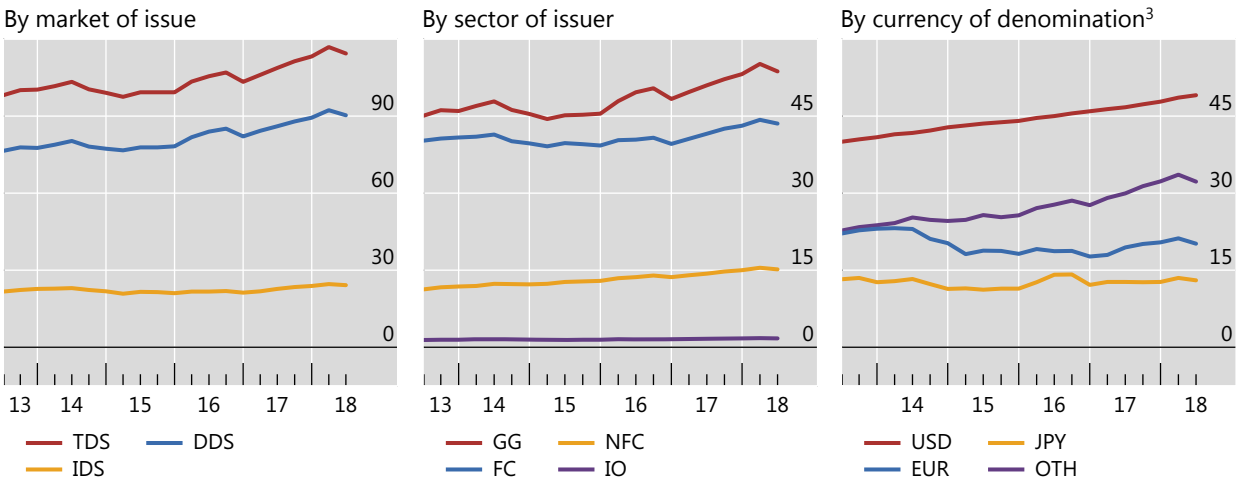
Source: BIS consolidated banking statistics (CBS).

C Debt securities statistics

Global debt securities markets[1]

Amounts outstanding, in trillions of US dollars[2]

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.

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

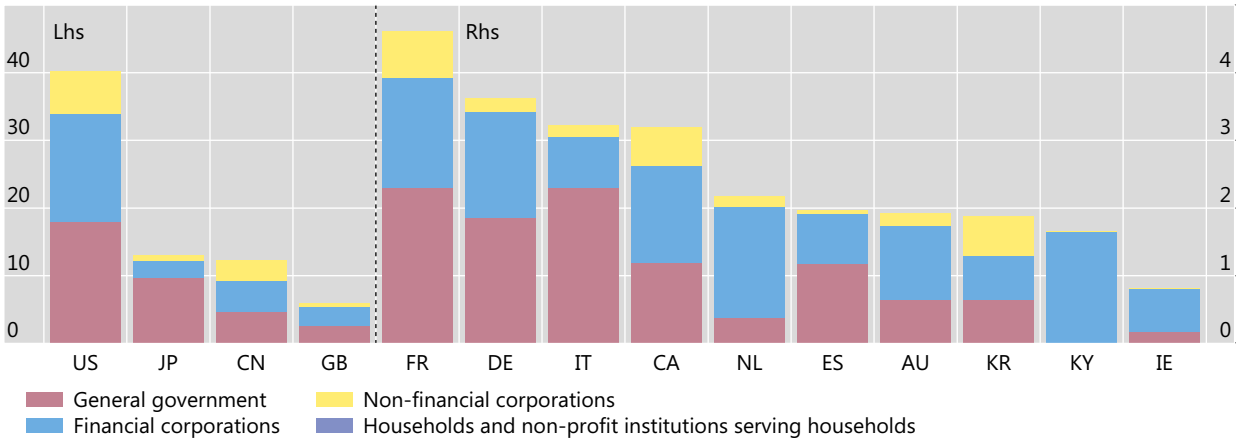
[1] Sample of countries varies across breakdowns shown. For countries that do not report TDS, data are estimated by the BIS as DDS plus IDS. For countries that do not report either TDS or DDS, data are estimated by the BIS as IDS. [2] At quarter-end. Amounts denominated in currencies other than the US 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: Dealogic; Euroclear; Thomson Reuters; Xtrakter Ltd; national data; BIS debt securities statistics; BIS calculations.

Total debt securities, by residence and sector of issuer[1]

Amounts outstanding for the latest available data, in trillions of US dollars[2]

Graph C.2



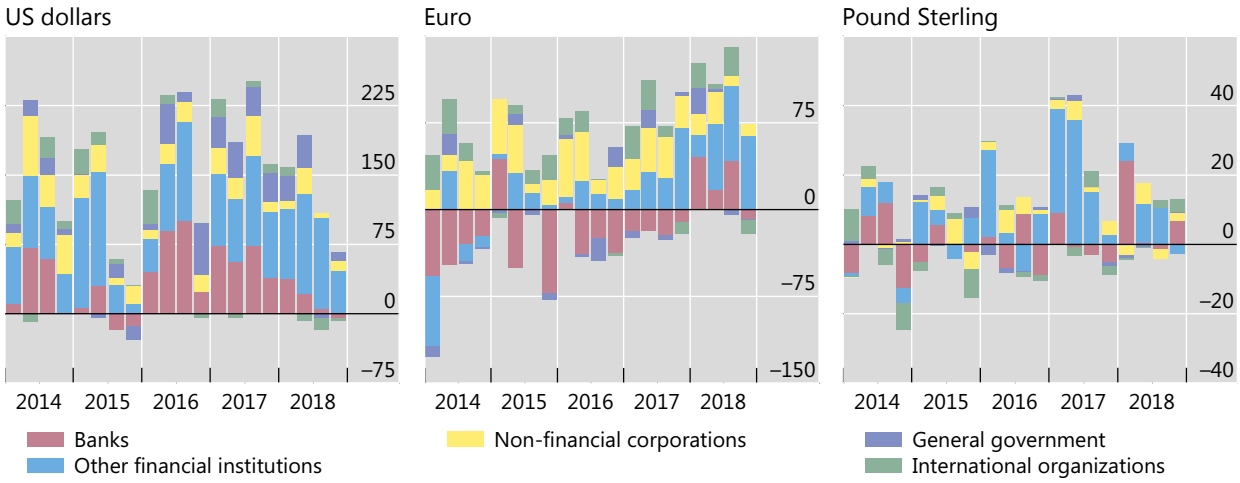
Further information on the BIS debt securities statistics is available at www.bis.org/statistics/secstats.htm.

[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.

Net issuance of international debt securities

By issuer sector and currency of denomination, in billions of US dollars — Graph C.3

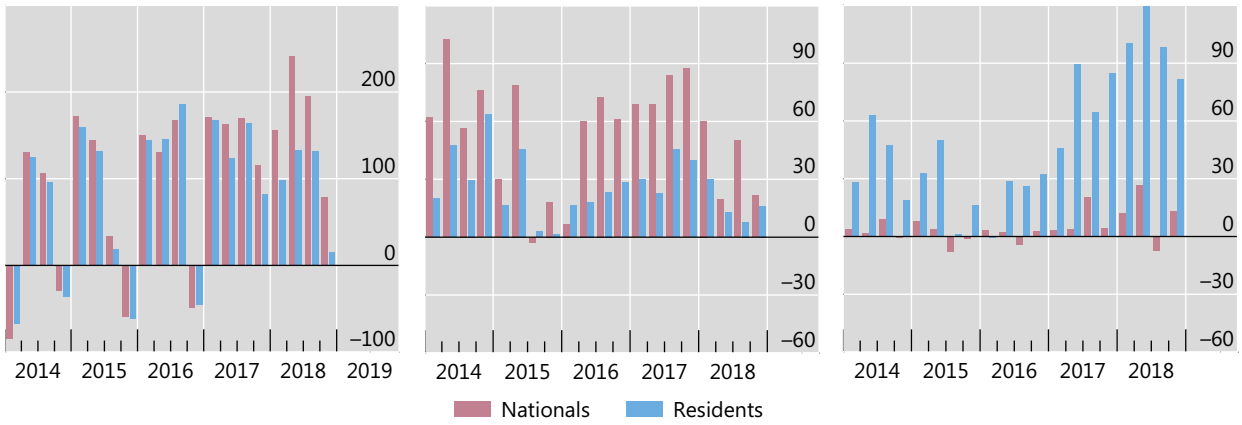


Further information is available at www.bis.org/statistics/secstats.htm.

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

International debt securities issued by financial and non-financial corporations[1]

Net issuance by region, in billions of US dollars[2] — Graph C.4



Further information is available at www.bis.org/statistics/secstats.htm.

[1] Excluding general government. [2] For a list of countries in each region, see Table C1 (http://stats.bis.org/statx/srs/table/c1).

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

D Derivatives statistics

Exchange-traded derivatives

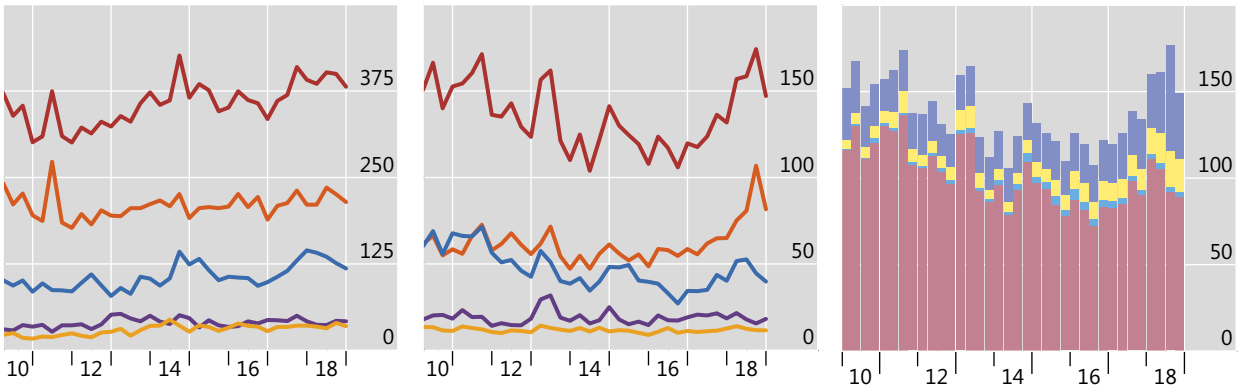
Graph D.1

Open interest, by currency[1]

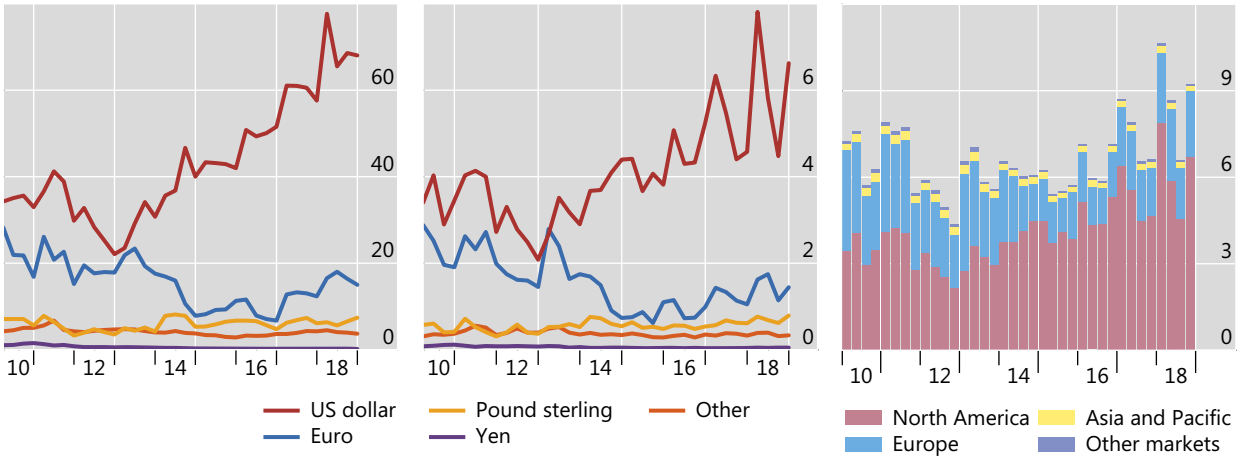
Daily average turnover, by currency[2]

Daily average turnover, by location of exchange[2]

Foreign exchange derivatives, USD bn[3]



Interest rate derivatives, USD trn[3]



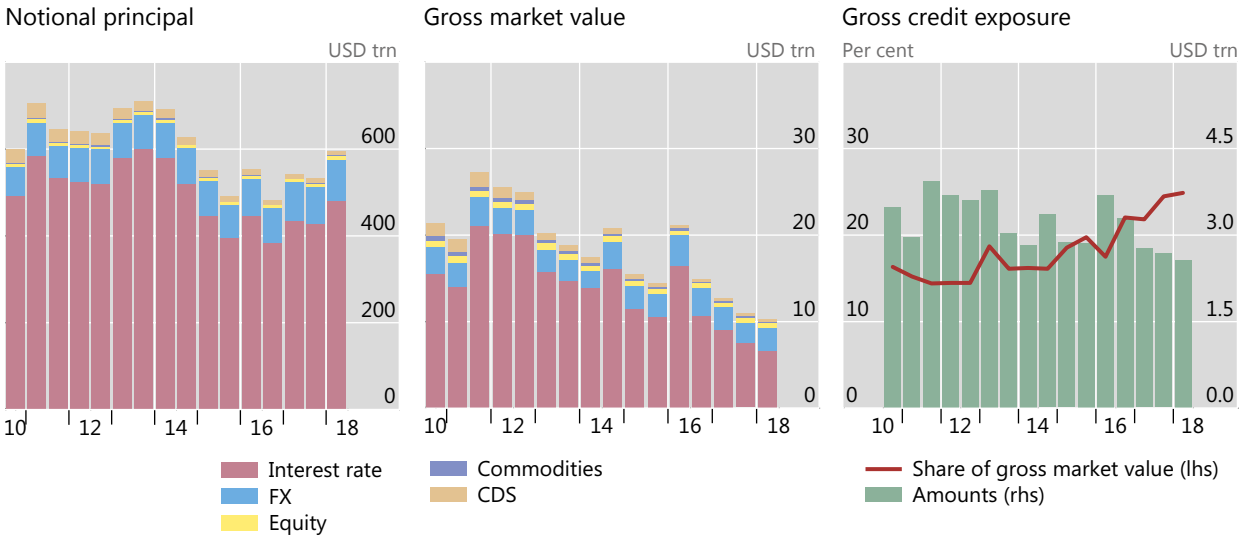
Further information on the BIS derivatives statistics is available at www.bis.org/statistics/extderiv.htm.

[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 markets[1]

Graph D.2



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

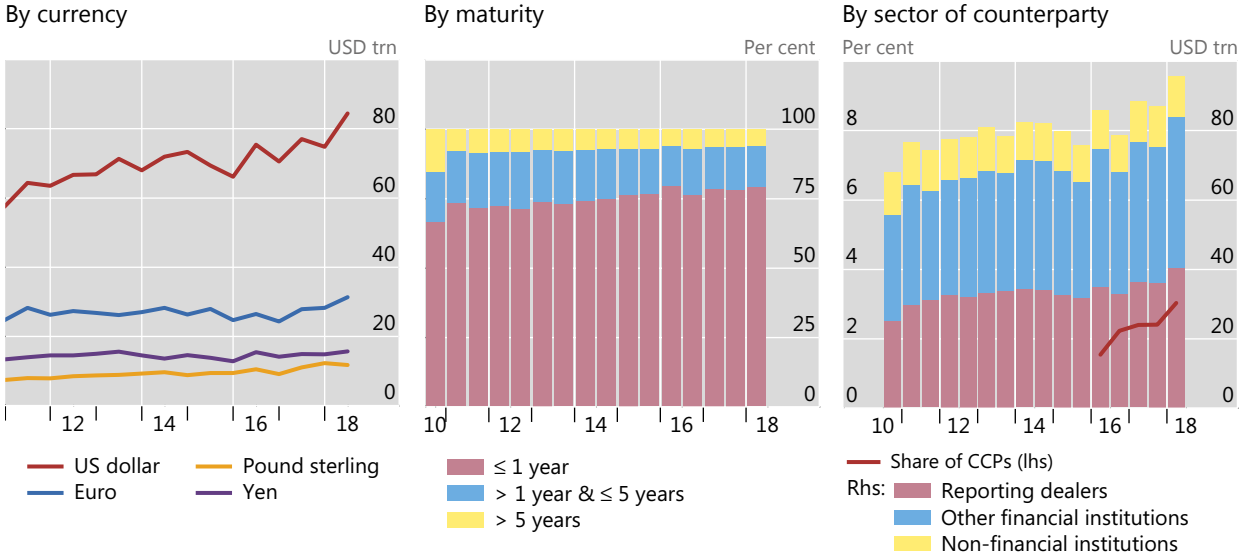
[1] At half-year end (end-June and end-December). Amounts denominated in currencies other than the US dollar are converted to US dollars at the exchange rate prevailing on the reference date.

Source: BIS derivatives statistics.

OTC foreign exchange derivatives

Notional principal[1]

Graph D.3



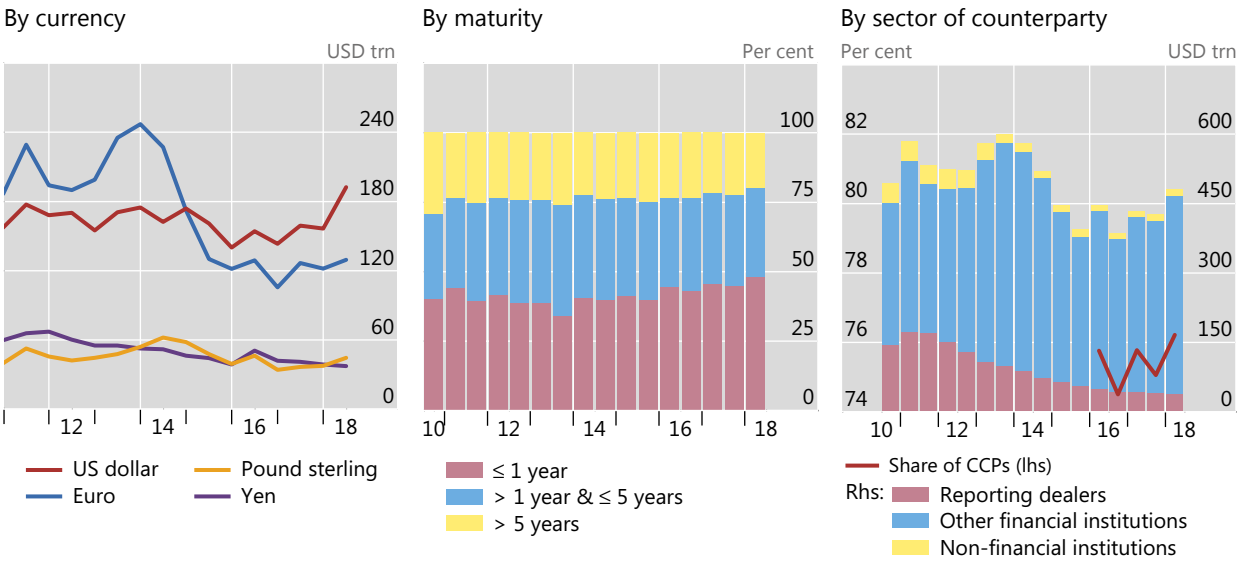
Further information on the BIS derivatives statistics is available at www.bis.org/statistics/derstats.htm.

[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 principal[1] Graph D.4



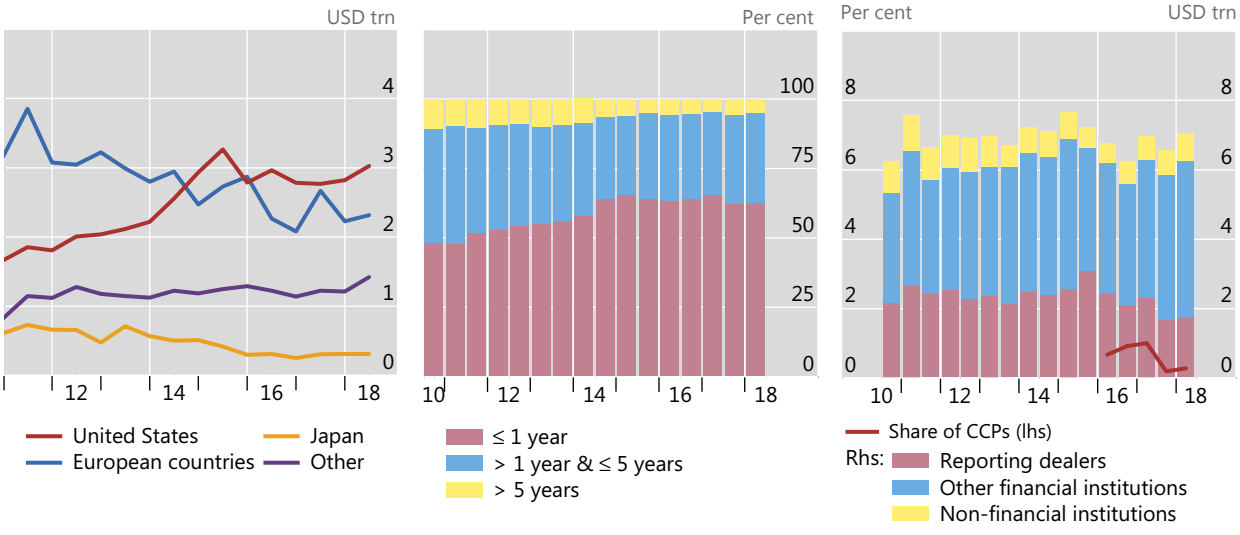
Further information on the BIS derivatives statistics is available at www.bis.org/statistics/derstats.htm.

[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 principal[1] Graph D.5



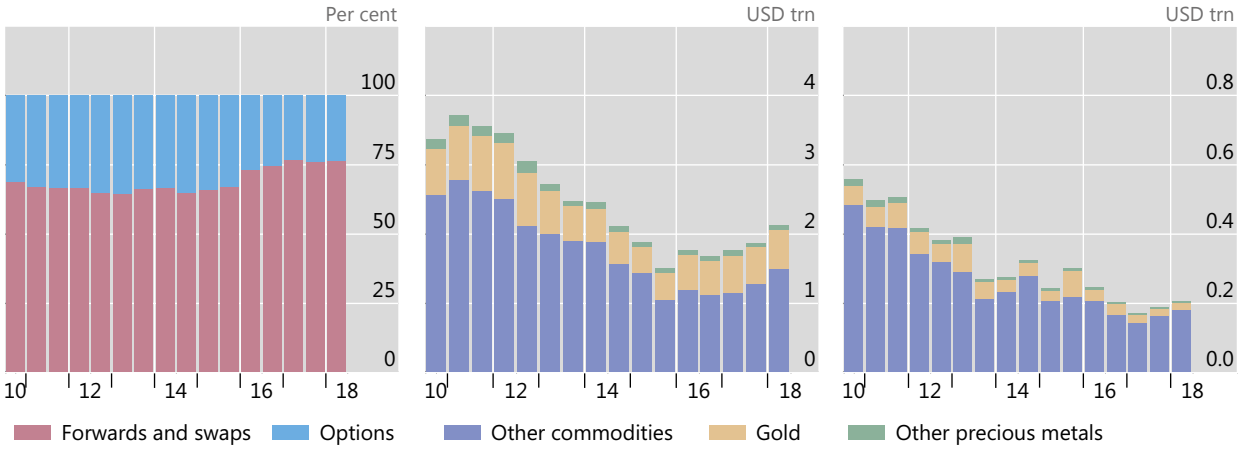
Further information on the BIS derivatives statistics is available at www.bis.org/statistics/derstats.htm.

[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 derivatives[1]

Graph D.6



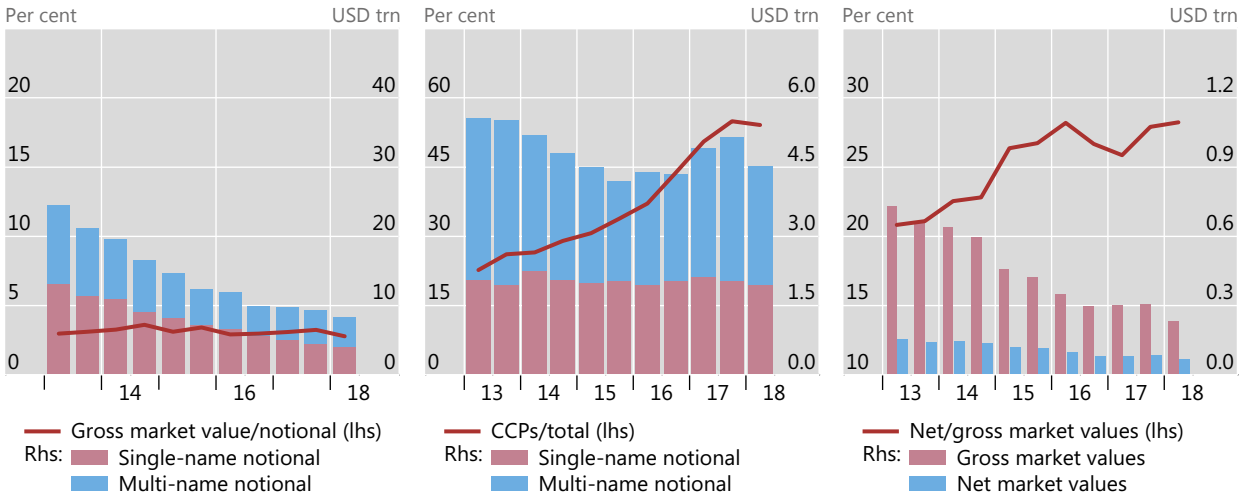
Further information on the BIS derivatives statistics is available at www.bis.org/statistics/derstats.htm.

[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 swaps[1]

Graph D.7



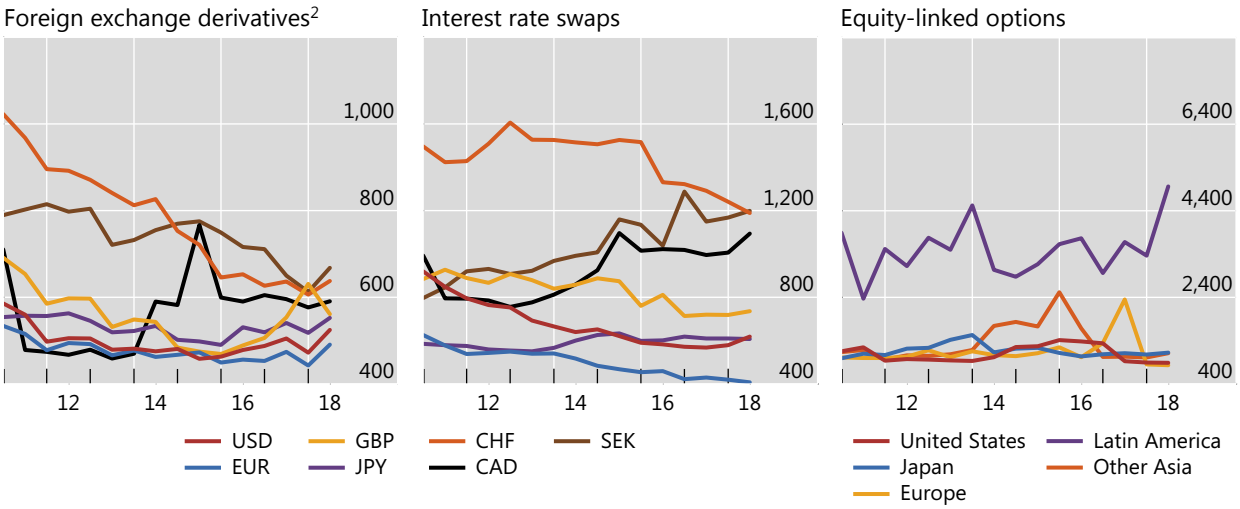
Further information on the BIS derivatives statistics is available at www.bis.org/statistics/derstats.htm.

[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 index[1] Graph D.8



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

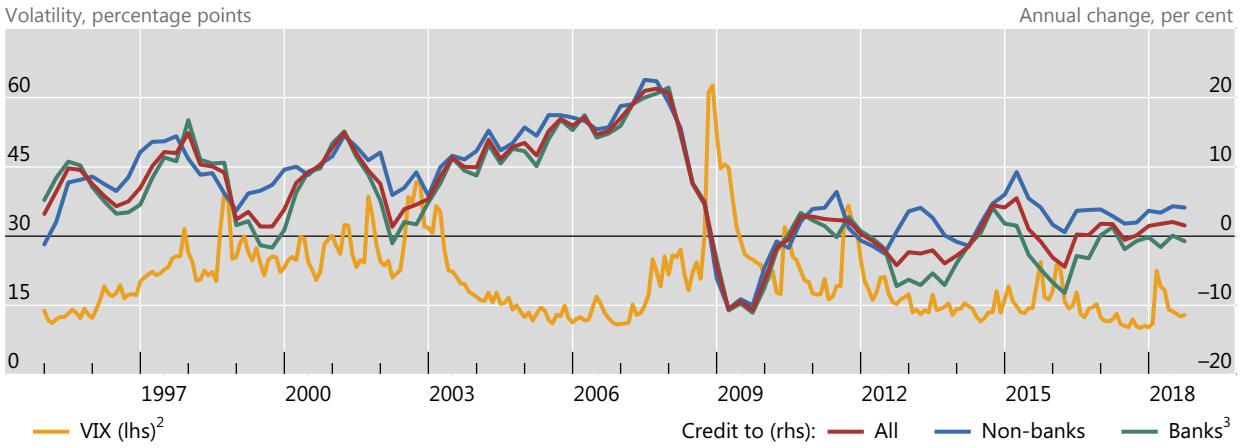
[1] The index ranges from 0 to 10,000, where a lower number indicates that there are many dealers with similar market shares (as measured by notional principal) and a higher number indicates that the market is dominated by a few reporting dealers. [2] Foreign exchange forwards, foreign exchange swaps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

Source: BIS derivatives statistics.

E Global liquidity indicators

Growth of international bank credit[1]

Graph E.1



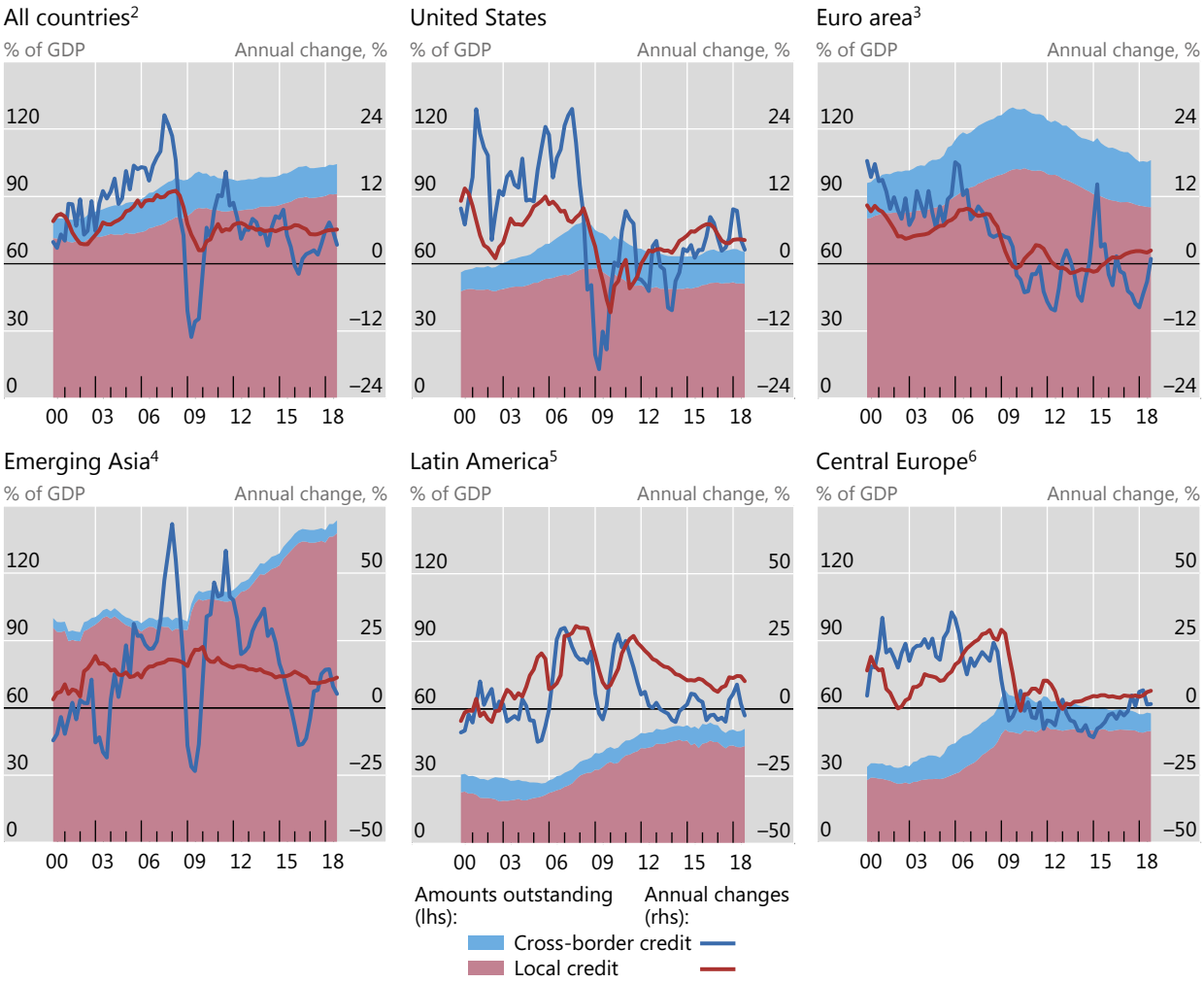
Further information on the BIS global liquidity indicators is available at www.bis.org/statistics/gli.htm.

[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.

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

Banks' cross-border credit plus local credit in all currencies[1] 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; BIS locational banking statistics; BIS calculations.

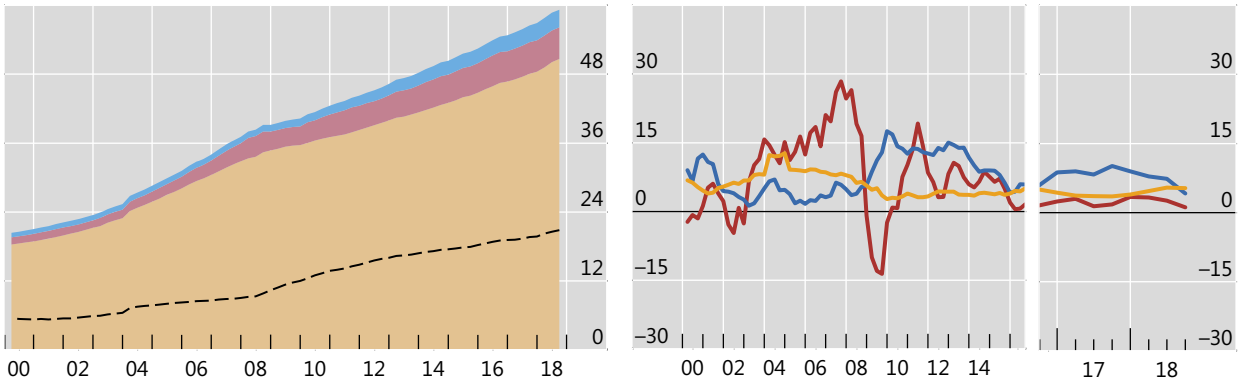
Global credit to the non-financial sector, by currency

Graph E.3

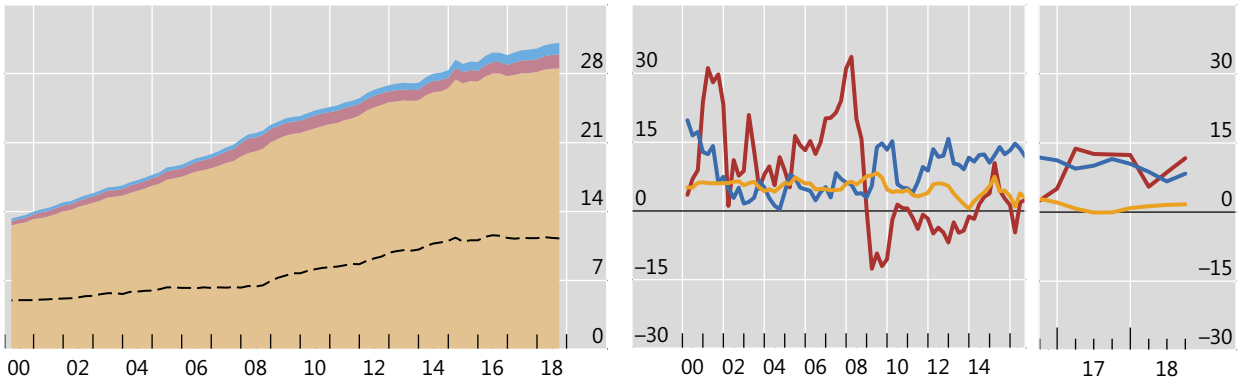
Amounts outstanding, in trillions of currency units[1]

Annual change, in per cent[2]

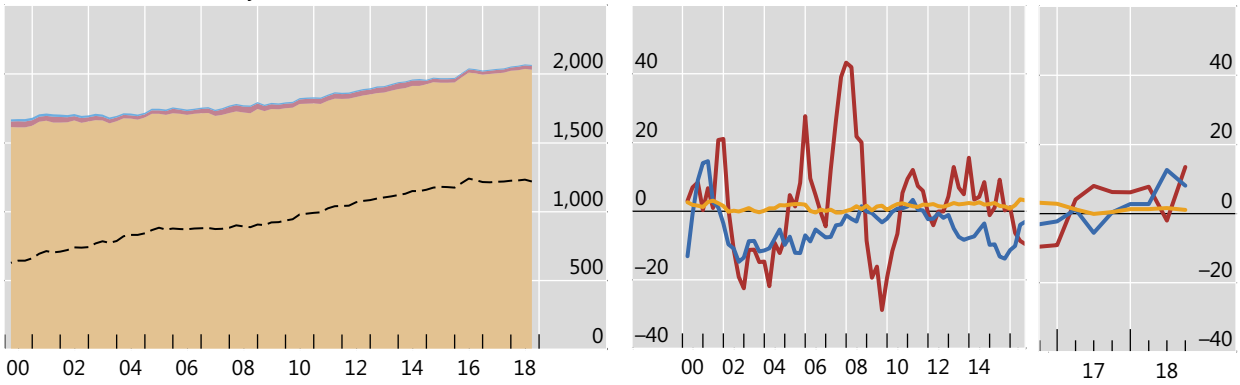
Credit denominated in US dollars (USD)



Credit denominated in euros (EUR)



Credit denominated in yen (JPY)



Credit to residents[3]
Of which:
Credit to government
Credit to non-residents:
Debt securities[4]
Loans[5]
Credit to residents[3]
Credit to non-residents:
Debt securities[4]
Loans[5]

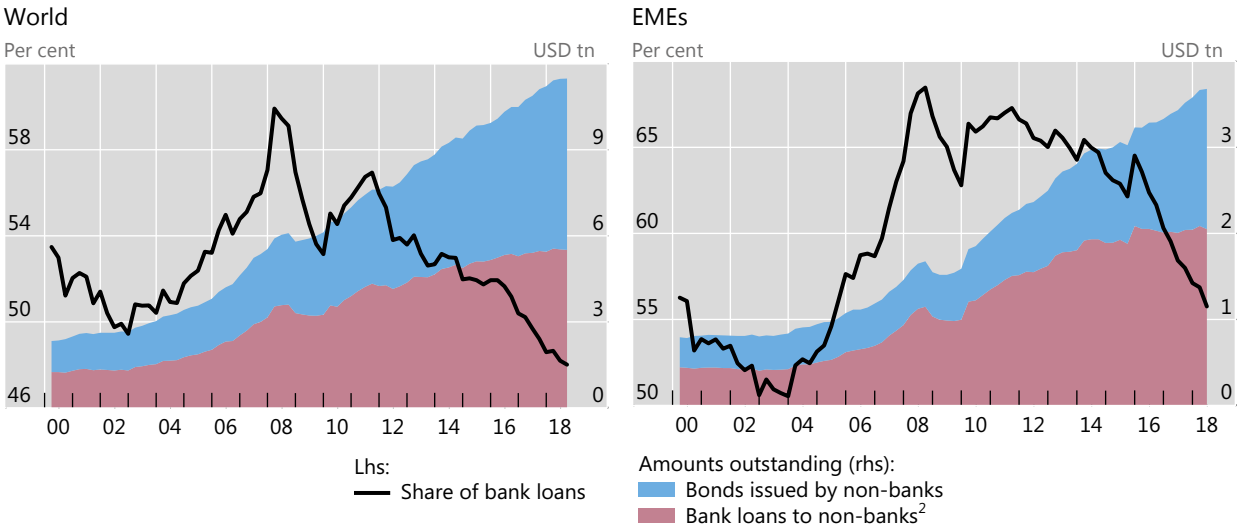
Further information on the BIS global liquidity indicators is available at www.bis.org/statistics/gli.htm.

[1] Amounts outstanding at quarter-end. [2] Based on quarterly break- and exchange rate-adjusted changes. [3] 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. [4] 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. [5] Loans by LBS-reporting banks to non-bank borrowers, including non-bank financial entities, comprise cross-border plus local loans.

Sources: Datastream; Dealogic; Euroclear; Thomson Reuters; Xtrakter Ltd; national data; BIS locational banking statistics (LBS); BIS calculations.

US dollar-denominated credit to non-banks outside the United States[1]

Graph E.4



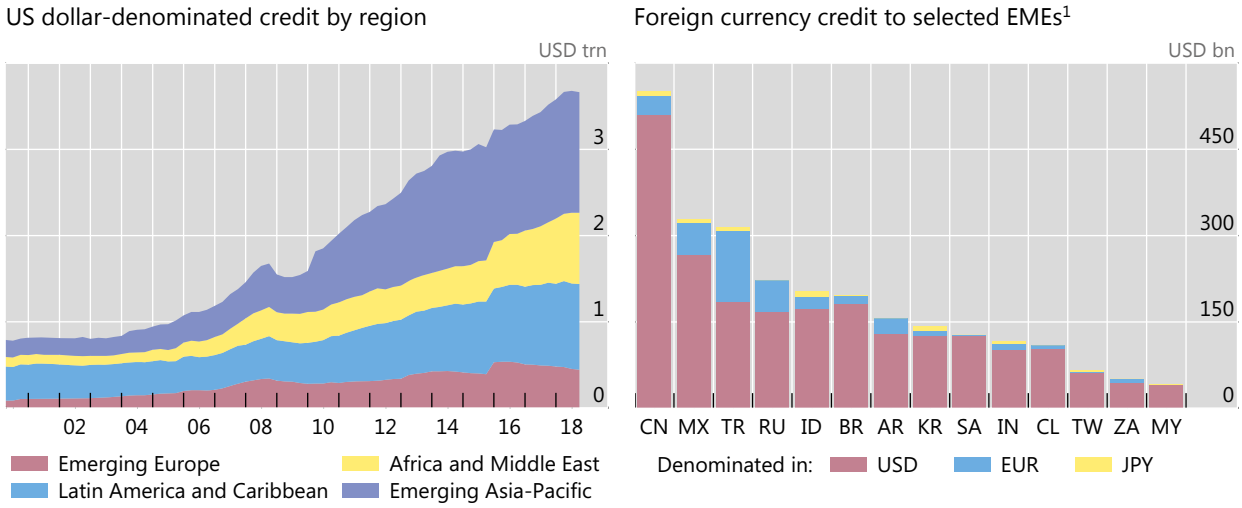
Further information on the BIS global liquidity indicators is available at www.bis.org/statistics/gli.htm.

[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.

Sources: Datastream; Dealogic; Euroclear; Thomson Reuters; Xtrakter Ltd; national data; BIS locational banking statistics (LBS); BIS calculations.

Foreign currency credit to non-banks in EMEs

Graph E.5



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

[1] Amounts outstanding for the latest available data.

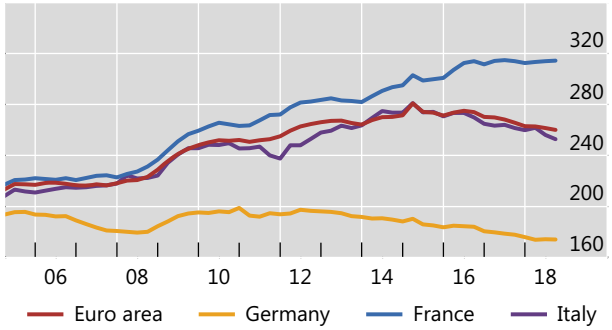
Sources: Datastream; Dealogic; Euroclear; Thomson Reuters; Xtrakter Ltd; national data; BIS locational banking statistics (LBS); BIS calculations.

F Statistics on total credit to the non-financial sector

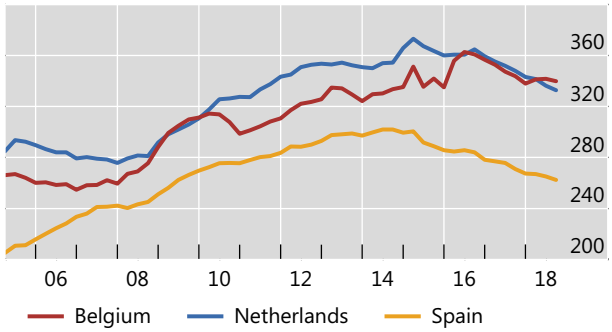
Total credit to the non-financial sector (core debt)

As a percentage of GDP — Graph F.1

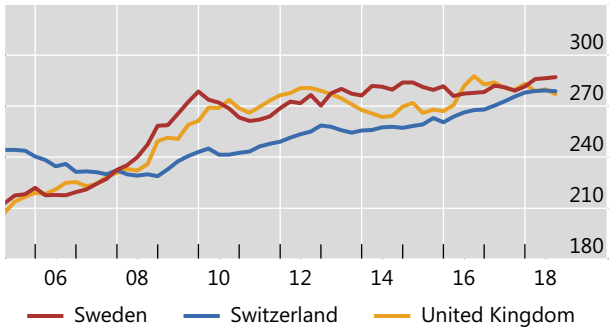
Euro area: aggregate and major countries



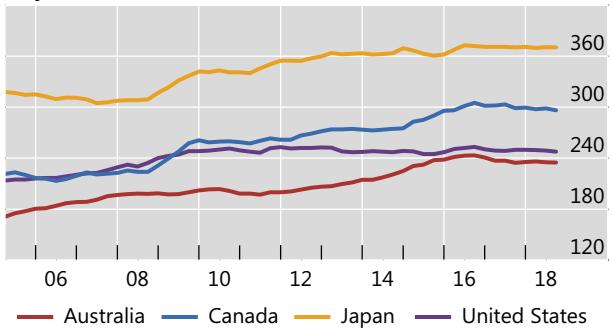
Euro area: other countries



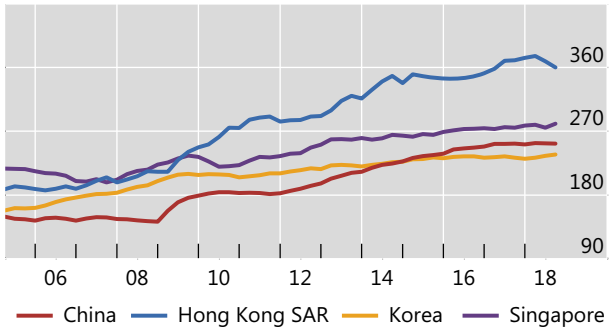
Other European countries



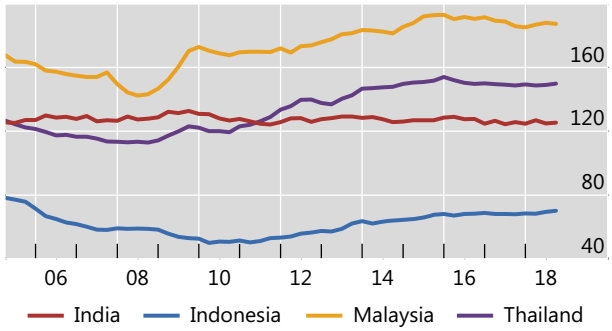
Major advanced economies



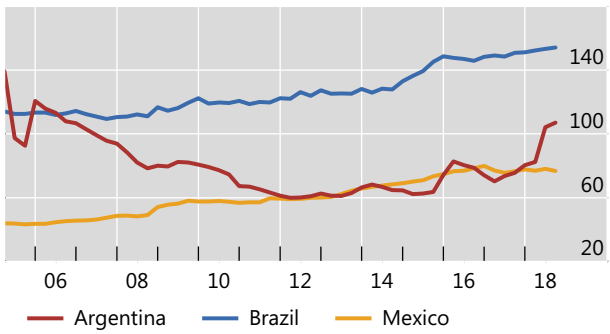
Emerging Asia



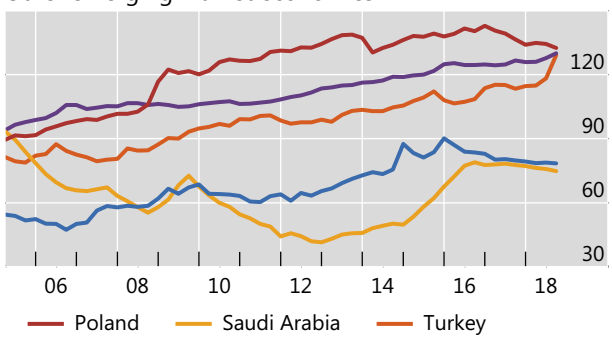
Other emerging Asia



Latin America



Other emerging market economies



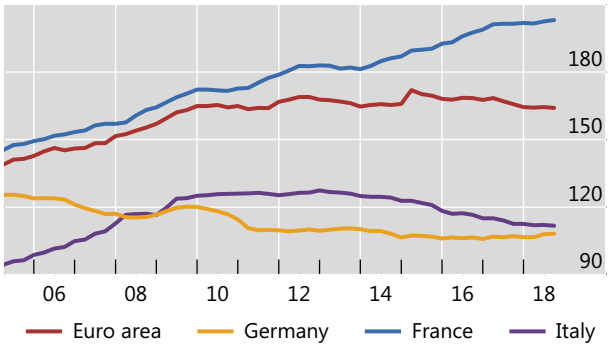
Further information on the BIS credit statistics is available at www.bis.org/statistics/totcredit.htm.

Source: BIS total credit statistics.

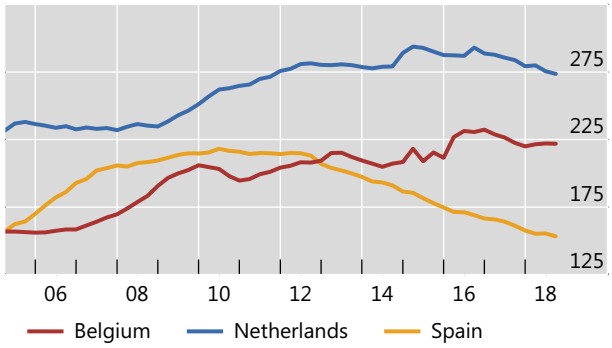
Total credit to the private non-financial sector (core debt)

As a percentage of GDP — Graph F.2

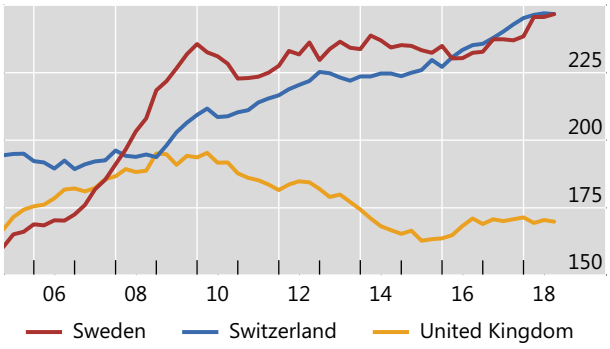
Euro area: aggregate and major countries



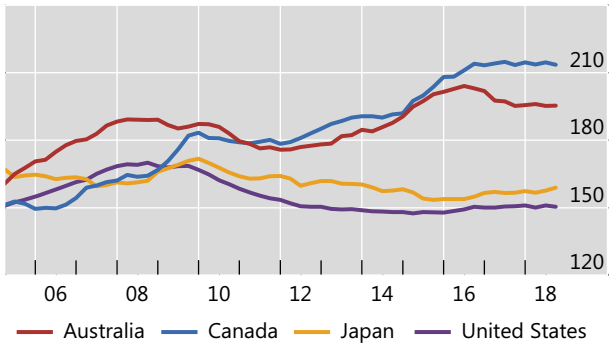
Euro area: other countries



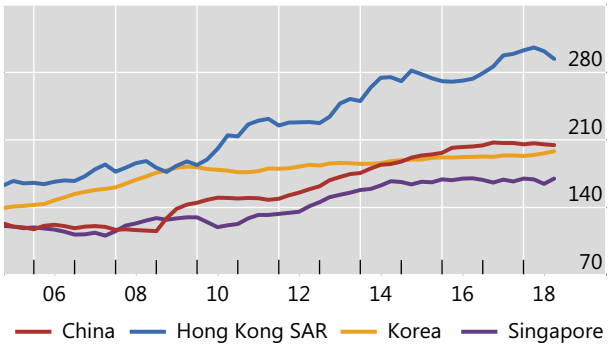
Other European countries



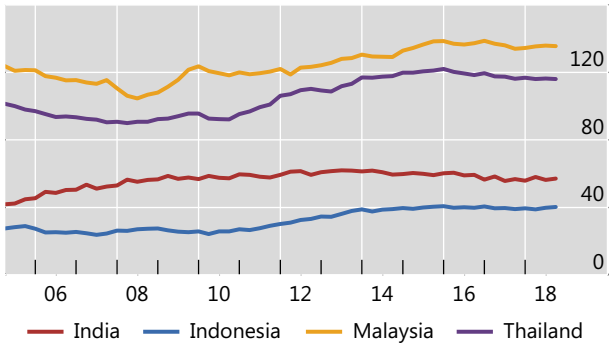
Major advanced economies



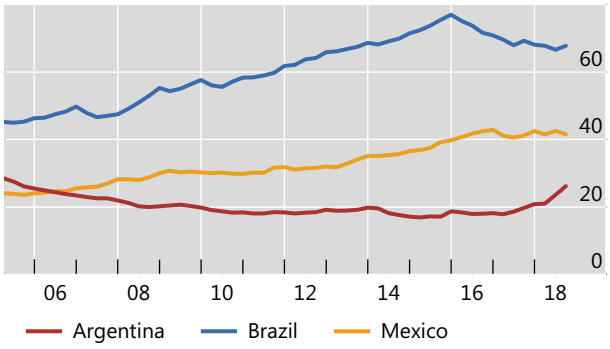
Emerging Asia



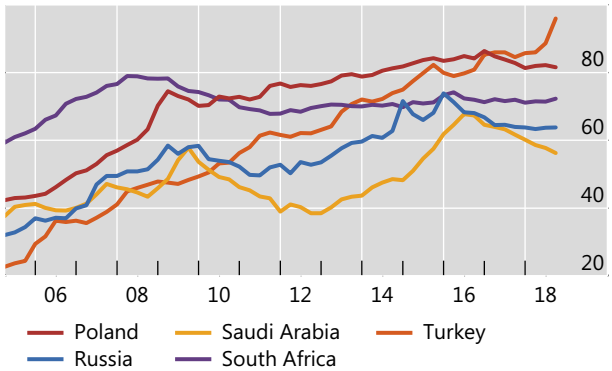
Other emerging Asia



Latin America



Other emerging market economies

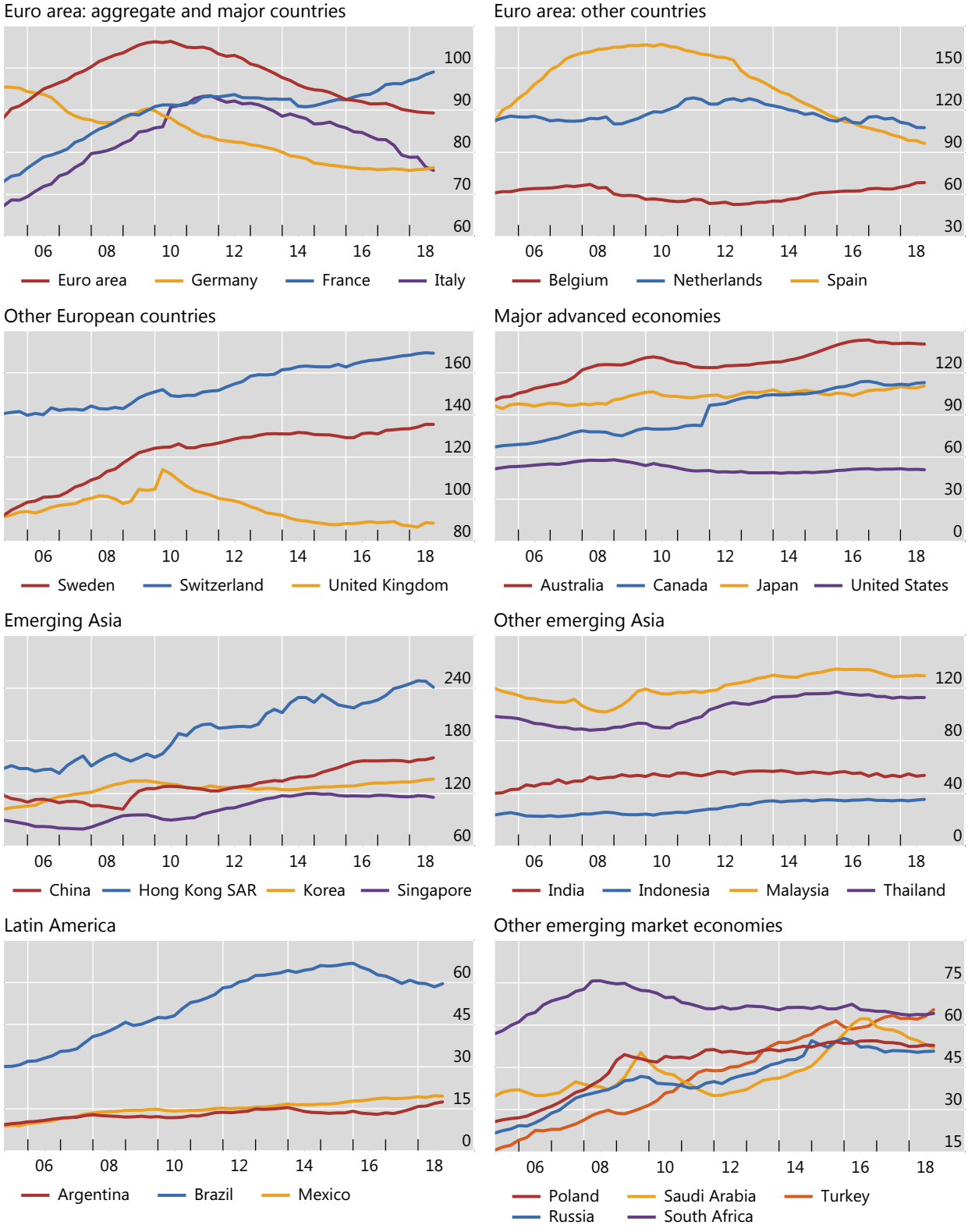


Further information on the BIS credit statistics is available at www.bis.org/statistics/totcredit.htm.

Source: BIS total credit statistics.

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

As a percentage of GDP — Graph F.3



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

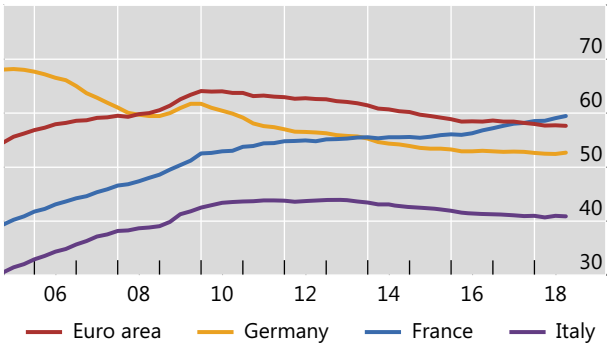
Source: BIS total credit statistics.

Total credit to households (core debt)

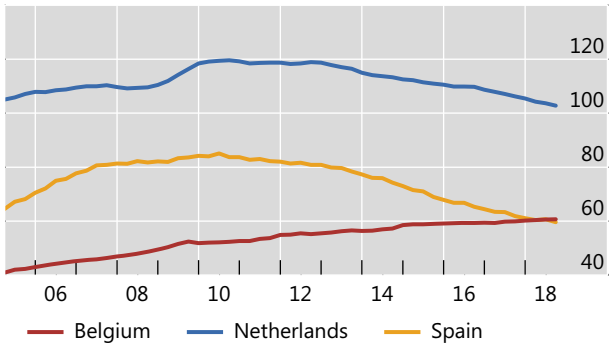
As a percentage of GDP

Graph F.4

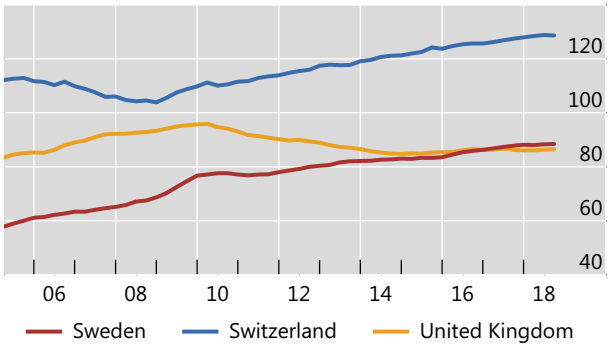
Euro area: aggregate and major countries



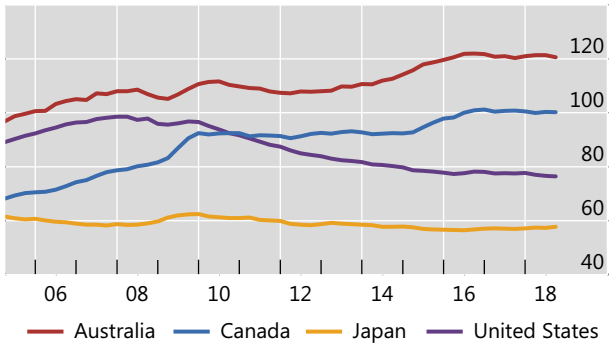
Euro area: other countries



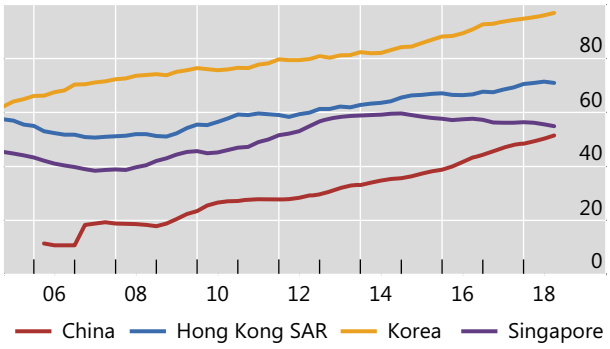
Other European countries



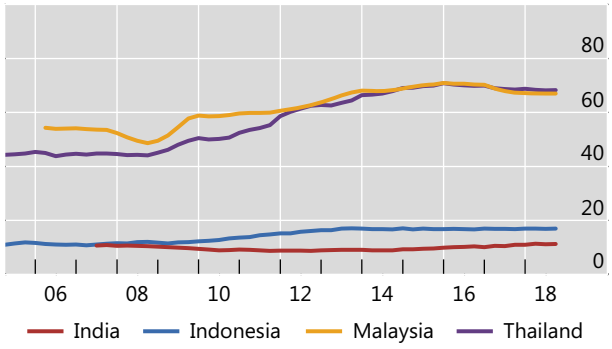
Major advanced economies



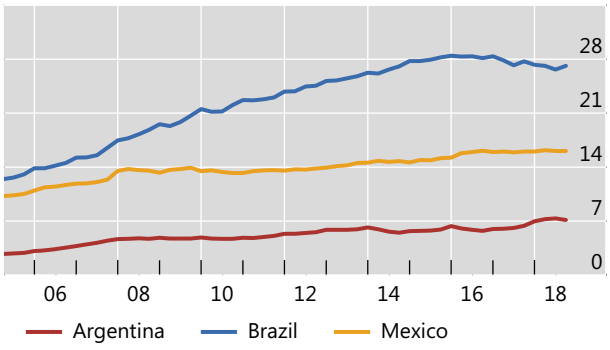
Emerging Asia



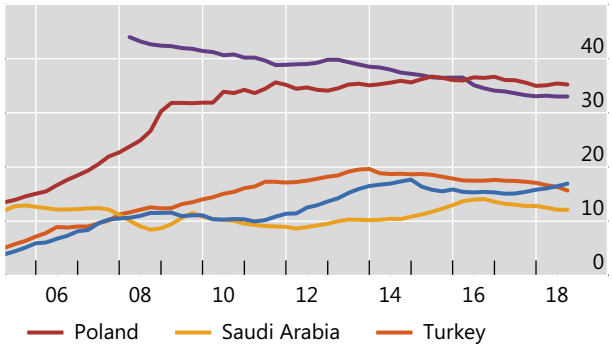
Other emerging Asia



Latin America



Other emerging market economies



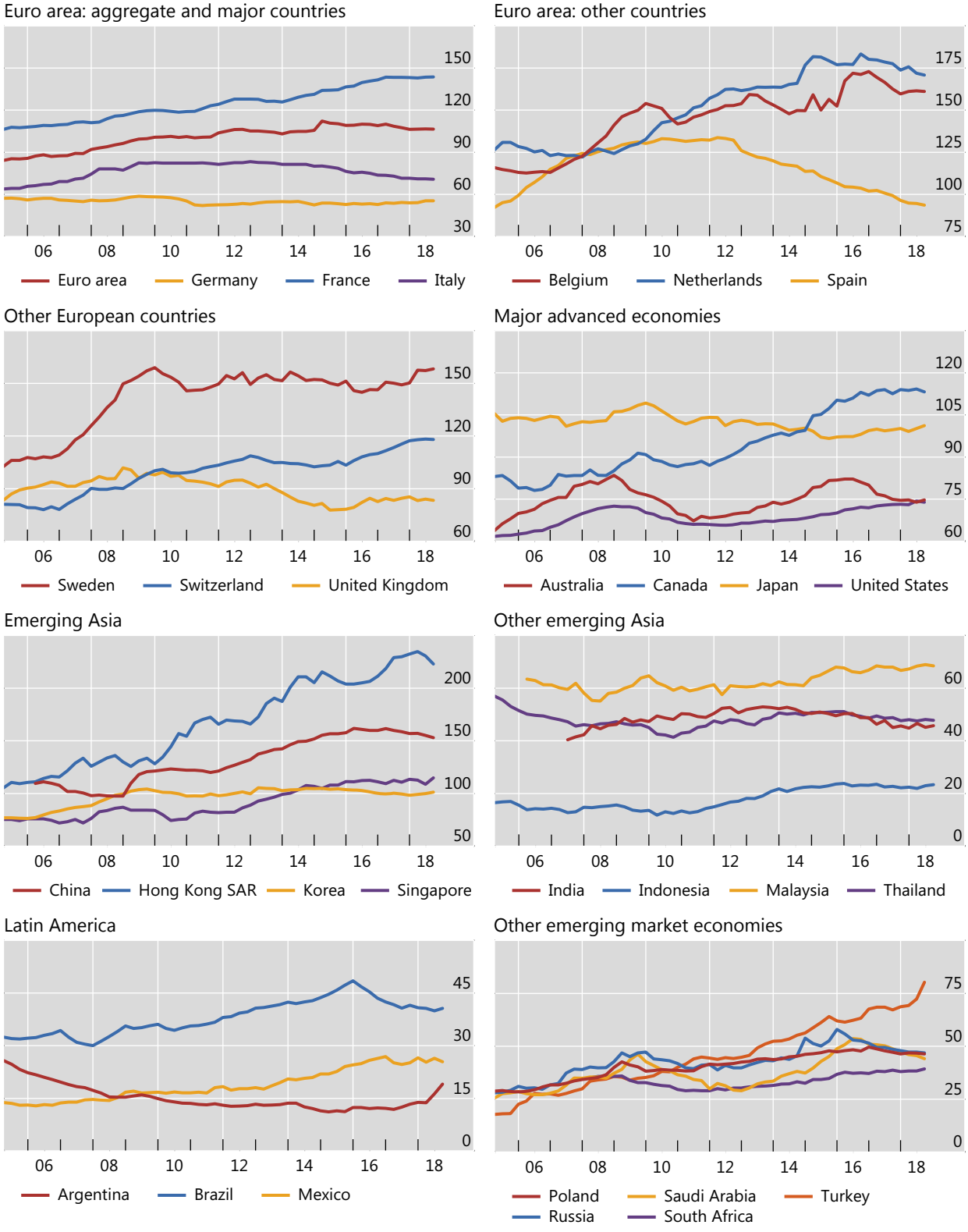
Further information on the BIS credit statistics is available at www.bis.org/statistics/totcredit.htm.

Source: BIS total credit statistics.

Total credit to non-financial corporations (core debt)

As a percentage of GDP

Graph F.5



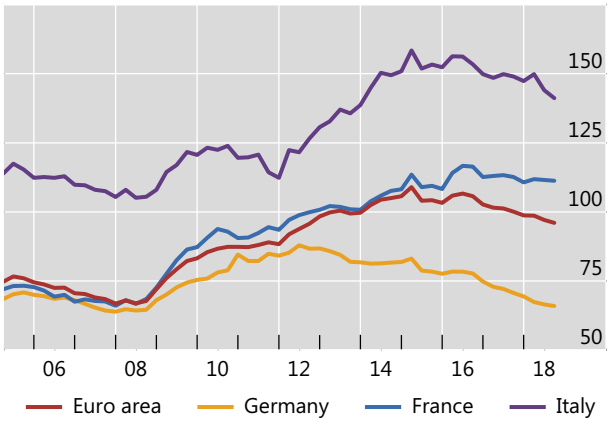
Further information on the BIS credit statistics is available at www.bis.org/statistics/totcredit.htm.

Source: BIS total credit statistics.

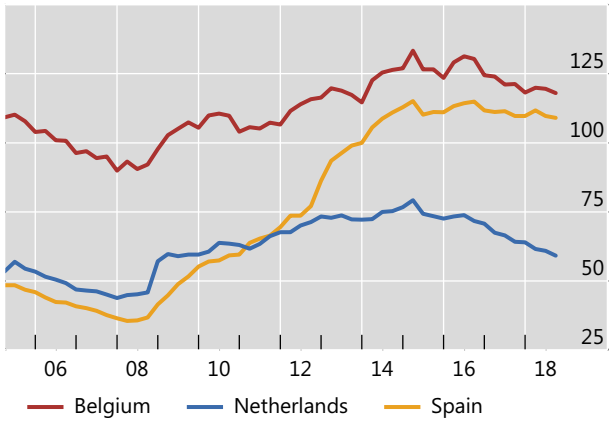
Total credit to the government sector at market value (core debt)[1]

As a percentage of GDP — Graph F.6

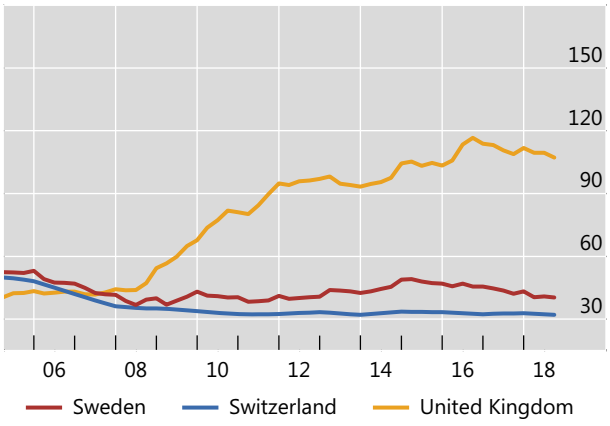
Euro area: aggregate and major countries



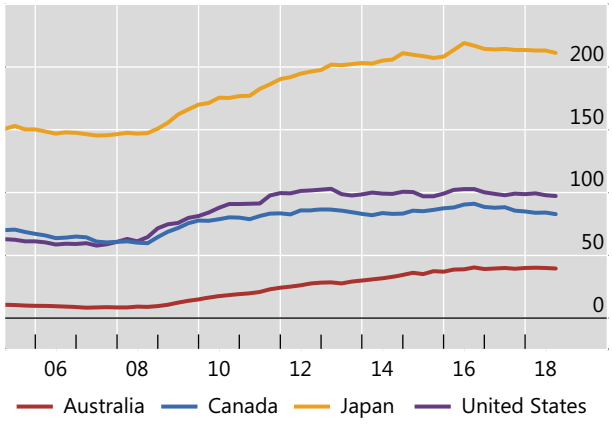
Euro area: other countries



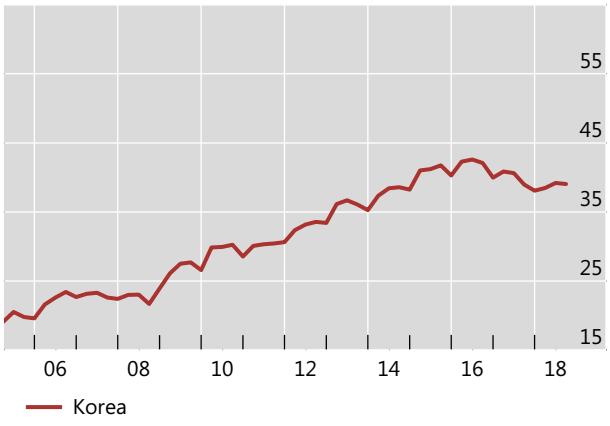
Other European countries



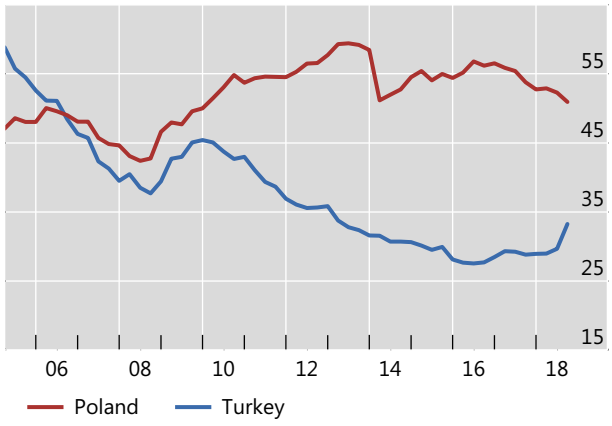
Major advanced economies



Emerging Asia



Other emerging market economies



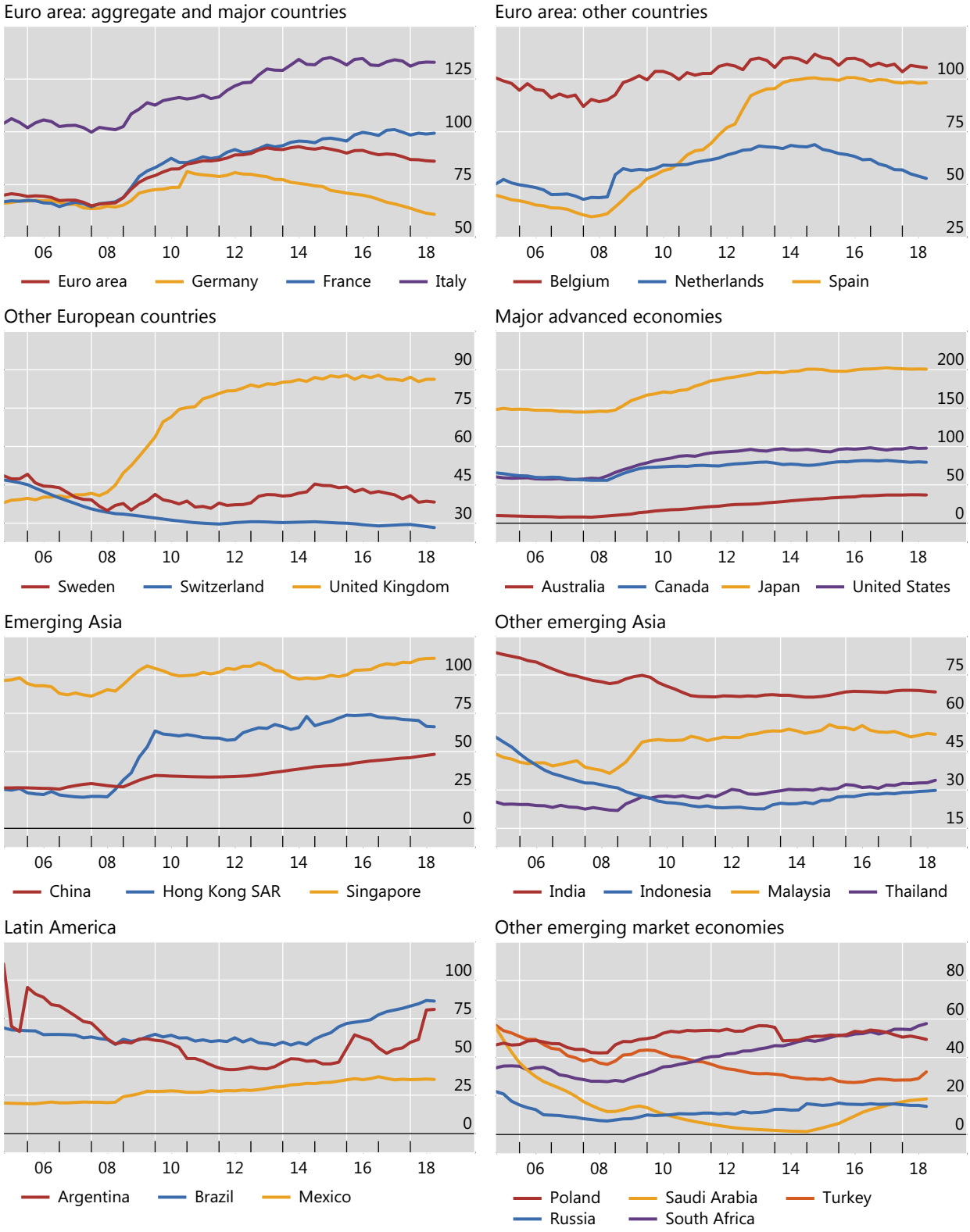
Further information on the BIS credit statistics is available at www.bis.org/statistics/totcredit.htm.

[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



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

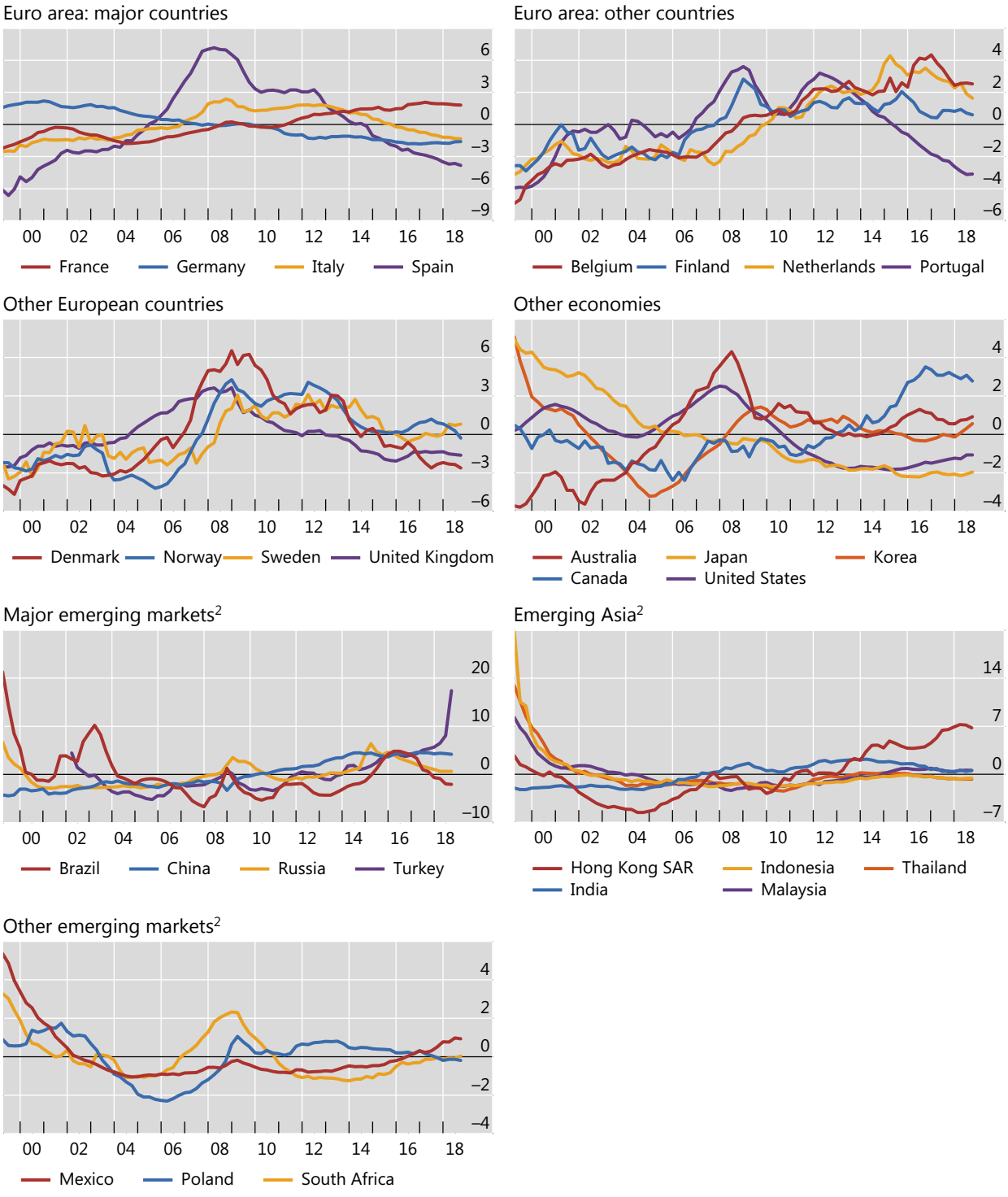
[1] Consolidated data for the general government sector; central government for Argentina, Indonesia, Malaysia, Mexico, Saudi Arabia and Thailand.

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 points[1] Graph G.1



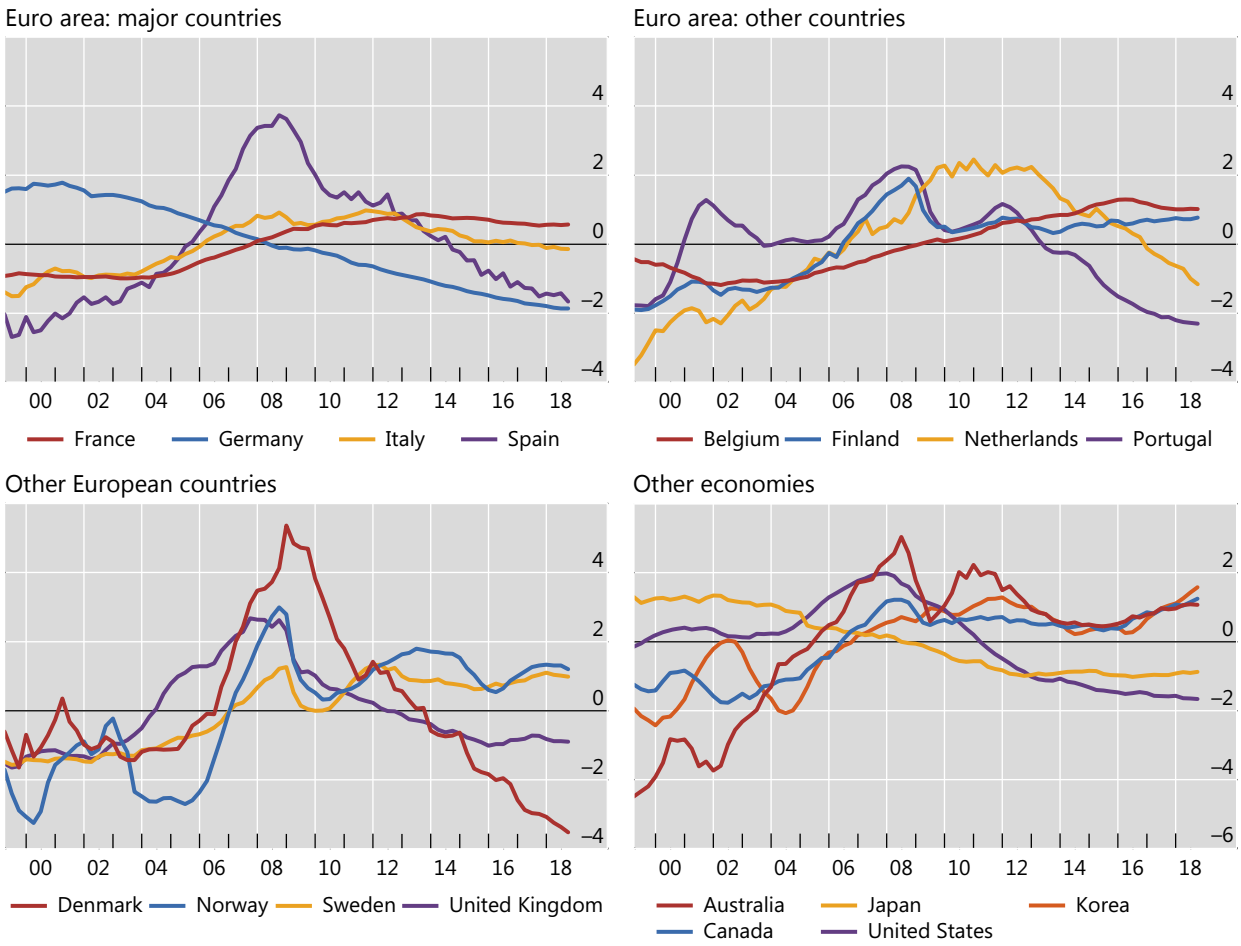
Further information on the BIS debt service ratio statistics is available at www.bis.org/statistics/dsr.htm.

[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 "Metholodogy 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 points[1] Graph G.2



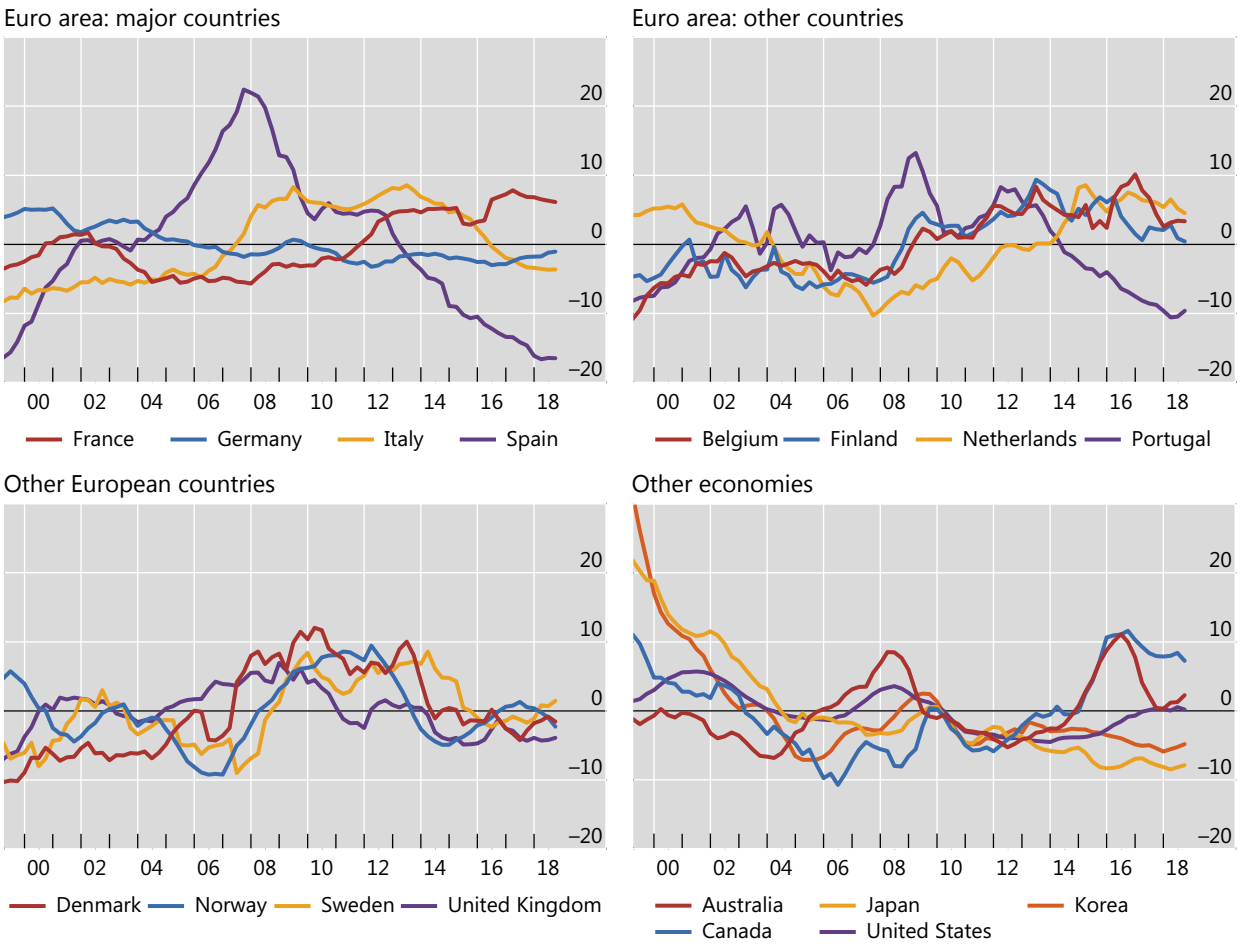
Further information on the BIS debt service ratio statistics is available at www.bis.org/statistics/dsr.htm.

[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 points[1] Graph G.3



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.

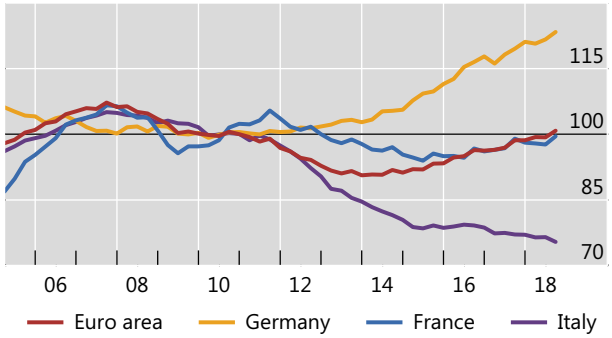
Source: BIS debt service ratios statistics.

H Property price statistics

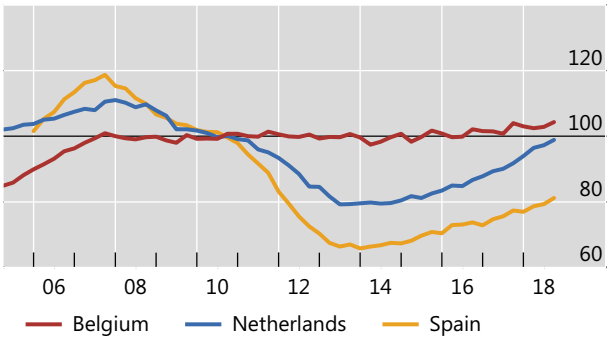
Real residential property prices

CPI-deflated, 2010 = 100 Graph H.1

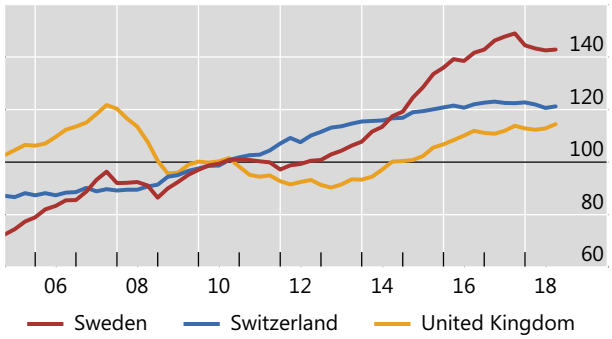
Euro area: aggregate and major countries



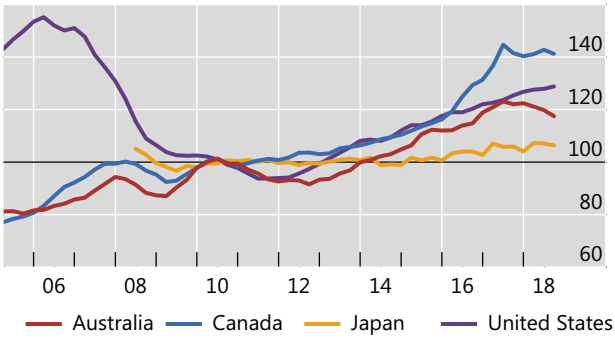
Euro area: other countries



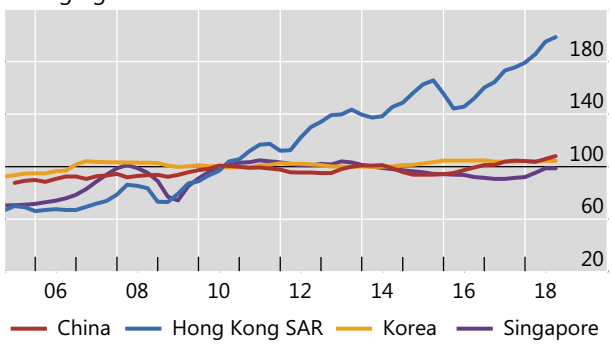
Other European countries



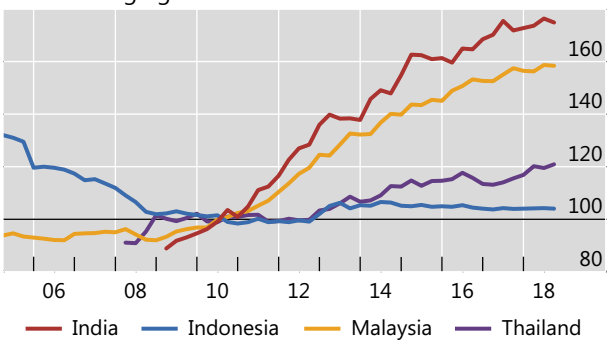
Major advanced economies



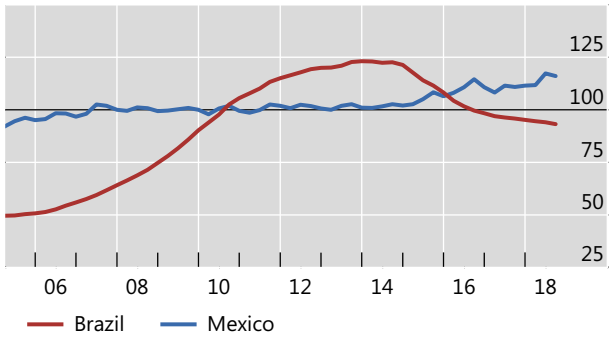
Emerging Asia



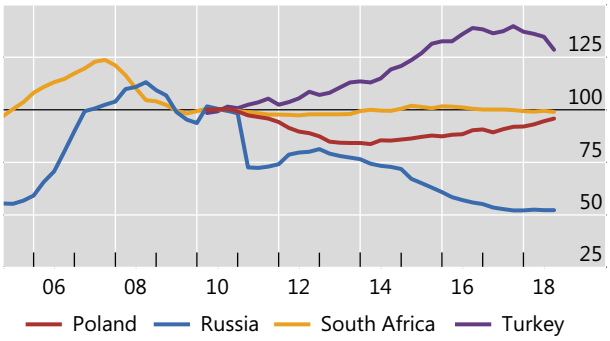
Other emerging Asia



Latin America



Other emerging market economies



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

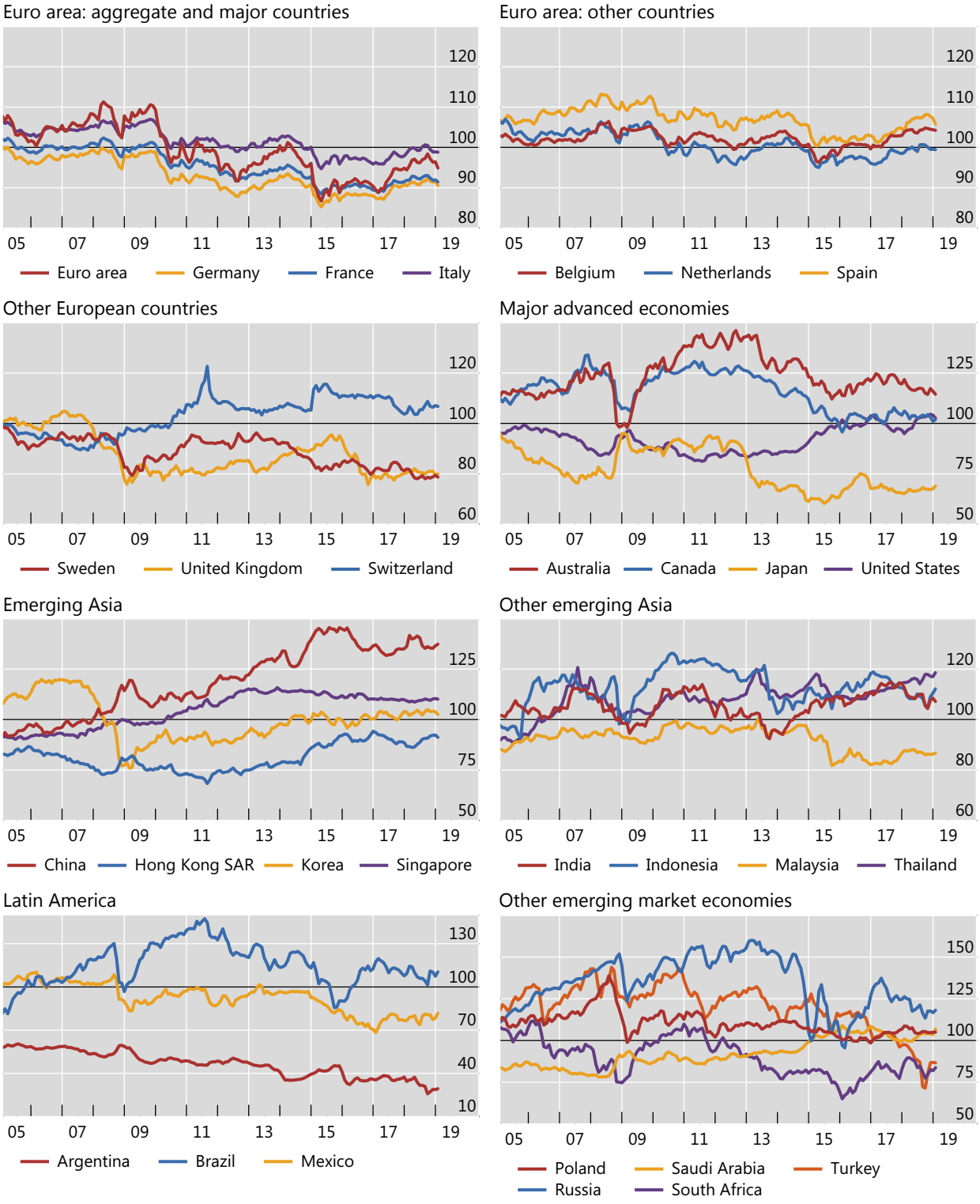
Source: BIS property prices statistics.

I Effective and US dollar exchange rate statistics

Real effective exchange rates

CPI-based, 1995–2005 = 100[1]

Graph I.1



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

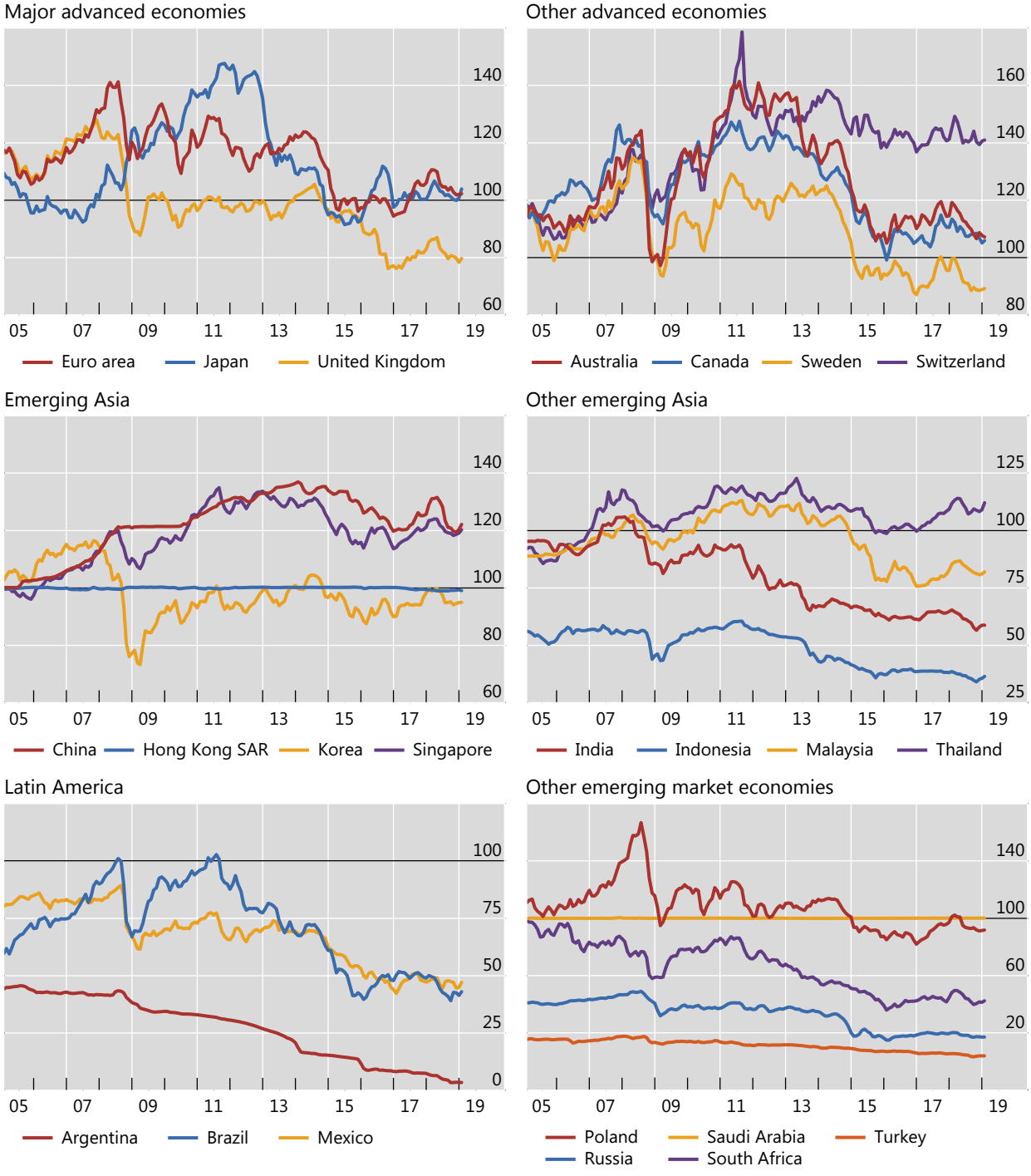
[1] An increase indicates a real-term appreciation of the local currency against a broad basket of currencies.

Source: BIS effective exchange rates statistics.

US dollar exchange rates

Indices, 1995–2005 = 100[1]

Graph I.2



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

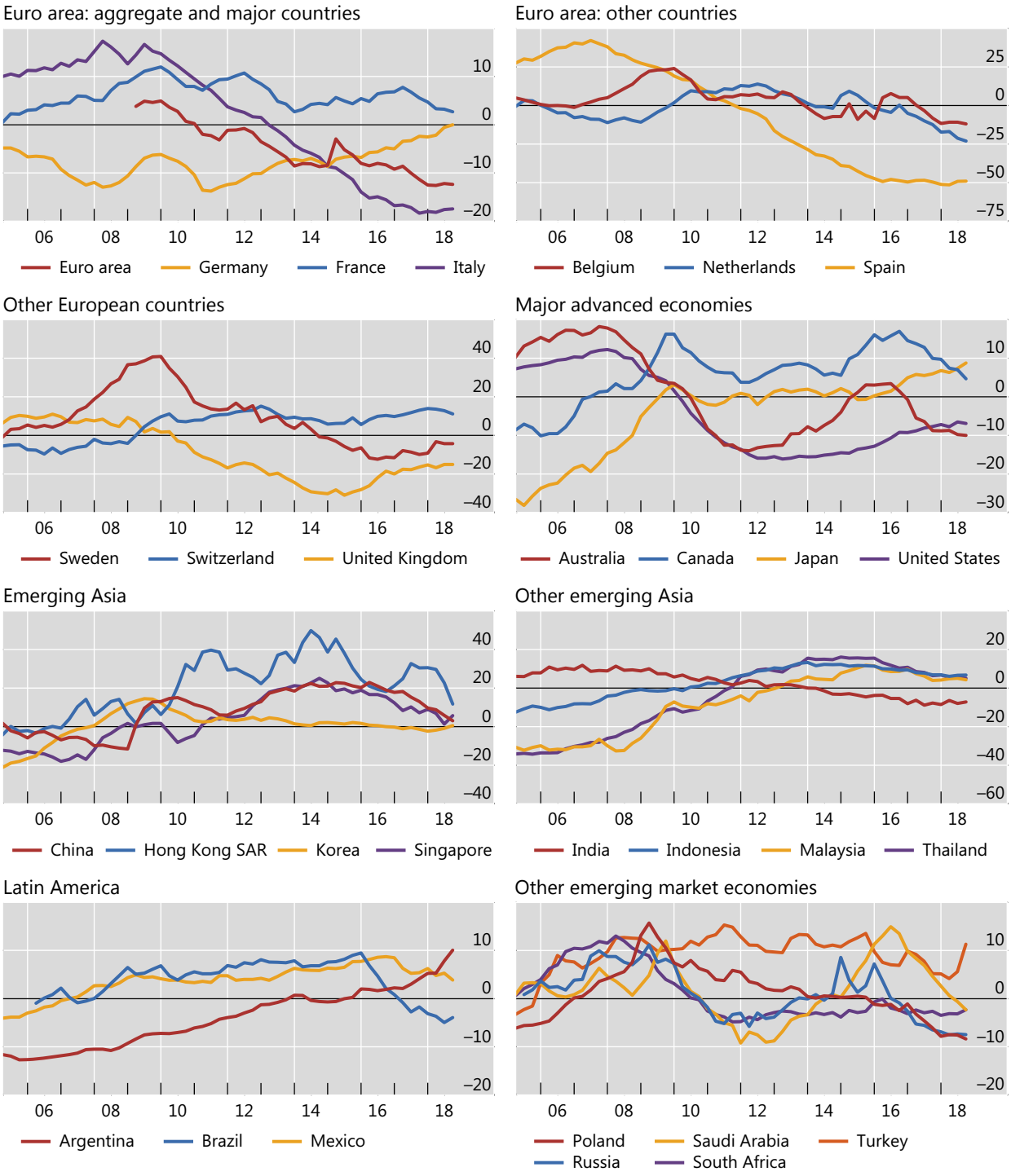
[1] An increase indicates an appreciation of the local currency against the US dollar.

Source: BIS US dollar exchange rates statistics.

J Credit-to-GDP gaps

Credit-to-GDP gaps

In percentage points of GDP — Graph J.1



[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.

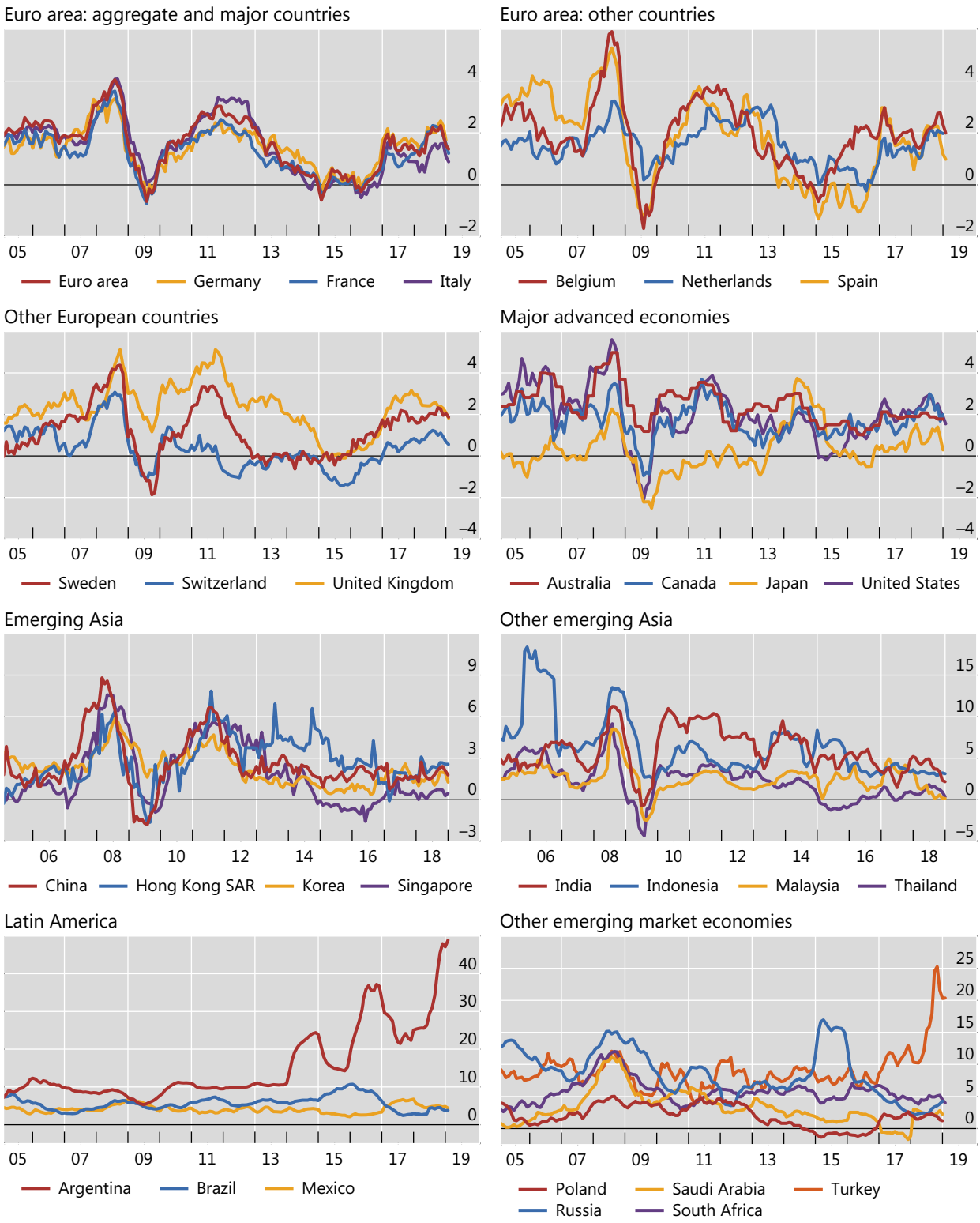
Source: BIS credit-to-GDP gaps statistics.

K Consumer prices

Consumer prices

Year-on-year percentage changes

Graph K.1



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

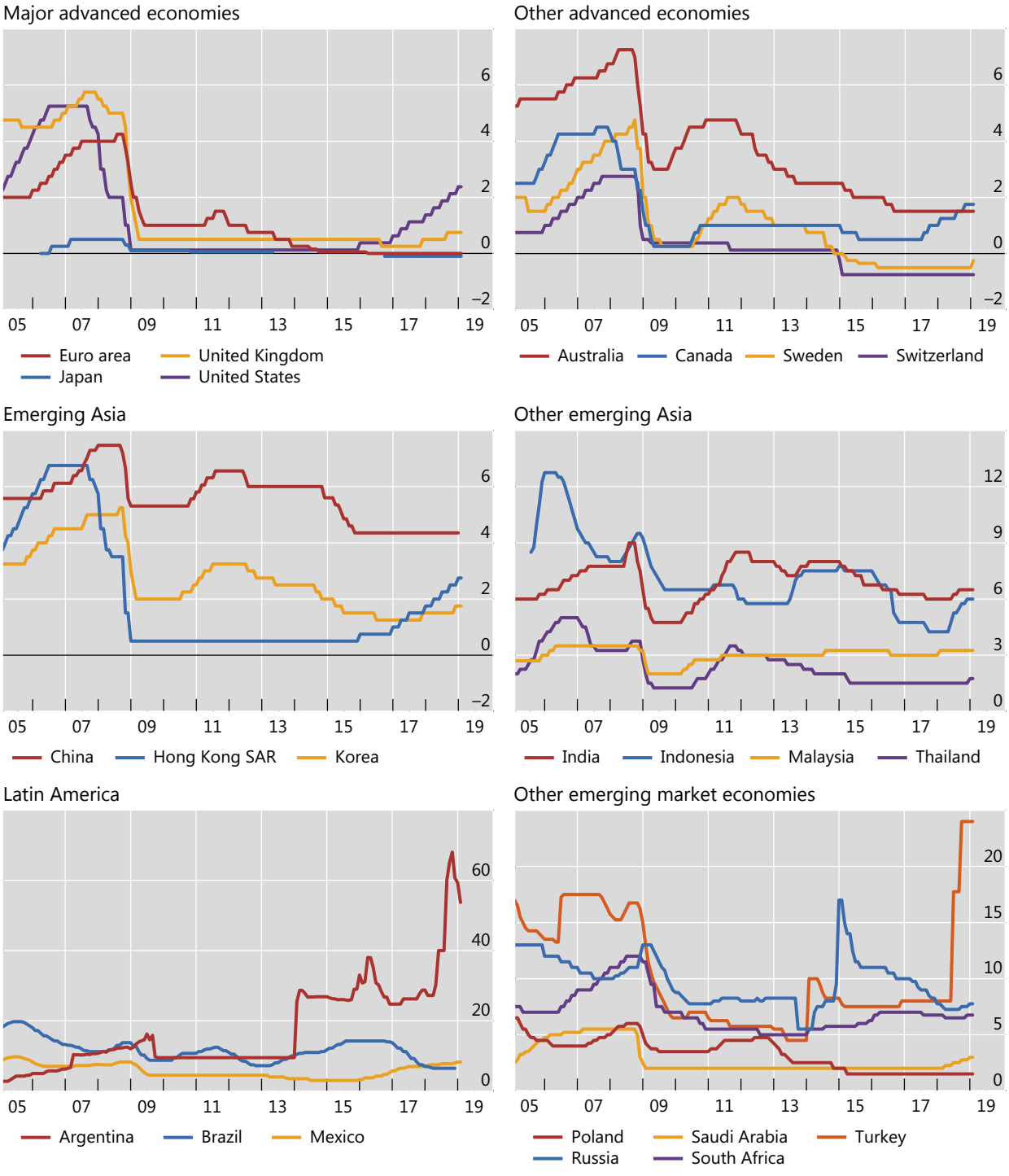
Source: BIS consumer price statistics.

L Central bank policy rates

Central bank policy or representative rates

Month-end; in per cent

Graph L.1



Further information on the policy rates is available at www.bis.org/statistics/cbpol.htm.

Source: BIS policy rates statistics.

Special features in the BIS Quarterly Review

December 2018	The growing footprint of EME banks in the international banking system	Eugenio Cerutti, Catherine Koch & Swapan-Kumar Pradhan
December 2018	The 2008 crisis: transpacific or transatlantic?	Robert N McCauley
December 2018	The financial cycle and recession risk	Claudio Borio, Mathias Drehmann & Dora Xia
December 2018	Clearing risks in OTC derivatives markets: the CCP-bank nexus	Umar Faruqui, Wenqian Huang & Előd Takáts
September 2018	Fintech credit markets around the world: size, drivers and policy issues	Stijn Claessens, Jon Frost, Grant Turner & Feng Zhu
September 2018	Regulating cryptocurrencies: assessing market reactions	Raphael Auer & Stijn Claessens
September 2018	The rise of zombie firms: causes and consequences	Ryan Banerjee & Boris Hofmann
September 2018	Term premia: models and some stylised facts	Benjamin H Cohen, Peter Hördahl & Dora Xia
March 2018	Early warning indicators of banking crises: expanding the family	Iñaki Aldasoro, Claudio Borio & Mathias Drehmann
March 2018	Tracking the international footprints of global firms	Stefan Avdjiev, Mary Everett, Philip R Lane & Hyun Song Shin
March 2018	Payments are a-changin' but cash still rules	Morten Bech, Umar Faruqui, Frederik Ougaard & Cristina Picillo
March 2018	The ABCs of bank PBRs: What drives bank price-to-book ratios?	Bilyana Bogdanova, Ingo Fender & Előd Takáts
March 2018	Mortgages, developers and property prices	Michael Chui, Anamaria Illes & Christian Uppe
March 2018	The implications of passive investing for securities markets	Vladyslav Sushko & Grant Turner

Recent BIS publications[1]

BIS Papers

Proceeding with caution - a survey on central bank digital currency
BIS Papers No 101, January 2019

The hypothetical benefits and risks of central bank digital currencies are being widely discussed. This BIS paper adds to these discussions by taking stock of how progress and plans in this area are developing, based on a global survey of central banks. Responses show that central banks are proceeding with caution and most are only at a conceptual stage with their work. However, a handful have moved to considering practical issues and a couple of central banks with idiosyncratic circumstances might issue a digital currency in the short or medium term

Globalisation and deglobalisation
BIS Papers No 100, December 2018

Globalisation has had a profound effect on economic outcomes, especially in emerging market economies (EMEs). In particular, it is widely acknowledged to have been a major driver of the strong income growth and reduction in poverty witnessed in EMEs in the past few decades. Despite these benefits, there has recently been a backlash against globalisation and growing support for inward looking policies in many parts of the world. Against this backdrop, this volume takes stock of the EME experience with two facets of globalisation-trade and migration. It summarises different country experiences with regard to the aggregate as well as distributional consequences. In doing so, it highlights several examples and avenues for policy action to continue to harness the benefits of globalisation while limiting the costs.

BIS Working Papers

Macroprudential policy with capital buffers
Josef Schroth
February 2019, No 771

This paper studies optimal bank capital requirements in a model of endogenous bank funding conditions. I find that requirements should be higher during good times such that a macroprudential "buffer" is provided. However, whether banks can use buffers to maintain lending during a financial crisis depends on the capital requirement during the subsequent recovery. The reason is that a high requirement during the recovery lowers bank shareholder value during the crisis and thus creates funding-market pressure to use buffers for deleveraging rather than for maintaining lending. Therefore, buffers are useful if banks are not required to rebuild them quickly.

[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/).

The expansionary lower bound: contractionary monetary easing and the trilemma
Paolo Cavallino and Damiano Sandri
February 2019, No 770

We provide a theory of the limits to monetary policy independence in open economies arising from the interaction between capital flows and domestic collateral constraints. The key feature is the existence of an "Expansionary Lower Bound" (ELB), defined as an interest rate threshold below which monetary easing becomes contractionary. The ELB can be positive, thus binding before the ZLB. Furthermore, the ELB is affected by global monetary and financial conditions, leading to novel international spillovers and crucial departures from Mundell's trilemma. We present two models in which the ELB may arise due to either carry-trade capital flows or currency mismatches.

Safe assets: made, not just born
Robert N McCauley
February 2019, No 769

Official reserve managers have a big stake in the debate over safe assets: their portfolios just about define such assets. This paper conveys the message that reserve managers need not worry about a shortage of safe assets. The debate turns first on whether demand for dollar safe assets will grow as rapidly as emerging market economies (EMEs). Second, it turns on whether the supply of dollar safe assets only grows with US fiscal deficits. Neither holds. On the demand side, EMEs' growth does not require ever higher dollar reserves. Indeed, the global economy may have reached "peak reserves" in 2014. On the supply side, law and policy extend state backing to various IOUs, thereby creating safe assets. US government support for the housing agencies Fannie Mae and Freddie Mac has made their debt into safe assets, albeit with wobbles. Federal Reserve liquidity, Federal Deposit Insurance Corporation insurance, and, in extremis as in 2008, Treasury equity also work to make US bank deposits safe. Elsewhere, government support of banks allows those from well rated countries to compete with US banks in issuing safe dollar deposits. Moreover, supranational organisations, non-US sovereigns and their agencies all compete with the US Treasury in issuing safe dollar bonds. In allocating their dollar foreign exchange reserves, central banks make room for such competitors. In particular, they hold more than a third of such reserves in instruments other than US Treasury securities.

Over-the-counter market liquidity and securities lending
Nathan Foley-Fisher, Stefan Gissler and Stéphane Verani
February 2019, No 768

This paper studies how over-the-counter market liquidity is affected by securities lending. We combine micro-data on corporate bond market trades with securities lending transactions and individual corporate bond holdings by U.S. insurance companies. Applying a difference-in-differences empirical strategy, we show that the shutdown of AIG's securities lending program in 2008 caused a statistically and economically significant reduction in the market liquidity of corporate bonds predominantly held by AIG. We also show that an important mechanism behind the decrease in corporate bond liquidity was a shift towards relatively small trades among a greater number of dealers in the interdealer market.

Central counterparty capitalization and misaligned incentives
Wenqian Huang
February 2019, No 767

Financial stability depends on the effective regulation of central counterparties (CCPs), which must take account of the incentives that drive CCP behavior. This paper studies the incentives of a for-profit CCP with limited liability. It faces a trade-off between fee income and counterparty credit risk. A better-capitalized CCP sets a higher collateral requirement to reduce potential default losses, even though it forgoes fee income by deterring potential traders. I show empirically that a 1% increase in CCP capital is associated with a 0.6% increase in required collateral. Limited liability, however, creates a wedge between its capital and collateral policy and the socially optimal solution to this trade-off. The optimal capital requirements should account for clearing fees.

Risk endogeneity at the lender/investor-of-last-resort
Diego Caballero, André Lucas, Bernd Schwaab and Xin Zhang
January 2019, No 766

We address to what extent a central bank can de-risk its balance sheet by unconventional monetary policy operations. To that end, we propose a novel risk measurement framework to empirically study the time variation in central bank portfolio credit risks associated with such operations. The framework accommodates a large number of bank and sovereign counterparties, joint tail dependence, skewness, and time-varying dependence parameters. In an application to selected items from the consolidated Eurosystem's weekly balance sheet between 2009 and 2015, we find that unconventional monetary policy operations generated beneficial risk spillovers across monetary policy operations, causing overall risk to be non-linear in exposures. Some policy operations reduced rather than increased overall risk.

Beyond the doomsday economics of "proof-of-work" in cryptocurrencies
Raphael Auer
January 2019, No 765

This paper discusses the economics of how Bitcoin achieves data immutability, and thus payment finality, via costly computations, ie "proof-of-work". Further, it explores what the future might hold for cryptocurrencies modelled on this type of consensus algorithm. The conclusions are, first, that Bitcoin counterfeiting via "double-spending" attacks is inherently profitable, making payment finality based on proof-of-work extremely expensive. Second, the transaction market cannot generate an adequate level of "mining" income via fees as users free-ride on the fees of other transactions in a block and in the subsequent blockchain. Instead, newly minted bitcoins, known as block rewards, have made up the bulk of mining income to date. Looking ahead, these two limitations imply that liquidity is set to fall dramatically as these block rewards are phased out. Simple calculations suggest that once block rewards are zero, it could take months before a Bitcoin payment is final, unless new technologies are deployed to speed up payment finality. Second-layer solutions such as the Lightning Network might help, but the only fundamental remedy would be to depart from proof-of-work, which would probably require some form of social coordination or institutionalisation.

Global Banking, Financial Spillovers, and Macroprudential Policy Coordination
Pierre-Richard Agénor and Luiz Awazu Pereira da Silva
January 2019, No 764

The gains from international macroprudential policy coordination are studied in a two-region, core-periphery macroeconomic model with imperfect financial integration and cross-border banking. Financial frictions occur at two levels: between firms and banks in each region, and between periphery banks and a global bank in the core region. Macroprudential regulation takes the form of a countercyclical tax on bank loans to domestic capital goods producers, which responds to real credit growth and is subject to a cost in terms of welfare. Numerical experiments, based on a parameterized version of the model, show that the welfare gains from macroprudential policy coordination are positive, albeit not large, for the world economy. In addition, these gains tend to increase with the degree of international financial integration. However, depending on the origin of financial shocks, they can also be highly asymmetric across regions.

On money, debt, trust and central banking
Claudio Borio
January 2019, No 763

This essay examines in detail the properties of a well functioning monetary system - defined as money plus the mechanisms to execute payments - in both the short and long run, drawing on both theory and the lessons from history. It stresses the importance of trust and of the institutions needed to secure it. Ensuring price and financial stability is critical to nurturing and maintaining that trust. In the process, the essay addresses several related questions, such as the relationship between money and debt, the viability of cryptocurrencies as money, money neutrality, and the nexus between monetary and financial stability. While the present monetary system, with central banks and a prudential apparatus at its core, can and must be improved, it still provides the best basis to build on.

A key currency view of global imbalances
Robert N McCauley and Hiro Ito
December 2018, No 762

This working paper contributes to a growing body of work that breaks free of the "triple coincidence" often assumed in international finance. A currency's domain does not coincide with the borders of the jurisdiction that issues it. Instead, key currencies enjoy global use. A key currency perspective can change how global imbalances look to economists, policymakers and market participants.

Non-monetary news in central bank communication
Anna Cieslak and Andreas Schrimpf
December 2018, No 761

We quantify the importance of non-monetary news in central bank communication. Using evidence from four major central banks and a comprehensive classification of events, we decompose news conveyed by central banks into news about monetary policy, economic growth, and separately, shocks to risk premia. Our approach exploits high-frequency comovement of stocks and interest rates combined with monotonicity restrictions across the yield curve. We find significant differences in news composition depending on the communication channel used by central banks. Non-monetary news prevails in about 40% of policy decision announcements by the Fed and the ECB, and this fraction is even higher for communications that provide context to policy decisions such as press conferences. We show that non-monetary news accounts for a significant part of financial markets' reaction during the financial crisis and in the early recovery, while monetary shocks gain importance since 2013.

Gross capital flows by banks, corporates and sovereigns
Stefan Avdjiev, Bryan Hardy, Sebnem Kalemli-Ozcan and Luis Servén
December 2018, No 760

We construct a new data set of quarterly international capital flows by sector, with an emphasis on debt flows. Using our new data set, we establish four facts. First, the co-movement of capital inflows and outflows is driven by inflows and outflows vis-à-vis the domestic banking sector. Second, the procyclicality of capital inflows is driven by banks and corporates, whereas sovereigns' external liabilities move acyclically in advanced and countercyclically in emerging countries. Third, the procyclicality of capital outflows is driven by advanced countries' banks and emerging countries' sovereigns (reserves). Fourth, capital inflows and outflows decline for banks and corporates when global risk aversion (VIX) increases, whereas sovereign flows show no response. These facts are inconsistent with a large class of theoretical models.

Basel Committee on Banking Supervision

An examination of initial experience with the global systemically important bank framework
February 2019

This paper presents a first analysis of the experience to date with the global systemically important bank (G-SIB) framework, the methodology for assessing the systemic importance of G-SIBs. Several issues are examined. First, we investigate whether G-SIBs and non-G-SIBs have behaved differently since the implementation of the G-SIB framework and if observed differences in behaviour are in accordance with the framework's aims. Next, we ask whether there are regional differences in the behaviour of G-SIBs and non-G-SIBs.

Minimum capital requirements for market risk
January 2019

The Minimum capital requirements for market risk replaces an earlier version of the standard as published in January 2016.

The standard has been revised to address issues that the Basel Committee identified in the course of monitoring the implementation and impact of the framework. This final standard

incorporates changes that were proposed in a March 2018 consultative document and has been informed by a quantitative impact based on data as of end-December 2017.

As in the January 2016 framework, the core features of the standard include:

•a clearly defined boundary between the trading book and the banking book;

•an internal models approach that relies upon the use of expected shortfall models and sets out separate capital requirements for risk factors that are deemed non-modellable; and

•a standardised approach that is risk-sensitive and is designed and calibrated to serve as a credible fallback to the internal models approach.

Revisions to the January 2016 framework include the following key changes:

- a simplified standardised approach for use by banks that have small or non-complex trading portfolios;
- clarifications on the scope of exposures that are subject to market risk capital requirements;
- refined standardised approach treatments of foreign exchange risk and index instruments;
- revised standardised approach risk weights applicable to general interest rate risk, foreign exchange and certain exposures subject to credit spread risk;
- revisions to the assessment process to determine whether a bank's internal risk management models appropriately reflect the risks of individual trading desks; and
- revisions to the requirements for identification of risk factors that are eligible for internal modelling.

This revised standard comes into effect on 1 January 2022.

Revisions to leverage ratio disclosure requirements
December 2018

The Basel III leverage ratio standard comprises a 3% minimum level that banks must meet at all times, a buffer for global systemically-important banks and a set of public disclosure requirements. For the purpose of disclosure requirements, banks must report the leverage ratio on a quarter-end basis or, subject to approval by national supervisors, report a measure based on averaging (eg using an average of exposure amounts based on daily or month-end values).

Heightened volatility in various segments of money and derivatives markets around key reference dates (eg quarter-end) has alerted the Basel Committee to potential regulatory arbitrage by banks. A particular concern is "window-dressing", in the form of temporary reductions of transaction volumes in key financial markets around reference dates resulting in the reporting and public disclosure of elevated leverage ratios. In this regard, the Committee published a newsletter in October 2018 in which it indicated that window-dressing by banks is unacceptable, as it undermines the intended policy objectives of the leverage ratio requirement and risks disrupting the operations of financial markets.

Pillar 3 disclosure requirements - updated framework
December 2018

Pillar 3 of the Basel framework seeks to promote market discipline through regulatory disclosure requirements. The revised Pillar 3 framework reflects the Committee's December 2017 Basel III post-crisis regulatory reforms and pertains to the following areas:

- credit risk, operational risk, the leverage ratio and credit valuation adjustment (CVA) risk;
- risk-weighted assets (RWAs) as calculated by the bank's internal models and according to the standardised approaches; and
- an overview of risk management, RWAs and key prudential metrics.

Cyber-resilience: range of practices
December 2018

The Basel Committee on Banking Supervision today published the report. It identifies, describes and compares the range of observed bank, regulatory and supervisory cyber-resilience practices across jurisdictions.

Based on analysis of authorities' responses to previous international surveys and on exchanges between international experts, the report gains insight into the effective practices and expectations in place. It also benefited from industry participants' input.

Committee on the Global Financial System

Establishing viable capital markets
January 2019, No 62

The Capital markets provide an important channel of financing for the real economy, they help allocate risk, and they support economic growth and financial stability. Moreover, capital markets have played an important part in financing the recovery from the Great Financial Crisis (GFC), a reminder of their "spare tyre" role in the financial system. This report examines recent trends in capital market development and identifies the factors that foster the development of robust capital markets.

The report finds that large differences persist in the size of capital markets across advanced and emerging economies. Emerging-economy markets have been catching up with their more advanced peers, but the gap has not yet been closed.

The analysis highlights the importance of macroeconomic stability, market autonomy, strong legal frameworks and effective regulatory regimes in supporting market development. Better disclosure standards, investor diversity, internationalisation, and deep hedging and funding markets, as well as efficient and robust market infrastructures, also play a key role.

The report's recommendations across six broad areas outline practical ways to support the development of robust and efficient markets.

Committee on Payments and Market Infrastructure

Implementation monitoring of PFMI: Assessment report for Switzerland
January 2019 No 183

The Committee on Payments and Market Infrastructures (CPMI) and the International Organization of Securities Commissions (・IOSCO) closely monitors the implementation of the Principles for financial market infrastructures (PFMI). This report presents the conclusions drawn by the CPMI and IOSCO from a Level 2 assessment of whether, and to what degree, the legal, regulatory and oversight frameworks for financial market infrastructures (FMIs) in Switzerland, including rules and regulations, any relevant policy statements, or other forms of implementation, are complete and consistent with the Principles.

The assessment found that - as of 30 June 2017 - Switzerland has generally implemented the PFMI. For PSs, CSDs/SSSs and CCPs, the Principles have been implemented in a complete and consistent or broadly consistent manner with the exception of Principle 7 on liquidity risk management and Principle 22 on communication procedures and standards, as well as Principle 19 (as applicable for PSs) on tiered participation arrangements. For TRs, a number of gaps were identified with varying severity. Principles 1, 3, 15, 17, 20, 22 and 24 on legal basis, the framework for the comprehensive management of risks, general business risk, operational risk, FMI links, communication procedures and standards, and disclosure of market data, respectively, have not been fully implemented.

Market Committee

Monitoring of fast-paced electronic markets
September 2018 No 10

The Foreign exchange and other fast-paced electronic markets (FPMs) have undergone a wide range of structural changes in recent years. Trading in FPMs has become increasingly electronic and automated, significantly changing the market ecosystem. Against this background, the report explores aspects of structural change with immediate relevance for central banks' market monitoring approaches.

The three key structural changes include greater speed and fragmentation of trading activity; greater concentration of liquidity provision among the largest banks and the new set of non-bank intermediaries; and the rise in volume and commoditisation of large quantities of high-frequency data on the back of greater electronification.

At the same time, the market-monitoring capacities of market participants in both the public and private sector have been transformed. Central banks have striven to adapt their near-time and medium-term monitoring approaches to these changes. Monitoring needs naturally vary according to central bank mandates and how far markets have been electronified. Central banks' monitoring requirements will also naturally differ from those of the private sector.

Speeches

Distributed ledger technology and large value payments: a global game approach

Lecture by Mr Hyun Song Shin, Economic Adviser and Head of Research of the BIS, · University of Cambridge, 22 January 2019.

Payment systems built around distributed ledger technology (DLT) operate by maintaining identical copies of the history of payments among the participant nodes in the payment system. Cryptocurrencies are perhaps the best-known example of the application of DLT, but the applicability of the technology is much broader. Payment systems based on DLT are compatible with oversight by the central bank, and several central banks have conducted successful trials of interbank payments. In these trials, payment system participants transfer digital tokens that are redeemable at the central bank and use DLT to transfer them to other system participants. Decentralised consensus is achieved through agreement of a supermajority of the participants (typically 75-80%) who collectively validate payments.

Nevertheless, the technology by itself does not overcome the credit needs of the payment system to maintain settlement liquidity. In conventional real-time gross settlement (RTGS) payment systems, the value of daily payments can be over 100 times the deposit balance maintained by the system participant at the central bank. As such, incoming payments are recycled into outgoing payments, and credit provided by the central bank supplements private credit from outside the payment system for the smooth functioning of the system as a whole.

We examine the liquidity properties of decentralised payment systems in an economic model of payments, in which the cost of credit to finance payments enters explicitly.

Claudio Borio interview with Capital

Original quotes from interview with Mr Claudio Borio, Head of the Monetary and Economic Department of the BIS, with Capital, conducted by Mr Lukas Zdrzalek and published on 24 January 2019.

BIS Quarterly Review, December 2018 - media briefing

Remarks by Claudio Borio and Hyun Song Shin.

Shelter from the storm

Remarks by Mr Agustín Carstens, General Manager of the BIS, at a seminar at the European Stability Mechanism, Luxembourg, 7 December 2018.

Getting one's house in order, building a resilient and flexible economy, and reducing vulnerabilities - all these things are of first-order importance. But it would be naive to believe that we can avoid all future crises. And when they do occur, having a shelter from the storm is very important. This speech reviews the achievements and unintended consequences of the policy response to the Global Financial Crisis and the subsequent European debt crisis. It then sketches the challenges authorities might face in the years to come and discusses what can be done to safeguard economic and financial stability.

Big tech in finance and new challenges for public policy

Keynote address by Mr Agustín Carstens, General Manager of the BIS, at the FT Banking Summit, London, 4 December 2018.

Large technology companies with established user networks ("big tech") are challenging traditional finance. Having started with payments, in some markets such companies have been expanding into the provision of credit, insurance and even wealth management. They have been doing so either directly or in cooperation with incumbent financial institutions. This raises a host of questions around competition, financial inclusion, data protection and financial stability. Will this growth lead to a more diverse financial system or to new forms of concentration? Is the expansion of big tech driven by efficiency gains, or by arbitrage of the current regulatory system? And how should public policy adapt to these developments in order to protect client data and help sustain strong and balanced growth?

Financial instability: can Big Data help connect the dots?

Remarks by Mr Luiz Awazu Pereira da Silva, Deputy General Manager of the BIS, and Goetz von Peter, Principal Economist at the BIS, based on a speech delivered at the Ninth European Central Bank Statistics Conference on "20 years of ESCB statistics: what's next?", Frankfurt am Main, 11 July 2018.

The Great Financial Crisis fuelled a broad-based expansion of financial statistics. A second, much larger wave of data hits the shores as central banks and the financial sector embrace Big Data. Collecting more data or dots is necessary, but connecting the dots is the critical step for understanding the implications for financial stability. It is the lens that matters: it takes purposeful analysis to turn data into useful information. Financial markets are flush with data, yet the bigger picture can slip out of sight. This is where policymakers and market participants fall short time and again: in run-ups to previous crises, simple aggregates would signal problems yet warnings went unheeded. The onset of a crisis then sharpens the focus on critical data for the management and resolution of the crisis. Later, when the financial cycle turns again, innovation and changing structure make financial risks harder to locate using the existing data.