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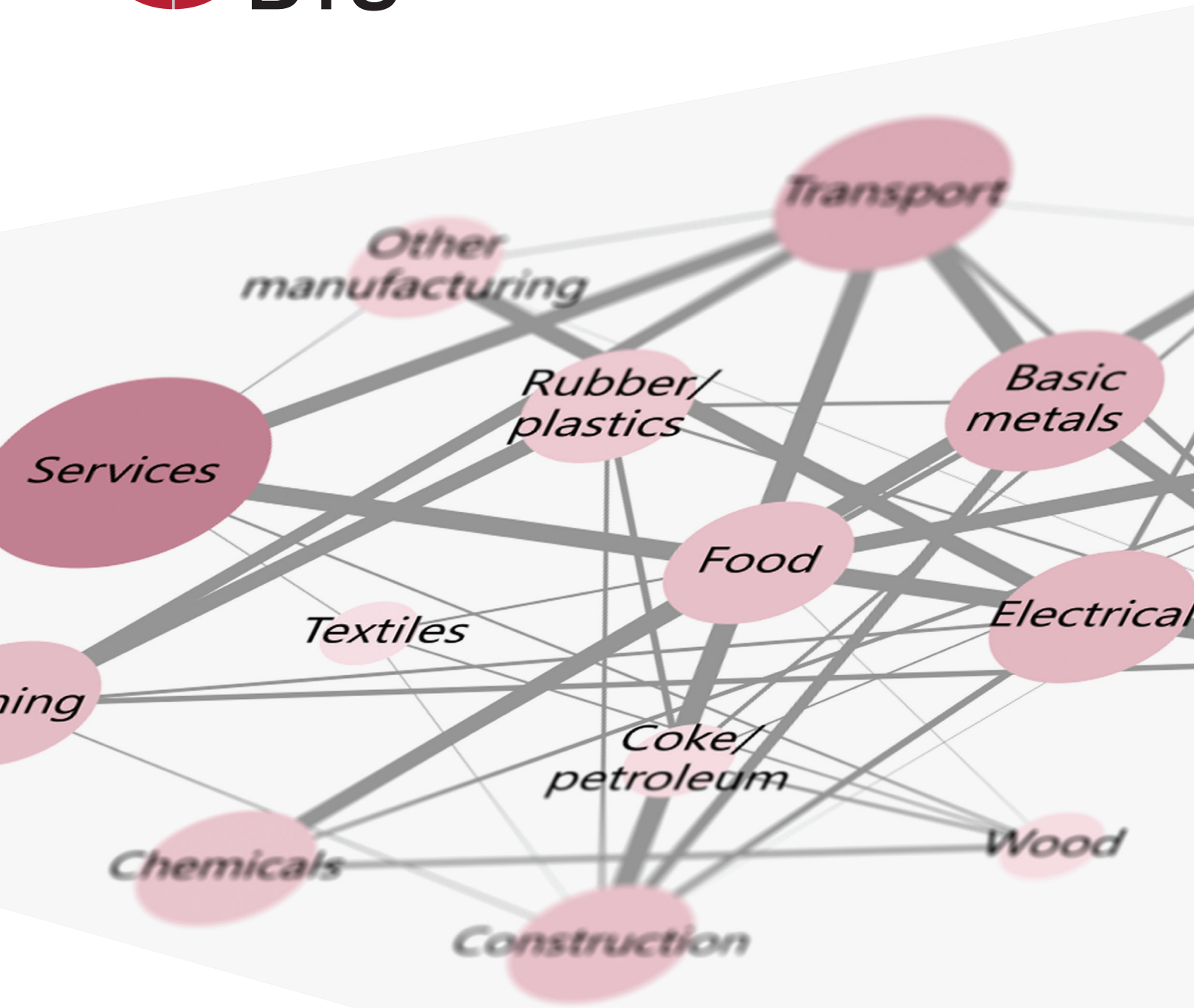

BIS Quarterly Review

International banking and financial market developments

September 2025

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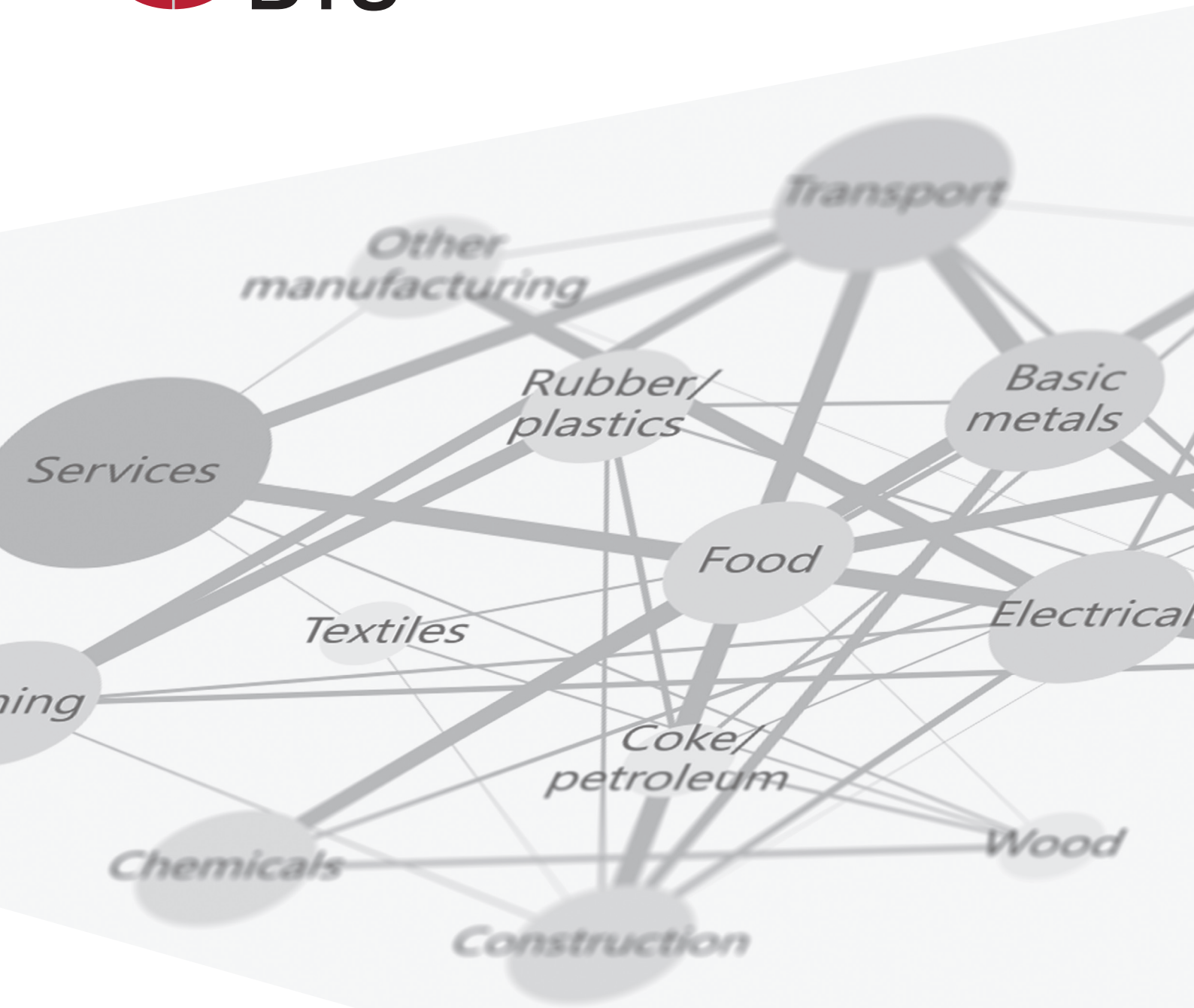

BIS Quarterly Review

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BIS Quarterly Review
Monetary and Economic Department

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This publication is available on the BIS website (https://www.bis.org/publ/qtrpdf/r_qt2509.htm).

ISBN 978-92-9259-883-9 (online)
ISSN 1683-0121 (online)

BIS Quarterly Review

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Articles

Notations used in this Review

billion	thousand million
e	estimated
lhs, rhs	left-hand scale, right-hand scale
$	US dollar unless specified otherwise
...	not available
.	not applicable
–	nil or negligible

Differences in totals are due to rounding.

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

Abbreviations

Currencies

AED	United Arab Emirates dirham	MXN	Mexican peso
ALL	Albanian lek	MXV	Mexican unidad de inversión (UDI)
ARS	Argentine peso	MYR	Malaysian ringgit
AUD	Australian dollar	NAD	Namibian dollar
BGN	Bulgarian lev	NGN	Nigerian naira
BHD	Bahraini dinar	NOK	Norwegian krone
BRL	Brazilian real	NZD	New Zealand dollar
CAD	Canadian dollar	OTH	All other currencies
CHF	Swiss franc	PEN	Peruvian sol
CLP	Chilean peso	PHP	Philippine peso
CNY (RMB)	Chinese yuan (renminbi)	PLN	Polish zloty
COP	Colombian peso	RON	Romanian leu
CZK	Czech koruna	RUB	Russian rouble
DKK	Danish krone	SAR	Saudi riyal
EUR	euro	SEK	Swedish krona
GBP	pound sterling	SGD	Singapore dollar
HKD	Hong Kong dollar	THB	Thai baht
HUF	Hungarian forint	TRY	Turkish lira
IDR	Indonesian rupiah	TWD	New Taiwan dollar
ILS	Israeli new shekel	USD	US dollar
INR	Indian rupee	VES	bolívar soberano
ISK	Icelandic króna	VND	Vietnamese dong
JPY	Japanese yen	XOF	CFA franc (BCEAO)
KRW	Korean won	ZAR	South African rand
MAD	Moroccan dirham		

Countries

AE	United Arab Emirates	DE	Germany
AF	Afghanistan	DJ	Djibouti
AL	Albania	DK	Denmark
AM	Armenia	DM	Dominica
AO	Angola	DO	Dominican Republic
AR	Argentina	DZ	Algeria
AT	Austria	EA	euro area
AU	Australia	EC	Ecuador
AZ	Azerbaijan	EE	Estonia
BA	Bosnia and Herzegovina	EG	Egypt
BD	Bangladesh	ER	Eritrea
BE	Belgium	ES	Spain
BF	Burkina Faso	ET	Ethiopia
BG	Bulgaria	FI	Finland
BH	Bahrain	FJ	Fiji
BI	Burundi	FO	Faeroe Islands
BJ	Benin	FR	France
BM	Bermuda	GA	Gabon
BN	Brunei	GB	United Kingdom
BO	Bolivia	GD	Grenada
BR	Brazil	GE	Georgia
BS	The Bahamas	GG	Guernsey
BT	Bhutan	GH	Ghana
BY	Belarus	GI	Gibraltar
BZ	Belize	GN	Guinea
CA	Canada	GQ	Equatorial Guinea
CD	Democratic Republic of the Congo	GR	Greece
CF	Central African Republic	GT	Guatemala
CG	Republic of Congo	GW	Guinea-Bissau
CH	Switzerland	GY	Guyana
CI	Côte d'Ivoire	HK	Hong Kong SAR
CL	Chile	HN	Honduras
CM	Cameroon	HR	Croatia
CN	China	HT	Haiti
CO	Colombia	HU	Hungary
CR	Costa Rica	ID	Indonesia
CV	Cabo Verde	IE	Ireland
CW	Curaçao	IL	Israel
CY	Cyprus	IM	Isle of Man
CZ	Czechia	IN	India

Countries (cont)

IQ	Iraq	MZ	Mozambique
IR	Iran	NA	Namibia
IS	Iceland	NC	New Caledonia
IT	Italy	NG	Nigeria
JE	Jersey	NL	Netherlands
JM	Jamaica	NO	Norway
JO	Jordan	NR	Nauru
JP	Japan	NZ	New Zealand
KE	Kenya	OM	Oman
KG	Kyrgyz Republic	PA	Panama
KH	Cambodia	PE	Peru
KR	Korea	PG	Papua New Guinea
KW	Kuwait	PH	Philippines
KY	Cayman Islands	PK	Pakistan
KZ	Kazakhstan	PL	Poland
LA	Laos	PT	Portugal
LB	Lebanon	PY	Paraguay
LC	St Lucia	QA	Qatar
LK	Sri Lanka	RO	Romania
LR	Liberia	RS	Serbia
LS	Lesotho	RU	Russia
LT	Lithuania	RW	Rwanda
LU	Luxembourg	SA	Saudi Arabia
LV	Latvia	SC	Seychelles
LY	Libya	SD	Sudan
MA	Morocco	SE	Sweden
MD	Moldova	SG	Singapore
ME	Montenegro	SK	Slovakia
MH	Marshall Islands	SI	Slovenia
MK	North Macedonia	SM	San Marino
ML	Mali	SR	Suriname
MM	Myanmar	SS	South Sudan
MN	Mongolia	ST	São Tomé and Príncipe
MO	Macao SAR	SV	El Salvador
MR	Mauritania	SZ	Eswatini
MT	Malta	TD	Chad
MU	Mauritius	TG	Togo
MV	Maldives	TH	Thailand
MW	Malawi	TJ	Tajikistan
MX	Mexico	TL	East Timor
MY	Malaysia	TM	Turkmenistan

Countries (cont)

TO	Tonga	UZ	Uzbekistan
TR	Türkiye	VC	St Vincent and the Grenadines
TT	Trinidad and Tobago	VE	Venezuela
TW	Chinese Taipei	VG	British Virgin Islands
TZ	Tanzania	VN	Vietnam
UA	Ukraine	ZA	South Africa
US	United States	ZM	Zambia
UY	Uruguay	1Z	British West Indies

Markets shrug off trade conflicts

Global financial markets maintained a risk-on tone during the review period,[1] shrugging off concerns over mounting tariff and policy uncertainty. Despite short-lived bouts of volatility triggered by incoming data and political developments, market sentiment remained upbeat, defying mounting challenges, including unease over the longer-run fiscal outlook in several key jurisdictions.

Equity markets in particular delivered strong returns, led by US stocks, which reached all-time highs. Large cap technology stocks outperformed, buoyed by enthusiasm around artificial intelligence (AI) and strong earnings, despite high valuations. Japanese stocks also posted gains. After having rallied earlier this year, European stocks remained flat, on the back of relatively weaker earnings growth. As is typical during risk-on phases, the rally was accompanied by subdued volatility, with the VIX receding. Credit spreads remained compressed and declined to lows not seen in a decade in spite of default rates ticking up.

The US dollar paused its depreciation after a significant step down in the second quarter of 2025. While dollar depreciation has historically been a marker of risk-on phases in financial markets, the dynamics over the review period did not match historical patterns. The risk-on tone was accompanied by an appreciation of the currency following the unveiling of the US fiscal package in early July. Overall, global financial conditions eased significantly, driven by equity gains and compressing credit spreads in the United States and benign conditions in emerging market assets. Conditions in Europe remained more subdued following a strong half-year.

The risk-on environment was underpinned by expectations of further monetary policy easing in the US and several other jurisdictions, coupled with expected fiscal largesse in the US and Germany. This policy cushion supported investors' optimism by reducing their perceived likelihood of adverse scenarios. Central banks in major advanced economies (AEs) continued reducing policy rates. The ECB, Sveriges Riksbank, the Swiss National Bank and the Bank of England implemented rate cuts. The Federal Reserve kept rates on hold, but some Federal Open Market Committee (FOMC) participants signalled a preference for an easier stance in the future, and signs of a cooler labour market fuelled expectations of rate cuts.

Such sanguine market assessments sit oddly with concerns about fiscal sustainability, which are arising from the dynamics of long-term government bonds. Long-run yields remained elevated in the risk-on environment, with yield curves showing significant steepening at the ultra-long end. This trend was probably driven by mounting unease about the fiscal outlook in certain jurisdictions and lingering concerns over a potential resurgence of inflation.

Emerging market economies (EMEs) capitalised on the global risk-on sentiment, benefiting from a softer US dollar and from market participants tuning out trade conflicts. EME currencies appreciated broadly, supported by both developments in the real economy and technical factors related to hedging activities. Local currency bonds saw modest positive returns, while EME bond issuance picked up. EME equity markets rallied, with notable gains in China, Colombia and Korea.

[1] The review period is from 1 June to 4 September.

Key takeaways

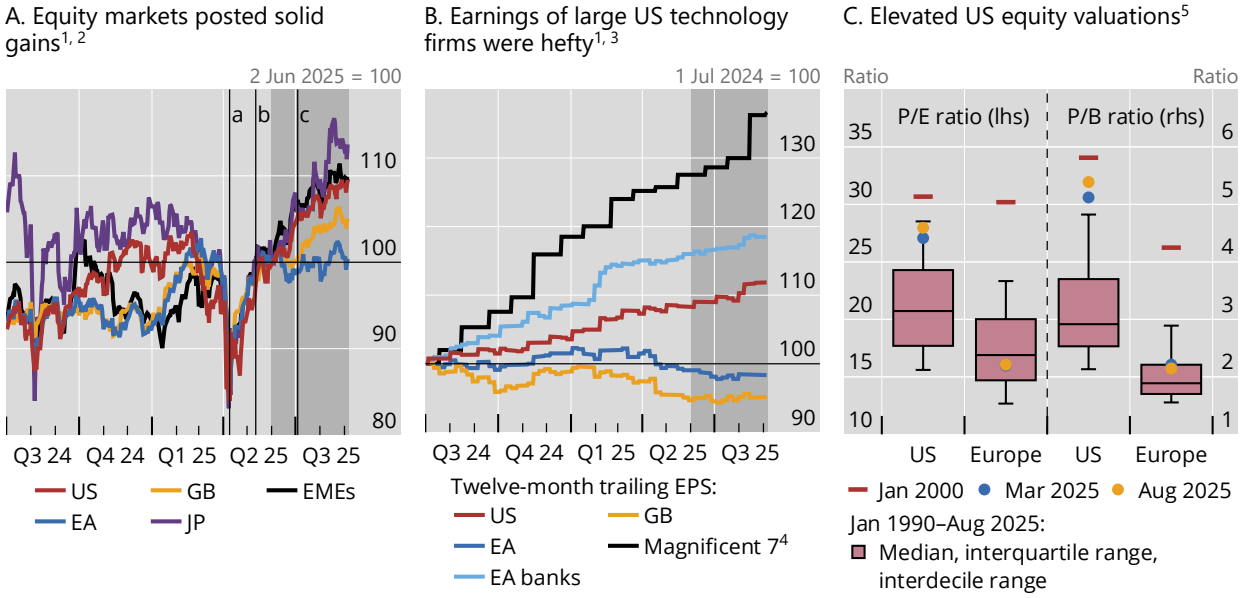
- *Equity markets rallied as markets shrugged off trade tensions and policy uncertainty and focused on robust corporate earnings, while credit spreads compressed further.*
- *Short-term bonds priced in greater policy easing, but long-term yields stayed high and yield curves steepened at the very long end on fiscal and inflation concerns.*
- *Emerging market assets saw gains, benefiting from the risk-on environment and the weakening of the US dollar.*

Risk assets plough ahead

During the review period, risk assets showed remarkable resilience, defying the trade conflict and policy uncertainties. Despite occasional volatility due to macroeconomic data surprises, positive sentiment held sway, reinforced by strong corporate earnings and an outwardly resilient macroeconomic outlook.

Global equity markets delivered robust returns, with US stocks setting the pace. US equity markets surged to all-time highs (Graph 1.A, red line), supported by better than expected corporate earnings. US stocks, particularly those of large cap technology companies (the so-called "Magnificent 7") reported solid earnings

Equity markets remained resilient, with a strong rally in US technology stocks — Graph 1



EPS = earnings per share; P/B = price-to-book; P/E = price/earnings.

The shaded area indicates 1 June–4 September 2025 (period under review).

[a] Ninety-day tariff pause announced (9 April 2025). [b] The United States and China agree to 90-day tariff reductions (14 May 2025). [c] Signing of the Big Beautiful Bill (4 July 2025).

[1] EA = EURO STOXX 50; GB = FTSE 100; US = S&P 500. [2] EMEs = MSCI EM; JP = Nikkei 225. [3] EA banks = EURO STOXX Banks; Magnificent 7 =Alphabet, Amazon, Apple, Meta, Microsoft, Nvidia and Tesla. [4] Simple average. [5] Europe = MSCI Europe; US = MSCI US.

Sources: Bloomberg; LSEG Datastream; BIS.

(Graph 1.B), which further fuelled investors' optimism. Japanese stocks also performed strongly (Graph 1.A, purple line). EME equities joined the rally (black line), outperforming those of many AEs. European equities performed more modestly and finished the period flat (blue line), reflecting weaker earnings growth and a pause in the recalibration of international portfolio allocations that prevailed in the first half of the year.

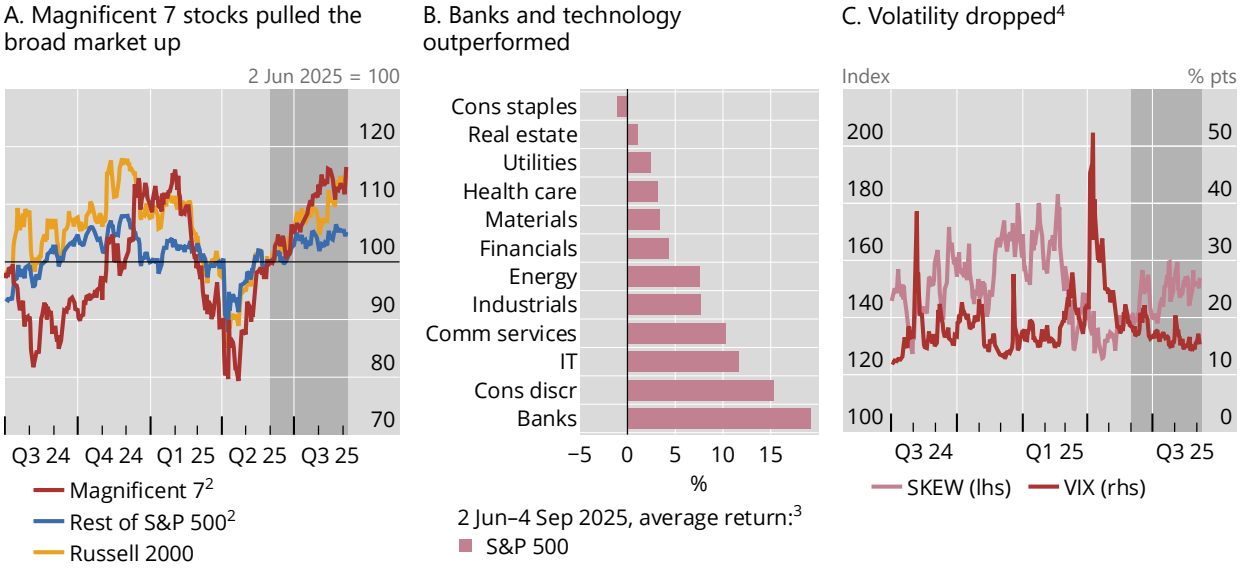
As a result of the stock market rally, equity valuations rose, overtaking their levels before the April shock. In the US, aggregate valuations were close to the top 10% of the historical distribution, and not far from the levels touched at the peak of the dotcom bubble (Graph 1.C). By contrast, European stock valuations were more in line with historical norms.

The rally in US equities was fuelled by large cap technology stocks and banks. The Magnificent 7 reported strong earnings and outperformed the rest of the S&P 500 index by about 11 percentage points (Graph 2.A). The AI trade boosted investor enthusiasm, with these companies capitalising on heightened demand for technology-driven solutions, in turn pushing the S&P 500 to all-time highs in August and overshadowing concerns over the future profitability of investment in AI. Other outperforming sectors included consumer discretionary and banks (Graph 2.B), which benefited from tailwinds from the early July fiscal package and a pause in the US-China trade conflict, as well as the upward-sloping yield curve in the case of banks. Investor confidence was further underpinned by resilient economic readings and consumer spending in the US, as well as expectations of policy easing, which offset increasing signs of weakness in the labour market.

The rally took place amid notably subdued volatility, which typically accompanies risk-on environments. Measures of equity market volatility such as the VIX declined

The Magnificent 7[1] pulled the market higher on decreasing volatility

Graph 2



Comm = communication; cons discr = consumer discretionary; IT = information technology.

The shaded area indicates 1 June–4 September 2025 (period under review).

[1] Alphabet, Amazon, Apple, Meta, Microsoft, Nvidia and Tesla. [2] Median. [3] Simple average of the respective index constituents' returns. [4] SKEW = Cboe SKEW Index; VIX = Cboe Volatility Index.

Sources: Bloomberg; LSEG Workspace; BIS.

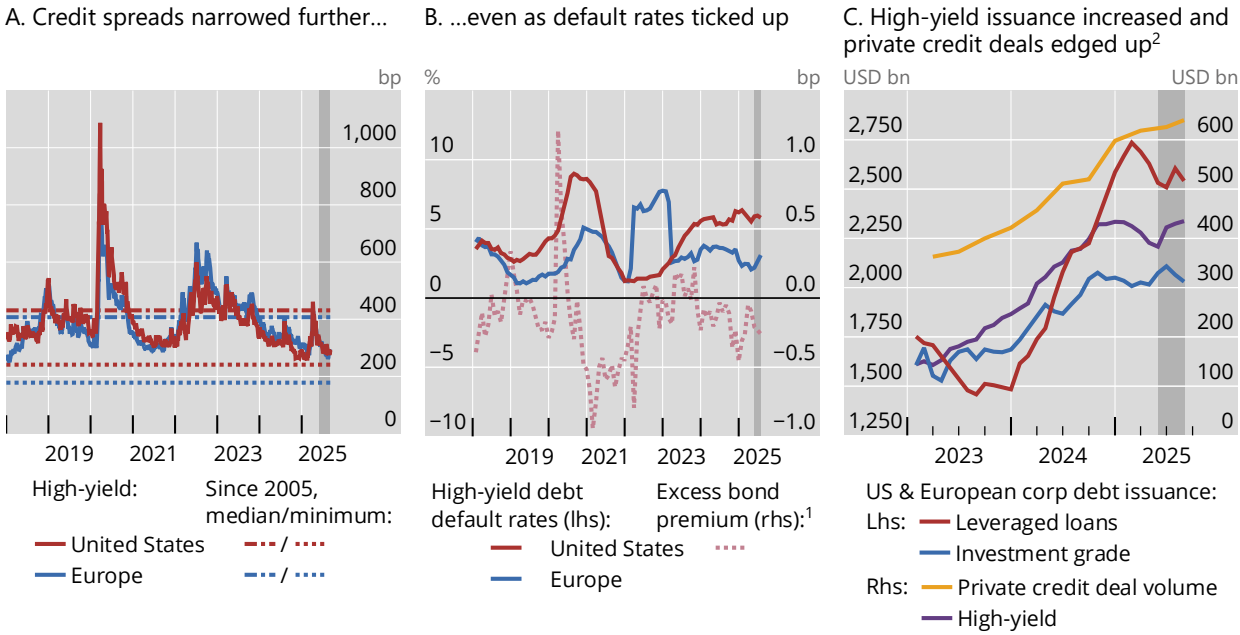
(Graph 2.C, red line). Volatility spikes during the period were mostly tied to macroeconomic data releases hinting at a possible slowdown, but ultimately proved short-lived. For example, the disappointing US non-farm payrolls data released in early August and September led to drops in the S&P 500. Another short bout of volatility coincided with higher than expected US and euro area inflation releases in June. Tariff news, by contrast, had an increasingly muted impact, as markets seemed to become less attentive to lingering trade tensions and focused more on factors other than tariffs, such as relatively positive macroeconomic readings and expectations of easier monetary policy (Box A).

Other signs of aggressive risk-taking were visible in options markets. The SKEW index turned more positive after 2 April and remained so over the review period, meaning that prices for upside exposure increased whereas those for downside protection decreased (Graph 2.C, pink line). These price moves may have also amplified the overall equity price increases via shifts in option dealers' hedging activities, as dealers presumably had to rebalance their downward protection hedges by buying equities during the June–July rally.

Broad risk-on sentiment was also evident in credit markets. Credit spreads in the high-yield segment compressed significantly in both the US and Europe, to be well below historical norms, and even close to historical lows in the US (Graph 3.A). The narrowing of spreads was associated with rising yields on government bonds, but such compression of spreads is at odds with default rates of high-yield bonds being elevated and marginally ticking up, especially in the US (Graph 3.B, red line). As such, narrow spreads mainly reflected reduced credit risk compensation by investors (pink line). In line with a risk-on environment, high-yield issuance also rebounded and private credit deals edged up (Graph 3.C, purple and yellow lines).

Credit markets remained buoyant

Graph 3



The shaded area indicates 1 June–4 September 2025 (period under review).

[1] Financial indicator introduced by Gilchrist and Zakrajšek (2012). [2] Twelve-month moving sum.

Sources: G Favara, S Gilchrist, K Lewis and E Zakrajšek, "Updating the recession risk and the excess bond premium", *FEDS Notes*, 6 October 2016; S Gilchrist and E Zakrajšek, "Credit spreads and business cycle fluctuations", *American Economic Review*, vol 102, no 4, 2012; Board of Governors of the Federal Reserve System; Dealogic; ICE Data Indices; Moody's; PitchBook Data Inc; BIS.

Box A

Understanding the swift market recovery after the April 2025 tariff shock

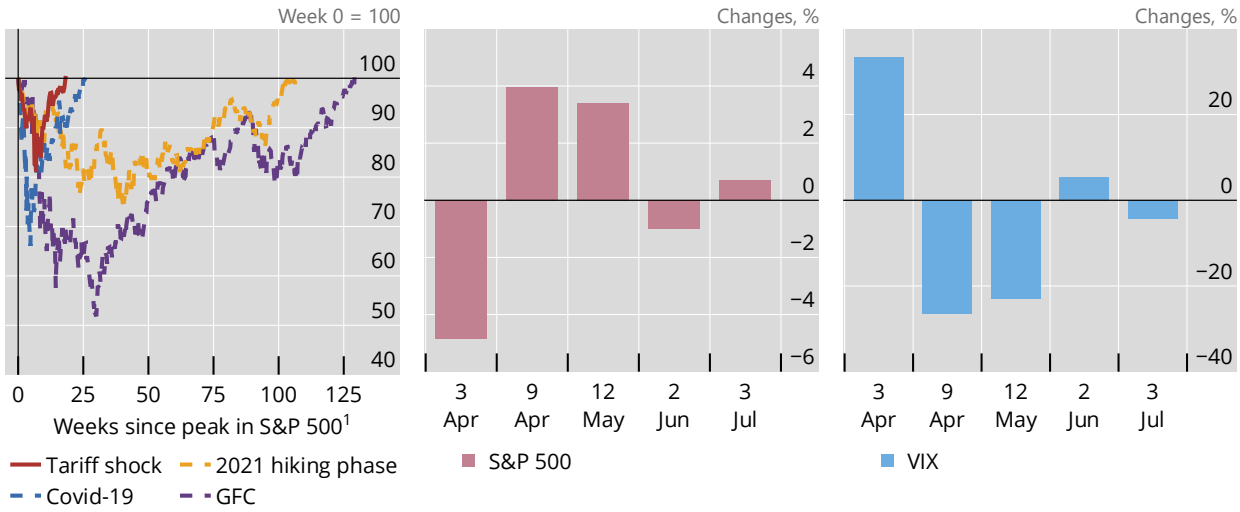
Marco Lombardi, Gabor Pinter and Karamfil Todorov ①

After the turmoil triggered by the tariff announcements on 2 April, market conditions across the globe stabilised remarkably quickly. In the United States, the S&P 500 resumed its upward trajectory, recovering losses and posting strong gains. Similarly, the VIX, which had more than doubled in the immediate aftermath of the tariff shock, retreated and fell below its pre-announcement levels, despite lingering political and trade uncertainty. This box shows that the market rebound through mid-May was mainly due to backtracking from the initial tariff shock, which offset the impact of the 2 April announcement. The protracted equity rally and compression in volatility from mid-May onwards were largely influenced by non-tariff-related news and developments. The box also illustrates that, in contrast with past episodes, retail investors, rather than institutional ones, bought into the rally.

The market recovery from the 2 April tariff announcement was notably faster than the one following the start of the Covid-19 pandemic and other recent market stress episodes (Graph A1.A, red line). For instance, the S&P 500 recovered all early-April losses by the end of the same month and surpassed its pre-stress peak in just under 20 weeks, setting new all-time highs. This stands in contrast to shallower recoveries following other crises, eg the Great Financial Crisis (GFC) (purple line).

The 2025 market recovery was remarkably quick as tariff shocks faded

Graph A1



GFC = Great Financial Crisis.

[1] The peaks represent the end-of-month index level recorded in the month prior to each episode. [2] The bars measure the contribution of the estimated tariff shocks to the S&P 500 and VIX, respectively, on selected dates, as identified using the event-targeted vector autoregression (ETVAR) methodology.

Sources: Pinter et al (2025); Federal Reserve Bank of St Louis; Bloomberg; authors' calculations.

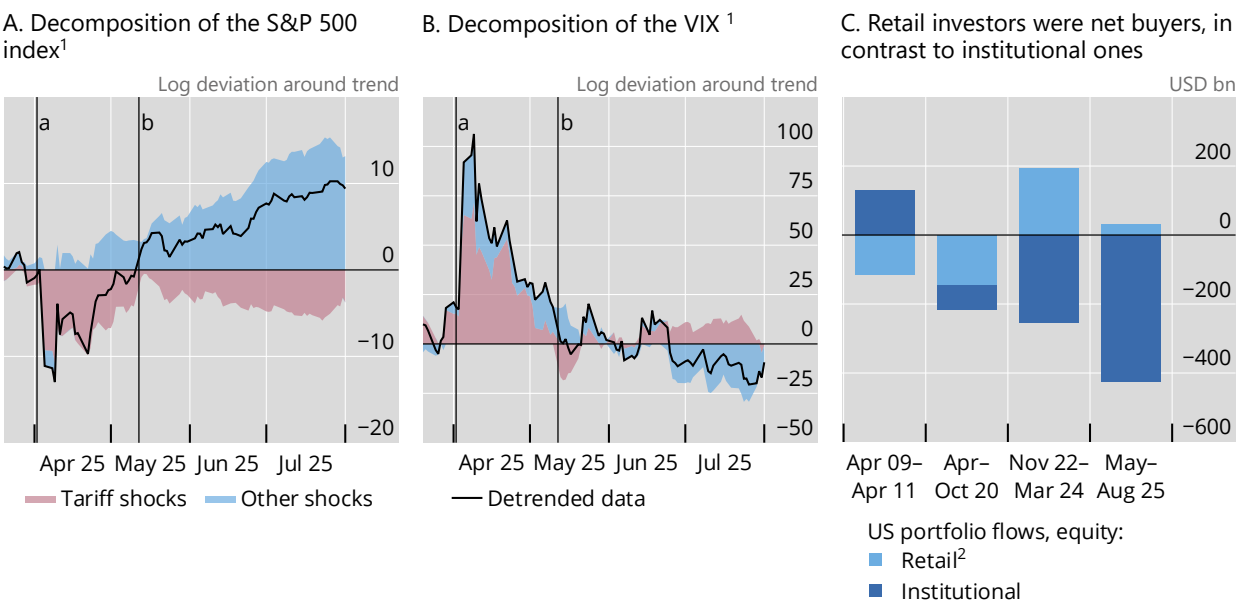
The apparent disconnect between lingering uncertainty and market optimism raises questions about what drove the rebound. To shed light on this issue, we use a statistical model of movements in financial market variables.② Assuming that a tariff shock was the only driver of the joint movements of financial market variables from 2 to 3 April, we can use the model to decompose subsequent asset price movements into two parts: (i) the impact of the initial tariff shock and subsequent (possibly offsetting) tariff announcements; and (ii) all other unrelated news and drivers. These "other shocks" are residual movements in the data that cannot be explained by the tariff shock; they reflect a multitude of factors such as macroeconomic and monetary policy surprises, corporate earnings news and fluctuations in risk appetite. The decomposition relies on a vector autoregression (VAR) model, estimated using daily data from January 2021, which features seven financial variables: the S&P 500, the VIX, copper prices, the one-year inflation swap rate, the one-year Treasury yield, the term spread (10 years minus one year) and the USD-EUR exchange rate.

The tariff shocks identified by the model can be plausibly linked to market movements on the days of key tariff news (Graphs A1.B and A1.C). For instance, when tariffs were rolled back or paused, such as on 9 April or 12 May, the tariff shock led the S&P 500 to post large positive gains (Graph A1.B) and the VIX to compress (Graph A1.C).

A full historical decomposition of movements in the S&P 500 and the VIX reveals that the initial market rebound through mid-May can be primarily attributed to subsequent revisions of the initial tariff shock, which ended up offsetting the negative effect of the 2 April announcement (Graphs A2.A and A2.B, red area). These include the 9 April pause on tariff implementation and the 12 May China–US truce, both of which contributed positively to equity prices and lowered the VIX.

The negative effects of tariff shocks were offset by other shocks

Graph A2



[a] "Liberation Day" (2 April 2025). [b] China–US truce (12 May 2025).

[1] The graph shows the results from a historical decomposition applied to the event-targeted vector autoregression (ETVAR) model of Pinter et al (2025) with a tariff shock identified assuming that movements in the variables during 2–3 April were due only to this shock. The black solid line shows the time series of the S&P 500 index (in panel A) and of the VIX index (in panel B) around the trend estimated by the VAR. The log deviations are multiplied by 100. [2] Retail is everything other than institutional.

Sources: Pinter et al (2025); Federal Reserve Bank of St Louis; Bloomberg; LSEG Lipper; authors' calculations.

The continued rally in equity markets and decline in volatility from mid-May onwards appear to have been driven largely by news unrelated to tariffs (Graphs A2.A and A2.B, blue area), for instance, resilient macroeconomic readings and a better than expected earnings season. In contrast, tariff shocks turned increasingly adverse again during June and July, exerting renewed pressure on markets. These effects probably stemmed from news related to tariff negotiations and the 1 August deadline, marking the end of the 90-day pause. Yet these adverse effects appear to have been dominated by non-tariff-related news triggering renewed optimism in risky asset markets. They may have also been amplified by retail investors. Even as institutional investors withdrew from equity markets, retail investors were on net "buyers of the dip", as visible from fund flows (Graph A2.C). These dynamics were somewhat unusual compared with past stress episodes (eg the GFC), when retail investors were net sellers and institutional investors were net buyers.

Overall, our analysis indicates that about 75% of the rise in the S&P 500 between the trough on 9 April and end-July was driven by positive surprises unrelated to tariffs. While policy reversals helped markets look through the initial shock, other factors, such as corporate earnings and the strength of macro fundamentals, ultimately underpinned the resilience of stock markets and risk sentiment.

① The views expressed are those of the authors and do not necessarily reflect the views of the BIS or its member central banks. ② For further details on this event-targeted vector autoregression (ETVAR) framework during the April 2025 shock, see G Pinter, F Smets and U Üslü, "Market whiplash after the 2025 tariff shock: an event-targeted VAR approach", *BIS Working Papers*, no 1282, August 2025.

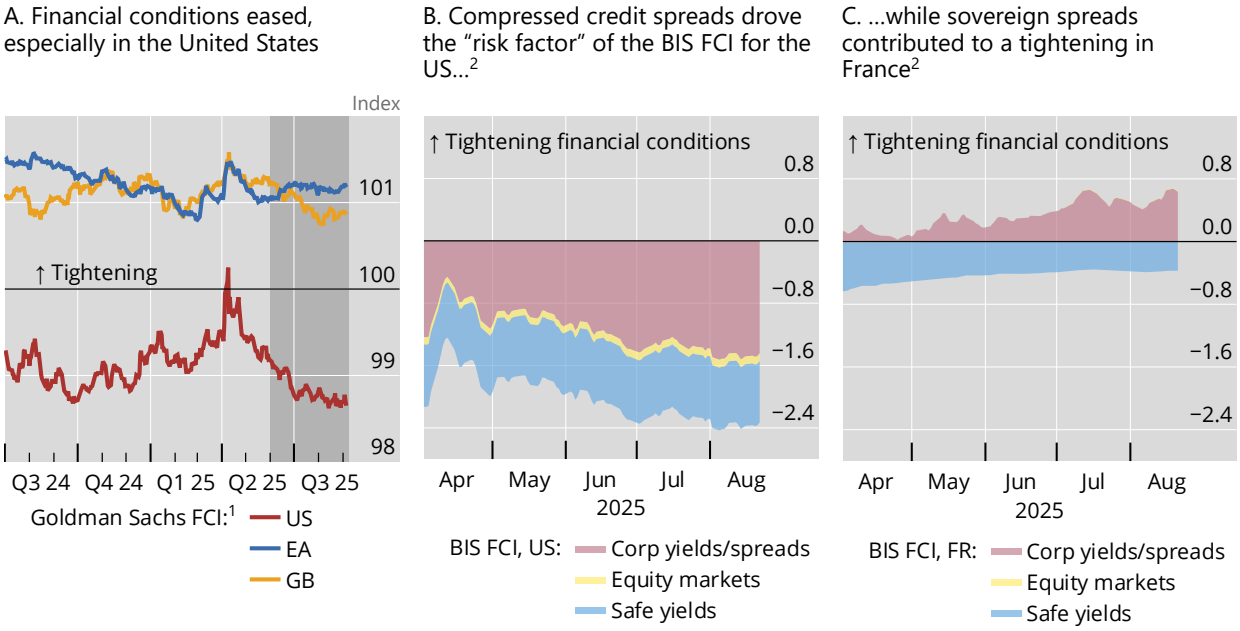
The prevailing risk-on sentiment was a key ingredient of generally easing financial conditions. Conditions relaxed significantly in the US, as well as in the United Kingdom (Graph 4.A). Those in the euro area remained broadly unchanged, with more lacklustre equity performance. Narrower credit spreads and buoyant corporate bond markets were the key drivers of the easing in the "risk factor" underlying the BIS measure of financial conditions.[2] In the US, corporate yields and spreads led the risk factor to ease further, despite the relatively high level of government bond yields (Graph 4.B). In France, an increase in credit and sovereign spreads, not only vis-à-vis German bunds but also Italian treasuries (also see below), contributed to a steady tightening of the risk factor (Graph 4.C).

The risk-on environment was also evident from the dynamics of digital assets and gold. Cryptoassets rallied, aligning with the risk-on mood (Graph 5.A) and supported by the GENIUS Act, which provided further tailwinds. In the first part of the review period, gold's appreciation paused, consistent with optimistic investors shifting portfolio flows towards growth-oriented assets, while the demand for safe haven assets waned. Yet towards the end of August gold prices resumed their march upwards, in line with emerging signs of unease about longer-run prospects.

Another unusual development in the general risk-on environment was the dynamics of the US dollar. Initially, the dollar stayed on the depreciation path entered in April owing to shifts in investors' hedging practices and some rebalancing of

Financial conditions eased on the back of compressed spreads

Graph 4



FCI = financial conditions index.

The shaded area indicates 1 June–4 September 2025 (period under review).

[1] A value of 100 indicates average conditions. A higher (lower) value indicates tighter (looser) conditions. [2] Decomposition of the "risk factor" according to the methodology by Lombardi et al (2025).

Sources: M Lombardi, C Manea and A Schrimpf, "Financial conditions and the macroeconomy: a two-factor view", *BIS Working Papers*, no 1272, June 2025; Goldman Sachs Global Investment Research.

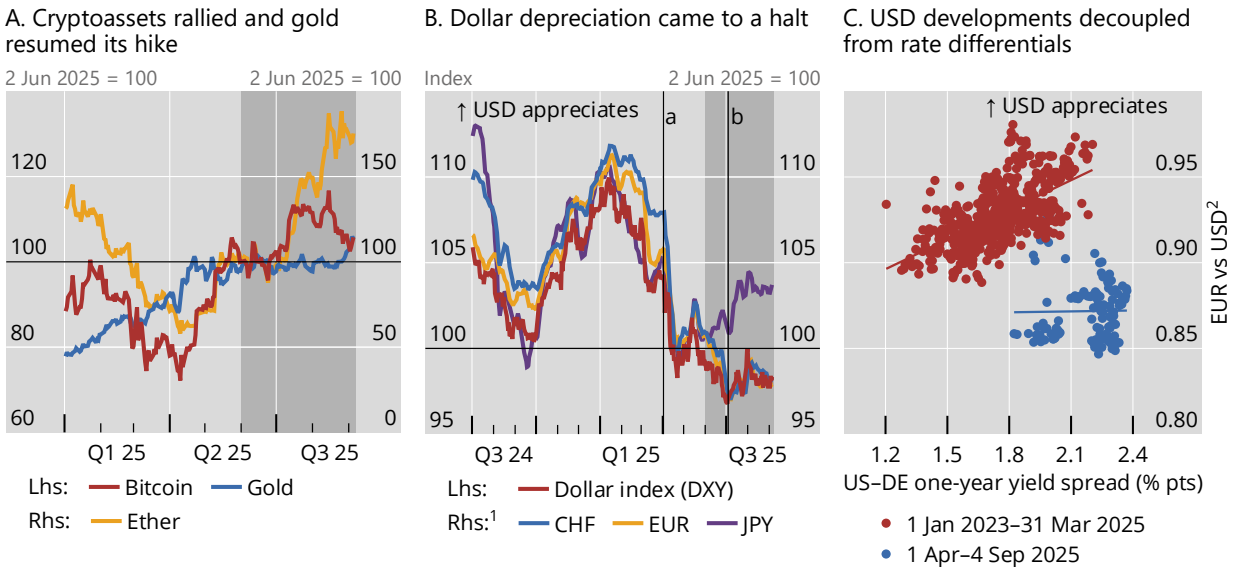
[2] See M Lombardi, C Manea and A Schrimpf, "Financial conditions and the macroeconomy: a two-factor view", *BIS Working Papers*, no 1272, June 2025.

portfolio flows away from dollar assets (Graph 5.B, red line). The depreciation was sustained against the Swiss franc and the euro (blue and yellow lines), while the Japanese yen diverged from other currencies and lost ground against the dollar (purple line). Yet the greenback's depreciation came to a halt after the unveiling of the fiscal package in July: the dollar appreciated while equity markets were posting strong gains. This appreciation is somewhat at odds with the dollar's tendency to soften in periods of heightened risk-taking.[3]

US dollar dynamics during the review period also did not square well with interest rate differentials. Typically, higher differentials between short-term yields on US Treasuries and German bunds have been associated with an appreciation of the dollar against the euro (Graph 5.C, red dots). Yet this historical pattern broke down in the aftermath of the April 2025 tariff-related turbulence (blue dots) when positive and widening yield differentials went hand in hand with dollar depreciation. As US rates declined after July while those in the euro area edged up, the interest rate differential narrowed, but the dollar actually firmed. While inflows into US equity and bond funds probably supported it (Box B), the appreciation in this phase might also be related in part to some unwinding of hedging activity that had taken place in April and May.[4]

The dollar behaved unusually for a risk-on phase

Graph 5



The shaded area indicates 1 June–4 September 2025 (period under review).

[a] "Liberation Day" (2 April 2025). [b] Big Beautiful Bill signing (4 July 2025).

[1] Five-day moving average. [2] EUR for 1 USD.

Sources: Bloomberg; CoinDesk Data; LSEG Datastream; national data; BIS.

[3] See S Avdjiev, V Bruno, C Koch and H S Shin, "The dollar exchange rate as a global risk factor: evidence from investment", *IMF Economic Review*, vol 67, no 1, pp 151–73, March 2018.

[4] See H S Shin, P Wooldridge and D Xia, "US dollar's slide in April 2025: the role of FX hedging", *BIS Bulletin*, no 105, June 2025.

Box B

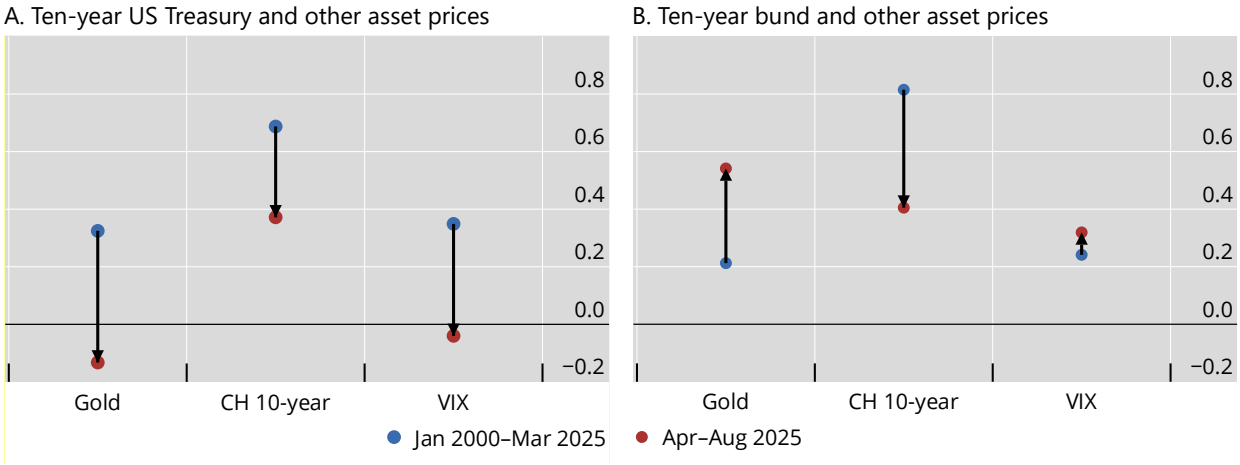
The safe haven properties of US Treasuries and portfolio flows of global investors

Frederic Boissay and Wenqian Huang ①

The US tariff announcements in early April 2025 marked a shift in long-established relationships involving US Treasuries. Historically, as safe haven assets, US Treasuries tended to exhibit positive correlations with other safe assets – eg bonds issued by highly rated sovereigns or gold – as well as with gauges of uncertainty and risk appetite – such as the VIX (Graph B1.A, blue dots).② However, these correlations have approached zero since April (red dots), possibly indicating a weakening of US Treasuries' safe haven properties. By contrast, the prices in other core bond markets have not been subject to similar shifts. Notably, the positive correlation between the price of the German bund and the VIX has (if anything) increased (Graph B1.B).

Shifts in asset price correlations[1]

Correlation — Graph B1



[1] Dots show the median of pairwise correlations of the changes in log prices over a two-month rolling window. Sovereign bond prices are based on the corresponding 10-year zero coupon yields. For Aug 2025, data until 21 Aug 2025.

Sources: Bloomberg; authors' calculations.

The fading correlations coincided with elevated policy uncertainties in the United States, prompting broader questions about a potential structural repositioning by global investors away from US assets, for both bonds and equities. Also, discussions intensified on which other countries and assets might benefit from any rotations in portfolio flows.

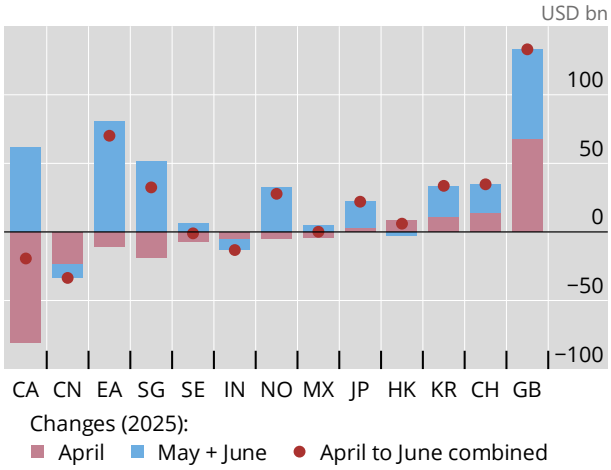
However, the evidence available – at least so far – does not show signs of a material portfolio reallocation away from US assets. While some non-US investors sold significant volumes of US assets in April, most of these flows reversed in May and June (Graph B2.A). Strong underlying fundamentals continue to anchor global demand for US assets, providing additional support for their momentum, as described in the main text. The favourable sentiment towards US assets aligns with the resilience of US corporate earnings and the unmatched depth of US financial markets. It may have also been bolstered by diminishing concerns about the long-term effects of trade conflicts (Box A). The outsize holdings of US assets by global investors, coupled with the slow pace of strategic asset allocation decisions and mandates, indicate that any significant portfolio shift away from US assets is likely to be gradual.

That said, global investors have been showing signs of adjusting their geographical exposures. During the second quarter of 2025, flows into sovereign bond funds targeting euro area countries and other advanced economies surpassed those targeting the United States (Graph B2.B, bars versus red and yellow lines). Since the

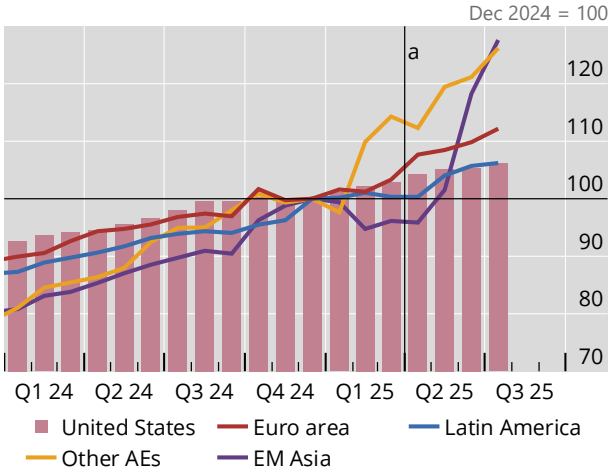
respective assets are seen as close substitutes, this development would be consistent with global investors seeking greater portfolio diversification. In addition, fund flows to sovereign bonds of Asian emerging market economies (EMEs) were particularly strong in June and July (purple line). The recent fund flows to Asian EMEs were probably fuelled by a combination of factors, including relatively low global interest rates, a persistently weaker US dollar② and strong domestic macroeconomic fundamentals.

US asset holdings: stable overall despite geographical diversification — Graph B2

A. Overall sales of US assets swiftly reversed[1]



B. Cumulative fund flows into government bonds[2]



[a] "Liberation Day" (2 Apr 2025).

[1] Change in foreign investor holdings of US securities (including equity investments). [2] Cumulation since January 2011. Emerging (EM) Asia = CN, HK, IN, KR, SG and TH; euro area = BE, DE, ES, FR, IT and NL; Latin America = AR, BR and MX; other AEs = AU, CA, CH, JP and SE.

Sources: US Treasury International Capital (TIC) System; EPFR; authors' calculations.

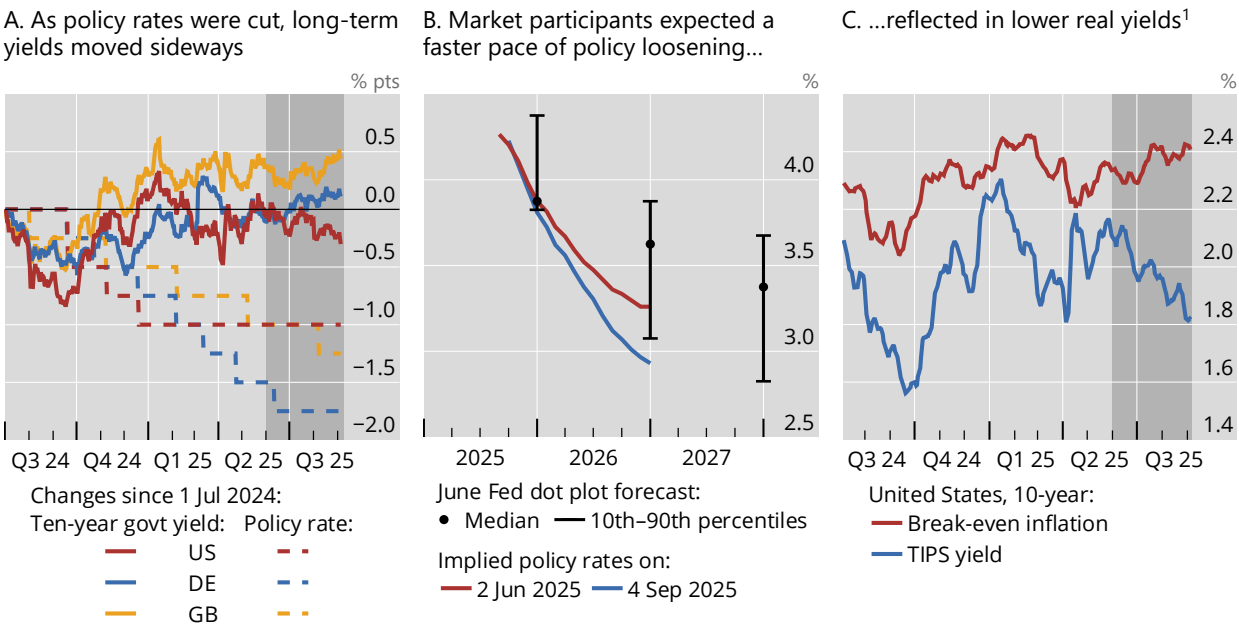
① The views expressed are those of the authors and do not necessarily reflect the views of the BIS or its member central banks. ② The US dollar weakened significantly against a broad basket of currencies in early April. The weakening persisted beyond April as global investors reportedly increased their hedge ratios for dollar exposures ex post via foreign exchange derivatives (see H S Shin, P Wooldridge and D Xia, "US dollar's slide in April 2025: the role of FX hedging," *BIS Bulletin*, no 105, June 2025). Thus, while global investors by and large held on to US assets, approaches towards the management of the inherent currency risk appear to have become more cautious.

Bond markets await further policy easing

The risk-on sentiment was also encouraged by actual and expected monetary easing. In the short segment of the yield curve, market pricing seemed consistent with investors' eyeing policy rate cuts, and more broadly being confident that policy interventions could mitigate the likelihood of adverse scenarios. At the same time, long-term yields remained elevated and the yield curve even steepened at its very long end, possibly reflecting unease over the outlook in the longer run.

Markets expected more aggressive easing

Graph 6



The shaded area indicates 1 June–4 September 2025 (period under review).

[1] Five-day moving average.

Sources: Board of Governors of the Federal Reserve System; Bloomberg; LSEG Datastream; national data; BIS.

Amid emerging concerns of an economic slowdown, and with inflation apparently in check, central banks in major economies continued lowering policy rates. The ECB and the Bank of England cut their policy rates by 25 basis points (Graph 6.A), and other central banks followed suit. The Federal Reserve kept the federal funds rate on hold at its July policy meeting. Yet US non-farm payrolls releases in early August and September surprised on the downside, while previous readings were also revised downwards, hinting at a cooling of the labour market. In mid-August, the CPI release seemed to at least temporarily dispel concerns over the inflationary effects of tariffs, as core goods prices increased only marginally.

Increasing evidence of a slowdown and subdued inflationary pressures from tariffs so far also led market participants to price more aggressive rate cuts in the near future (Graph 6.B). The dovish tone of the Jackson Hole meeting at the end of August fuelled expectations of upcoming rate cuts and supported further risk-taking. Overall, market participants progressively revised their expectations on the policy stance downwards, relative to FOMC members' own projections made in June.

Notwithstanding the policy easing in major AEs, long-term bond yields stayed elevated across those economies (Graph 6.A). In the US, 10-year government bond yields were dragged in different directions by expectations of an easier policy stance and longer-term concerns over fiscal prospects. While the former was the key driver of a decline in real rates, the latter may have been reflected in break-even inflation rates ticking up (Graph 6.C). Long-term rates generally rose in other AEs, including the euro area and the UK.

Yield curves steepened considerably at the very long end in all major AEs. This could also reflect structurally weaker demand from long-term investors such as

pension funds and insurers. Term spreads between 30- and 10-year government bonds increased steadily over the review period, especially in the UK, France and Germany (Graph 7.A). In the UK, yields on longer-term gilts were particularly affected by weaker demand by institutional investors, following the UK government's liability-driven investment (LDI) reform. In Japan, longer-term rates rose steadily after their spurt in the second quarter, reflecting political uncertainty clouding the fiscal outlook.

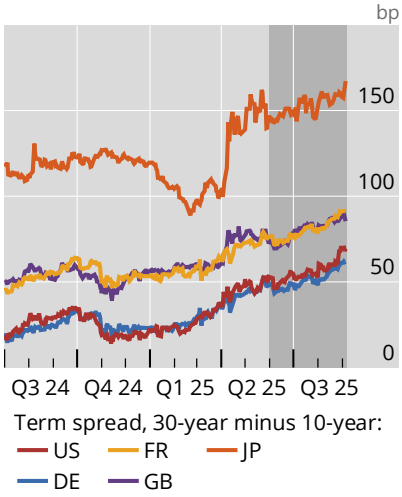
In the euro area, fiscal developments also took centre stage. On top of tariff-related uncertainties, the increase of longer-term rates in Germany may reflect expectations of a larger supply of government bonds, given the fiscal expansion plans. Fiscal concerns led the yields on French government bonds to increase even faster, as mounting political challenges could thwart the fiscal outlook. This led to an increase in the spread of French over German government bonds (Graph 7.B, red line). At the same time, other sovereign spreads in the euro area continued to compress. For example, the spread of Italian versus German bonds reached levels not seen since 2010, settling close to the French sovereign spread in August (blue line).

Pressures on long-term rates also reflected rising inflation concerns in the medium to long run. In the US, the entire term structure of market-based inflation expectations shifted upwards by around 10 basis points over the review period, a move that gained further impetus in August after the Jackson Hole meeting (Graph 7.C).

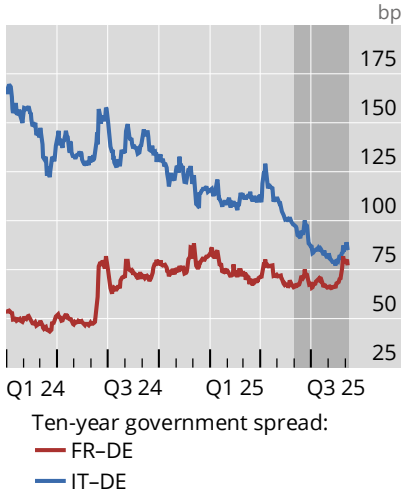
The ultra-long end of yield curves signals unease

Graph 7

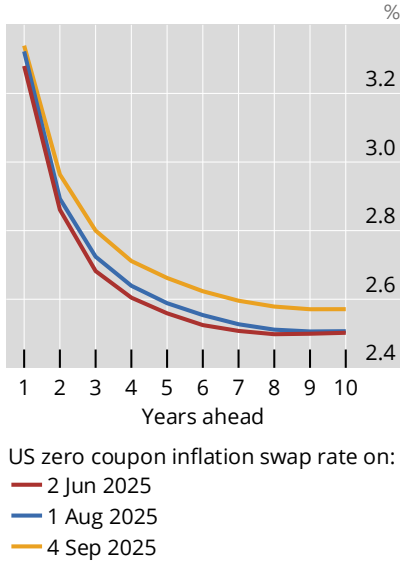
A. Yield curves steepened at the very long end



B. Sovereign spreads of France edged up



C. US market-implied inflation expectations shifted upwards



The shaded area indicates 1 June–4 September 2025 (period under review).

Sources: Bloomberg; BIS.

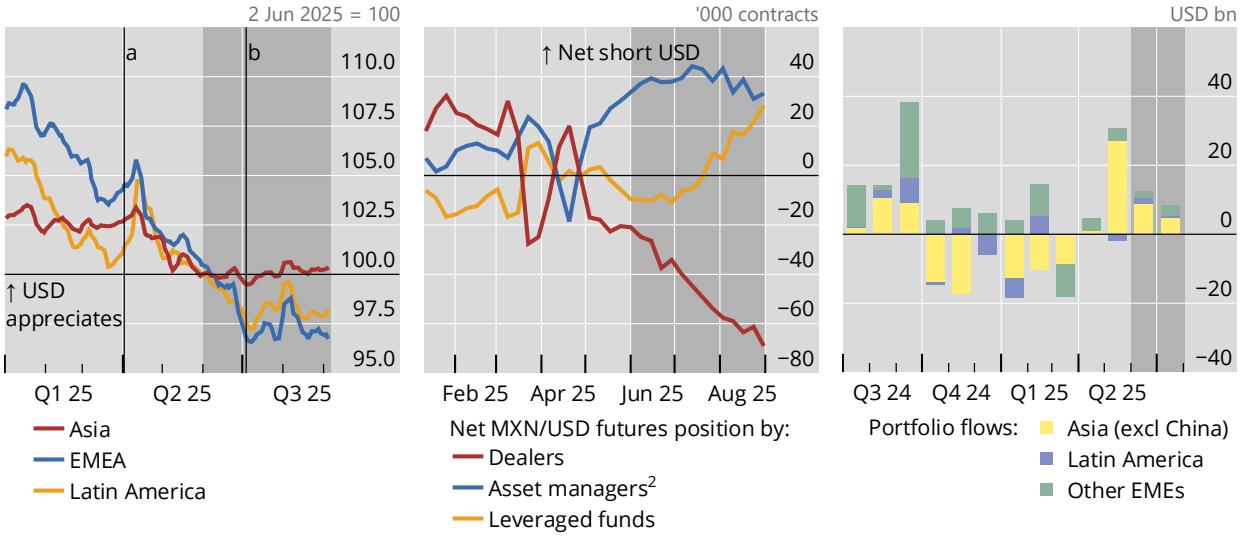
EMEs joined the risk-on rally

EMEs capitalised on the global risk-on sentiment, benefiting from US dollar weakness, subdued corporate bond yields and markets paying less attention to lingering trade tensions. EME currencies, bonds and equities saw gains, with regional variations reflecting differences in local economic dynamics.

The risk-on environment went hand in hand with the appreciation of several EME currencies. Currencies in Latin America and Europe, the Middle East and Africa (EMEA) led the appreciation, whereas Asian currencies were mostly flat, with some exceptions (Graph 8.A). The appreciation of some EME currencies partly indicated large asset managers raising currency hedge ratios on their US dollar asset holdings after April. Public data on currency futures show that asset managers increased their long positions in EME currencies such as the Mexican peso, effectively shorting the US dollar vis-à-vis these currencies (Graph 8.B). Portfolio flows maintained their momentum from the second quarter and were positive on net (Graph 8.C).

Long-term yields in EMEs showed regional divergence and bond issuance picked up. In Latin America, yields ticked lower, reflecting uneven growth and a generally higher sensitivity to the waxing and waning of US trade policy uncertainties (Graph 9.A, yellow line). Brazil, which was hit by a hefty 50% US tariff, was an exception, even though a policy rate increase aimed at countering inflationary pressures also contributed to higher yields. In Asia and EMEA, yields remained

EME currencies appreciated amid portfolio inflows — Graph 8



EMEA = Europe, the Middle East and Africa.

The shaded area indicates 1 June–4 September 2025 (period under review).

[a] "Liberation Day" (2 April 2025). [b] Big Beautiful Bill signing (4 July 2025).

[1] Simple average. Asia = CN, HK, ID, IN, KR, MY, SG and TH; EMEA = CZ, HU, IL, PL and ZA; Latin America = BR, CL, CO, MX and PE. Five-day moving average. [2] An increase in long futures positions in MXN/USD indicates that asset managers are shorting the US dollar. [3] Asia = ID, IN, KR, LK, MN, MY, PH, PK, TH, TW and VN; Latin America = BR, CL, CO and MX; other EMEs = BG, CZ, EE, GH, HU, KE, LB, LT, LV, MK, PL, QA, RO, RS, RU, SA, SI, TR, UA and ZA.

Sources: Commodity Futures Trading Commission; IIF; national data; BIS.

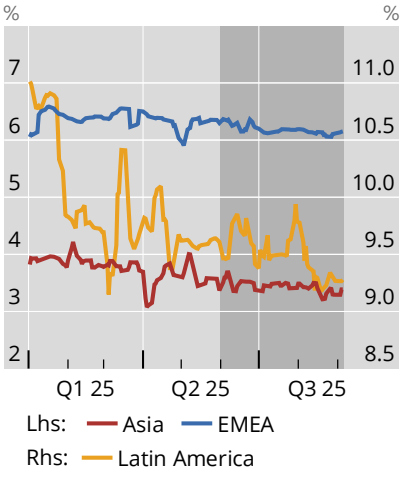
broadly flat, reflecting less monetary policy easing and stable investor sentiment (red and blue lines). EME sovereign bond issuance picked up pace after lacklustre performance in the first quarter, echoing the improved risk sentiment (Graph 9.B, pink bars) as global investors sought higher yields in EME debt markets. Dollar-denominated EME bonds were also supported by the risk-on environment and saw a notable compression in spreads (red line).

In line with the broad risk-on sentiment, EME equity markets rallied. In Asia, markets in China, Indonesia and Korea led the gains, driven by the 90-day US-China tariff pause in June, which temporarily eased trade tensions (Graph 9.C). China's markets also benefited from stabilising economic data and stimulus measures, such as infrastructure spending, which boosted investor confidence. Equities in Hong Kong SAR rose in tandem, supported by its linkage to Chinese markets, and strong financial sector performance. There was some regional divergence in Latin America, with Colombian equites outperforming those in Brazil and Mexico, even though Colombia faced headwinds amid fiscal and tariff uncertainty.

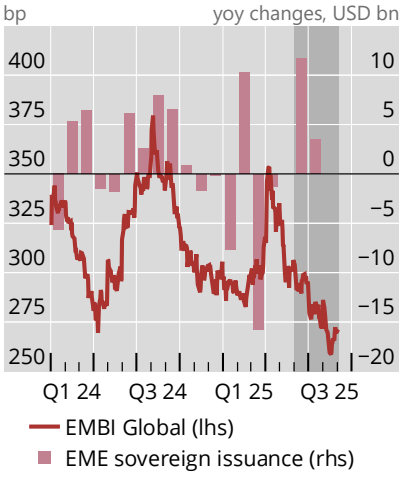
EME yields were stable and stocks joined the risk-on rally

Graph 9

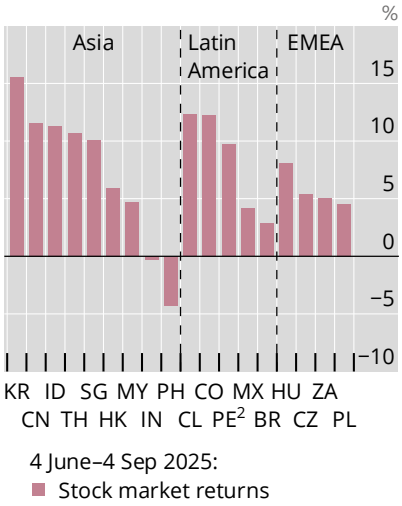
A. Long-term yields were broadly flat in Asia and EMEA[1]



B. EME public debt issuance picked up pace



C. Asian EMEs led the gains



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[1] Simple average. Asia = CN, HK, ID, IN, KR, MY, SG and TH; EMEA = CZ, HU, IL, PL and ZA; Latin America = BR, CL, CO, MX and PE. Five-day moving average. [2] For PE, stock market return between 4 June and 29 August 2025.

Sources: Bloomberg; Dealogic; JPMorgan Chase; national data; BIS.

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A multi-sector assessment of the macroeconomic effects of tariffs[1]

We draw insights from multi-sectoral trade and macroeconomic models to quantify the implications of higher tariffs for inflation and output. While tariffs lower output in most jurisdictions, their inflationary consequences are nuanced. Tariffs are inflationary for countries that impose them and typically disinflationary for imposing countries' largest trading partners. For other countries, the estimated effects are generally small, as an inflationary impulse from disruptions to global supply chains balances out the disinflationary effect of lower global growth. For some countries, lower output and materially higher inflation pose difficult trade-offs for monetary policy, which could worsen if an initial rise in inflation becomes embedded in higher inflationary expectations.

JEL classification: E17, E52, F17

In April 2025, the United States announced sharply higher import tariffs. Subsequent months have seen repeated cycles of trade policy announcements, negotiations, adjustments and reversals. While the final extent of tariffs remains uncertain, they are likely to be materially higher in the coming years than they were previously, at least for trade between the United States and the rest of the world.

Higher tariffs will affect inflation and output and hence matter for monetary policy. In principle, for countries that levy them, tariffs should resemble a supply shock – raising prices and lowering domestic incomes and output. For countries on the receiving end, they should resemble a demand shock – reducing economic activity and inflation. The size of the effects will depend on the size of the tariff and the depth of the affected trading relationships. In practice, the consequences will be more complex, as they depend not only on tariffs themselves but also on how the tariffs affect global supply chains. They also depend on the ability and willingness of households and businesses to substitute away from goods subject to tariffs.

This article assesses the short-run implications of the increase in tariffs for monetary policy through the lens of two complementary multi-sector models.[2]

[1] The views expressed in this publication are those of the authors and not necessarily those of the BIS or its member central banks. We thank Andrew Li for superb research assistance. Matthias Burgert contributed to this article while he was on secondment at the BIS. For helpful comments, we are also grateful to Marco Del Negro, Gaston Gelos, Marco Lombardi, Phurichai Rungcharoenkitkul, Damiano Sandri, Andreas Schrimpf, Hyun Song Shin, Frank Smets, Tom Rosewall, Phil Wooldridge and James Yetman. All remaining errors are our own.

[2] Our analysis focuses exclusively on the direct effects of tariffs. We do not assess the indirect effects arising from uncertainty about the size and scope of tariffs, shifts in household and business sentiment or pre-emptive stockpiling by firms in anticipation of higher future tariffs. Numerous studies, including Caldara et al (2020), Kohlscheen et al (2025), Poilly and Tripier (2025) and ECB (2025) conclude that higher trade policy uncertainty will weigh on economic activity. Likewise,

Key takeaways

- *Higher import tariffs could lower global growth and disrupt supply chains. The estimated effects on output and inflation are largest for the United States and its major trading partners.*
- *To fully assess the macroeconomic impact of tariffs and their implications for aggregate supply and demand, it is critical to account for global supply chains and sectoral spillovers.*
- *Some central banks could face a difficult trade-off between stabilising output and maintaining price stability, which could worsen significantly if inflation expectations de-anchor.*

The first – a global multi-sector trade model – allows us to assess how tariff changes affect output and prices, by sector and country, taking into account potential shifts in household spending patterns, changes in the structure of global production networks and rerouting of trade flows. While well suited for this task, the trade model assumes flexible prices. Because of this, it cannot assess how monetary policy shapes the macroeconomic impact of tariffs. We therefore use our second model – a multi-sector New Keynesian dynamic stochastic general equilibrium (DSGE) model – to map the sectoral output and price responses generated by the trade model onto sectoral supply and demand shocks, analyse how sectoral dynamics affect aggregate output and inflation trajectories, and explore alternative monetary policy responses to tariffs.[3]

Our sectoral approach provides a granular perspective on how the effects of tariffs propagate within and across countries, highlighting their impact on global value chains and inter-industry dynamics. The sectoral dimension of tariff changes matters for two reasons. First, a large share of international trade consists of intermediate goods that cross borders as part of intricate global value chains, and tariffs will induce substitution across countries. Second, tariff rates, which vary greatly between industries, trigger cost spillovers and substitution effects across sectors within countries. Assessing tariffs from a sectoral dimension is therefore crucial to understand their macroeconomic impact and transmission within and across economies.

Three key findings stand out in our analysis. First, the effects of tariffs are more complex than the simple characterisation of countries as those that impose tariffs and those that are subject to them would imply. Countries that impose tariffs are also hit by spillbacks from the global reduction in aggregate demand. Meanwhile, countries that do not impose tariffs may still experience adverse supply shocks, not least due to the realignment of global value chains. Because firms may find it hard to adjust their production networks, at least in the short run, such supply disruptions could be inflationary and in some cases may even overwhelm the disinflationary effect of lower aggregate demand.

we do not model the effects of shifts in investor perceptions of sovereign risk or of other major determinants of trade such as movements in commodity prices or persistent excess supply capacity in several large economies.

[3] Several recent papers (eg Bergin and Corsetti (2025), Monacelli (2025) and Werning et al (2025)) have explored the implications of tariffs for optimal monetary policy. Kalemli-Özcan et al (2025) quantify the effect of the 2025 tariff changes for a single monetary policy rule. Our article is the first analysis that we are aware of that considers the implications of alternative monetary policy strategies at the country level.

Second, a large part of our estimated macroeconomic effect of tariffs reflects sectoral spillovers within countries. For example, changes in output or prices in industries subject to tariffs will in turn affect wages and input costs in other parts of the economy, even if those sectors' products are not traded internationally or subject to tariffs. For jurisdictions most affected by tariffs, including the United States, Canada and Mexico, 30–50% of the drop in output is due to services, even though services are not subject to tariff changes.

Third, while monetary policy cannot make up for losses in potential output that result from higher tariffs, it can smooth changes in demand and limit movements in inflation. For countries like Mexico, where tariffs primarily resemble an aggregate demand shock, the monetary policy prescription is reasonably straightforward, as central banks face little trade-off between stabilising the output gap and stabilising inflation.[4] For jurisdictions where changes in tariffs resemble an adverse supply shock, central banks face a more difficult choice. They may, for example, opt to "look through" the increase in prices in order to limit the decline in output. However, particularly in countries where projected price increases are large and inflation has not returned to target since the post-Covid-19 inflation surge, such a strategy creates the risk that inflation expectations will de-anchor. This could lead to worse outcomes for both output and inflation than would have resulted had the central bank not adopted a look-through strategy.

In addition to the three qualitative findings mentioned above, we also quantify the effects of tariff changes on key economies. While these indicate the possible magnitudes of the effects across countries, we would caution against reading too much into the specific numerical results. They assume, for example, a specific combination of tariffs across countries and industries, which may be subject to change. Moreover, they rely on a number of further assumptions about features of the economic landscape, such as the willingness of consumers and businesses to substitute across products or the degree to which businesses will absorb tariffs through lower profit margins, which are inherently uncertain. While the economic mechanisms we highlight are insensitive to the modelling choices used in this paper, the actual impact of tariffs could well be larger or smaller than we estimate.

The first section of this article describes the key features of recent tariff announcements and discusses the rationale for using a sectoral perspective to assess their monetary policy implications. The second quantifies the short-run implications of tariffs using a multi-country, multi-sector model of global trade. In the third section, we use a calibrated multi-sector New Keynesian DSGE model to recover the underlying demand and supply shocks that explain the sectoral output and inflation outcomes in the trade model and assess the implications of alternative monetary policy strategies. We conclude with some final policy considerations.

Tariff announcements and the structure of global trade

Recent US trade policy announcements represent a step change in the level of trade tariffs. Before the announcements, US tariffs had been low by historical standards (Graph 1.A). Notwithstanding a modest increase in the second half of the 2010s, the

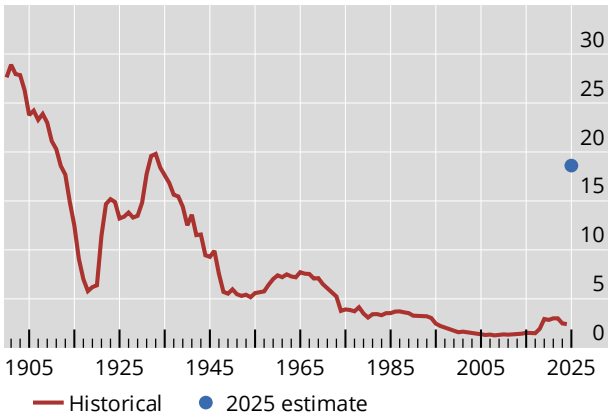
[4] Note that even if the output gap is zero, actual output may still be lower than it would have been in the absence of tariffs if *potential* output declines.

Tariffs are set to surge and vary by jurisdiction[1]

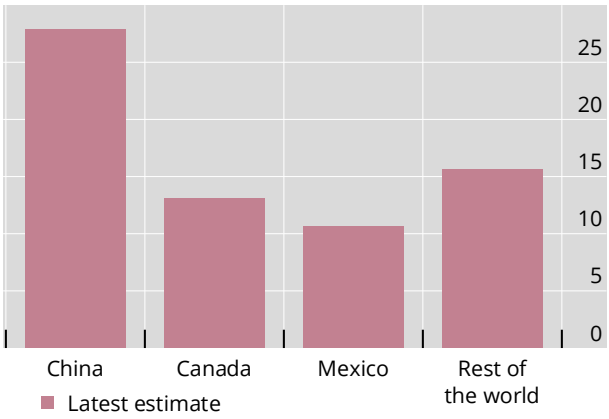
In per cent

Graph 1

A. US average effective tariff rate



B. US effective tariff rate by jurisdiction



[1] Estimated as of 7 August 2025. The effective tariff rate is defined as customs duty revenue as a percentage of goods imports.

Source: The Budget Lab at Yale.

weighted average effective tariff rate was less than 3%. While the final extent of tariffs remains uncertain, it seems likely that US tariffs will ultimately settle at levels last seen in the 1930s.

Announced US tariff increases vary greatly across jurisdictions (Graph 1.B). As of the time of writing, most countries faced a tariff rate of 10–15%. There are some exceptions, however. Jurisdictions such as Brazil, China, Hong Kong SAR, India and Switzerland face much higher tariffs on many items. In contrast, many goods originating from Canada and Mexico that are covered by the United States-Mexico-Canada Agreement (USMCA) are exempt from tariffs.

US tariff increases also vary across items. Tariffs on aluminium and steel imports are now set at 50%, with few exceptions. Many motor vehicles and car parts face tariffs of 25%. In contrast, items such as petroleum, computer equipment, many pharmaceutical products and most services are currently excluded from tariffs.

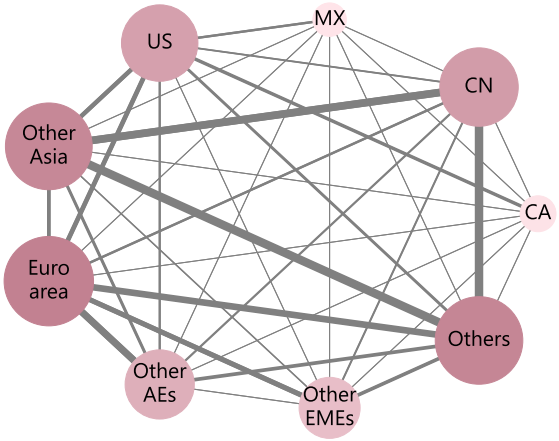
Some jurisdictions have levied their own tariffs on US exports in response to US tariff announcements. For example, China has set tariffs of 10% on most imports from the United States, while Canada has imposed tariffs of 25% on imports of certain goods from the United States, including steel, aluminium products and car parts.

The macroeconomic effects of tariffs will be complex, for several reasons. One is the previously mentioned variation in tariff rates across items and countries. This creates an incentive for substitution, either by consumers – who may tilt their spending towards items that face lower tariffs – or businesses – which may shift production to jurisdictions that face lower tariffs in other markets. For countries that face relatively low US tariffs, substitution effects should cushion the fall in demand for their exports, although the gains to growth may be partly offset by higher imports from countries subject to higher US tariffs.

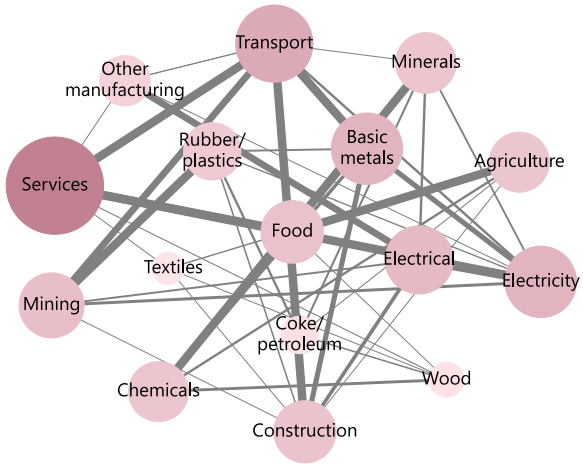
Trade in intermediate goods further complicates the impact of tariffs. Whether considered at the country or sectoral level, the global trading system represents a dense network of linkages that stretches well beyond the main trading partners of the United States (Graphs 2 A. and 2.B). Tariff-induced changes in bilateral trade flows

The network structure of global trade links[1] Graph 2

A. Trade linkages for intermediate goods[2]



B. Trade networks across sectors[3]



[1] The size of each node represents the sum of inputs and outputs for all other economies/sectors in the Asian Development Bank (ADB) Input-Output Table for 2023, while the width of each line represents the sum of inputs and outputs between the corresponding pair of economies/sectors. [2] For the regions, data are aggregated for 24 other Asian economies ("other Asia"), 17 euro area economies, six other AEs and seven other EMEs. "Others" is four economies combined with the rest of the world, as defined by the ADB. [3] To reduce complexity, only the three largest connections by outputs for each node are considered.

Sources: Asian Development Bank, Multiregional Input-Output (MRIO) Tables; authors' calculations.

could have disruptive upstream and downstream spillovers through production networks. Countries where demand falls due to the imposition of tariffs by key trading partners could nonetheless also face higher import prices on goods produced in supply chains that have been affected by tariffs.

The effects of tariffs will also be felt through shifts in global aggregate demand. Countries not subject to tariffs may nonetheless see exports decline if tariffs on their trading partners lower incomes, and hence spending, in those jurisdictions. The resulting contraction in economic activity will also be felt in sectors, such as services, that have not been subject to changes in tariffs.

When trying to quantify the macroeconomic implications of trade tariffs, it is therefore crucial to take a global perspective that considers cross-country demand spillovers, allows for potential substitution and disruption to supply chains, and accounts for sectoral differences in tariff rates and trade patterns. We turn to this in the next section.

The impact of tariffs on output and inflation – an initial assessment

We use a multi-sector global trade model, which we refer to as MS-Trade, to form an initial quantitative assessment of the impacts of tariffs on output and inflation.[5] The model accounts for the direct effects of tariffs and second-round effects through

[5] The model is based on Caliendo and Parro (2015).

changes in the structure of global value chains, domestic wages and other input costs, as well as in the composition of final demand across sectors and countries. Demand for each industry's output depends on its relative price, which in turn is determined by domestic and imported input costs, wages and any tariffs that goods may face in destination markets. The model can be used to assess the effect of changes in tariff rates on output and prices for each country and sector. We calibrate it to match the input-output structure of production and global trade across 16 sectors for 63 jurisdictions (see Box A for a description of the model).

Box A

MS-Trade: a quantitative trade model for a global perspective on the impact of tariffs

Our first model, MS-Trade, is a quantitative global trade model. It is based on the multi-country, multi-sector Ricardian framework of Eaton and Kortum (2002) and Caliendo and Parro (2015), incorporating cross-country input-output linkages to capture spillovers across countries and industries. The model is designed to simulate counterfactual tariff scenarios, calculating the sectoral responses of output and inflation across 62individual jurisdictions, which collectively represent around 90% of world GDP, as well as the rest of the world.

The key actors in the model are households and firms. Households decide how much of the output of each sector to consume and how much labour to supply, taking prices and wages as given. The output of each sector consists of a large number of individual items that can either be produced domestically using labour and intermediate inputs or imported. Firms minimise costs by sourcing inputs from the lowest-cost sources, either domestically or internationally, subject to trade costs that differ across country-sector pairs. These costs reflect factors such as transportation expenses, costs associated with meeting regulatory requirements and tariffs.

Tariffs make international trade more costly. Faced with higher costs for goods subject to tariffs, firms and households tend to tilt their purchases towards items produced domestically or from countries not subject to tariffs. The model can distinguish between the effects of tariffs over the short or long run. In the short run, firms have limited ability to adjust their suppliers (represented in the model by a low elasticity of substitution between goods varieties from different countries). In the long run, firms have more flexibility to adjust their trading relationships (represented in the model by a higher trade elasticity), which for most countries mitigates some of the initial impacts of higher tariffs. Since this paper focuses on a short-run analysis, we assume a lower substitution elasticity, where a 1% tariff-induced price rise would lower import demand by 1.75%. This elasticity falls within the range found in the literature, such as Bonadio et al (2021) and Boehm et al (2023).

Sectoral composition of MS-Trade

Table A1

Number	Description	Number	Description
1	Agriculture	9	Other non-metallic minerals
2	Mining, petroleum and natural gas	10	Basic metals and fabricated metals
3	Food, beverages and tobacco	11	Electrical and optical equipment; machinery not elsewhere classified
4	Textiles and textile products; leather, leather products and footwear	12	Transport equipment
5	Wood and products of wood and cork; pulp, paper, paper products, printing and publishing	13	Manufacturing not elsewhere classified; recycling
6	Coke, refined petroleum and nuclear fuel	14	Electricity, gas and water supply
7	Chemicals and chemical products	15	Construction
8	Rubber and plastics	16	Services

Source: Authors' elaboration.

Adjustments to expenditure patterns alter other economies' exports (and hence aggregate demand) as well as the structure of global production networks (and hence aggregate supply). The relative importance of these forces varies across jurisdictions. In countries that trade intensively with jurisdictions that impose tariffs, demand side effects will typically dominate. In countries that are heavily integrated into global value chains, supply side effects can be more important. For countries that impose tariffs, the resulting increase in costs also represents a decline in real income, then affecting also the demand for domestically produced and imported goods and services.

We calibrate the country and industry structure of the model to match the Asian Development Bank (ADB) Multiregional Input-Output (MRIO) database, which provides data from over 30 sectors in each jurisdiction. For analytical tractability, we aggregate these 30 sectors into 16 broader categories, shown in Table A1.

We use the model to simulate the effects of announced tariffs as of 25 August 2025. The tariffs include differentiated US rates by country and sector, as well as retaliatory tariffs on US exports to China and Canada. We aim to assess the short-run effect of tariffs, ie over a time horizon relevant for central banks.[6] Accordingly, while we allow agents in the model to alter their spending patterns in response to tariff-induced shifts in relative prices, we put more constraints on the degree of adjustment than we would if we sought to assess the long-run structural implications of tariffs. Specifically, when simulating the model, we assume that firms can adjust international trade along the intensive margin – meaning that they can choose to buy more or less from existing suppliers – but not along the extensive margin – meaning that they cannot tap entirely new sources of supply or start exporting to markets where they do not currently operate.[7] We present all results as deviations from a counterfactual where tariffs remained at their end-2024 levels.

We show results for the world economy as a whole and for the jurisdictions that are most affected by the tariffs. These include the United States itself and its largest trading partners: Canada, China and Mexico. We also show results for Germany and Vietnam, which are among the most significant trading partners of the United States within the European Union and the Association of Southeast Asian Nations (ASEAN), as well as Brazil and India, two large economies subject to particularly high tariffs at the time of writing.[8]

The impact of tariff changes on output and inflation varies across countries. The model's projections indicate that the effects will be felt strongly in the United States. Relative to a counterfactual with unchanged tariffs, our model suggests a significant drop in output and rise in the price level in the United States (Graphs 3.A and 3.B). These estimates of the short-run effects of tariffs are broadly within the range of other recent studies.[9] Nonetheless, it should be emphasised that the projections do not factor in other recent developments that may lower inflation, as mentioned above. In particular, they do not account for the depressing effects of tariff uncertainty on

[6] We interpret this as corresponding to a one-year horizon in our simulations. That said, delays in tariff implementation, pre-emptive stockpiling in anticipation of tariffs or delays in price adjustment by firms due to uncertainty about the final level of tariffs, among other factors, all mean that these effects may play out over a longer horizon than the one we assume in this article.

[7] Our interpretation of a scenario in which firms cannot adjust along the extensive margin as representing the short-run effects of a trade policy change follows Dekle et al (2008).

[8] The online appendix includes the tariff assumptions, as well as output and inflation projections for all 63 jurisdictions.

[9] For instance, The Budget Lab (2025) projects a 1.1% decline in GDP, relative to a no-tariff baseline, by mid-2026 and a 1.8% rise in the price level in the short run.

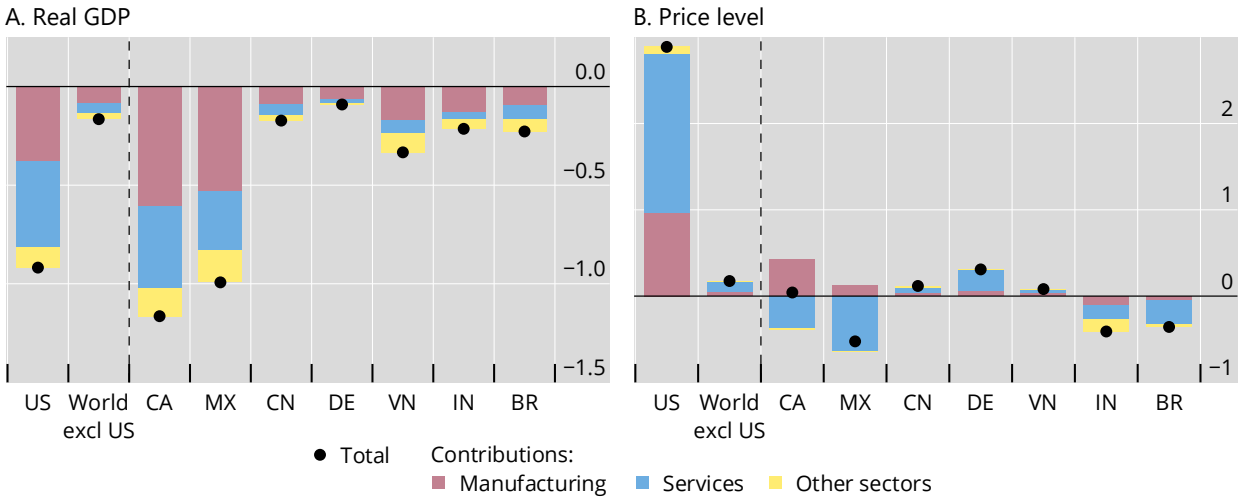
aggregate demand or the reduction in oil prices since early 2025, and assume that firms do not accommodate tariffs through lower profit margins.

Output falls in most other jurisdictions as well, although the effects are material in only a few. Cross-country differences largely reflect the importance of trade with the United States (relative to the overall size of the economy) and the tariffs a country faces. For example, projected output declines are particularly large in Canada (1.2%) and Mexico (1%), for which the United States is by far the most important export destination.[10] Economies in Asia with significant trade links to the United States are generally projected to experience somewhat smaller, but still noticeable, output declines. The estimated 0.3% output decline in Vietnam is among the largest. In Brazil and India, large economies subject to higher than average tariffs, output is projected to fall by a bit more than 0.2%. The hit to output is smaller in large economies where exports to the United States are less important relative to the size of the overall economy. For China and Germany, these are in the range of 0.1–0.2%.

The impact of trade tariffs on prices differs notably across countries as well. The cases of Mexico, Brazil and Canada are instructive. In Mexico, which experiences a sizeable output drop and for which the United States is the largest source of imports, prices fall by 0.5%. In Brazil, the price decline is only a bit smaller, at 0.4%, even though output is projected to decline by much less. In Canada, which displays the largest projected output drop, but which has also imposed retaliatory tariffs on the United States, the price level is projected to be essentially unchanged.

Impact of tariffs on output and price level[1]

In per cent, deviation from no-tariff change baseline — Graph 3



[1] Short-run impacts of announced tariffs as of 25 August based on simulations of the MS-Trade model, as deviations from a counterfactual where tariffs remained at end-2024 levels.

Sources: Asian Development Bank, Multiregional Input-Output (MRIO) Tables; authors' calculations.

[10] Our finding of a significant decline in economic output in Canada is consistent with projections from the Bank of Canada (2025), which report a decline in GDP growth of 2.5 percentage points in a scenario that assumes that the United States levies 25% tariffs on all goods imports and that Canada imposes retaliatory tariffs in response.

The variation in price changes across Mexico, Brazil and Canada reflects a mix of factors. First, in all three countries lower output is disinflationary, albeit to a lesser degree in Brazil – which has the smallest output decline – than in Canada or Mexico. Second, weighing against this disinflationary force, higher prices in the United States raise costs for firms that rely on US imports.[11] This inflationary force transmits across countries through supply chain linkages, compounded by higher wages and prices.[12] It is felt most strongly in countries that trade extensively with the United States, helping to explain the comparatively modest overall price decline (relative to output) in Mexico compared with Brazil. Third, retaliatory tariffs are a further inflationary force for countries that implement them. This explains why prices do not decline in Canada, despite the large ouput drop.

In most other economies, projected price changes are modest. Particularly in jurisdictions like China and Germany, whose integration into global supply chains is large relative to their bilateral trade links with the United States (Graph 2.A), the inflationary effect of higher intermediate input costs acts as a counterweight to the disinflationary effect of lower global aggregate demand, and can even offset it.

Spillovers across industries magnify the direct impact of tariff changes on aggregate outcomes. The contributions of the different sectors to changes in output and the price level illustrate this mechanism. The services sector, which is not subject to tariff changes, accounts for around half of the output drop in the United States and more than half of the increase in inflation.[13] For economies like China, Germany, Brazil and Mexico, the contribution of services to price dynamics is also material.

The large contribution of services to overall price changes reflects three factors. First, many services are labour-intensive. Tariff-induced changes in aggregate economic conditions, which are likely to affect wages, will therefore also influence services prices. Second, some services (eg travel services) are traded and so can be affected by price changes abroad. Third, the services sector is large. Hence, even small moves in services prices can exert a large influence on the overall price level.

The size, and even direction, of the aggregate demand and intermediate input cost channels on services prices varies across countries. In Canada and Mexico, lower aggregate demand dominates the price impact on services. This contrasts with China, Germany and the United States, where higher intermediate input costs translate into higher services prices. These effects speak to the powerful – and at times countervailing – influence of shifts in aggregate demand and intermediate input costs in the transmission of tariff changes, and hence the value of assessing the implications of tariffs from a sectoral perspective.

The output and price effects of higher tariffs vary greatly by industry. In the United States, output contracts in all industries. It falls most in the transport equipment and textile sectors, where US firms make extensive use of imported

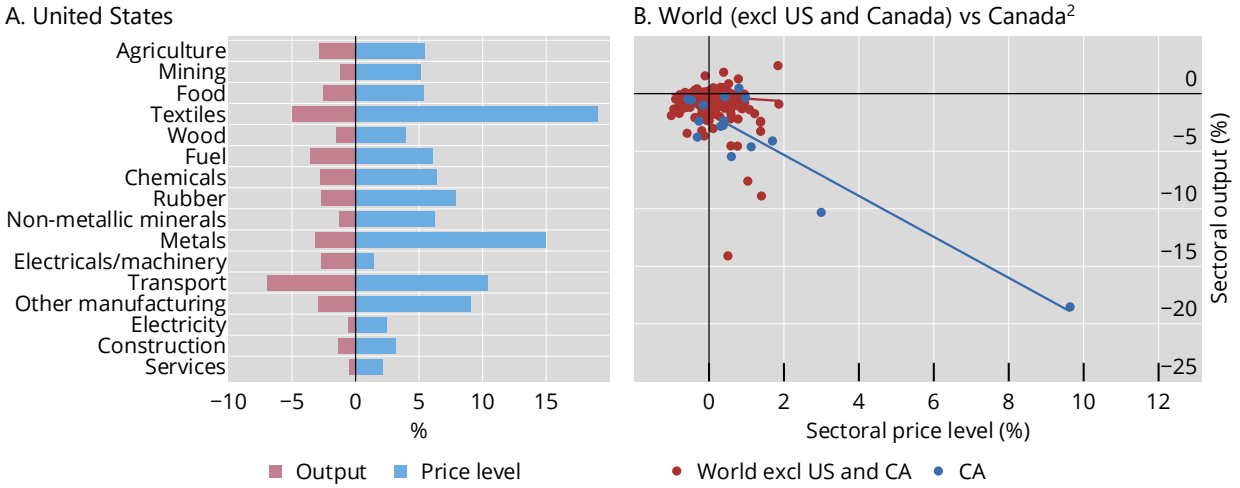
[11] Although higher prices lower demand for US exports, the effect of this channel is smaller in our model than it would be if we allowed firms to adjust on the external margin and source products from jurisdictions with which they do not currently trade.

[12] In related analysis, Gnocato et al (2025) conclude that tariffs levied on intermediate goods are more inflationary than those levied on final goods because tariffs on intermediate goods amplify cost pressures through production linkages.

[13] Paulson et al (2025) also find that the services sector contributes substantially to the decline in output.

Sectoral effects of tariffs[1]

Deviation from no-tariff change baseline — Graph 4



[1] Sectoral effects of announced tariffs as of 25 August based on MS-Trade model simulations, as deviations from a counterfactual where tariffs remain at end-2024 levels. For more details on the sectoral composition, see Table A1. [2] Each dot represents a sector within a specific economy, illustrating the sectoral effects of tariffs on the corresponding price level and output.

Sources: Asian Development Bank, Multiregional Input-Output (MRIO) Tables; authors' calculations.

intermediate inputs.[14] These sectors also see some of the largest price increases, of 10% and 19%, respectively, while in the metals industry prices rise by 15% (Graph 4.A). However, even in the services sector, which faces no additional tariffs, output still declines by around 0.5% and prices rise by 2.2%.

Outside the United States, these patterns are more nuanced. Those of Canada are unique (Graph 4.B, blue dots and line). Highly exposed to tariff increases due to its close trading relationship with the United States and having imposed retaliatory tariffs, our model suggests a severe drop in output and higher prices in several industries, albeit to a generally smaller extent than in the United States. Retaliatory tariffs play a key role, as their level significantly influences the extent of the increase in the price level. Elsewhere, there is a wide diversity of output and price outcomes (Graph 4.B, red dots and line). Both output and prices decline in many country/sector pairs (bottom left-hand quadrant), consistent with the intuition that tariffs by and large act as negative demand shocks for countries on the receiving end. However, in many country/sector pairs output and prices move in opposite directions (bottom right-hand and top left-hand quadrants), and in a few both output and prices even increase (top right-hand quadrant). This illustrates that the sectoral effects of tariffs are more complex than simple intuition would suggest, and motivates the use of our second model to shed light on these sectoral supply and demand interactions.

[14] If we simulate the long-run effects of tariffs by allowing firms to adjust along the extensive margin (ie by accessing inputs from previously untapped markets), output in the US textile industry expands by 5%, while that in the transport industry declines by 4%, significantly less than the 7% drop observed in the short run. The consequences of these gains for aggregate US output, which still contracts by 0.7% relative to a no-tariff baseline, are modest.

Interpreting the transmission mechanism: supply, demand and production networks

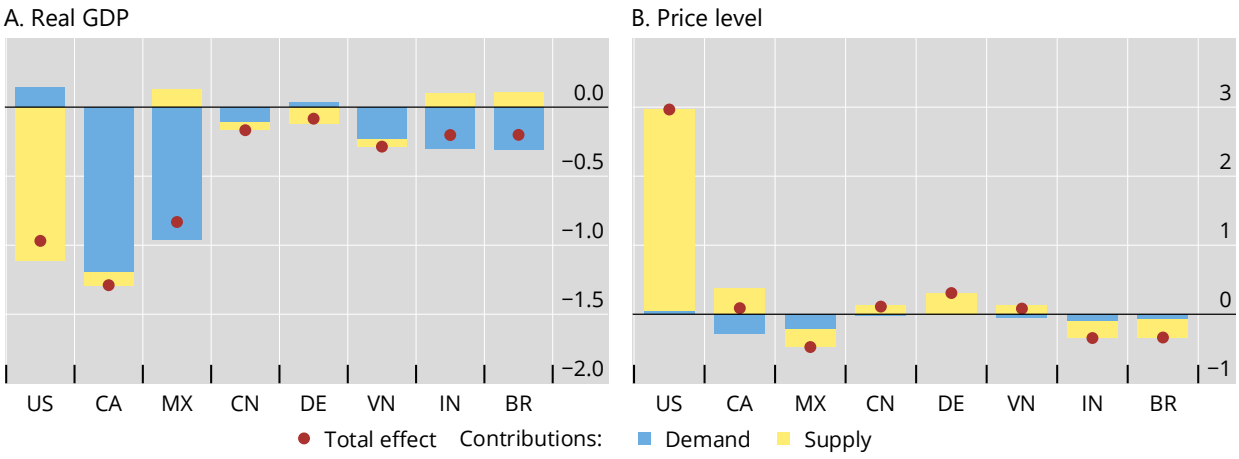
We now turn to the mechanisms determining the output and price responses to tariff changes, which could inform the appropriate monetary policy response.[15] To do so, we use our second model – the multi-sector New Keynesian DSGE model (BIS-MS; see Box B for a description). This model features the same 16-sector input-output structure as MS-Trade. Unlike that model, BIS-MS is a dynamic closed economy model featuring sticky prices. While unable to assess the effects of tariffs on global trade flows, BIS-MS is well equiped to analyse the implications of tariff changes for monetary policy.

We link the two models by calibrating BIS-MS to replicate the main results of the trade model from the previous section. Specifically, we calculate the sequence of supply and demand shocks in BIS-MS that allows it to exactly match the trade model's industry- and country-specific output and price responses after four quarters (see Box C for more explanation). The model's supply shocks can be interpreted as changes in imported goods prices resulting from global tariff changes. The demand shocks can be viewed as tariff-induced shifts in external demand. With these results in hand, we conduct two exercises.

The first assesses the relative importance of supply and demand side influences in explaining the behaviour of sectoral output and prices. This reveals interesting country-specific patterns. As one might expect, for the United States, which has imposed tariffs on other countries, the model interprets the output and price movements primarily as cost-push shocks that lower aggregate supply (Graphs 5.A and 5.B).

Demand and supply decomposition[1]

In per cent; deviation from no-tariff change baseline after four quarters — Graph 5



[1] Simulations of supply and demand factor contributions based on the BIS-MS model.

Sources: Burgert et al (2025); Asian Development Bank, Multiregional Input-Output (MRIO) Tables; authors' calculations.

[15] While it is possible with MS-Trade to decompose output and price responses into the contributions of changes in tariffs, wages and intermediate input costs within and across sectors, one cannot use the model to separately identify shifts in sectoral or aggregate demand and supply.

Box B

BIS-MS: a framework for analysing sectoral spillovers and assessing monetary policy

We use BIS-MS, the BIS's quantitative multi-sector model, to analyse the transmission mechanism of tariff changes to output and inflation and assess the implications of alternative monetary policy strategies.

BIS-MS is a multi-sector New Keynesian dynamic stochastic general equilibrium (DSGE) model. It augments the framework of a standard medium-scale DSGE model – a common tool that many central banks use to assess economic developments and monetary policy transmission – with a detailed multi-industry structure (described in detail in Burgert et al (2025)).① Industries are imperfect substitutes as sources of consumer and investment goods, employment and intermediate inputs. The industries also differ in their production functions, price stickiness, importance to the overall production network and role in final demand. The model's production structure can be mapped to the input-output data of the jurisdictions included in MS-Trade (Box A), allowing for a multi-country perspective on policy trade-offs.

A key feature of the model is its flexibility to accommodate alternative scenarios regarding economic structure or policy behaviour. This allows us to adjust, for instance, the degree of sector-specific wage and price indexation to govern the strength of the backward-looking element in inflation expectations. Crucially, it also allows us to alter the monetary policy rule to compare a Taylor rule that targets headline inflation and the output gap against a "look-through" approach, in which the central bank keeps the interest rate at its base level for some periods before responding to inflation and the output gap.

By accounting for sectoral heterogeneity and interlinkages, BIS-MS is well suited to evaluate the varied impacts of tariffs across the economy and the amplification of these shocks through country-specific production. The model matches the dynamics using either demand or supply side disturbances, resulting in a decomposition of the relative drivers of prices and activity for each sector. This rich structure then allows us to analyse the economic implications of tariffs and specifically evaluate their interplay with monetary policy.

① The BIS-MS model builds on the growing literature that integrates multi-sector structures into macroeconomic frameworks, such as Baqaee and Farhi (2022), Kalemli-Özcan et al (2025) and Rubbo (2023).

For other countries, the drivers of output and prices are more nuanced. For most, negative demand shocks are a significant contributor to lower output. In fact, in economies like China and Vietnam, these shocks account for the bulk of the output decline, and in Mexico, India and Brazil for all of it. There are exceptions, however. In Canada, adverse supply shocks explain around 10% of the decline in output, reflecting retaliatory tariffs on imports from the United States.

The drivers of prices are different from those of output. While the negative aggregate demand shocks that lower output in most economies also weigh on prices, their influence is quantitatively small in most cases. One reason may be that BIS-MS is calibrated to a period in which the Phillips curve was flat in many economies, meaning that changes in economic activity have only a modest impact on prices. In contrast, shifts in aggregate supply are more important.

The second exercise illustrates the importance of production networks for understanding the transmission of tariffs. To do so, we set up an alternative version of the model that features only a single good and, hence, eliminates all sectoral interactions (henceforth, the one-sector model), meaning that the model does not account for any intersectoral production linkages. We then calculate the weighted average of the sectoral demand and supply shocks from the baseline 16-sector BIS-MS model and feed them into the one-sector model.

Box C

Bridging MS-Trade and BIS-MS through the multi-sector structure

A key contribution of our study is to link results from MS-Trade – a quantitative trade model well suited for analysing the economic consequences of tariff changes at the sectoral and the macroeconomic level – to BIS-MS – a quantitative macroeconomic model well suited for analysing alternative monetary policy strategies.

MS-Trade generates projections for sectoral output and prices resulting from changes in tariffs. We map these changes into BIS-MS by applying two series of disturbances to the model's equations.

The first series of disturbances captures the idea that, by imposing a tariff, a country creates a "wedge" between the prices that its firms charge and their production costs.① We model this as a sectoral cost-push shock that affects the model's sectoral Phillips curves:

(1) $\pi_{j,t} = \kappa_{j1} E_t \pi_{j,t+1} + \kappa_{j2} \pi_{j,t-1} + \kappa_{j3} mc_{j,t} + \mu_{j,t},$

where $\pi_{j,t}$ is the inflation rate in sector *j* at time *t*, $mc_{j,t}$ are marginal costs in sector *j* and $\mu_{j,t}$ is the cost-push shock applied to sector *j*. The parameters κ_{j1}, κ_{j2} and κ_{j3} govern the sensitivity of inflation to expected future inflation, past inflation and marginal costs and depend on factors such as the frequency of price changes and degree of price indexation within a given sector. We refer to an increase in $\mu_{j,t}$ as a "supply side" shock, because it leads to an increase in price for a given level of production and marginal costs.

The second series of disturbances captures the idea that an increase in tariffs abroad is equivalent to an exogenous contraction in demand that is unrelated to domestic economic conditions. We model this as a shock to the sectoral market clearing condition:

(2) $y_{j,t} = \phi_{j1} c_{j,t} + \phi_{j2} i_{j,t} + \phi_{j3} g_{j,t} + \sum_{k=1}^{\mathrm{F}} \phi_{jxk} x_{jk,t} + \varepsilon_{j,t},$

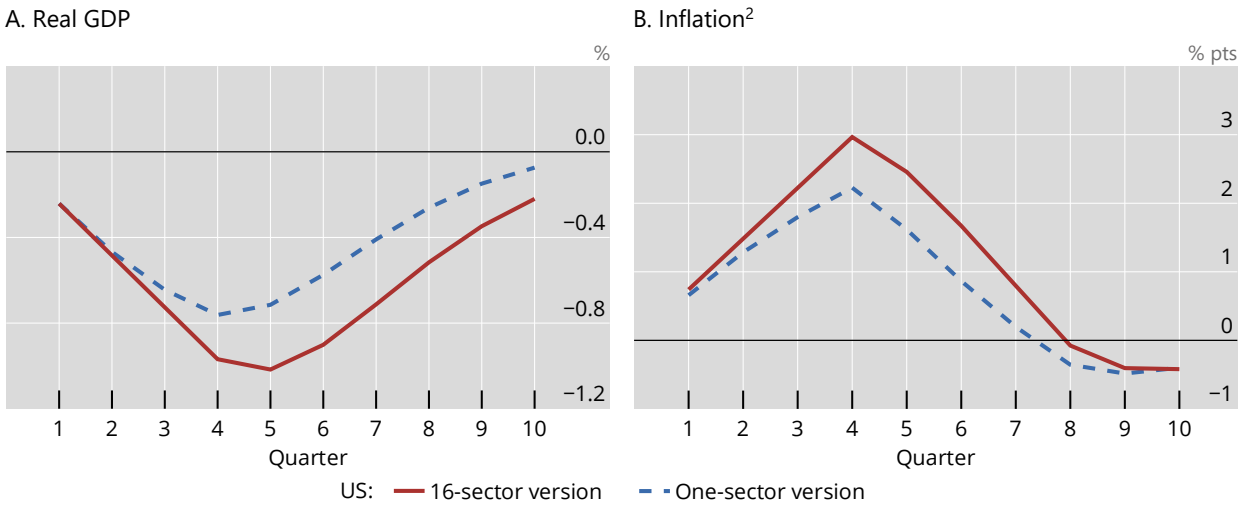
where $y_{j,t}$ is the gross output of sector *j* at time *t*, $c_{j,t}$, $i_{j,t}$ and $g_{j,t}$ are the amount of sector *j*'s output used for domestic consumption, investment and public demand, respectively, $x_{jk,t}$ is the amount of sector *j*'s output used as a domestic intermediate input by sector *k*, and $\varepsilon_{j,t,}$ is the shock applied to the equation. The parameters ϕ_{j1}, ϕ_{j2}, ϕ_{j3} and ϕ_{jxk} govern the weight of each component of demand in a sector's steady-state gross output. We refer to a decrease in $\varepsilon_{j,t,}$ as a "demand side" shock because it leads to a decrease in a sector's output for a given price.

Because BIS-MS is a linear model, for each country there is a unique combination of sector-specific demand and supply shocks that allows it to exactly match the sequence of sector-specific output and price changes generated by the MS-Trade model.② Including demand and supply shocks for each sector and country pair allows the model to capture second-round effects, such as disruptions to global value chains that affect aggregate supply even in countries that do not change their tariff rates, or changes in global aggregate demand that affect economic conditions in countries that impose tariffs on other countries.

When calculating the sequence of sectoral demand and supply shocks, we assume that monetary policy follows the model's standard monetary policy reaction function.③ To evaluate the effect of alternative monetary policy strategies, we apply the same sequence of demand and supply shocks but vary the coefficients of the policy rule.④

① Werning et al (2025) show formally that there is a precise mapping between a tariff and a cost-push shock in a standard closed-economy New Keynesian model without capital. ② We assume that the changes in output and prices occur in equal proportions over the first quarters of the simulation. After that we apply no further shocks to the model, which will gradually return to its initial steady state. ③ The model's standard monetary policy reaction function is $r_t = 0.7 \times r_{t-1} + 1.5 \times \pi_t + 0.125 \times gap_t$ where r_t is the policy interest rate, π_t is CPI inflation and gap_t is the output gap. ④ Such an approach, which involves deriving the sequence of structural shocks to evaluate alternative monetary policy rules, is well suited for our purpose, as used similarly by eg Bianchi et al (2021).

Sectoral amplification[1] Graph 6



[1] Simulations based on the BIS-MS model. [2] The fourth quarter inflation increase corresponds to the increase in prices as reported in Graph 5.B.

Sources: Burgert et al (2025); Asian Development Bank, Multiregional Input-Output (MRIO) Tables; authors' calculations.

This exercise reveals that sectoral linkages play a substantial role in driving the aggregate results. For the United States, the trough in output in the one-sector model is only three quarters as deep as in the full model and substantially less persistent (Graphs 6.A and 6.B). Similarly, the rise in inflation is almost 1 percentage point lower. The difference for other countries is qualitatively similar.[16]

Policy implications

We now turn to the implications of tariffs for monetary policy.

A clear distinction exists between those economies where the overall impact of tariffs resembles an aggregate demand shock from those where it resembles an aggregate supply shock. In the former, where output and inflation move in the same direction, central banks face no distinct trade-off between stabilising economic activity and stabilising inflation, although they still face a choice about how quickly to seek to return these variables to target.

In jurisdictions where we project the effects of tariffs to resemble an aggregate supply shock, central banks, particularly those with a dual mandate to support domestic economic conditions as well as to ensure price stability, face a more complex task. In these economies, limiting the inflationary impact of tariffs risks worsening the output consequences, and vice versa.[17]

One way to illustrate the choices central banks face is to compare inflation and output outcomes across two scenarios: one where central banks follow a standard

[16] In a similar vein, Kalemli-Özcan et al (2025) highlight that overlooking a multi-sector perspective risks underestimating the effects of tariffs on GDP.

[17] Werning et al (2025) argue that in response to a tariff shock that transmits as a supply shock, the optimal monetary policy involves partial accommodation at the cost of higher inflation.

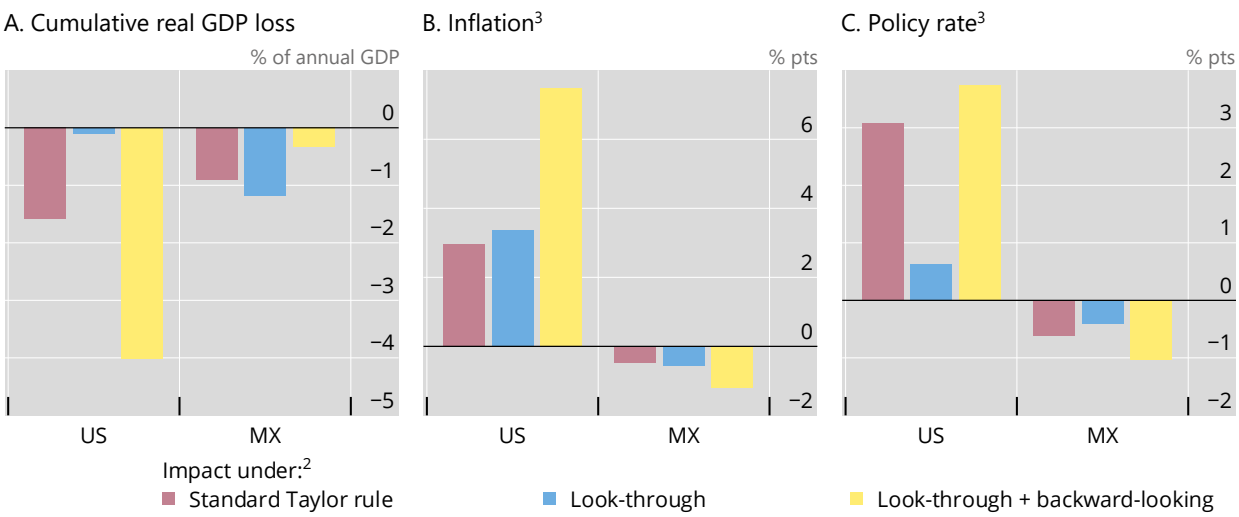
Taylor rule, which assumes that they respond to current levels of inflation and the output gap, versus an alternative scenario where they look through the effect of tariffs by holding their policy rates unchanged. Such a look-through strategy is a common policy prescription for central banks in the face of supply disturbances that are expected to be temporary.[18] Conceptually, the introduction of tariffs that imply a "once-and-for-all" increase in the price level could fall into that category. Both scenarios consider the effects of tariffs in isolation, and do not take into account other economic developments that may influence the appropriate stance of monetary policy.

We find that for the United States, adopting a look-through strategy could potentially mitigate much of the short-run output loss that results from higher trade tariffs (Graphs 7.A and 7.B). Over the first three years after the introduction of higher tariffs, the projected cumulated output loss declines from 1.6% to 0.1% of annual GDP. However, this comes at the cost of a larger increase in inflation. In contrast, for Mexico, where the effect of tariffs resembles an aggregate demand shock, a look-through strategy leaves both output and inflation further away from target than would be the case if the central bank followed the model's standard Taylor rule.

A drawback of the look-through strategy is that higher inflation could have second-round effects from an upward shift in inflation expectations. The consequences of this could be substantial. For example, if we adjusted the model so that past inflation fed into expectations – what economists label backward-looking

Monetary policy response is crucial[1]

Deviation from no-tariff change baseline over three years — Graph 7



[1] Simulations under alternative scenarios based on the BIS-MS model. [2] Under a look-through scenario, the policy rate is allowed to adjust after four quarters. "Backward-looking" refers to a scenario in which firms fully index their price changes to inflation in the previous quarter, plus their standard response to changes in marginal costs. [3] Peak effect within a projection horizon of 12 quarters.

Sources: Burgert et al (2025); Asian Development Bank, Multiregional Input-Output (MRIO) Tables; authors' calculations.

[18] Hofmann et al (2024) present evidence that central banks respond more strongly to inflation that arises from changes in aggregate demand than they do when inflation is supply-driven. Nelson (2025) reviews historical episodes where central banks have looked through perceived temporary supply shocks and their link to well anchored inflation expectations.

expectations – the projected increase in US inflation from tariffs would rise further (Graph 7.B).[19]

Large increases in inflation raise the risk that the look-through strategy could ultimately cause central banks to fall behind the curve. To then restore price stability, they may need to hike policy rates substantially (Graph 7.C). For the United States, if we assume that the look-through strategy were to be dropped after four quarters, the ultimate increase in the policy rate in our counterfactual simulation is larger than it would have been if the central bank had not pursued the look-through strategy. A delay in responding to higher inflation would come at a cost to economic activity.

Conclusion

This article has explored the implication of higher trade tariffs for monetary policy in the short run. Our analysis indicates that the impact of tariff changes for output and inflation will vary significantly across countries. In particular, it would have sizeable impacts mostly in the United States and its main trading partners – Canada and Mexico. We also show that accounting for the sectoral dimension of tariff changes is crucial for gauging their size and nature and, hence, for determining the appropriate monetary policy response.

For countries where the effects of tariffs resemble a supply shock, monetary policy faces a difficult trade-off. It cannot simultaneously stabilise inflation and the output gap. Counterfactual scenarios indicate that if inflation expectations remain well anchored, monetary policy may be able to offset much of the short-run output loss due to higher tariffs, at the cost of modestly higher inflation. However, if the increase in tariffs leads to inflation expectations becoming unmoored, the safest route (absent other disinflationary forces) for central banks is to set rates at a level that would achieve their inflation targets. Failing to do so may eventually require a much tighter monetary policy stance at the cost of a material loss of output.

Finally, one cannot expect monetary policy to undo any reductions in *potential* output that result from tariff changes, eg due to reduced ability to source goods from the lowest-cost producers. This speaks to the critical role of other policies – particularly structural reform policies – in helping economies adjust to the consequences of tariff changes. Over time, tariffs could lead to material changes in the shape of supply chains, both within and across economies. Even though these adjustments may mitigate some of the impact, there will be long-lasting effects. It will be important for central banks to understand these changes and their implications for growth, inflation and trade patterns going forward.

[19] One reason price- and wage-setting might be backward-looking is that it may be costly for households and firms to acquire information about the economic landscape (Mankiw and Reis (2022)). Hard to observe when inflation is broadly stable, such behaviour could become more apparent after significant economic disturbances, such as those resulting from large tariff changes.

References

Bank of Canada (2025): "Evaluating the potential impact of US tariffs", *Monetary Policy Report*, January.

Baqaee, D and E Farhi (2022): "Supply and demand in disaggregated Keynesian economies with an application to the COVID-19 crisis", *American Economic Review*, vol 112, no 5, pp 1397–436.

Bergin, P and G Corsetti (2025): "Monetary stabilization of sectoral tariffs", *NBER Working Paper*, no 33845.

Bianchi, F, L Melosi and M Rottner (2021): "Hitting the elusive inflation target", *Journal of Monetary Economics*, vol 124, pp 107–22.

Boehm, C, A Levchenko and N Pandalai-Nayar (2023): "The long and short (run) of trade elasticities", *American Economic Review*, vol 113, no 4, pp 861–905.

Bonadio, B, Z Huo, A Levchenko and N Pandalai-Nayar (2021): "Global supply chains in the pandemic", *Journal of International Economics*, vol 133, pp 1–23.

Burgert, M, G Cornelli, B Erik, B Mojon, D Rees and M Rottner (2025): "The BIS multisector model: a multi-country environment for macroeconomic analysis", *BIS Working Papers*, forthcoming

Caldara, D, M Iacoviello, P Molligo, A Prestipino and A Raffo (2020): "The economic effects of trade policy uncertainty", *Journal of Monetary Economics*, vol 109, pp 38–59.

Caliendo, L and F Parro (2015): "Estimates of the trade and welfare effects of NAFTA", *The Review of Economic Studies*, vol 82, no 1, pp 1–44.

Dekle, R, J Eaton and S Kortum (2008): "Global rebalancing with gravity: measuring the burden of adjustment", *IMF Staff Papers*, vol 55, no 3, pp 511–40.

Eaton, J and S Kortum (2002): "Technology, geography, and trade", *Econometrica*, vol 70, no 5, pp 1741–79.

European Central Bank (ECB) (2025): "Eurosystem staff macroeconomic projections for the euro area", June.

Gnocato, N, C Montes-Galdon and G Stamato (2025): "Tariffs across the supply chain", *ECB Working Paper Series*, no 3081.

Hofmann, B, C Manea and B Mojon (2024): "Targeted Taylor rules: monetary policy responses to demand- and supply-driven inflation", *BIS Quarterly Review*, December, pp 19–35.

Kalemli-Özcan, Ş, C Soylu and M Yildirim (2025): "Global networks, monetary policy and trade", mimeo.

Kohlscheen, E, P Rungcharoenkitkul, D Xia and F Zampolli (2025): "Macroeconomic impact of tariffs and policy uncertainty", *BIS Bulletin*, no 110.

Mankiw, N and R Reis (2002): "Sticky information versus sticky prices: a proposal to replace the New Keynesian Phillips curve", *The Quarterly Journal of Economics*, vol 117, no 4, pp 1295–328.

Monacelli, T (2025): "Tariffs and monetary policy", mimeo.

Nelson, E (2025): "A look back at 'look through'", *Finance and Economics Discussion Series*, no 2025-037.

Paulson, C, A Poduri, A Singh and M Ulate (2025): "The economic implications of tariff increases", *FRBSF Economic Letter*, no 2025-17.

Poilly, C and F Tripier (2025): "Regional trade policy uncertainty", *Journal of International Economics*, vol 155, pp 104–34.

Rubbo, E (2023): "Networks, Phillips curves, and monetary policy", *Econometrica*, vol 91, no 4, pp 1417–55.

The Budget Lab (2025): "State of US tariffs: August 7, 2025", https://budgetlab.yale.edu/research/state-us-tariffs-august-7-2025.

Werning, I, G Lorenzoni and V Guerrieri (2025): "Tariffs as cost-push shocks: implications for optimal monetary policy", *NBER Working Papers*, no 33772.

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A global survey of household perceptions and expectations[1]

The article introduces a novel survey of household economic perceptions and expectations conducted across 31 economies in March and April 2025. Household inflation expectations are elevated, exceeding prevailing inflation rates and professional forecasts. Households recognise that prices have increased faster in the post-pandemic period compared with earlier years and overestimate losses in real wages. Perceptions of the inflation surge appear to be lifting inflation expectations, suggesting that temporary price level increases can have persistent effects on expectations. Households generally do not hold central banks responsible for the inflation surge and support their independence. Knowledge of central banks remains limited in an environment where social media have become an important information source. Informed households tend to have more anchored inflation expectations, underscoring the importance of effective communication strategies.

JEL classification: E31, E58

The post-pandemic inflation surge has highlighted the critical importance of monitoring and understanding inflation expectations. A key concern for central banks was the risk of inflation expectations becoming de-anchored, potentially triggering second-round effects. Such dynamics could have necessitated sharper and more prolonged monetary policy tightening, heightening the likelihood of a hard landing for the economy.

While current survey and market data provide rich insights into the inflation expectations of professional forecasters and market participants across many countries, less is known about the expectations of *households*. This gap is problematic since households drive aggregate private consumption – the largest component of GDP – and influence wage-setting processes as providers of labour.[2]

Several central banks have made notable progress in recent years by collecting detailed data on domestic household inflation expectations. However, differences in

[1] The views expressed in this publication are those of the authors and not necessarily those of the BIS or its member central banks, Georgetown University or Purdue University. We thank Rudraksh Kansal for excellent research assistance. We are also grateful to Ryan Banerjee, Blaise Gadanecz, Gaston Gelos, Benoît Mojon, Daniel Rees, Andreas Schrimpf, Frank Smets, Hyun Song Shin and James Yetman for helpful comments. All remaining errors are our own.

[2] See D'Acunto et al (2024) for a literature review on the role of household inflation expectations for consumption and investment choices, as well as for price and wage setting.

Key takeaways

- *Across all countries, the short-term inflation expectations of households are consistently and significantly above prevailing inflation rates and professional forecasts.*
- *Households perceiving larger post-pandemic price increases have higher inflation expectations, pointing to the risk that inflation bursts may have lasting effects on their expectations.*
- *Knowledge of the central bank remains limited. Informed households tend to have better-anchored inflation expectations, highlighting the importance of effective communication.*

survey methodologies complicate cross-country comparisons. Moreover, some countries still lack representative surveys capturing household expectations.

To address this gap and enable a uniform and comparable measurement of economic expectations and perceptions across a broader range of countries, the BIS sponsored an international household survey conducted between March and April 2025.[3] This survey spans 31 countries, encompassing both advanced economies (AEs) and emerging market economies (EMEs).[4] It includes approximately 1,000 respondents per country, aged 18 to 70, who are broadly representative of the local populations based on gender and age composition. Besides eliciting 12-month-ahead inflation expectations, the survey gathered a wealth of additional information, including individual respondents' socioeconomic characteristics, expectations of other economic variables, perceptions of the strength and causes of the post-pandemic inflation surge, trust in public and private institutions, and knowledge of and preferences regarding central bank mandates.[5]

The survey includes several modules. The module on household economic expectations will be conducted annually to build comparable time series data. Other questions will be periodically adapted to provide timely insights that support central banks in their efforts to maintain price and macro-financial stability.

This article first introduces the survey by describing the structure of the questionnaire and providing an overview of the data collected in March and April 2025.[6] It then delves into household inflation expectations, documenting baseline forecasts and their risk balance, the role of salient items, the relationship with other economic expectations and differences across households. The subsequent section focuses on perceptions of the post-pandemic inflation surge, its drivers and the impact on real wages. Finally, the article examines knowledge of central banks, including awareness of their mandates and operational tools, households' sources of information and their support for central bank independence.

[3] The survey was designed in collaboration with Francesco D'Acunto (Georgetown University) and Michael Weber (Purdue University) who also contributed to financing the study.

[4] The countries include AR, AU, BE, BR, CA, CH, CN, CO, DE, ES, FR, GB, HK, ID, IN, IT, JP, KR, MX, MY, NL, PH, PL, SA, SE, SG, TH, TR, US, VN and ZA.

[5] The survey elicits expectations and perceptions of individuals. In the article we refer to "individuals", "respondents" and "households" interchangeably.

[6] The overview in this article is based on 29 countries, as it excludes Argentina and Türkiye, where inflation expectations are significantly higher than in other countries.

Structure of the survey questionnaire

This section provides a brief overview of the survey structure, with the complete questionnaire available in a separate Online Annex. The first two questions elicit information about the age and gender of respondents, and the third assesses their attention, discarding those that provide answers inconsistent with the instructions.[7] The rest of the questionnaire is broadly organised in four modules, as summarised in Graph 1.

The first part of the survey, covering questions 4 to 10, focuses on eliciting households' near-term expectations about inflation and a few other key macroeconomic variables. After a simple explanation of the concept of inflation, survey participants are asked about their perception of current inflation and their expectations of the inflation rate over the next 12 months.[8] Specifically, households have to provide their lowest, highest and most likely expected inflation rates, which allows us to measure both the first and second moment of inflation expectations under standard distributional assumptions and with minimal cognitive effort from the respondents. Additionally, participants are asked about the specific goods or services that most strongly influence their inflation expectations. This section also gathers household expectations about their future income, the unemployment rate and interest rates, as well as their trust in the government, central banks and domestic banks.

Structure of the questionnaire — Graph 1

Module 1: Expectations

Q4. Perceived inflation
Q5. Expected inflation: lowest, highest, most likely
Q6. Salient prices for inflation expectations
Q7. Expected change in household income
Q8. Expected change in the unemployment rate
Q9. Expected change in interest rate
Q10. Trust in institutions

Module 2: Perceptions of the inflation surge

Q11. Perceived price changes pre- and post-pandemic
Q12. Perceived income changes pre- and post-pandemic
Q13. Drivers of post-pandemic price increases
Q14. Drivers of post-pandemic income increases
Q15. Change in purchasing power post-pandemic

Module 3: Knowledge of central banks

Q16. Knowledge of central bank name
Q17. Perceived central bank goals
Q18. Desired central bank goals
Q19. Awareness of central bank tools
Q20. Support for central bank independence
Q21. Information sources about the central bank

Module 4: Respondents' characteristics

Q1. Age
Q2. Gender
Q3. Attention level
Q22. Financial literacy
Q23. Frequency of grocery shopping or car refuelling
Q24. Personal attitudes
Q25. Household income
Q26. Home ownership
Q27. Employment situation
Q28. Household size
Q29. Education
Q30. Support for government

Source: Authors' elaboration.

[7] Survey participants are selected to broadly match the population structure of each country.

[8] The question design follows standard practice in the literature, for example as in Guiso et al (2002), Armantier et al (2017) and Coibion and Gorodnichenko (2025).

The second part of the survey, covering questions 11 to 15, gauges households' views of the post-pandemic inflation surge and contrasts this period with pre-pandemic years. Specifically, respondents are asked about perceived changes in prices and wages during the five years before and after the Covid-19 pandemic. The survey also goes a step further by asking for the perceived causes of the inflation surge, the factors driving wage dynamics and the perceived change in purchasing power since the onset of the pandemic.

The third section, spanning questions 16 to 21, assesses households' knowledge of central banks and their mandates. Participants are asked whether they recognise the name of their central bank and to indicate their perceived and desired objectives for central banks. Further questions explore households' understanding of monetary policy tools, their support for central bank independence and their sources of information about central banks and monetary policy.

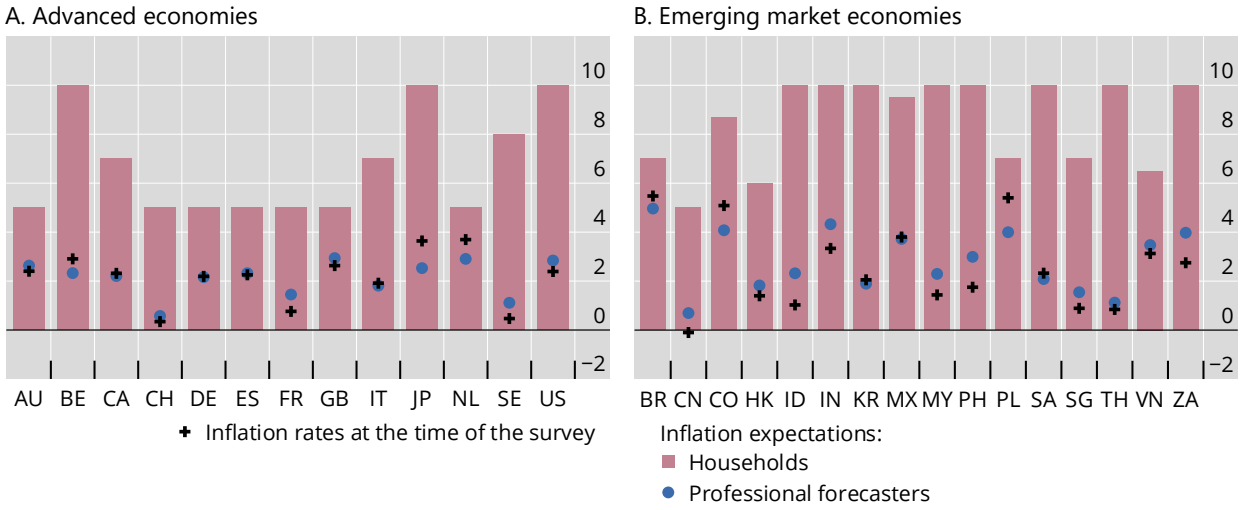
The final section of the survey collects rich information about respondents' demographic, socioeconomic and other personal characteristics. This includes questions on their financial literacy, the frequency of grocery and gasoline shopping, personal attitudes such as risk-taking, impatience and mathematical ability, as well as household income, home ownership, employment status, household size, education level and support for the political parties in power in their country.

The first and fourth sections of the survey will likely be repeated on a yearly basis on a new set of households to build consistent time series data. This will also make it possible to verify the extent to which the insights based on this first wave are time-specific or hold more broadly over time. The second and third sections will be adapted periodically to address topical issues.

Household inflation expectations are elevated, higher than professional forecasts and prevailing inflation rates[1, 2]

In per cent

Graph 2



[1] Based on data from survey question Q5. [2] Household inflation expectations are calculated by taking the median of the individual responses for each country.

Sources: BIS global household survey; Consensus Economics; authors' calculations.

Household inflation expectations

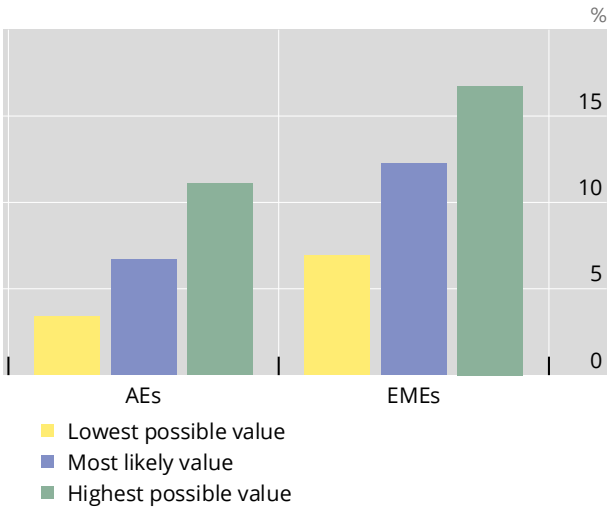
Across both AEs and EMEs, the 12-month-ahead inflation expectations of households are elevated, considerably exceeding the prevailing inflation rates at the time of the survey.[9] Household inflation expectations are also notably higher than professional forecasts. In AEs, the former are approximately double the latter, with the largest gaps observed in Switzerland, Japan, Sweden and the United States (Graph 2.A). In EMEs, the discrepancies tend to be even more pronounced, with the widest gaps recorded in Thailand, Saudi Arabia, Malaysia, Indonesia and Korea (Graph 2.B). Overall, the survey results demonstrate that the upward bias in household inflation expectations relative to actual realisations as well as to professional forecasts is a truly global phenomenon.

On average across all countries, households report broadly balanced views of the risk to the inflation outlook (Graph 3.A). Besides providing the "most likely value" of the 12-month-ahead inflation rate, households are also asked about the "lowest possible value" and the "highest possible value". The "most likely value" for expected inflation falls roughly in the middle of the reported range, indicating that households expect inflation to be equally likely to overshoot or undershoot the baseline forecasts. However, we observe some differences between AEs and EMEs, with risks to the inflation outlook modestly tilted to the upside for AEs and to the downside for EMEs.

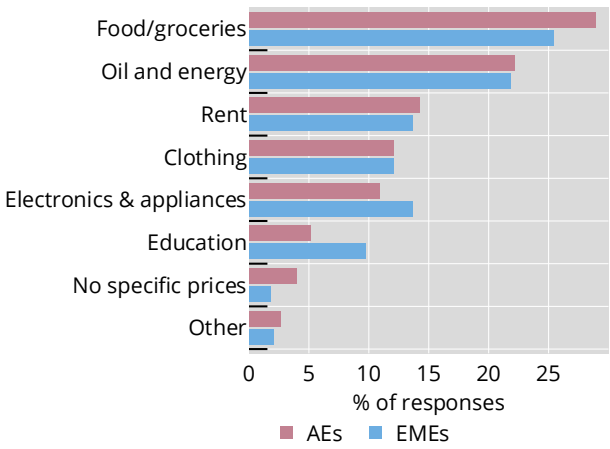
The survey also provides new evidence regarding the specific goods and services influencing household inflation expectations. Notably, households place more emphasis on particular categories of prices when forming expectations of aggregate

Risks to the inflation outlook are broadly balanced; inflation expectations are mostly influenced by food and energy prices[1, 2] Graph 3

A. Inflation expectations' balance of risk



B. Salient items for inflation expectations



[1] Panel A uses data from survey question Q5, and panel B from Q6. [2] The values are calculated by taking the median of the individual "most likely value" responses within each country and then taking the mean across countries.

Sources: BIS global household survey; authors' calculations.

[9] These results are consistent with evidence from household surveys in individual countries (D'Acunto and Weber (2024)).

inflation, although with significant variation across country groups. In both AEs and EMEs, expectations appear most heavily influenced by the price of food and groceries as well as of oil and energy (Graph 3.B).[10] However, food appears to have a stronger influence on household inflation expectations in AEs than in EMEs, despite the typically higher weight for food in EMEs' consumer price indices. Conversely, electronics and education hold relatively greater salience in EMEs.

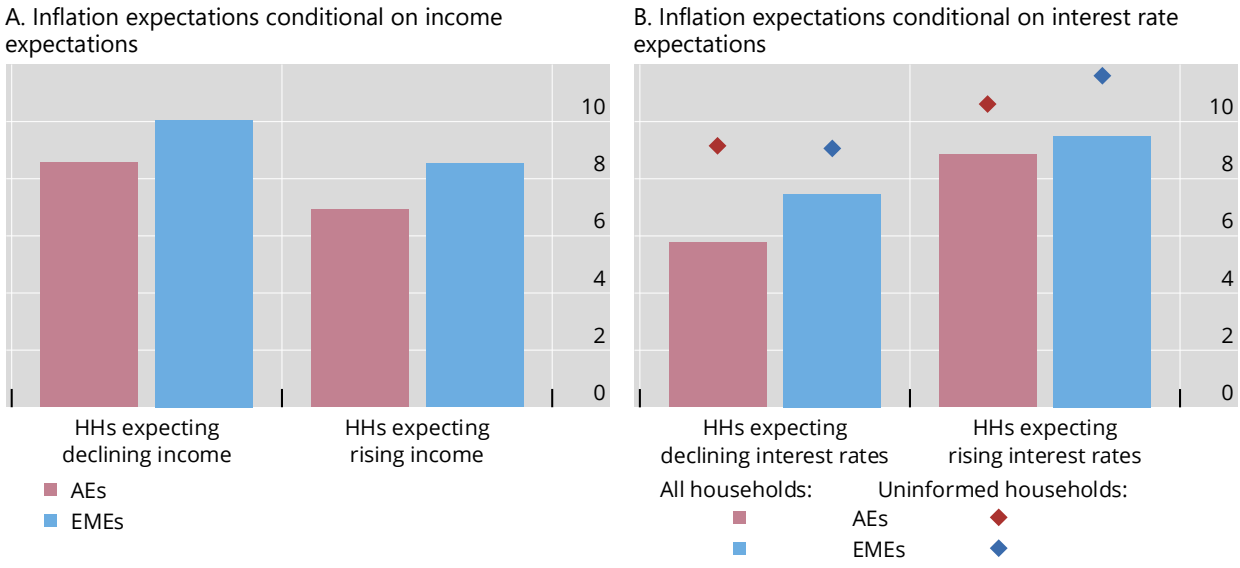
Relationship between inflation expectations and other economic expectations

Regarding the relationship between inflation expectations and other economic beliefs, in both AEs and EMEs inflation expectations tend to be more elevated among households that expect their income to decrease (Graph 4.A). These patterns should be interpreted with caution since they are based on cross-sectional variation across households, which prevents a clear identification of the underlying drivers. However, a plausible interpretation consistent with other evidence in the literature (Kamdar (2019); Coibion et al (2022); Grigoli and Sandri (2024)), is that households' views of inflation tend to be stagflationary rather than demand driven. In other words,

Inflation expectations tend to be higher for households that expect declining incomes or increasing interest rates[1, 2]

In per cent

Graph 4



[1] Panel A uses data from survey questions Q5 and Q7 combined, and panel B from Q5 and Q9 combined. [2] The bars represent the inflation expectations of all the households (HHs) which took part in the survey. In panel B, the dots reflect the inflation expectations of households which do not recognise the name of their country's central bank (Q16) and do not select price stability as one of the goals of the central bank (Q17).

Sources: BIS global household survey; authors' calculations.

[10] These findings are consistent with previous survey results, documenting that some goods (eg groceries and gasoline prices) have outsize salience and hence stronger influence on household expectations (see eg D'Acunto, Malmendier, Ospina and Weber (2021) and D'Acunto, Malmendier and Weber (2021)).

households tend to associate higher inflation with lower income, consistent with perceptions of a worsening economic outlook following an adverse supply shock.

Inflation expectations also tend to be higher among households that expect interest rates to increase (Graph 4.B), as also documented in Coibion et al (2023) for the United States. These findings lend themselves to different interpretations. One possibility is that households understand that central banks typically increase interest rates to maintain price stability when inflation rises. However, this interpretation is unlikely to explain the positive correlation between expected inflation and interest rate changes since this pattern is present even among respondents that have very limited understanding of monetary policy.[11] Alternatively, causality may run in the opposite direction, reflecting the cost channel of monetary policy (Barth and Ramey (2001)). Specifically, households may expect that higher interest rates will feed into inflation by raising borrowing costs. Finally, these patterns may also simply reflect differences in attitudes, with some households being more pessimistic and thus expecting higher inflation and increasing interest rates.

Differences across households

The survey results also reveal that household inflation expectations vary considerably across households. Across both AEs and EMEs, the distribution of inflation expectations displays a long right tail (Graph 5.A).[12]

By collecting a rich set of information about the respondents, the survey makes it possible to examine how personal characteristics influence the formation of household expectations and helps to explain their dispersion. To this end, we estimate the following regression:

$$\pi_i^e = \alpha_c + \beta D_i + \varepsilon_i \,.$$

The dependent variable, π_i^e, is the inflation expectation of an individual household i. The vector D_i includes dummy variables capturing the following household characteristics: financial literacy (high),[13] gender (female), age (above 50), education level (college or higher), political views (supports the political party currently forming the government), employment status (employed), home ownership (owns a home), and income level (above the median value for each country).[14]

[11] These are the respondents who do not recognise the name of their country's central bank and do not select price stability among its goals.

[12] For example, on average across countries, about one in five households expect the inflation rate over the next 12 months to exceed 15%. A large dispersion in household inflation expectations can be indicative of higher future inflation, as documented, for example, in Reis (2021) and Brandao-Marques et al (2023).

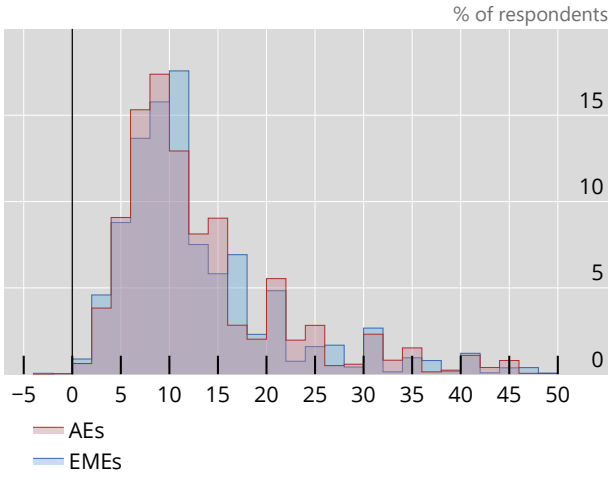
[13] The dummy variable for financial literacy takes the value of one if the household understands that the statement in question Q22 is incorrect: "If the money in your savings account grows at an annual rate of 5%, then you will be able to buy more with this money in the future than you are able to buy today regardless of the rate of inflation."

[14] The regression includes country fixed effects α_c, is estimated for AEs and EMEs separately and takes out outliers, including only households with inflation expectations between –5% and 50%.

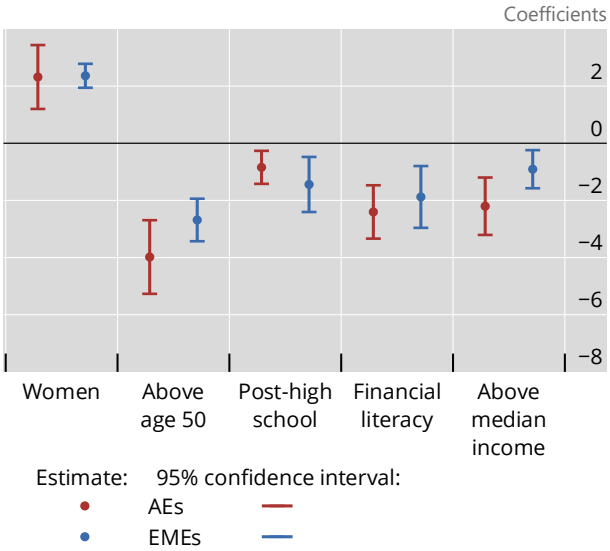
Inflation expectations differ considerably across households, and tend to be higher for women and lower for older people[1]

Graph 5

A. Dispersion of household inflation expectations



B. Role of individual characteristics in household inflation expectations[2]



[1] Panel A uses data from survey question Q5. To ensure that the distribution reflects only household-level heterogeneity and not cross-country differences, we rescale inflation expectations in country c by subtracting the median inflation expectation in country c and adding the average median inflation expectation across all AEs or EMEs. [2] Panel B plots the regression coefficients β from the regression $\pi_i^e = \alpha_c + \beta D_i + \varepsilon_i$. Positive coefficients indicate personal characteristics that are associated with higher inflation expectations. The lines represent the 95% confidence intervals of the coefficient estimates.

Sources: BIS global household survey; authors' calculations.

Regression results highlight gender, age, education, financial literacy and income level as key factors influencing inflation expectations, in both AEs and EMEs (Graph 5.B). Specifically, inflation expectations tend to be higher for women, possibly due to their greater exposure to volatile food prices (D'Acunto, Malmendier and Weber (2021)). Expectations are also generally lower among older individuals and those with higher levels of education, better financial literacy and higher income levels (consistent with evidence from individual countries reported in Das et al (2020), D'Acunto et al (2023) and Weber et al (2022)). The lower expectations among older individuals may stem from their longer experience of relatively stable inflation, which may have reduced the sensitivity of their inflation expectations to the recent post-pandemic inflation surge, in line with the results in Malmendier and Nagel (2016). The role of higher education and financial literacy, in turn, probably reflects greater attention to the news and a better understanding of the economic outlook. Lastly, higher income levels may reduce vulnerability to inflation and mitigate concerns about its future evolution.

Perceptions of the post-pandemic inflation surge

One module of the survey is designed to gather information about households' views of the post-pandemic inflation surge. A first key finding here is that households clearly recognise that the pace of price increases in the post-pandemic years has been significantly faster than in the pre-pandemic period (Graph 6.A). The perceived

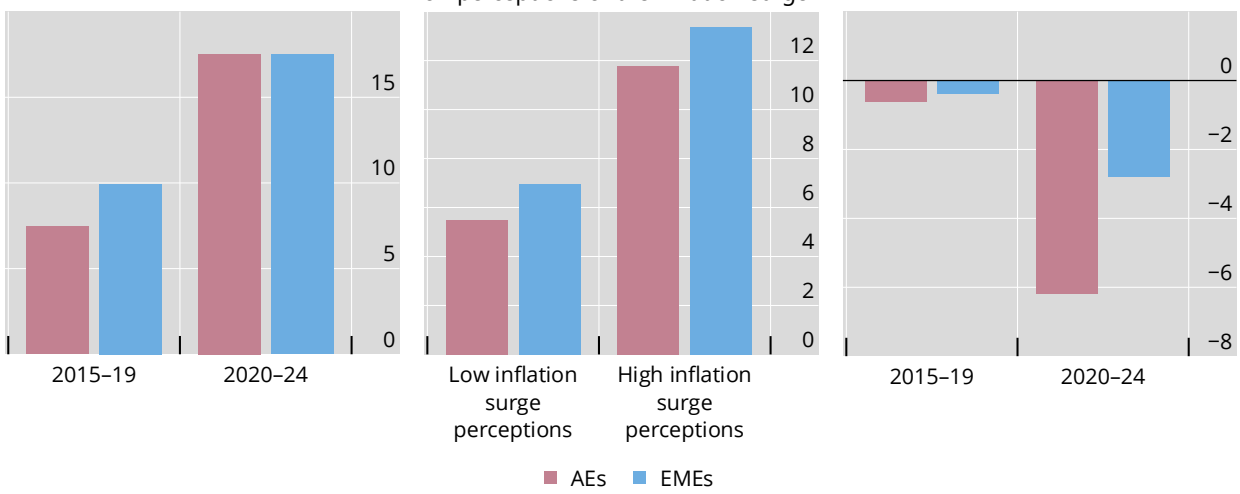
acceleration in price growth is particularly pronounced in AEs, where households report that prices rose more than twice as fast during 2020–24 than in 2015–19.

The survey also reveals that inflation expectations are considerably higher among households that perceive a stronger surge in inflation. Specifically, households with an above-median perception of the inflation surge tend to have inflation expectations that are twice as high as those with below-median perceptions (Graph 6.B). As noted earlier, these results reflect cross-sectional differences and do not allow for a clear identification of the underlying drivers. Nonetheless, they suggest that the inflation surge might be playing an important role in shaping the current elevated level of inflation expectations. These considerations underscore the risk that a temporary inflation burst could have lasting effects on household inflation expectations.

Besides being aware of the post-pandemic acceleration in price growth, households believe the inflation surge has led to a notable erosion of real wages (Graph 6.C). In the pre-pandemic years, households had only a mildly negative perception of real wage dynamics, across both AEs and EMEs. However, these perceptions have significantly deteriorated in the post-pandemic period, especially in AEs, where households report a 6% loss in real wages. This stands in contrast to actual data, which indicate that wages have broadly kept pace with price increases.[15] The perceived strong erosion of real wages is further confirmed by most survey participants reporting a decline in their purchasing power since the onset of the pandemic.

Households perceive much sharper price increases in the post-pandemic years and a loss in real wages and purchasing power[1]

In per cent — Graph 6

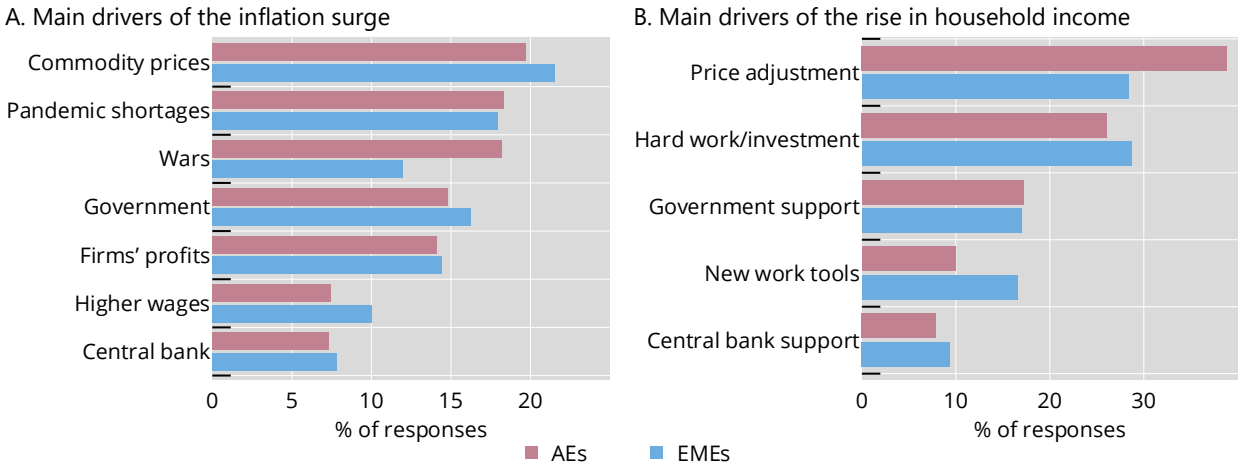


[1] Panel A uses data from survey question Q11, panel B from Q5 and Q11 combined, and panel C from Q11 and Q12 combined.

Sources: BIS global household survey; authors' calculations.

[15] See Hofmann et al (2025) for evidence about the behaviour of real wages during the pandemic and Afrouzi et al (2024) for a macroeconomic theory that can explain the divergence between data and households' perceptions.

Households blame the inflation surge on commodity prices and pandemic shortages and largely attribute income increases to personal efforts[1] Graph 7



[1] Panel A uses data from survey question Q13 and panel B from Q14.

Sources: BIS global household survey; authors' calculations.

The survey also sheds light on households' perceptions about the causes of the inflation surge and the factors driving the post-pandemic increase in household income. Households attribute the inflation surge primarily to the rise of commodity prices and shortages caused by pandemic-related disruptions (Graph 7.A). Governments and wars are also perceived as important factors driving price increases, with the latter playing a particularly important role in AEs. In contrast, central banks are the least frequently mentioned factor, suggesting that households generally do not hold central banks responsible for the inflation surge. That said, rather than indicating broad-based support for the central bank's actions during the inflation surge, this finding may reflect limited public understanding of the central bank's role, as discussed in the next section.

Regarding the factors contributing to income increases in the post-pandemic years, households typically recognise that wage adjustments have been partly driven by the need to compensate workers for rising prices, especially in AEs (Graph 7.B). This understanding might have offered households some consolation during the inflation surge. However, as previously noted, households do not believe that wage adjustments have fully kept pace with inflation. Additionally, households attribute post-pandemic wage increases to their hard work and personal efforts. The perceived erosion of real wages, coupled with the belief that wage increases were largely driven by individual efforts, probably underpins the strong social resentment linked to the inflation surge (Edelman (2025)).

Households' knowledge of central banks

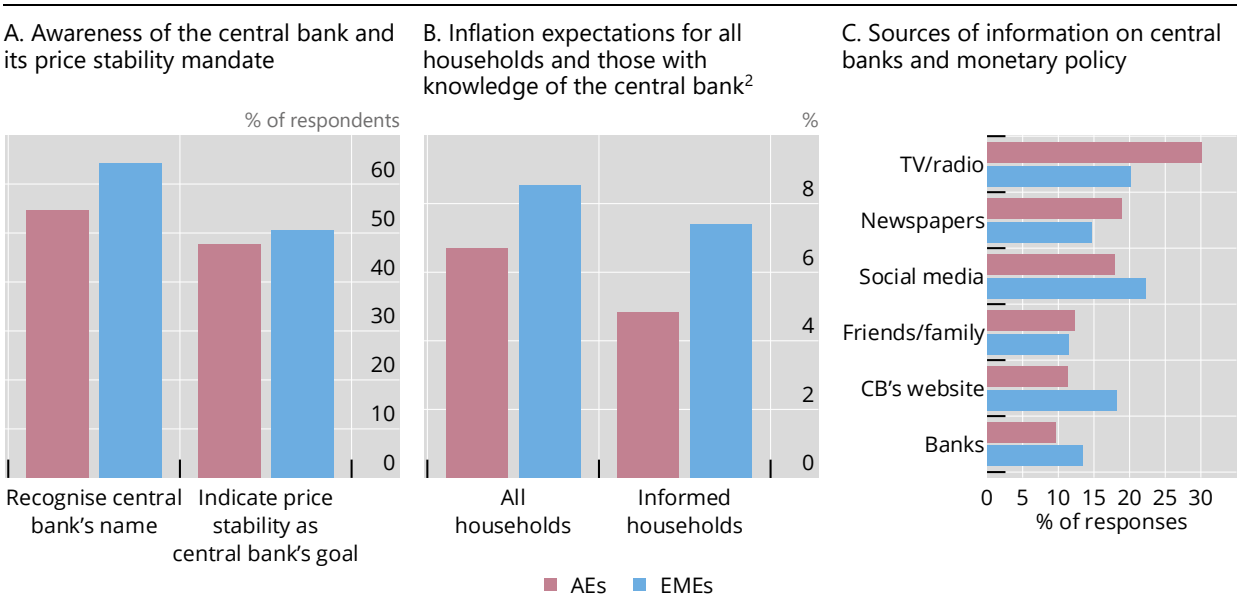
Finally, the survey gathers information about households' knowledge of the central bank, preferences regarding its mandates, knowledge of its operational tools and support for its independence.

Survey participants are presented with the name of the country's central bank and asked to identify which institution it refers to. They have five options to choose from, for example a large private bank or a bank that provides services to the government. Most households recognise the central bank's name but knowledge is far from universal (Graph 8.A). Awareness is higher in EMEs than in AEs, suggesting that households may pay more attention to the central bank in a context of relatively less stable inflation (Weber et al (2025)).[16] Fewer households, just about half, understand that preserving price stability is one of the central bank's goals.[17]

Interestingly, households' knowledge of the central bank and its price stability mandate appears to help anchor inflation expectations. Across both AEs and EMEs, households which recognise the name of their country's central bank and identify price stability as one of its goals tend to have lower inflation expectations (Graph 8.B).

These results highlight the potential value of targeting central bank communication to effectively reach uninformed or disengaged households.

Knowledge of central banks remains limited, while helping to anchor inflation expectations, and social media are an important source of information[1] Graph 8



[1] Panel A uses data from survey questions Q16 and Q17 combined, panel B from Q5 and Q16 combined, and panel C from Q21. [2] "Informed" households are those which recognise the name of their country's central bank and are aware that one of the central bank's objectives is to maintain price stability.

Sources: BIS global household survey; authors' calculations.

[16] Consistent with limited awareness, De Fiore et al (2022) and Blinder et al (2024) provide evidence that household inflation expectations exhibit little sensitivity to Federal Open Market Committee announcements in the United States, although De Fiore et al (2024) find greater sensitivity to the media coverage of these announcements.

[17] Among all 29 jurisdictions examined in this article, only the Hong Kong Monetary Authority does not have a price stability mandate, focusing instead on currency stability.

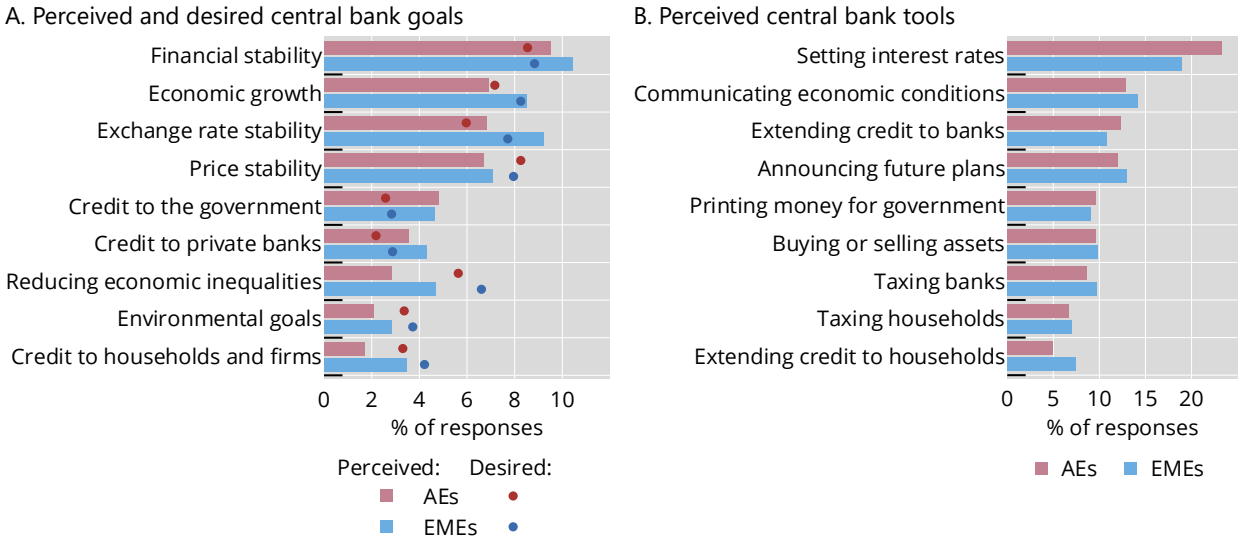
Survey participants report that they obtain central bank and monetary policy information through a variety of channels. Social media emerges as an important source, especially in EMEs, where it surpasses news channels such as TV, radio and newspapers (Graph 8.C).

Besides assessing households' knowledge of price stability mandates, the survey inquires more broadly about the perceived goals of the central bank. Financial stability, economic growth and exchange rate stability are the most frequently mentioned perceived goals, scoring even above price stability (Graph 9.A).

The survey also asks respondents about which goals they would like central banks to pursue. Across AEs and EMEs, households' responses denote a desire for the central bank to place less emphasis on financial and exchange rate stability and more on price stability. Furthermore, households would like central banks to be more involved in reducing economic inequality and addressing environmental concerns relative to their currently perceived engagement, although these objectives are ranked as less important than ensuring price and financial stability. Lastly, households would prefer that central banks reduce credit provisions to governments and banks in favour of increasing credit to households and firms.

Households demonstrate a broad understanding of how central banks conduct monetary policy. Survey respondents are asked how central banks try to achieve their goals (Graph 9.B). "Setting interest rates", "communicating economic conditions" and "announcing future plans" emerge among the most frequently mentioned tools. Additionally, households exhibit awareness of the importance of tools such as "extending credit to banks" and "buying or selling assets", probably reflecting increased focus on unconventional monetary policy measures in central bank communication and media coverage since the Great Financial Crisis.

Households support central banks' pursuit of price and financial stability and perceive interest rates and communication as the key operational tools[1] Graph 9

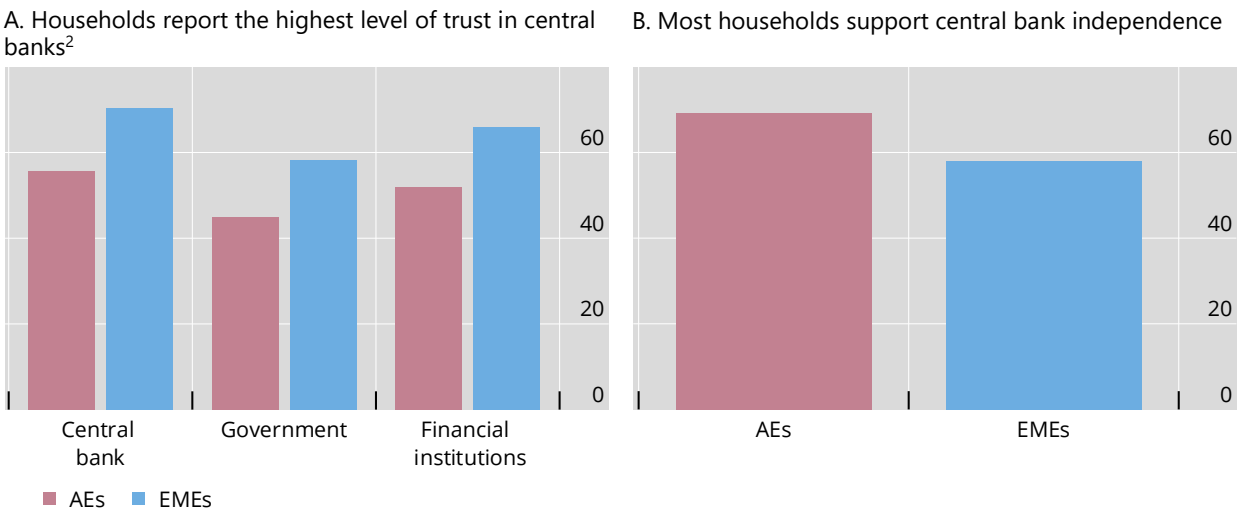


[1] Panel A uses data from survey questions Q17 and Q18, and panel B from Q19.

Sources: BIS global household survey; authors' calculations.

Households trust central banks more than governments, and most support central bank independence[1]

As a percentage of respondents — Graph 10



[1] Panel A uses data from survey question Q10, and panel B from Q20. [2] The bars indicate the share of respondents who chose "some" or "a lot" as their level of trust.

Sources: BIS global household survey; authors' calculations.

The survey also collects information on households' trust in institutions and their support for central bank independence. Households report higher levels of trust in central banks than in governments (Graph 10.A). This aligns with earlier findings that households attribute more blame to governments than to central banks for the inflation surge. The greater trust in central banks is further reflected in the majority support for central bank independence, with this support being stronger in AEs than in EMEs (Graph 10.B).

Conclusions

The findings from the global household survey presented in this article carry significant implications for central banks.

The elevated level of household inflation expectations – consistently higher than current inflation rates and professional forecasts – underscores the value in central banks engaging with wider public audiences to better anchor inflation expectations. In this regard, the survey highlights the importance of improving public understanding of central banks' role and price stability mandates, which remains quite limited. Households with greater knowledge indeed tend to have lower inflation expectations.

The data also reveal that inflation expectations are considerably higher among households with a stronger perception of the post-pandemic increase in the price level. This underscores the risk that even a temporary inflation burst could have lasting effects on household inflation expectations. It also invites consideration of whether central banks should base decisions not only on deviations of inflation from

target but also on the dynamics of the price level. Household perceptions that real wages have significantly eroded in the post-pandemic period, despite wages having largely kept pace with inflation, further point to the importance of central banks enhancing transparency and addressing misconceptions about price and wage dynamics.

Finally, the importance of social media as households' source of information on monetary policy raises the question of whether central banks should enhance their engagement on these platforms to foster public understanding of their policies and achieve broader outreach.

References

Afrouzi, H, A Blanco, A Drenik and E Hurst (2025): "A theory of how workers keep up with inflation", *Becker-Friedman Institute Working Paper*, no 2024-153.

Armantier, O, G Topa, W Van der Klaauw and B Zafar (2017): "An overview of the survey of consumer expectations", *Economic Policy*, vol 23, no 2, pp 51–72.

Barth III, M and V Ramey (2001): "The cost channel of monetary transmission", *NBER macroeconomics annual*, vol 16, pp 199–240.

Blinder, A, M Ehrmann, J de Haan and D Jansen (2024): "Central bank communication with the general public: promise or false hope?", *Journal of Economic Literature,* vol 62, no 2, pp 425–57.

Brandão-Marques, L, G Gelos, D Hofman, J Otten, G Pasricha and Z Strauss (2023): "Do household expectations help predict inflation?", *IMF Working Paper*, no 2023/224.

Coibion, O, D Georgarakos, Y Gorodnichenko and M Weber (2023): "Forward guidance and household expectations", *Journal of European Economic Association,* vol 21, no 5, pp 2131–71.

Coibion, O and Y Gorodnichenko (2025): *Expectations matter: the new causal macroeconomics of surveys and experiments*, Princeton University Press.

Coibion, Y Gorodnichenko and M Weber (2022): "Monetary policy communications and their effects on household inflation expectations", *Journal of Political Economy*, vol 130, no 6, pp 1537–84.

D'Acunto, F, E Charalambakis, D Georgarakos, G Kenny, J Meyer and M Weber (2024): "Household inflation expectations: an overview of recent insights for monetary policy", *NBER Working Paper*, no 32488.

D'Acunto, F, D Hoang, M Paloviita and M Weber (2023): "IQ, expectations, and choice", *Review of Economic Studies,* vol 90, no 5, pp 2292–325.

D'Acunto, F, U Malmendier, J Ospina and M Weber (2021): "Exposure to grocery prices and inflation expectations", *Journal of Political Economy,* vol 129, no 5, pp 1615–39.

D'Acunto, F, U Malmendier and M Weber (2021): "Gender roles produce divergent economic expectations", *Proceedings of the National Academy of Sciences,* vol 118, no 2.

D'Acunto, F and M Weber (2024): "Why survey-based subjective expectations are meaningful and important", *Annual Review of Economics,* vol 16, pp 329–57.

Das, S, C Kuhnen and S Nagel (2020): "Socioeconomic status and macroeconomic expectations", *Review of Financial Studies,* vol 33, no 1, pp 395–432.

De Fiore, F, M Lombardi and J Schuffels (2022): "Are households indifferent to monetary policy announcements?", *CEPR Discussion Paper*, no DP17041.

De Fiore, F, A Maurin, A Mijakovic and D Sandri (2024): "Monetary policy in the news: communication pass-through and inflation expectations", *BIS Working Papers*, no 1231.

Edelman (2025): "Trust and the crisis of grievance", *2025 Edelman Trust Barometer Global Report*.

Grigoli, F and D Sandri (2024): "Public debt and household inflation expectations", *Journal of International Economics*, vol 152, 104003.

Guiso, L, T Jappelli and L Pistaferri (2002): "An empirical analysis of earnings and employment risk", *Journal of Business and Economic Statistics*, vol 20, no 2, pp 241–53.

Hofmann, B, K Munakata, T Rosewall and D Sandri (2025): "Completing the post-pandemic landing", *BIS Bulletin*, no 97.

Kamdar, R (2019): "The inattentive consumer: sentiment and expectations", mimeo.

Malmendier, U and S Nagel (2016): "Learning from inflation experiences", *Quarterly Journal of Economics*, vol 131, no 1, pp 53–87.

Reis, R (2021): "Losing the inflation anchor," *Brookings Papers on Economic Activity*, September.

Weber, M, F D'Acunto, Y Gorodnichenko and O Coibion (2022): "The subjective inflation expectations of households and firms: measurement, determinants, and implications", *Journal of Economic Perspectives,* vol 36, no 3, pp 157–84.

Weber, M et al (2025): "Tell me something I don't already know: learning in low- and high-inflation settings", *Econometrica,* vol 93, no 1, pp 229–64.

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Monetary policy operational frameworks – a new taxonomy[1]

Central banks' operational frameworks are at the heart of monetary policy implementation. Yet the conventional classification falls short of capturing their wider implications for banks' incentives and market outcomes. We propose a new taxonomy based on two key dimensions. First is the marginal opportunity cost of holding reserves, which influences banks' incentives to trade reserves in the money market. Second is the quantity of reserves, which affects how banks manage liquidity risks and comply with regulatory and supervisory requirements. The continuous nature of these dimensions allows for a granular classification of operational frameworks. Applying the taxonomy to real-world operational frameworks uncovers unexpected similarities between distinct frameworks and highlights how similar designs can lead to differing outcomes.

JEL classification: E42, E58

Monetary policy operational frameworks (in short, operational frameworks) are critical for central banks. They encapsulate the mechanisms and tools used to steer the central bank's operational target in line with the desired policy stance and to provide liquidity to the financial sector. As such, the operational framework enables the central bank to achieve its monetary policy and financial stability objectives.

In recent years, changes in balance sheet size and composition have prompted central banks to re-examine how they implement monetary policy. Multiple rounds of quantitative easing (QE) following the Great Financial Crisis and the Covid-19 pandemic led many central banks to transition from operational frameworks with scarce reserves, ie a small volume of reserves, to frameworks with ample or a large volume of reserves.[2] More recently, some central banks have combined balance sheet reductions with a reassessment of their operational framework design.

Operational frameworks have traditionally been classified based on where the overnight money market rate – typically the central bank's operational target – trades

[1] The views expressed in this publication are those of the authors and not necessarily those of the BIS or its member central banks. We thank Albert Pierres Tejada for excellent research assistance. For helpful comments, we are also grateful to Claudio Borio, Gaston Gelos, Patrick McGuire, Daniel Rees, Kilian Rieder, Andreas Schrimpf, Hyun Song Shin, Frank Smets, Nikola Tarashev and John Williams. Our thinking regarding the taxonomy, country-specific details and data availability benefited from conversations with central bank practitioners. Special thanks go to Chanutaporn Boonsongsawat, Rodrigo Cano and Per Åsberg-Sommar. All remaining errors are our own.

[2] See Cap et al (2020) for a detailed discussion about changes in operational frameworks after the Great Financial Crisis and Cantú et al (2021) for a discussion of central banks' monetary response to the pandemic.

Key takeaways

- *A new taxonomy of monetary policy operational frameworks explores two dimensions: the marginal opportunity cost of holding reserves and the quantity of reserves.*
- *This taxonomy is rooted in economically relevant dimensions that influence and reflect banks' incentives and, therefore, market outcomes.*
- *When applied to current operational frameworks, the taxonomy reveals surprising similarities between frameworks regarded as distinct and highlights how similar designs can yield very different outcomes.*

relative to the interest rates set by the central bank.[3] This classification, rooted in the seminal Poole (1968) model, identifies four archetypes, with the "corridor" system and the "floor" system being the most prominent. In a corridor system, the overnight interest rate trades in a "corridor" bounded from below by the interest rate paid by the central bank on overnight deposits and from above by the rate it charges on overnight loans. In contrast, in a floor system the overnight interest rate trades close to the interest rate the central bank pays on deposits.

While the traditional classification of operational frameworks is helpful for encapsulating how central banks implement monetary policy, it does not fully capture their broader implications for banks' incentives and the financial system as a whole. Two dimensions are especially important: the *marginal opportunity cost* of holding reserves, and the *aggregate quantity* of reserves. The former is the difference between the rate earned on lending an additional unit of reserves in the money market, and that earned by depositing it at the central bank. This cost is the key driver of banks' incentives to trade reserves in the money market. The aggregate quantity of reserves affects how banks manage liquidity risks and comply with regulatory and supervisory requirements. The role of reserves in managing liquidity risks has been an important consideration for several central banks that have recently changed their operational frameworks.

The conventional archetypes are too coarse and fail to capture important variations along these key dimensions. For example, corridor systems can operate with widely varying corridor widths – from a few basis points to several percentage points – which imply very different marginal opportunity costs. Similarly, in floor systems the quantity of supplied reserves can vary significantly – from just above the level where the demand curve flattens to very large amounts.[4] These differences have implications for banks' incentives and behaviours. Moreover, conventional archetypes can at times be misleading, grouping distinct systems or separating similar ones, hampering comparisons of operational frameworks. These limitations have become increasingly apparent in recent decades, both when central banks' balance sheets expanded and more recently when they contracted.

In this article, we propose a new taxonomy that categorises operational frameworks along the two dimensions: (i) the marginal opportunity cost of holding an additional unit of reserves; and (ii) the aggregate quantity of reserves. The first

[3] Not all central bank operational targets are overnight money market rates. Some central banks have targeted a longer-term rate (eg the three-month or the 10-year rate) or the foreign exchange rate.

[4] The former case is often referred to as an ample supply of reserves, while the latter case is often referred to as an abundant supply of reserves.`

provides a precise measure of where the money market rate trades relative to the central bank's deposit facility rate, moving beyond traditional labels that indicate only whether the money market rate trades "in the corridor" or "at the floor". Similarly, the quantity of reserves offers a specific measure of where on the demand curve the central bank operates.

Applying the taxonomy to real-world operational frameworks uncovers surprising similarities between frameworks commonly regarded as distinct and highlights how similar designs can yield very different outcomes. For instance, the Reserve Bank of Australia, the Bank of Canada and Sveriges Riksbank operate seemingly different operational frameworks but achieve similar outcomes: a moderately large quantity of reserves paired with a low, yet positive, marginal opportunity cost. On the other hand, the Bank of Mexico, the Swiss National Bank and the Bank of Thailand design their frameworks to achieve a high marginal opportunity cost while maintaining a lower average opportunity cost of holding reserves, but their outcomes vary. Reserve levels in Mexico and Thailand are significantly lower than in Switzerland. Additionally, the marginal opportunity cost of holding reserves in Mexico is much higher than in Thailand and Switzerland.

The remainder of the article is organised as follows. First we briefly review the Poole (1968) model and the archetypal operational frameworks. Then we discuss the new taxonomy in more detail. Finally, we apply the new taxonomy to a select group of central banks. The two boxes examine how international prudential standards affect banks' demand for reserves, and the balance sheet mechanics that influence the level of reserves in the system.

Operational frameworks – a primer

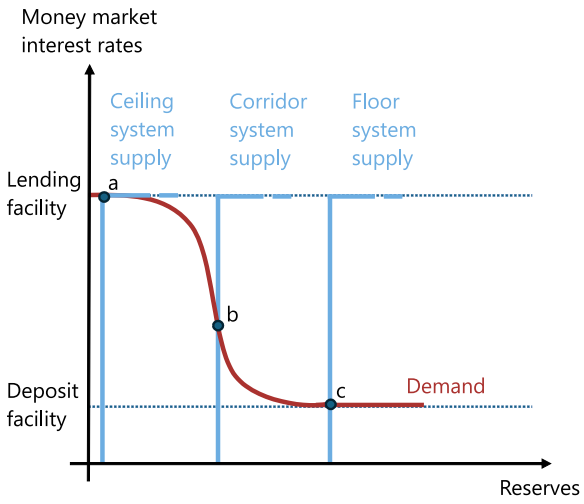
Operational frameworks encapsulate the mechanisms and tools used to steer the central bank's operational target in line with the desired policy stance and to provide liquidity to the financial sector. While multifaceted in practice, the core of any operational framework is the supply of reserves given the prevailing demand.

Poole (1968) was the first to examine these issues theoretically, laying the foundation for numerous models developed since. These models of the overnight market are based on two core features.[5] First, central bank reserves are essential to settle payments flowing between banks during the day. Any bank that is short can borrow from the interbank market, but – if short at the end of the trading day – it needs to turn to the central bank and borrow from the lending facility at a premium. Second, banks can lend reserves in the interbank market, with the standing central bank deposit facility serving as the outside option for potential lenders. These features imply a non-linear reserve demand curve (Graph 1): for low levels of reserves, the demand curve is flat at the lending facility rate, while for high levels of reserves, the demand curve is flat at the deposit facility rate. Between these flat segments, the demand curve is downward-sloping.

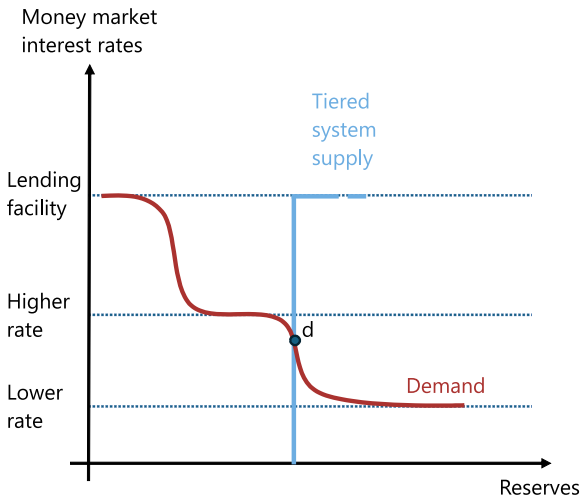
[5] These features remain central to recent papers that incorporate search and matching, bargaining and heterogenous market participants in the money market (eg Lagos and Navarro (2024)).

Stylised description of the conventional classification of operating systems[1] Graph 1

A. Ceiling, corridor and floor systems



B. Tiered system



[1] The stylised description illustrates how the archetypical operating frameworks (ceiling, corridor, floor and tiered systems) operate on different parts of the demand for reserve curve.

Source: Authors' elaboration.

Against the backdrop of these models, operational frameworks are typically classified into four main archetypes: the "ceiling" system, the "corridor" system, the "floor" system and the "tiered" system.[6] This taxonomy is based on where the money market rate trades relative to the rates on standing facilities or, equivalently, on which part of the demand curve the system operates:

- In the ceiling system, the central bank operates on the upper flat segment of the demand curve and supplies reserves via its standing lending facility (Graph 1.A, point a). As a result, the money market rate aligns with the lending facility rate.
- In the corridor system, the central bank calibrates the supply of reserves to intersect the downward-sloping portion of the demand curve (point b). Here, the money market rate trades within the corridor defined by the rates of the two standing facilities.
- In the floor system, the central bank provides a sufficiently large volume of reserves so that supply intersects the flat, lower segment of the demand curve (point c). In this case, the money market rate trades at the deposit facility rate.
- In the tiered system, the central bank engineers a second steep segment of the demand curve (Graph 1.B) by remunerating reserves up to a certain level at a higher rate, while reserves exceeding this level earn a lower rate. The

[6] All four archetypes have been used at various times: ceiling systems were common around the turn of the 20th century when standing lending facilities were often the main tool used by central banks to supply reserves; corridor systems were common around the turn of the 21st century; and floor and tiered systems have become more common in recent years as some central bank balance sheets have grown alongside foreign exchange intervention and unconventional monetary policies (Bindseil (2024)).

central bank sets the supply to intersect this second steep segment, and the money market rate trades between the two renumeration rates (point d).

A new operational framework taxonomy

The traditional classification of operational frameworks is useful for encapsulating how central banks steer their operational target in line with the desired policy stance, but it does not fully capture the implications of each framework for banks' behaviour and the financial system. To address this gap, we propose a new operational framework taxonomy based on two core dimensions: the marginal opportunity cost of holding reserves and the quantity of reserves.

The marginal opportunity cost of holding reserves

The marginal opportunity cost of holding reserves is defined as the difference between the rate at which one additional unit of reserves can be lent overnight in the market and the rate at which it can be deposited overnight at the central bank.[7]

This marginal opportunity cost plays a crucial role in shaping banks' incentives to either accumulate or economise on reserves at the margin. Thereby, it influences the degree of activity in the overnight money market.[8] All else equal, a higher marginal opportunity cost strengthens a bank's incentive to avoid holding more reserves than are strictly needed and to benefit from lending reserves in the money market.

The quantity of reserves

The quantity of reserves is defined as the aggregate quantity of reserves held by banks overnight in excess of any requirement set by the central bank.

Banks hold these reserves overnight as part of their overall portfolio decision, balancing risk and return considerations. Intraday, banks need reserves for payment and settlement purposes. But for banks considering whether and how many reserves to hold overnight, reserves are simply another asset with specific risk-return characteristics. In particular, reserves earn the interest rate on the deposit facility, which may be zero if they are unremunerated. From a risk perspective, reserves are the safest asset in the market, because central banks carry virtually no counterparty risk. From a liquidity risk perspective, reserves, unlike other high-quality liquid assets (HQLA), do not need to be monetised. Hence they are immediately available to meet outflows and are not subject to market risk. To put it differently, the quantity of reserves is the next day's immediately available funding liquidity for banks.[9]

[7] If there is more than one overnight market rate – for example, an interbank unsecured rate and an interbank secured rate – we use whichever constitutes the central bank's operational target. If neither does, we use whichever is a reference rate, or whichever market is larger.

[8] See, for instance, Bindseil and Jablecki (2011) and Blasques et al (2018).

[9] We define funding liquidity as the ability to settle obligations with immediacy (Drehmann and Nikolaou (2013)). Consequenly, funding liquidity risk is the possibility that over a specific horizon the bank will become unable to settle obligations with immediacy, which depends on future in- and outflows including obtaining reserves from different sources such as the interbank market or selling assets.

The aggregate quantity of reserves can therefore affect the extent to which banks hold reserves as part of their liquidity risk management strategy. This may include the use of reserves to fulfil regulatory and supervisory requirements (see Box A). Holding reserves rather than other HQLA may entail some benefits for banks' liquidity risk management and overall financial stability. Bailey (2024), for instance, argues that the supply of reserves by the central bank should take into account the increased size and speed of potential runs given that there are limits to the capacity of private markets and contingent facilities to convert other assets into reserves. Logan (2023) points out that reserves are the most liquid asset and argues that a system with a low quantity of reserves imposes a penalty on good liquidity risk management. That said, Acharya et al (2023) and Borio (2023) argue that the quantity of reserves supplied can fundamentally alter banks' behaviour and business models in ways that increase, rather than reduce, their liquidity risk and dependence on central bank support.[10] Indeed, there is empirical evidence that the demand curve for reserves in major advanced economies has shifted outwards in recent years, although identifying the underlying drivers remains empirically challenging.[11]

The quantity of reserves and the marginal opportunity cost of holding them are two independent but related dimensions. The quantity of reserves is tied to the *average* opportunity cost of holding them, defined as the average spread between the overnight money market rate and the rate earned on reserves held at the central bank. While central banks can set the aggregate quantity of reserves in the system, they cannot simultaneously set the aggregate quantity and their price; for banks to be willing to hold greater amounts of reserves, all else being equal, the average opportunity cost of holding reserves must decrease.[12]

The distinction between marginal and average opportunity cost is subtle, but important. In frameworks where the central bank pays a single rate on all reserves held overnight, marginal and average opportunity costs coincide. This occurs, for example, in the archetypical corridor and floor systems. In the former, each unit of reserves incurs a high opportunity cost as the central bank deposit rate is below the market overnight interest rate. In the latter, the market rate trades close to the deposit facility, and again the marginal and average opportunity cost are the same. But in the archetypal tiering system, the central bank pays the policy rate on reserves up to certain bank-specific quotas, and a lower rate on reserves held above the quotas. In such a system, the average opportunity cost is low – or indeed negative, since the policy rate paid on reserves within the quota is *higher* than the market rate – but the marginal opportunity cost for banks with reserves above their quota is high. This

[10] An example of behavioural shifts by banks in response to central banks' reserve supply is the case of Norway, where the central bank operated a floor system from 1990 to 2011. During this period, the Central Bank of Norway had to consistently increase its supply of reserves to maintain the short-term money market rate near the deposit rate. This trend was especially pronounced following the Great Financial Crisis. In October 2011, the central bank transitioned to a tiering system with a high marginal opportunity cost of holding reserves. Since implementing this new framework, the level of reserves has remained constant. See Central Bank of Norway (2014, 2021).

[11] See eg Maechler and Moser (2022), Lopez-Salido et al (2023), Afonso et al (2024) or Borio et al (2024).

[12] In theory, once the average opportunity cost of holding reserves reaches zero (ie the central bank operates on the flat part of the reserves demand curve) the central bank can increase reserve supply without the average opportunity cost falling further. However, this might not necessarily be the case in practice, if key money market participants (eg non-bank financial institutions) do not have access to the deposit facility and there are limits to arbitrage for central bank counterparties. Indeed, there has been a "leaky floor" in the United States (for a long time) and the euro area (more recently) where money market rates have fallen below the deposit rate – a negative opportunity cost.

generates incentives for banks to trade reserves in the money market. A similar outcome can be achieved if the central bank offers reserve-absorbing operations during the day at a rate higher than the deposit rate.

Other relevant dimensions

By focusing on the key dimensions that drive banks' incentives, the proposed taxonomy does not capture the full complexity of operational frameworks in practice.[13] One issue that has gained attention in recent years are the modalities of how the central bank supplies reserves, in particular whether it fixes the quantity of reserves or their price, or utilises a combination of both. If the central bank fixes the quantity, banks' demand determines the price of reserves. This approach of fixing the supply of reserves is sometimes referred to as "supply-driven". Conversely, if the central bank sets the price at which it injects or drains reserves and meets all demand at that price, it is banks' demand that determines the quantity of reserves, and the framework is typically called "demand-driven".[14]

The distinction between frameworks that primarily rely on fixing quantities versus prices was prominent in recent operational framework reviews by central banks that have started to shrink their balance sheets.[15] Unconventional monetary policies such as quantitative easing, funding for lending schemes and foreign exchange intervention – if not sterilised – increase the supply of reserves and lower the opportunity cost of holding reserves (see Box B for a discussion of central bank balance sheet mechanics and the quantity of reserves). Once a central bank wants to maintain a low opportunity cost of holding reserves and at the same time shrink its balance sheet, it faces a choice: maintain a supply-driven operational framework or move to a demand-driven one. In both cases, the central bank has to account for variation in reserves demand if it wants to keep opportunity costs low and avoid sudden jumps in money market rates. But demand- and supply-driven approaches address this uncertainty differently. The former allows the level of reserves to respond to demand. The latter seeks to estimate variation in demand ex ante and takes it into account when determining the level of reserve supply.

Distinguishing supply- and demand-driven frameworks is not always straightforward, as central banks offer a range of operations that combine elements of both. For example, all central banks operating supply-driven frameworks offer a backstop lending facility designed to meet any additional demand for reserves at a fixed price for eligible banks that can post sufficient collateral. Frameworks commonly portrayed as supply-driven can also be very responsive to demand conditions, as is the situation in Canada. In this case, the supply-driven systems are functionally very similar to demand-driven ones. Conversely, in demand-driven frameworks the central bank may still use operations commonly associated with supply-driven frameworks, such as government bond purchases or fixed-quantity term lending operations, to

[13] The Markets Committee Compendium on monetary policy frameworks and central bank market operations provides a detailed overview across a wide range of dimensions for nearly 30 countries. See www.bis.org/mc/compendium.htm?m=147.

[14] Demand-driven frameworks are often implemented via fixed-price full allotment repo auctions, ie banks tell the central bank the quantity of reserves they want (at the fixed interest rate), and the central bank supplies this quantity in full to banks. Meanwhile, one way to implement supply-driven frameworks is for the central bank to hold a variable rate repo auction to allocate a fixed quantity of reserves to bidding banks. Another is for the central bank to purchase a set quantity of securities in the market.

[15] See eg Bailey (2024), ECB (2024) and Kent (2024).

supply at least a portion of reserves. Such an approach is used, for instance, in the United Kingdom.

Box A

International liquidity standards and banks' demand for central bank reserves

Rebeca Anguren, Ulf Lewrick and Nikola Tarashev ①

International prudential standards that strengthen banks' liquidity management could in principle interact with the implementation of monetary policy by affecting the demand for reserves – the liquid asset par excellence. This box conceptually reviews whether the Basel III Liquidity Coverage Ratio (LCR) and Net Stable Funding Ratio (NSFR) or other prudential standards may give rise to such interactions.② The review shows that Basel III does not impose any explicit regulatory *requirements* on reserve holdings but does create scope for supervisors to do so. By affecting cost-benefit trade-offs, prudential standards could also generate *incentives* for banks to hold more reserves. The materiality of the various effects hinges on the monetary policy operational framework.

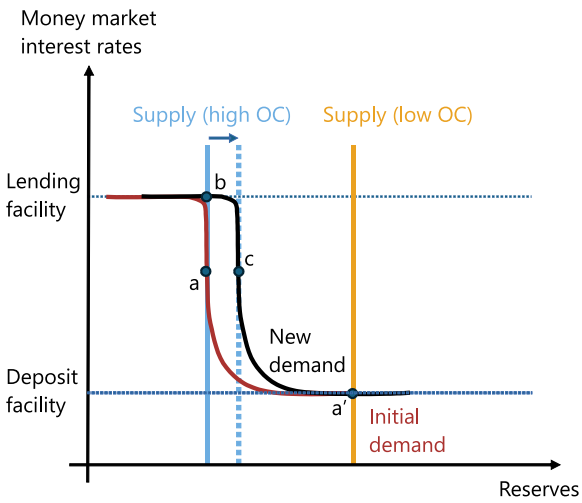
The operational framework determines which part of the demand for reserves is relevant. Banks' demand decreases with the difference between the overnight money market rate and the rate at the central bank deposit facility – that is, with the marginal opportunity cost of holding an additional unit of reserves (see the stylised example in Graph A1). Under a prototypical framework with a high opportunity cost, the quantity demanded is low, reflecting mostly what banks need to hold (eg for payment purposes or to meet requirements): the blue supply curves cross the steep part of the demand curve.③ Under a low-opportunity cost framework, by contrast, the supply (green line) crosses the flat part of the demand curve at a high level of reserves that banks choose to hold in view of the relative returns on similar assets. Importantly, the different parts of the demand for reserves would respond differently to prudential *requirements* and to stronger *incentives* to hold reserves.

A prudential requirement would create interest-*insensitive* demand for reserves, shifting the curve outward (Graph A1.A). The resulting impact on the overnight interest rate would be stronger, all else being equal, under frameworks imposing a high opportunity cost (a rise from point a to b). This creates a greater need for countervailing central bank actions – an increase in the supply of reserves – to ensure interest rate control (at point c). Conceptually, the demand and supply adjustments would resemble those under standard central bank reserve requirements.④

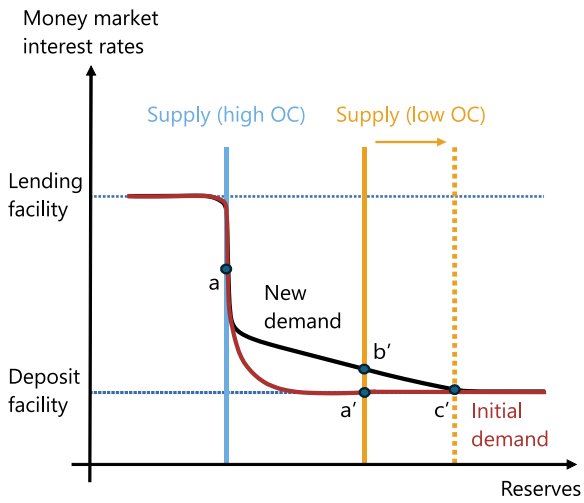
Hypothetical impact of prudential standards on banks' demand for reserves[1]

Graph A1

A. New or additional requirement to hold more reserves



B. Increased incentives to hold reserves



[1] Each panel portrays two frameworks, with distinct supplies of central bank reserves but facing the same demand for reserves. The target interest rate corresponds to point a (high marginal opportunity cost (OC) of holding reserves) or a′ (low OC). The depicted supply shift (from solid to dashed line) offsets the impact of a demand change on the overnight money market interest rate.

Source: Authors' elaboration.

Standards that increase the regulatory or supervisory benefits of holding a certain level of reserves – but do not impose requirements – would have different implications. Such standards would be inconsequential either at a high opportunity cost that dwarfs the new benefits or when banks already hold the amount necessary to achieve these benefits. In intermediate cases, however, the incentives stemming from the standards would raise the demand for reserves (Graph A1.B). This would prompt the central bank to pre-empt an interest rate rise (from point a' to b') by supplying more reserves (at point c'), thus ensuring interest rate control.

The above conceptual considerations notwithstanding, the LCR and NSFR are not designed to affect the demand for reserves. Neither formulates an explicit requirement for reserve holdings. Further, the LCR treats equally reserves and other Level 1 high-quality liquid assets (HQLA), eg domestic sovereign bonds. While the NSFR in principle treats reserves slightly more favourably than other Level 1 HQLA, many jurisdictions eliminate this difference.⑤ Thus, in practice, these two standards also do not alter banks' incentives to hold reserves.

That said, the Basel III liquidity standards create scope for supervisors to influence the demand for reserves. For instance, the standards prescribe monetisation tests that guide supervisory assessments of banks' ability to liquidate non-reserve HQLA in private markets. Stricter assumptions about market conditions and more dire consequences of failing these tests strengthen banks' incentives to hold reserves, as they help to reduce market liquidity risks and operational limitations.⑥ As further similar examples, intraday liquidity considerations or supervisory stress tests that impose losses on non-reserve HQLA could incentivise banks to increase their reserve holdings. In extreme cases, a conservative implementation of the standards or stringent supervisory actions could create interest-*insensitive* demand for reserves – similar to the effect of a requirement.

Factors other than Basel III liquidity standards could also influence banks' incentives to hold central bank reserves. For instance, stricter margining requirements that seek to reduce settlement risk may increase banks' need for central banks reserves in times of market volatility.⑦ The anticipation of such needs could lead to a higher precautionary demand for reserves in frameworks with low marginal costs of holding them.

Proper assessment of the above mechanisms' quantitative implications for the conduct of monetary policy requires empirical analysis, which is beyond the scope of this box. Importantly, only *unpredictable* shifts in the demand for reserves could interfere with interest rate control – eg shifts in response to margin calls triggered by a sudden spike in market volatility – as the central bank may be able to address them only with a lag. By contrast, as the monopoly supplier of reserves, a central bank can pre-empt any undesirable effect of *predictable* demand shifts on the overnight interest rate.

① The views expressed in this publication are those of the authors and not necessarily those of the BIS or its member central banks. ② The LCR seeks to ensure that banks maintain sufficient high-quality liquid assets (HQLA) to cover net cash outflows over a 30-day stress scenario. The NSFR requires banks to maintain a stable funding profile to reduce reliance on short-term wholesale funding. See also Basel Committee on Banking Supervision (BCBS), *Principles for sound liquidity risk management and supervision*, September 2008. ③ The picture is more complex under an archetypal tiering framework, which is not covered in this box. ④ Minimum reserve requirements are imposed by central banks for liquidity management and monetary policy reasons in many jurisdictions. ⑤ While Basel III sets the stable funding requirement for non-reserve Level 1 HQLA at 5% and for reserves and cash at 0% (see NSFR 30.25 and 30.26), many jurisdictions apply a uniform 0% funding requirement (see eg BCBS, *Regulatory Consistency Assessment Programme (RCAP) Assessment of Basel NSFR regulations – European Union*, June 2022; or BCBS, *RCAP Assessment of Basel NSFR regulations – United States*, July 2023. ⑥ The LCR standard requires banks to periodically monetise a representative proportion of the assets to test market access, monetisation processes and collateral availability (see LCR 30.15). ⑦ For example, in response to the March 2020 jump in margin requirements, central bank reserves became a more important source of liquidity in both absolute and relative terms (see BCBS-Committee on Payments and Market Infrastructures-International Organization of Securities Commissions, *Review of margining practices*, 2022).

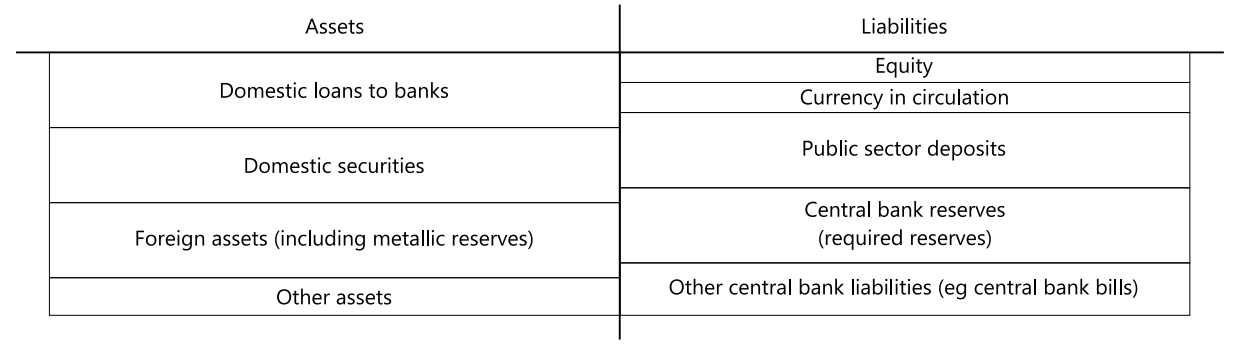
Box B

Central bank balance sheet mechanics and the quantity of reserves

This box explores key balance sheet mechanics that influence the level of reserves in the system. Central banks have full control over some balance sheet items (Graph B1). For example, they can increase the level of reserves by conducting standard open market operations either via outright asset purchases or lending operations.① But changes in other balance sheet items can be outside the control of the central bank – the so-called autonomous factors – or implemented by the central bank with another primary objective than managing the quantity of reserves. That said, central banks have the tools to offset the impact of these changes, which they have done to varying degrees across countries.

A stylised central bank balance sheet

Graph B1



Source: Authors' elaboration.

Currency in circulation, or cash, and the government account are the two most important autonomous factors on the liability side. For instance, when the public demands more currency, banks exchange reserves at the central bank for cash, which reduces the total reserves available in the banking system. Equally, government deposits at the central bank also have a significant mechanical impact on reserves. When the government collects taxes or issues debt, reserves are transferred to the government's account at the central bank, thus depleting reserves held there by the banking system. Conversely, when the government spends from its central bank account, it injects reserves back into the banking system. These flows can be large and sometimes unpredictable, which can lead to sizeable fluctuations in reserves.

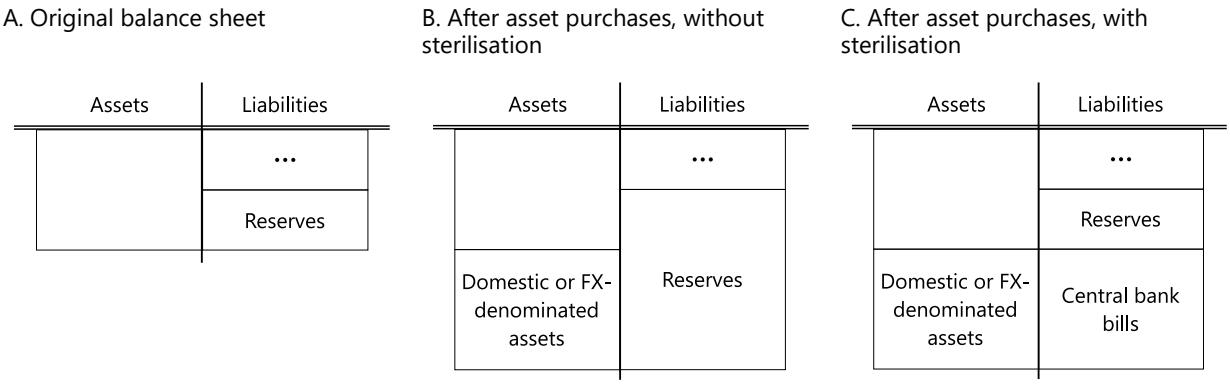
Foreign exchange (FX) operations and unconventional monetary policy operations, such as quantitative easing\tightening (QE\QT) or long-term lending operations, also change the quantity of reserves but typically have objectives other than managing the quantity of reserves per se. For example, when a central bank intervenes in the foreign exchange market to buy foreign currency, it injects domestic currency into the banking system, increasing reserves. Equally, purchases of government securities increase the level of reserves in the system as a central bank buys a domestic asset, eg a government bond, by issuing reserves.

While FX operations and unconventional monetary policy operations change the quantity of reserves initially, central banks can "sterilise" the impact. That is, an initial increase of reserves can be reverted by, for instance, issuing central bank bills or other liquidity-absorbing operations, such as reverse repos (Graph B2). As these liabilities are paid for in reserves, a central bank can, if desired, keep the level of reserves constant despite changes in the overall balance sheet size.

Over the last decades, FX and unconventional monetary policy operations have been the key drivers of the size of central bank balance sheets, but central banks have dealt differently with associated implications for the level of reserves (Graph B.3). In many major advanced economies, large QE interventions or long-term lending operations increased central banks' balance sheets dramatically. The majority of these central banks did not sterilise these interventions. Instead, the level of reserves increased alongside these interventions, so that the share of reserves to total assets increased, as was eg the case in the United States. In many emerging market economies, central bank balance sheets have grown alongside FX reserves. However, emerging market central banks, such as the Bank of Mexico, have typically absorbed these reserves, for instance by issuing central bank bills or conducting FX swaps. While these have tended to increase with the balance sheet size, there is no one-to-one mapping as the central bank can vary the use of different reserve-absorbing operations.

Central bank balance sheet after asset purchases

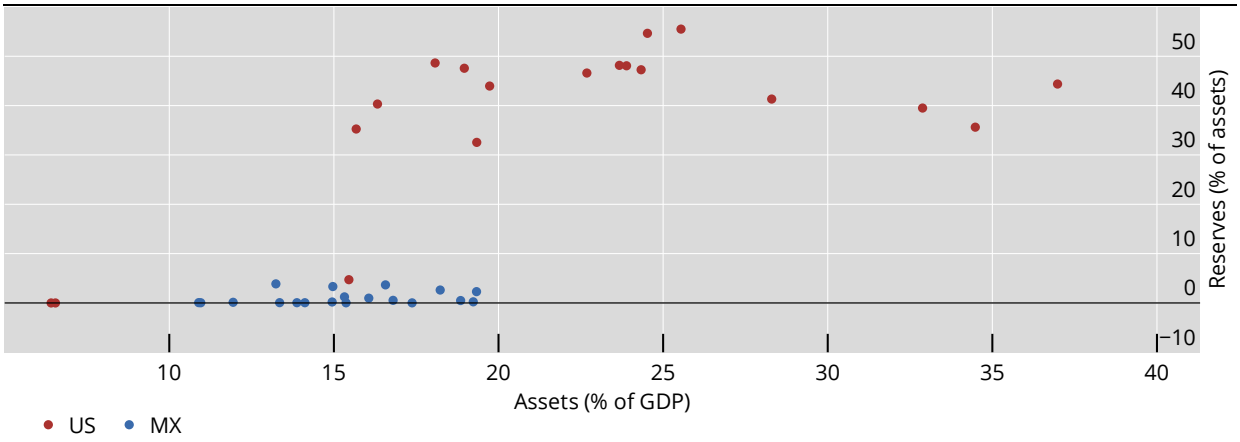
Graph B2



Source: Authors' elaboration.

Central bank assets and reserves[1]

Graph B3



[1] Based on annual data from 2006 to 2024.

Sources: National central banks; LSEG Datastream; BIS; authors' calculations.

① If they want to absorb reserves, central banks can sell assets or conduct reverse repos.

Applying the taxonomy to central bank practices

To apply the taxonomy in practice, we make two adjustments to the definition of the quantity of reserves. First, as previously noted, we exclude required reserves, as these are not held for risk-return considerations. Second, we include other non-reserve central bank liabilities that, from a bank's perspective, have similar characteristics to reserves for managing liquidity risk. This adjustment reflects the fact that some central banks absorb reserves by issuing instruments that closely resemble reserves from a liquidity risk management perspective.[16]

[16] These instruments cannot be used to settle payments, but they share similar risk and liquidity characteristics with reserves. Whether a central bank non-reserve liability is sufficiently similar to

Graph 2 presents the taxonomy for 12 jurisdictions in 2024 along the two dimensions: the marginal opportunity cost and the quantity of reserves. To ensure the comparability across countries and time, we normalise the quantity of reserves by total bank credit to the private non-financial sector as a readily available proxy for the size of the banking sector. Several insights emerge from the graph.

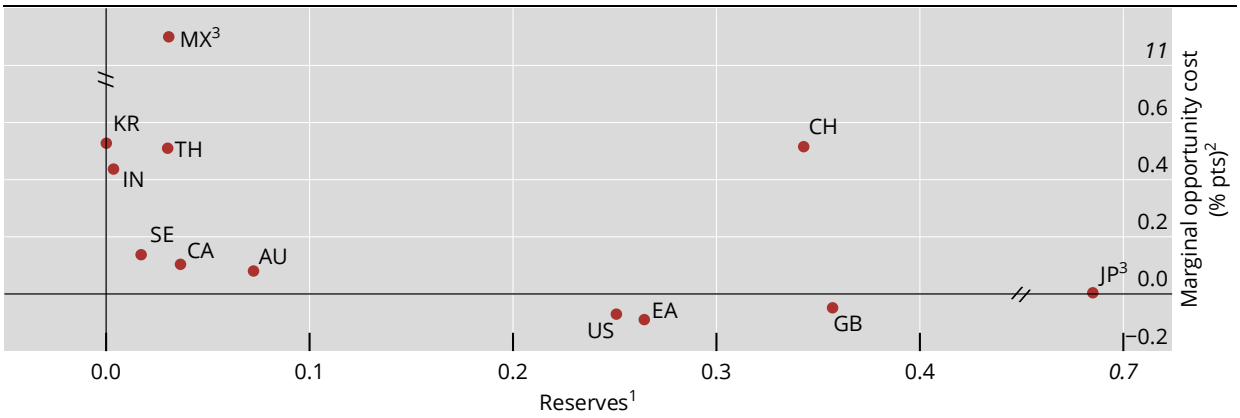
First, the taxonomy captures the substantial heterogeneity that exists within each dimension. For instance, marginal opportunity costs range from above 11 percentage points in Mexico, to small negative values in the euro area, the United Kingdom and the United States. Similarly, the quantity of reserves varies widely across jurisdictions, ranging from zero in Korea to close to 65% of bank credit to the private non-financial sector in Japan.

Second, some central banks operate frameworks that align closely with the canonical archetypes. For instance, the Bank of Korea and the Reserve Bank of India implement frameworks with zero (or near-zero) reserves and high marginal opportunity costs, resembling the archetypal corridor system. In contrast, the ECB, Federal Reserve and Bank of England maintain frameworks characterised by large quantities of reserves and zero or negative marginal opportunity costs, aligning with the archetypal floor system. The Bank of Japan operates a similar framework but with a substantially larger quantity of reserves.

Third, the taxonomy highlights surprising similarities between frameworks that are not immediately apparent in the traditional classification. The Reserve Bank of Australia, the Bank of Canada and Sveriges Riksbank operate seemingly different operational frameworks but achieve similar outcomes: a moderately large quantity of reserves paired with a low, yet positive, marginal opportunity cost. The Bank of Canada operates what it refers to as a floor system, remunerating reserves held at the deposit facility at 5 basis points below the policy target rate and supplying reserves

Operational frameworks across jurisdictions

Graph 2



[1] Reserves are normalised by bank credit to the private non-financial sector. [2] The marginal opportunity cost of holding reserves is defined as the difference between the short-term money market rate and the remuneration rate of reserves (for tiering systems, the remuneration rate above quota). [3] Y-axis is truncated, MX marginal opportunity cost = 11.10; x-axis is truncated, JP reserves = 0.63.

Sources: National central banks; LSEG Datastream; BIS; authors' calculations.

reserves to include in our definition is to some extent a matter of judgment and will depend on the context of each jurisdiction. For the purposes of this article, we include central bank liabilities that mature the following day such as reverse repos with an overnight maturity. This is empirically relevant for Mexico, Sweden and Thailand.

through ad hoc fixed-quantity overnight repo auctions at the policy target rate. Sveriges Riksbank conducts full-allotment weekly reserve-absorbing operations at the policy rate and remunerates reserves held at the deposit facility at a rate 10 basis points below the policy rate. It refers to this approach as a "narrow corridor". In contrast, the Reserve Bank of Australia supplies reserves through fixed rate full-allotment repo operations priced at 10 basis points above the policy rate, with the policy rate in turn 10 basis points above the deposit rate, describing its framework as "ample reserves with full allotment". Despite these differences in design, these three frameworks create similar incentives and market outcomes.

Finally, the taxonomy reveals the frameworks where marginal and average opportunity costs diverge – a surprising commonality between Mexico, Switzerland and Thailand. But the tools used to implement such frameworks differ, as well as the ultimate outcomes. The Swiss National Bank remunerates reserves at the policy rate up to bank-specific quotas, applying a lower rate to reserves exceeding these thresholds. The Bank of Thailand and the Bank of Mexico conduct daily reserve-absorbing operations at the policy rate and pay a lower rate at their deposit facility.[17] Despite all these frameworks achieving high marginal opportunity costs and low average ones, the specific outcomes in terms of marginal opportunity costs and reserve levels vary. Reserve levels in Mexico and Thailand – counting reserves held at the deposit facility as well as other overnight central bank liabilities as noted above – are significantly lower than in Switzerland. Additionally, the marginal opportunity cost of holding reserves in Mexico is much higher than in Thailand and Switzerland as the deposit facility is not renumerated and thus marginal opportunity costs fluctuate with the money market rate that tracks the policy rate.

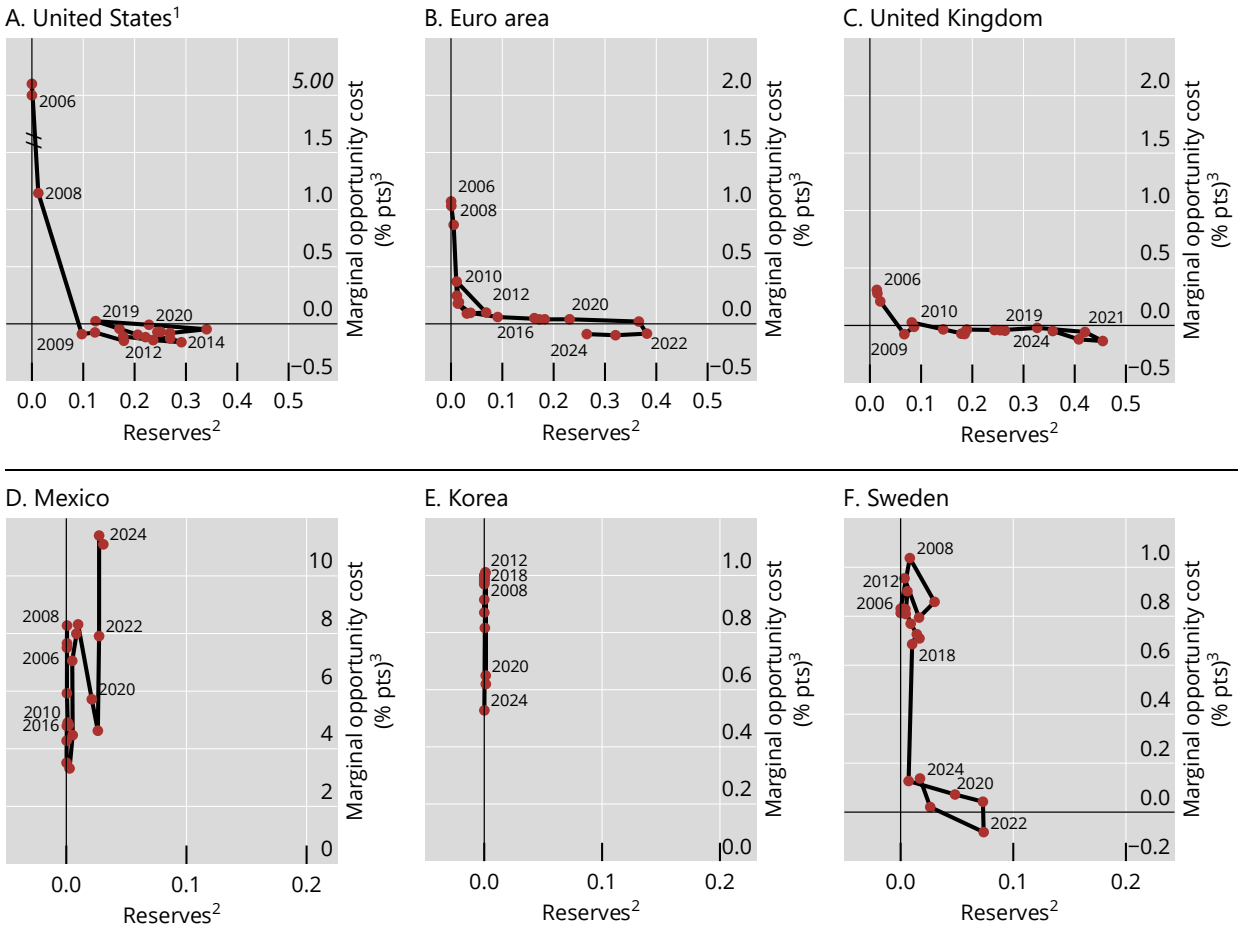
While Graph 2 provides a snapshot of monetary policy operational frameworks in 2024, it does not capture the significant changes over the past 15 years (Graph 3).

Consider the cases of the euro area, the United Kingdom and the United States, and to a lesser extent Sweden, which are typical for many advanced economies. Before the Great Financial Crisis, it was standard to utilise operational frameworks with low reserve levels and high marginal opportunity costs. Opportunity costs differed across jurisdictions because of the width of the corridor (ie the difference between the lending and deposit facility rates) and whether it was symmetric or not. But once central banks implemented large-scale QE programmes and long-term lending operations they transitioned to frameworks with large quantities of reserves. And as reserve levels increased – and with this their average opportunity cost fell – central banks allowed the marginal opportunity costs to fall in parallel. The evolution in Sweden is somewhat similar, except that QE programmes only started after the pandemic and balance sheet shrinkage is more advanced. Moreover, Sweden employed daily fine-tuning operations up to 2019, so that average opportunity costs diverge from marginal ones before the onset of QE.

[17] The timing and specifics of the reserve-absorbing operations differ in Mexico and Thailand. In Mexico, reserves are absorbed near the end of the trading day through an auction with a maximum price capped at the policy rate. In Thailand, the central bank offers fixed-price full-allotment overnight reverse repos at the policy rate early each morning.

The historical evolution of frameworks

Graph 3



[1] Y-axis is truncated, US marginal opportunity cost = 5 in 2006 and 5.1 in 2007. [2] Reserves are normalised by bank credit to the private non-financial sector. [3] The marginal opportunity cost of holding reserves is defined as the difference between the short-term money market rate and the remuneration rate of reserves (for tiering systems, the remuneration rate above quota).

Sources: National central banks; LSEG Datastream; BIS; authors' calculations.

In contrast, operational frameworks in most emerging market economies have remained unchanged over the past two decades as central banks continued to operate with high opportunity costs despite fairly large balance sheets. The evolution in Korea exemplifies the classical "corridor" system. Reserves (above minimum reserve requirements) have been low and marginal opportunity costs have ranged between 50 and 100 basis points because the central bank changed the width of the corridor during periods of stress. In Mexico, the volume of reserves changed because the Bank of Mexico changed the volume of overnight reserve-absorbing operations. At the same time, marginal opportunity costs fluctuated with the monetary policy rate because the deposit rate has been unremunerated, as discussed above. The framework hence provides strong incentives to trade in the money market, which has had a daily turnover of close to 5% of GDP.

Conclusion

This article proposes a new taxonomy for classifying operational frameworks. By focusing on two key dimensions – the marginal opportunity cost of holding reserves and the aggregate quantity of reserves – the taxonomy captures the ways in which central bank frameworks shape banks' incentives and financial market outcomes.

Applying the taxonomy to real-world operational frameworks uncovers surprising similarities between frameworks commonly regarded as distinct and highlights how similar designs can yield very different outcomes. It also sheds light on the evolution of operational frameworks over time, particularly in response to shifts in central bank balance sheet expansions and contractions. This granular approach not only enhances cross-country comparisons but also provides a more accurate understanding of how operational frameworks influence liquidity management and market behaviour.

References

Acharya, V, R Chauhan, R Rajan and S Steffen (2024): "Liquidity dependence and the waxing and waning of central bank balance sheets", *NBER Working Paper*, no 31050, December.

Afonso, G, D Giannone, G La Spada and J Williams (2024): "Scarce, abundant, or ample? A time-varying model of the reserve demand curve", *Federal Reserve Bank of New York Staff Working Papers*, no 1019, May.

Bailey, A (2024): "The importance of central bank reserves", lecture in honour of Charles Goodhart, London School of Economics, 21 May.

Bindseil, U (2024): *Monetary policy implementation: theory, past and present*, Oxford University Press.

Bindseil, U and J Jabłecki (2011): "The optimal width of the central bank standing facilities corridor and banks' day-to-day liquidity management", *ECB Working Paper*, no 1350.

Blasques, F, F Bräuning and I Van Lelyveld (2018): "A dynamic network model of the unsecured interbank lending market", *Journal of Economic Dynamics and Control*, vol 90, pp 310–42.

Borio, C (2023): "Getting up from the floor", *BIS Working Papers,* no 1100, May.

Borio, C, P Disyatat and A Schrimpf (2024): "The double-faced demand for bank reserves and its implications", *VoxEU.org*, 15 February.

Cantú, C, P Cavallino, F De Fiore and J Yetman (2021): "A global database on central banks' monetary responses to Covid-19", *BIS Working Papers*, no 934, March.

Cap, A, M Drehmann and A Schrimpf (2020): "Changes in monetary policy operating procedures over the last decade: Insights from a new database", *BIS Quarterly Review*, December, pp 27–39.

Central Bank of Norway (2014): "Banks' assessment of Norges Bank's liquidity management", *Norges Bank Papers*, no 4/2014.

——— (2021): "Norges Bank's liquidity policy: principles and design", *Norges Bank Papers*, no 3/2021.

Drehmann, M and K Nikolaou (2013): "Funding liquidity risk: definition and measurement", *Journal of Banking and Finance*, vol 37, no 7, pp 2173–82.

European Central Bank (ECB) (2024): "Changes to the operational framework for implementing monetary policy", statement by the Governing Council, 13 March.

Kent, C (2024): "The future system for monetary policy implementation", speech at the Bloomberg Australia Briefing, Sydney, 2 April.

Lagos, R and G Navarro (2023): "Monetary policy operations: theory, evidence, and tools for quantitative analysis", *NBER Working Papers*, no 31370, June.

Logan, L (2023): "Ample reserves and the Friedman rule", speech at the European Central Bank Conference on Money Markets, Frankfurt, 10 November.

Lopez-Salido, D and A Vissing-Jorgensen (2023): "Reserve demand, interest rate control, and quantitative tightening", *SSRN Working Paper*, March.

Maechler, A and T Moser (2022): "Return to positive interest rates: why reserve tiering?", speech at the Money Market Event, Geneva, 17 November.

Poole, W (1968): "Commercial bank reserve management in a stochastic model: implications for monetary policy", *The Journal of Finance*, vol 23, no 5, pp 769–91.

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International finance through the lens of BIS statistics: bond markets, domestic and international[1]

The period since the Great Financial Crisis has seen a shift in debt financing from loans to bonds. This article provides an overview of how the BIS debt securities statistics can be used to examine the size and structure of bond financing, including its sectoral and currency composition. Government issuance drove the growth of bond markets, but private sector activity fuelled their broader development, including access for a more diverse mix of borrowers. Governments stepped up their borrowing mainly in their domestic currency. Meanwhile, private sector borrowers continued to tap bond markets in foreign currency, mainly US dollars.

JEL classification: F34, F36, G10, G15, H63

The period since the Great Financial Crisis (GFC) of 2008–09 has seen a shift in debt financing from loans to bonds. While in many countries, bank loans have remained the main source of debt financing, bond financing has grown at a faster pace. Globally, bond markets are set to surpass bank lending as the dominant funding source for non-financial borrowers.

This article is a primer on how the BIS debt securities statistics can be used to examine the size and structure of bond financing and assess associated vulnerabilities that could pose risks to financial stability. The statistics encompass the issuance and outstanding amounts of bonds and bills issued by governments and private sector borrowers, with breakdowns by market, sector, currency, maturity and interest rate type. Coverage of debt securities issued offshore in international markets and domestically in markets of major economies is reasonably complete. However, the history and granularity of breakdowns vary across markets, and data on markets in smaller economies are less comprehensive.

Based on these statistics, the article highlights salient trends that have shaped bond markets. Since 2020, governments have become the largest borrowers in global bond markets, accounting for more than half of outstanding debt securities. The largest surges in government issuance were seen during the GFC and the Covid-19 pandemic, as governments financed expanding deficits.

[1] The views expressed in this publication are those of the authors and not necessarily those of the BIS or its member central banks. This is the sixth article in a series showcasing the BIS international banking and financial statistics. We thank Iñaki Aldasoro, Stefan Avdjiev, Bilyana Bogdanova, Mauro Bucci, Gaston Gelos, Bryan Hardy, Carlos Mallo, Benoît Mojon, Ismail Mustafi, Swapan Pradhan, Dan Rees, Andreas Schrimpf, Jimmy Shek, Hyun Song Shin and Frank Smets for helpful comments and inputs.

Key takeaways

- *The period since the Great Financial Crisis of 2008–09 has seen a shift in debt financing from loans to bonds.*
- *Government issuance drove the expansion of bond markets, with outstanding government bonds now outweighing private sector bonds in many economies.*
- *Governments increasingly relied on domestic currency bonds, but private sector borrowers continued to issue sizeable amounts in foreign currency, mainly US dollars.*

Government bonds today are predominantly denominated in the borrower's domestic currency. This has long been the norm for advanced economies (AEs). In emerging market economies (EMEs), governments' ability to tap bond markets in their own currency is a more recent development.[2] It has helped EME borrowers to reduce their exposure to currency and maturity mismatches. At the same time, it has heightened the sensitivity of financial conditions in EMEs to mismatches on the balance sheets of global investors.

In contrast to governments, private sector borrowers continue to issue substantial amounts in foreign currency. The bulk of foreign currency bonds are denominated in US dollars, although the range of currencies that borrowers use has widened over time. Foreign currency bonds might be hedged by international sales or financial derivatives, but incomplete information about hedging raises concerns about the systemic risks posed by potential currency mismatches at these entities.

The first section of this article explains the concepts underlying the BIS debt securities statistics, with additional details about their scope and dimensions provided in the Annex. The second section documents the growing importance of bond financing in the global financial system. The article then examines trends in government and private sector bond markets, followed by a section on the currency mix. The concluding section outlines challenges arising from those developments.

Concepts underpinning the BIS debt securities statistics

The BIS debt securities statistics record primary issuance in money and bond markets. They capture debt securities placed by residents in their domestic market – known as domestic debt securities (DDS) – as well as those issued outside the market where the borrower resides, for example in international financial centres – known as international debt securities (IDS).[3] Total debt securities (TDS) sum DDS and IDS together, representing all debt securities issued by residents of an economy regardless of currency or the issuer's nationality.

[2] In this article, "EMEs" refers to a selection of major economies from among the larger group of emerging market and developing economies (EMDEs), as detailed in the Endnotes.

[3] IDS are distinguished from DDS based on three criteria: registration domain (identified by the ISIN number), listing place and governing law. If any one of these criteria differs from the residence of the issuer, the BIS defines the security as international (Gruić and Wooldridge (2012)).

The debt securities statistics are compiled at the country level, disaggregated by sector. Resident issuers are categorised as belonging to the general government sector, financial corporations (which comprise banks, non-bank financial institutions (NBFIs) and central banks) or non-financial corporations (NFCs).[4]

The statistics capture each sector's financing choices across currencies, maturities and interest rate types. The currency dimension is central to BIS international banking, derivatives and other statistics (McGuire et al (2024b)). Currency risk is an integral aspect of bond financing: issuers borrowing unhedged in a foreign currency face the risk of a rising debt burden when their domestic currency depreciates, whereas borrowing in their own currency shifts the currency exposure to creditors. Attributes like maturity and interest rate type (fixed vs variable) also have a critical influence on the risks associated with bond financing. Longer maturities protect borrowers from refinancing risk. Yet they expose bondholders to greater duration risk: the value of their holdings becomes more sensitive to changes in interest rates.

The debt securities tables published by the BIS show quarterly data for issuers in about 50 major economies, as detailed in the Annex. The TDS and DDS statistics are based on aggregates compiled by national authorities. The IDS statistics are compiled by the BIS using security-level data from commercial sources; they are available for all countries issuing IDS.

The BIS also publishes holdings statistics on a from-whom-to-whom basis, with breakdowns by residence and sector. The trading of bonds in secondary markets makes it difficult to identify ownership, and thus the country and historical coverage of holdings statistics is more limited than that of the issuance statistics. The issuance statistics are mostly shown at face value or at nominal value – the amount that the debtor owes. In contrast, holding statistics are shown at market value, which is the more relevant metric from a creditor's perspective.

The rise of bond markets

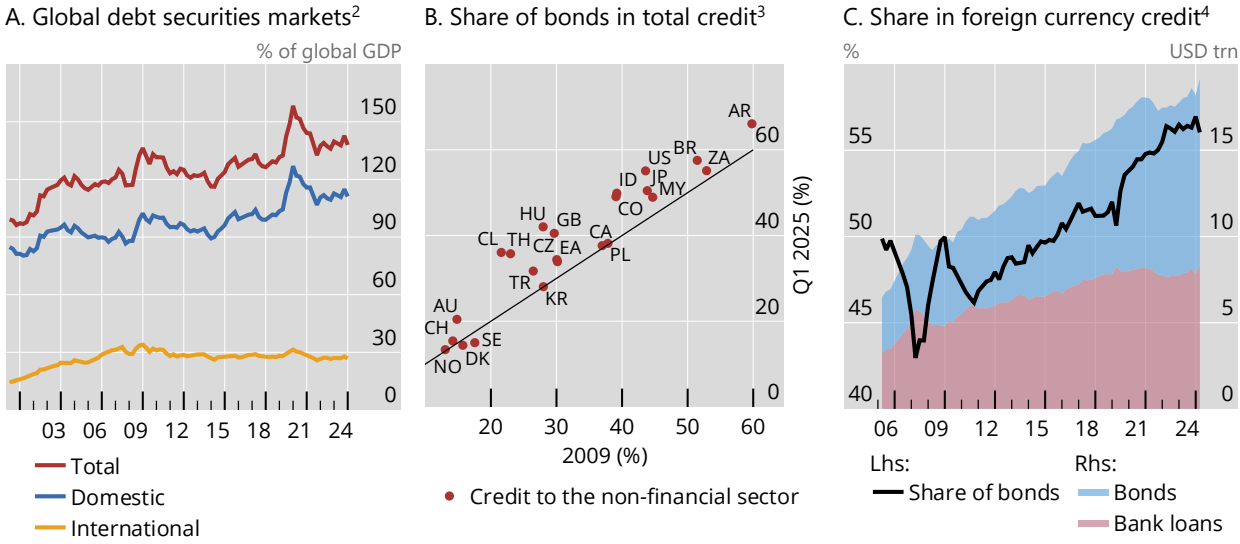
Since the 1990s bond markets around the world have expanded rapidly, outpacing economic activity. Debt securities outstanding rose from 1027% of global GDP in 2000 to over 135% by end-2024, topping $150 trillion (red line, Graph 1.A). The GFC and the Covid-19 pandemic saw sharp increases in the ratio of bonds to GDP, owing in part to declines in GDP. Yet the upward trend has been evident outside these crises.

While the largest AEs have long had well developed bond markets, smaller AEs and EMEs have tended to rely less on bond financing. EMEs' dependence on banks, especially for cross-border funding, left many exposed to currency and maturity mismatches, which led to a series of financial crises in the 1980s and 1990s. These crises motivated initiatives to develop domestic bond markets, where funds could be raised in local currency at fixed rates for long maturities (CGFS (2007)).

The shift towards bond markets was given an impetus by the GFC, which set in motion two related structural changes (BIS (2025)). First, as banks retrenched after the crisis, the post-GFC financial system saw portfolio investors take centre stage as creditors. Between 2009 and 2023, financial assets held by non-bank creditors surged

[4] Households and non-profit institutions serving households are grouped separately, but usually they do not issue bonds. For the purpose of analysis, in this article central banks are considered alongside the general government and excluded from private sector aggregates.

Bonds account for a rising share of credit, especially foreign currency credit[1] Graph 1



[1] See endnotes for details. [2] Amounts outstanding at nominal or (for international debt securities) face value. Sample of countries varies across breakdowns shown. [3] Credit in all currencies. [4] US dollar-, euro- and yen-denominated credit to non-bank borrowers outside the respective currency areas, at face value.

Sources: World Bank; CEIC; Dealogic; Euroclear; LSEG; Xtrakter Ltd; national data; BIS credit statistics; BIS debt securities statistics (Tables C3 and C5); BIS global liquidity indicators; authors' calculations.

from 167% to 225% of global GDP (BIS (2025)). Over the same period, banks' total assets grew more modestly, from 164% to 177% of global GDP. Notably, global portfolio investors stepped up their purchases of bonds denominated in EME currencies, supporting the development of domestic markets. International bond markets expanded at a slower pace (Graph 1.A).

The second change was a shift from lending to private sector borrowers to claims on the government. This shift was driven by increased fiscal deficits, especially during the Covid-19 pandemic. Government issuance helped to propel the growth of domestic bond markets in particular, which expanded from 95% of global GDP in 2009 to about 110% in 2024 (Graph 1.A).

These changes led to a shift in debt financing from loans to bonds. While loans remain the largest source of debt financing in most countries, the share of bonds has risen since 2009, as shown by the number of countries lying above the 45° line in Graph 1.B. By end-March 2025, the share of bonds in total credit to non-financial borrowers – governments, NFCs and households – had risen to 40% globally and exceeded 50% in Brazil, the United States and several other economies. The shift towards bonds was especially significant for foreign currency credit, which, since 2016, has been extended predominantly in the form of bonds (Graph 1.C). The rise was less pronounced for smaller EMEs and developing countries, whose financial systems remain largely bank-based.

Government issuance fuels domestic bond markets

Since 2020, governments have become the largest borrowers in global bond markets, accounting for more than half of total debt securities outstanding. Government

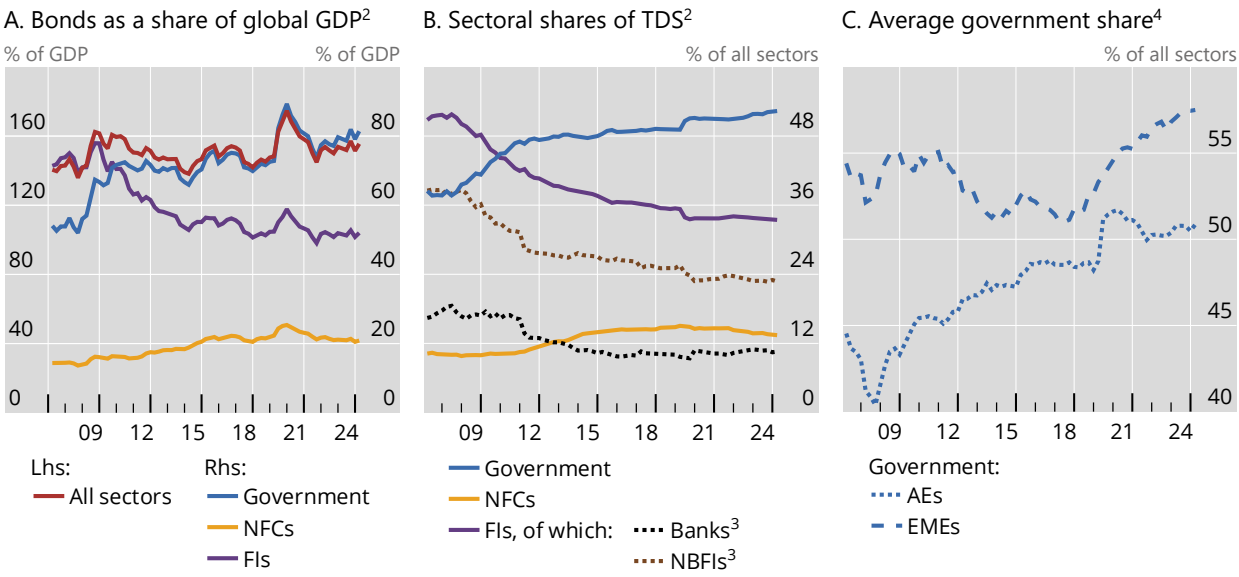
bonds outstanding rose from around 65% of global GDP in 2009 to over 80% by end-March 2025 (Graph 2.A).[5] This took the share of government bonds in global TDS to 52% (Graph 2.B). The share of government bonds in TDS is higher for the average EME than for the average AE: 58% versus 51% (Graph 2.C).

The largest surges in government issuance were seen during the GFC and the Covid-19 pandemic, when governments sought financing for expanded deficits (Graphs 2.A and 2.B). The jump in AE government issuance during the pandemic abated as GDP recovered. In contrast, EME government issuance continued to trend up as a share of total issuance even after the pandemic (Graph 2.C).

Most government bonds are issued by the central government, although in some economies other levels of government add substantially to outstanding debt. Globally, state and local governments accounted for only about 20% of government bonds outstanding in 2024. In countries with federal systems, this share was often considerably higher, as much as 50% in Canada and 36% in India. In China, most of the large increase in government debt since the mid-2010s was incurred by local governments.

Government bonds drive the growth of bond markets[1]

Graph 2



FIs = financial institutions (excluding central banks); NBFIs = non-bank financial institutions; NFCs = non-financial corporations.

[1] See endnotes for details. Amounts outstanding at nominal or face value with some exceptions. [2] Share of the global total. [3] Based on a smaller sample of economies than FIs. [4] Government share in total debt securities (TDS); simple average across the economies in each group (constant sample).

Sources: BIS debt securities statistics (Table C5); authors' calculations.

[5] Total government debt includes loans, currency and deposits and thus exceeds debt securities outstanding. Between 2009 and end-March 2025, outstanding government debt at nominal value increased from 74% of global GDP to 93%, according to the BIS credit statistics.

On occasion, central banks have also issued debt securities at scale. Central bank issuance accounts for little overall, averaging 0.5% of outstanding TDS since the pandemic. However, it occasionally jumps, particularly in small open economies and EMEs when central banks issue bills to sterilise foreign exchange intervention or absorb liquidity in the financial system.[6]

Governments often borrow at long maturities. Prior to the GFC, the longest maturity was typically 30 years in AEs and perhaps 10 years in EMEs. During the low-for-long period that followed the GFC, some governments extended the maturity of their bonds to 50 or even 100 years. For example, in 2017 the Argentine government issued a US dollar bond with a maturity of 100 years, and in 2020 Austria issued a euro-denominated century bond. Such ultra-long bonds reduce refinancing risk for issuers but increase the exposure of bondholders to duration risk. Consequently, demand for such bonds waned as interest rates began to rise in 2022.

In recent years, the maturity of government bonds has averaged around 13 years in AEs and 12 years in EMEs.[7] However, when government and central bank balance sheets are combined, the average maturity falls because central bank liabilities are mostly bank reserves that take the form of overnight deposits. Where central banks conducted large-scale purchases of government bonds, they replaced long-term government bonds with debt indexed to the rate on reserves held by banks. At the peak of asset purchases in 2021, this effectively turned 30–50% of public debt into overnight debt in some of the largest AEs (BIS (2022)). The share has since fallen sharply as central banks have unwound these purchases.

NBFIs boost private sector bond markets

While government issuance drove growth, the private sector fuelled the broader development of bond markets. This was reflected in the growing diversity of private sector issuers with market access: banks, various NBFIs including securitisation vehicles, and NFCs.[8]

Since the mid-2010s, the ratio of private sector bonds to GDP has remained roughly constant. This was more evident in AEs, notwithstanding a temporary blip during the Covid-19 pandemic (Graph 3.A). In EMEs, outstanding bonds issued by the private sector grew steadily during the 2010s, but their ratio to GDP has since levelled off. At end-March 2025, the ratio in the typical EME was half as large as in AEs: 0.47 compared with 0.91 (Graph 3.A).

The market for private sector bonds tends to be larger in economies where NBFIs are active issuers. Graph 3.B shows this relationship in a positive correlation between the share of NBFIs in private sector bonds (x-axis) and the ratio of private sector bonds to GDP (y-axis). In turn, the share of NBFIs is boosted by securitisation. The United States stands out with the largest mortgage-backed securities (MBS) market in the world. This takes the share of NBFIs in US private sector issuance above 60%

[6] Countries with spikes in central bank debt securities include Switzerland (peaking at 19% of GDP in 2011), Thailand (25% in 2012), Singapore (48% in 2024) and Czechia (more than 100% in 2021).

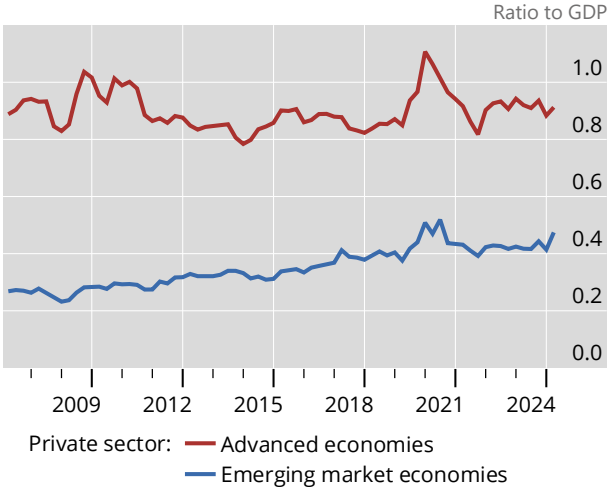
[7] On a residual maturity basis, it averaged eight years for AE governments and seven years for EME governments.

[8] Private sector refers to non-government issuers. In the BIS debt securities statistics, state-owned corporations are included in their respective sector of activity: banks, NBFIs or NFCs.

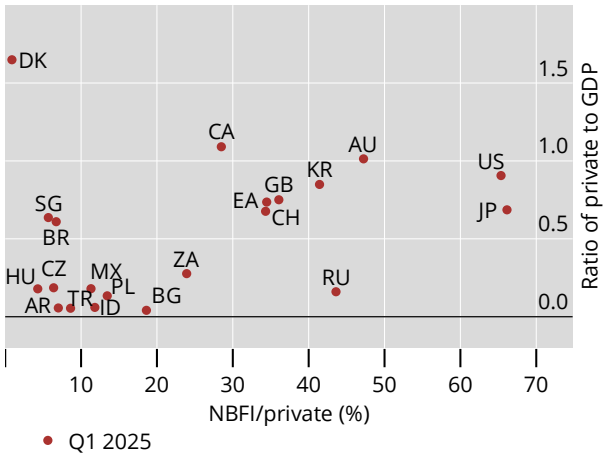
Private sector bond markets are larger where NBFIs are active issuers[1]

Graph 3

A. Ratio of private sector bonds to GDP[2]



B. Private sector bonds: NBFI share vs ratio to GDP



NBFIs = non-bank financial institutions.

[1] Amounts outstanding at nominal or face value, with some exceptions. [2] See endnotes for details. Simple average across the economies in each group.

Sources: BIS debt securities statistics (Table C5); authors' calculations.

(Graph 4.A). Australia, Canada and the United Kingdom also have substantial MBS markets, raising the outstanding amount of bonds issued by the private sector in those countries.

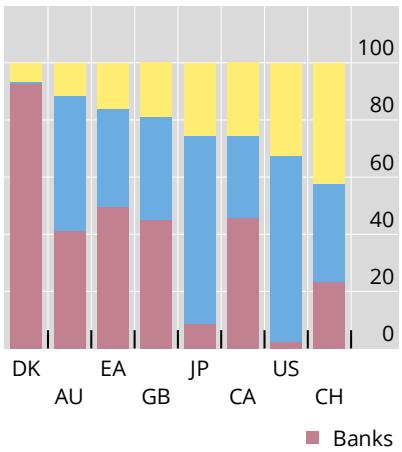
In many European AEs, banks account for the greatest share of private sector issuance, surpassing NBFIs and NFCs. Banks' share is boosted by the prevalence of covered bonds. Like MBS, covered bonds are secured by residential or commercial mortgages or other loans, but unlike MBS, the loans remain on the issuer's balance

Composition of private sector issuers varies across economies

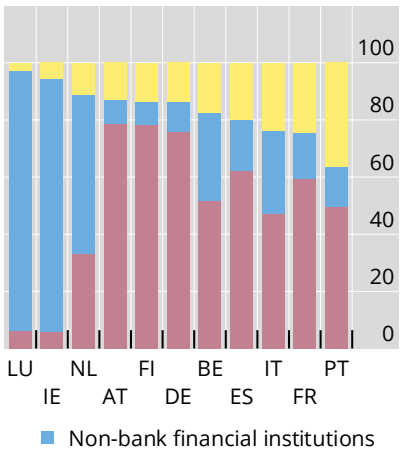
Sectoral composition of TDS outstanding at Q1 2025, in per cent

Graph 4

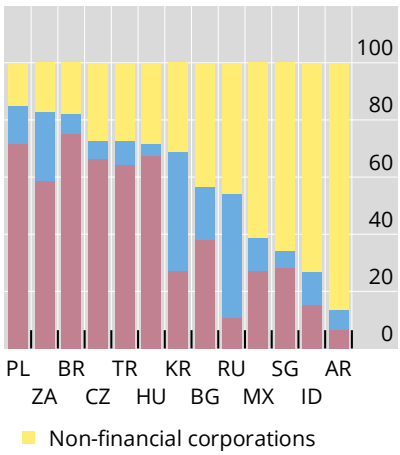
A. Advanced economies



B. Euro area



C. Emerging market economies



Banks | Non-bank financial institutions | Non-financial corporations

TDS = total debt securities.

Sources: BIS debt securities statistics (Table C5); authors' calculations.

sheet. This explains the exceptionally large share of bank issuance in economies like Austria, Denmark and Germany (Graphs 4.A and 4.B).

In contrast to NFCs in AEs, NFCs in EMEs are often the largest issuers or rank second only to banks (Graph 4.C). Securitisation and covered bond markets are growing but remain small, as housing finance remains relatively underdeveloped. Among EMEs, Korea has the most developed securitisation market and, accordingly, also the largest amount of private sector bonds outstanding (Graph 3.B).

Currency choice across sectors

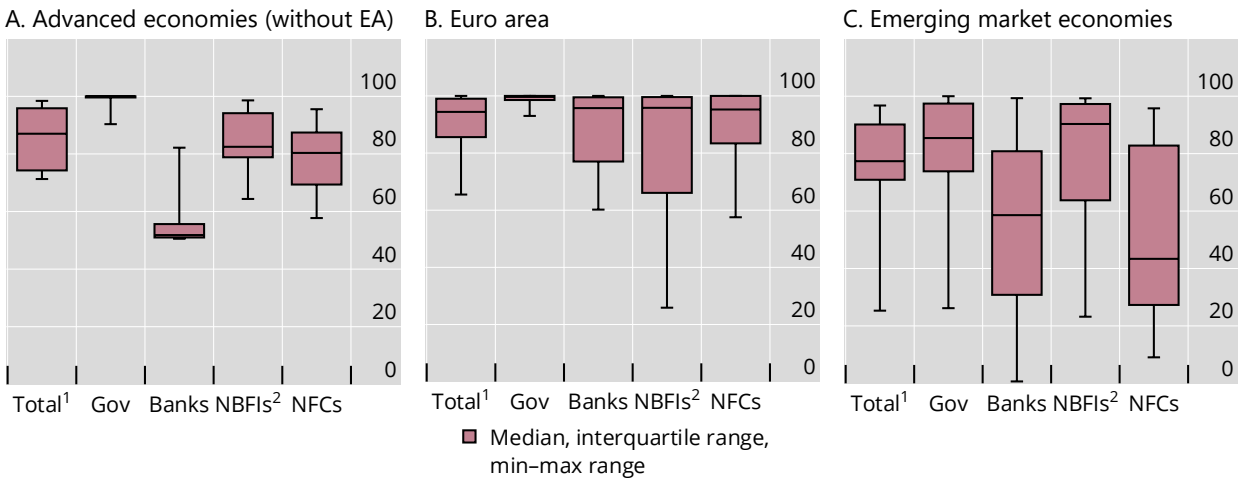
Turning to the currency dimension, around 93% of all bonds globally are denominated in the borrower's domestic currency (Graph 5). However, this share ranges from less than 60% in countries with a history of macroeconomic instability, such as Argentina and Türkiye, to nearly 100% in the United States and other countries with global reserve currencies. Across sectors within a country, the domestic currency share is highest for governments and typically lowest for banks and NFCs. Among borrowers who issue bonds denominated in a currency other than their own, the US dollar remains the predominant choice.

EME governments overcoming "original sin"

Government bonds are typically issued in the domestic market in local currency (CGFS (2007); IMF and World Bank (2021)). Most AE governments overwhelmingly issue bonds in their own currency. This is also the case for the largest EMEs, notably China and India (Bogdanova et al (2021)). Governments in other major EMEs often issue in a mix of domestic and foreign currencies. Developing countries issue bonds predominantly in foreign currencies, usually US dollars, because their domestic market is too shallow.

Private sector borrowers issue more in foreign currencies than governments

Local currency bonds as a percentage of TDS outstanding, at Q1 2025 — Graph 5



NBFIs = non-bank financial institutions; NFCs = non-financial corporations; TDS = total debt securities.

[1] All sectors. [2] Financial institutions excluding banks and central banks.

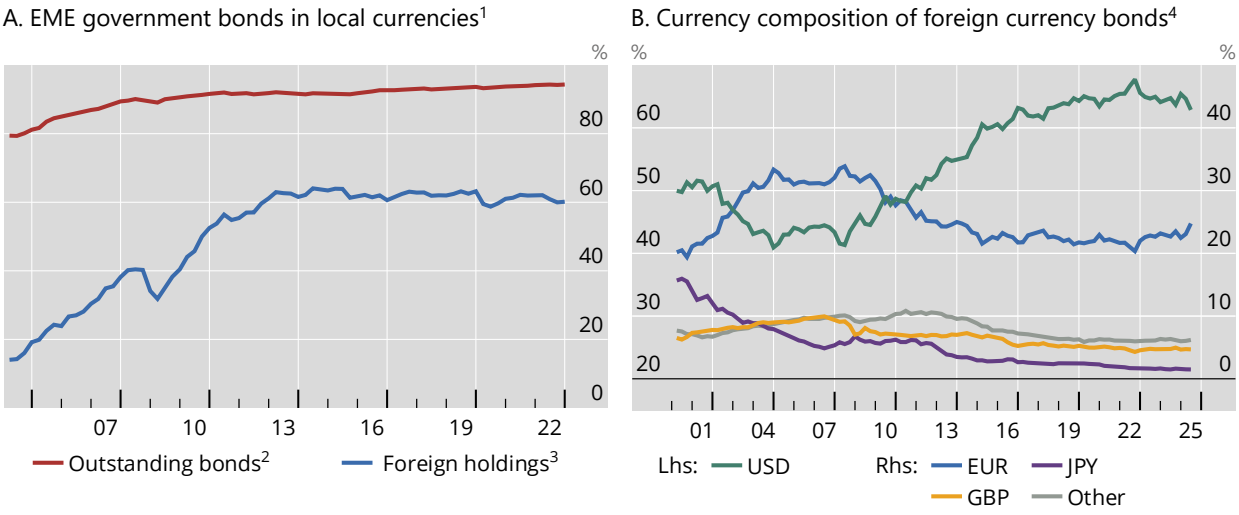
Sources: Dealogic; Euroclear; LSEG; Xtrakter Ltd; BIS debt securities statistics (Tables C3, C5); authors' calculations.

The ability of governments in major EMEs to tap bond markets in their own currency is a noteworthy development. Prior to the 2000s, most suffered from "original sin" – the inability to borrow (abroad) in their own currency (Eichengreen and Hausmann (1999)). Initiatives to deepen domestic markets by expanding the institutional investor base, coupled with the post-GFC rise of global portfolio investors and search for yield, helped to boost the local currency share of outstanding EME government bonds (Graph 6.A, red line).[9] At the same time, the share of local currency bonds in foreign holdings of EME bonds rose from less than 30% to more than 50% (blue line). That said, even major EMEs have seen setbacks in foreign participation in recent years, in part due to currency weakness (Onen et al (2025)).

US dollar remains the predominant choice for foreign currency bonds

Foreign currency issuance is more common among private sector borrowers (Graph 5). Indeed, in contrast to EME governments, foreign currency borrowing by NFCs in EMEs has increased since the GFC. The BIS global liquidity indicators capture this trend.[10] The second phase of global liquidity following the GFC saw a general shift towards bond financing, led by foreign currency issuance by NFCs (Graph 1.C) (Hardy and von Peter (2023)).

Currency composition of outstanding bonds has changed over time — Graph 6



[1] See endnotes for details. [2] EME government bonds denominated in local currencies as a share of EME government bonds outstanding in all currencies. [3] Foreign holdings of EME government bonds denominated in local currencies as a share of foreign holdings of EME government bonds in all currencies. [4] International debt securities denominated in foreign currencies, all issuers.

Sources: BIS debt securities statistics (Tables C4 and C3); Onen et al (2025).

[9] Progress has been uneven and slow since the mid-2010s. Smaller EMEs and developing countries continue to rely on foreign currency bonds (and bank loans) to borrow abroad (Eichengreen et al (2023)).

[10] The BIS uses the term "global liquidity" to refer to the ease of financing in global financial markets. The BIS global liquidity indicators track total credit to non-bank borrowers, covering both bank loans and IDS denominated in the three major reserve currencies (US dollars, euros and Japanese yen) to non-residents, ie borrowers outside the respective currency areas.

Foreign currency issuance is not exclusive to NFCs in EMEs; NFCs in some AEs also issue large amounts. For example, over 40% of bonds issued by NFCs in Canada are in foreign currency, as are the majority of those issued by NFCs in Denmark. In some countries, banks also issue large amounts of foreign currency debt (Graph 5). For instance, over 90% of the bonds issued by banks in Türkiye and about 50% of those issued by banks in Indonesia are denominated in a foreign currency.

Foreign currency issuance is often, but not always, hedged. NFCs might borrow in foreign currency to hedge their international sales, while banks might have foreign currency loans.[11] Some borrow in foreign currency to lower funding costs, for example tapping the deep US dollar market for corporate debt, and then use derivatives to hedge the currency risk. Others leave their borrowing unhedged.[12]

The vast majority of foreign currency bonds are denominated in US dollars: 63% as of June 2025 (Graph 6.B and Table 1). The dollar's share has increased by 20 percentage points since end-2007, mainly at the expense of the euro (whose share fell from 32% to 25%), pound sterling (from 9% to 5%) and yen (from 5% to 1%).[13] Borrowers in some 125 economies issue international bonds in dollars, about twice the number doing so in euro or yen (Table 1). The choice of currency is influenced by trade and financial integration: issuers with close ties to Europe raise substantial amounts in euro, whereas borrowers elsewhere, notably in Asia and Latin America, issue mostly in dollars.

Despite the dollar's rising share, borrowers have tapped markets in a wider range of currencies. At the time of the GFC, foreign currency issuance was limited to around 50 currencies; by 2025, there were international bonds outstanding in 75 currencies, including many EME currencies. In 2020 the Chinese renminbi (CNY) overtook the Hong Kong dollar as the most borrowed EME currency internationally. Even so, the outstanding amount of CNY bonds issued by residents outside China remains very small, accounting for only 1% of all foreign currency bonds.

Relative to total bond issuance, including issuance by residents in domestic currency, the Norwegian kroner (NOK) and Swiss franc (CHF) are the most internationalised currencies. In 2025, about 20% of outstanding NOK bonds were issued by borrowers from outside Norway, and 21% of CHF bonds by borrowers outside Switzerland (Table 1). Government debt in Norway and Switzerland is low, and both are among the world's largest international creditors. This makes it attractive for foreigners to issue bonds in NOK and CHF, since investors often prefer to lend in their own currency (Maggiori et al (2020)). In contrast, non-resident issuers' share of the Japanese yen market was relatively low at 3%, crowded out by a large amount of government borrowing.

[11] In many countries regulations restrict the size of banks' open foreign currency positions, which suggests that this borrowing is largely hedged. For example, in Australia, around 90% of foreign currency borrowing by banks in offshore debt securities markets is hedged with financial derivatives into Australian dollars (Atkin and Harris (2023)).

[12] They might engage in carry trades by borrowing foreign currency to accumulate cash or fund credit to suppliers in local currency (Bruno and Shin (2020); Hardy and Saffie (2024)). Some may even borrow unhedged to signal their creditworthiness and growth potential (Eren et al (2023)).

[13] Explanations for the dollar's dominance in foreign currency issuance include its role in trade invoicing and the pricing of safe assets (Gopinath and Stein (2021)), investor preferences (Maggiori et al (2020)) and its use as a vehicle currency in foreign exchange transactions (McGuire et al (2024b)).

Composition of foreign currency bond issuance[1]

At end-June 2025, excluding bonds denominated in the issuer's local currency Table 1

	Amount (USD bn)	Share in all foreign currency bonds outstanding	Number of foreign countries that issued bonds in the specified currency	Share in total bonds outstanding denominated in the specified currency[2]
USD	13,075	62.9%	125	18%
EUR	5,150	24.8%	64	17%
GBP	976	4.7%	36	16%
JPY	310	1.5%	51	3%
AUD	244	1.2%	29	11%
CHF	221	1.1%	35	21%
CNY	185	0.9%	33	1%
HKD	122	0.6%	30	…
NOK	74	0.4%	26	20%
CAD	73	0.4%	21	2%
65 other currencies	370	1.8%	…	…

[1] Foreign currency issuance is defined with respect to the residence of the immediate issuer and captures $21 trillion out of $33 trillion in total international debt securities outstanding at end-June 2025. [2] Bonds issued by non-residents of the currency area as a share of bonds denominated in the specified currency. At end-March 2025.

Sources: Dealogic; Euroclear; LSEG; Xtrakter Ltd; BIS international debt securities statistics (Table C3); authors' calculations.

Conclusions

The shift in debt financing from loans to bonds has broadened the diversity of funding sources and instruments available to borrowers and enabled them to better manage currency and maturity mismatches. EME governments, in particular, are less reliant on foreign currency funding than they once were. Private sector borrowers continue to raise large amounts through foreign currency bonds, predominantly in US dollars, but often hedged by foreign sales or financial derivatives.

Notwithstanding the benefits associated with the development of bond markets, the shift to bonds has also brought new challenges. One is the vulnerabilities associated with currency or duration mismatches on investors' balance sheets. The flipside of the bond-enabled reduction in mismatches on borrowers' balance sheets is the transfer of risks to creditors. Mark-to-market losses from currency depreciation or interest rate increases can lead to selling or ex post hedging, which further pushes down asset prices. As a result, even EMEs without foreign currency debt remain vulnerable to fluctuations in global financial conditions (Bertaut et al (2025)).

A related challenge is monitoring the hedging activities of issuers and investors active in bond markets. Information about hedging by NBFIs and NFCs is less complete than for banks, raising concerns about the systemic risks posed by currency mismatches at these entities. Moreover, even when investors hedge their holdings, they often use derivatives that have a shorter maturity than the assets being hedged. The resulting rollover risk exposes investors that hedge to stress in dollar funding markets (McGuire et al (2021)).

References

Aldasoro, I, B Hardy and N Tarashev (2021): "Corporate debt post-GFC through the pandemic", *BIS Quarterly Review*, June, pp 1–14.

Atkin, T and J Harris (2023): "Foreign currency exposure and hedging in Australia", *Reserve Bank of Australia Bulletin*, March, pp 86–95.

Bank for International Settlements (BIS) (2022): "Old challenges, new shocks", *Annual Economic Report 2022*, chapter I, pp 1–39.

——— (2025): "Financial conditions in a changing global financial system", *Annual Economic Report 2025*, chapter II, pp 47–76.

Bank for International Settlements, European Central Bank and International Monetary Fund (BIS, ECB and IMF) (2015): *Handbook on securities statistics*.

Bertaut, C, V Bruno and H S Shin (2025): "Original sin redux: the role of duration risk", *BIS Working Paper*, no 1109, March.

Bogdanova, B, T Chan, K Micic and G von Peter (2021): "Enhancing the BIS government bond statistics", *BIS Quarterly Review*, June, pp 15–24.

Committee on the Global Financial System (CGFS) (2007): "Financial stability and local currency bond markets", *CGFS Papers*, no 28, June.

Eichengreen, B and R Hausmann (1999): "Exchange rates and financial fragility", in *New challenges for monetary policy*, proceedings of the Federal Reserve Bank of Kansas City Jackson Hole Economic Policy Symposium, August, pp 329–68.

Eichengreen B, R Hausmann and U Panizza (2023): "Yet it endures: the persistence of original sin", *Open Economies Review*, vol 34, pp 1–42.

Eren, E, S Malamud and H Zhou (2023): "Signaling with debt currency choice", *BIS Working Papers,* no 1067, January.

Gopinath, G and J Stein (2021): "Banking, trade, and the making of a dominant currency", *Quarterly Journal of Economics,* vol 136, no 2, pp 783–830.

Gruić, B and P Wooldridge (2012): "Enhancements to the BIS debt securities statistics", *BIS Quarterly Review*, December, pp 63–76.

Hardy, B and F Saffie (2024): "From carry trades to trade credit: financial intermediation by non-financial corporations", *Journal of International Economics*, vol 152, November, 103988.

Hardy, B and G von Peter (2023): "Global liquidity: a new phase?", *BIS Quarterly Review*, December, pp 21–31.

IMF and World Bank (2021): "Guidance note for developing government local currency bond markets", *IMF Analytical Notes*, no 2021/001.

Maggiori, M, B Neiman and J Schreger (2020): "International currencies and capital allocation", *Journal of Political Economy*, vol 128, no 6, pp 2019–66.

McGuire, P, G von Peter and S Zhu (2024a): "International finance through the lens of BIS statistics: residence vs nationality", *BIS Quarterly Review*, March, pp 73–88.

——— (2024b): "International finance through the lens of BIS statistics: the global reach of currencies", *BIS Quarterly Review*, June, pp 1–16.

Onen, M, H S Shin and G von Peter (2025): "Overcoming original sin: shedding new light on uneven progress", *Economic Policy*, vol 40, no 122, pp 575–620.

Endnotes

The country groupings used in this feature divide economies around the world into two groups: advanced economies (AEs) and emerging market economies (EMEs). The BIS Annual Economic Report (AER) lists some 60 jurisdictions as either advanced AEs or EMEs. The BIS international banking and financial statistics extend this categorisation to all economies that appear in published data as counterparties. The set of AEs includes those listed in the BIS AER, plus the overseas and dependent territories of these AEs. The emerging market and developing economy (EMDE) group comprises all economies not classified as AEs, including the EMEs listed in the BIS AER. The names of jurisdictions with ISO codes are provided under the abbreviations on pages iv–vii.

DDS = domestic debt securities; IDS = international debt securities; NBFIs = non-bank financial institutions; TDS = total debt securities.

Graph 1.A: For countries that do not report either TDS or DDS, data are estimated by the BIS as IDS.

Graph 1.B: The panel compares the shares at Q1 2025 with those at end-2009 or the earliest available: for AR 2018, BR 2013, ID 2018, MY 2013, TH 2011, TR 2014 and ZA 2023.

Graph 1.C: Non-banks comprise government, NBFIs, non-financial corporations, households and international organisations. Euro- and yen-denominated credit has been converted to US dollars using the end-of-period exchange rates.

Graph 2.A: The weighted average is calculated as the sum of bonds outstanding as a ratio of the TDS reporting countries' combined GDP, starting with the earliest available data: for AR 2021, BR 2018, CA 2015, CZ 2020, DK 2020, EE 2008, HU 2020, ID 2018, IE 2009, KR 2018, LT 2012, LU 2008, LV 2011, MX 2018, PH 2015 and ZA 2023.

Graph 2.B: The aggregate sector share is the TDS issued by the respective sector, as a percentage of the TDS of all sectors combined, starting with the earliest available data: for AR 2021, BR 2018, CA 2015, CZ 2020, DK 2020, EE 2008, HU 2020, ID 2018, IE 2009, KR 2018, LT 2012, LU 2008, LV 2011, MX 2018, PH 2015 and ZA 2023. Excludes 11 countries with incomplete data: CN, CL, CO, IL, IS, MY, NO, PE, PH, TH and TW.

Graph 2.C: Constant sample of countries with a common start date.

Graph 3.A: Starting with earliest available data: for AR 2021, BR 2018, CA 2015, CZ 2020, DK 2020, HU 2020, ID 2018, KR 2018, MX 2018 and PH 2015.

Graph 6.A: The red line is based on a balanced panel of 25 major EMEs; the blue line is based on an unbalanced panel of 24 major EMEs (see Onen et al (2025)).

Annex: Introduction to the BIS debt securities statistics

This annex provides detailed information on the BIS debt securities statistics and how they appear in statistical tables on the BIS Data Portal (with FAQs and a Glossary). Table A.1 presents an overview of the statistics (with links to published tables) and lists the dimensions and breakdowns available in each.

Reporting basis

All BIS debt securities statistics are compiled on a *residence basis*: they aggregate the issuance of all units with a physical presence under a common jurisdiction (McGuire et al (2024a)). The published tables differ in scope and the breakdowns they report (Table A.1). To align with aggregate statistics received from national authorities, the BIS delineates the *market of issue* (primary market) as follows: *domestic debt securities* (DDS) are those issued by residents in their local market, whereas *international debt securities* (IDS) are issued outside the local market of the country where the borrower resides. In particular, IDS are distinguished from DDS based on three criteria: registration domain (identified by the ISIN number), listing place and governing law. If any one of these criteria differs from the residence of the issuer, the BIS defines the security as international (Gruić and Wooldridge (2012)). Note that the distinction does not depend on the nationality of the issuer or the currency denomination of the security (Box A in Aldasoro et al (2021) provides examples).

Total debt securities (TDS) of a country sum DDS and IDS together, representing *all* debt securities issued by its residents, anywhere. For example, TDS for Ireland comprise issuance by all entities residing in Ireland, whether onshore in the Irish market (DDS) or offshore in markets outside Ireland (IDS).[14] The BIS receives DDS and TDS as aggregates from national sources.[15] Separately, the BIS compiles IDS from commercial data sources (Dealogic, Euroclear, LSEG, Xtrakter) and constructs aggregates from security-level data. This allows the IDS to be reaggregated by *nationality* (McGuire et al (2024a)).

Coverage and valuation

The focus of the statistics is on the issuance and amounts outstanding of individual *issuer countries*, disaggregated by sector. IDS are available for all issuer countries, whereas TDS and DDS statistics have limited coverage (row "Number of countries" in Table A.1), depending on BIS membership or participation in the G20 Data Gaps Initiative.[16] They include AEs and EMEs, but do not cover frontier markets and developing economies.

Time series typically go back to 2000 or further, except for more recent holdings statistics. Tables with more granular breakdowns (eg Tables C5 and C6) have a larger

[14] However, bonds issued by an Irish subsidiary registered in the Cayman Islands are not included in Ireland's TDS. They would be included in the TDS for the Cayman Islands; since the Cayman Islands does not report TDS, this gap can be covered with the IDS available for the Cayman Islands.

[15] For some countries, national data are available for DDS or TDS but not for both; hence, DDS and TDS are not published for all countries. The BIS does not calculate the missing series, because it cannot control for potential double-counting, eg reported DDS may include securities the BIS classifies as IDS. Differences in valuations also complicate comparisons.

[16] In addition to G20 members, this includes Chinese Taipei, Cyprus, Lebanon, Malta and Pakistan.

share of missing observations at more granular levels, such as subsectors and maturity buckets in the long-term segment.

Most statistics are available at quarterly frequency, some are available annually. Amounts are expressed in billions of local currency. When expressed in US dollars, the statistics use current end-of-period exchange rates for amounts outstanding and average-of-period exchange rates for net issuance. TDS and DDS outstanding are reported at nominal value – the amount the debtor owes, including accrued interest – or, in the case of IDS, at face value (principal). Net issuance is also reported at face value. Holdings statistics are reported at market value, which are more relevant to creditors.

Dimensions

Table A.1 also sets out the main breakdowns available in the BIS debt securities statistics. They are harmonised with the internationally agreed recommendations in the *Handbook on securities statistics* (BIS, ECB and IMF (2015)). Next to *issuer country*, the most prominent dimensions are the issuer sector and currency of denomination. *Sectors* available across published tables are (i) general government (comprising central and local government, excluding public corporations); (ii) financial corporations (banks, central banks and several types of non-bank financial institutions); and (iii) non-financial corporations. Households and non-profit institutions serving households are separate but usually do not issue bonds.

Most tables distinguish between domestic and foreign *currency* denomination. The distinction is always from the borrower's perspective. Only IDS (Table C3) itemises specific currencies (USD, EUR, CNY, etc). Table A.1 notes which publication tables provide additional information on bond features. *Maturity* is generally reported as original maturity (in buckets for C3, C5, C6; in years for C2). *Interest rate type* distinguishes mainly fixed vs variable interest bonds (C2, C3, C5, C6; C5 provides several variable rate types).

Holdings statistics

The BIS has expanded its offering of debt securities tables in the context of the G20 Data Gaps Initiative, yielding tables C5, C6 and C7. Table C5 provides the broadest capture of TDS, by issuer sector and country, with breakdowns by currency, maturity, interest type and valuation basis. To complement the issuer side, tables C6 and C7 focus on holdings of debt securities.

Table C6 provides the most detailed breakdown of holders by sector and subsectors (for residents; foreign holders are treated as a separate sector). Table C7 combines the debtor-creditor perspectives, providing whom-to-whom statistics that link issuers' liabilities with holders' assets on a sector-by-sector basis. It details resident sectors as holders and residents and non-residents as issuers, as well as non-residents as holders and residents as issuers. These two tables allow users to examine the relationship between bond issuers and holders within an economy and across economies. They do not map out the geography of portfolio holdings by country and counterparty country; this is the focus and strength of the IMF's Portfolio Investment Positions by Counterpart Economy (PIP) survey.

Overview of publication tables on the BIS debt securities statistics[1] Table A.1

Dimensions and breakdowns	Table C1		Table C2	Table C3	Table C4	Table C5	Table C6	Table C7
	Debt securities (TDS[2], DDS[3], IDS[4])	International debt securities (IDS[4])	Central government debt securities[5, 6]	International debt securities (IDS[4])	Government debt securities	Debt securities issues (TDS[2], DDS[3])	Debt securities holdings (TDS[2], DDS[3])	Debt securities issues and holdings (TDS[2])
Issue market								
All markets	✓				✓	✓	✓	✓
Domestic market	✓		✓			✓	✓	
International market	✓	✓		✓		✓	✓	
Issuer residence								
Resident issuers	✓		✓		✓	✓	✓	✓
Non-resident issuers		✓		✓			✓	✓
Reporting basis								
By residence	✓	✓	✓	✓	✓	✓	✓	✓
By nationality		✓		✓				
Sector	Issuer	Issuer	Issuer	Issuer	Issuer	Issuer	Holder	Issuer/Holder
All resident sectors	✓					✓	✓	✓
NFC[7]	✓	✓		✓		✓	✓	✓
Financial corporations	✓	✓[8]		✓[8]		✓	✓	✓
Central bank						✓	✓	
OMFI[9]						✓	✓	
ODC[10]						✓	✓	
MMF[11]							✓	
OFC[12]						✓	✓	
Of which: sec corp[13]						✓	✓	
ICPF[14]						✓	✓	
General government	✓	✓		✓	✓	✓	✓	✓
Of which: cen govt[15]			✓		✓	✓	✓	
Memo item: public sector						✓	✓	
HH and NPISH[16]						✓	✓	✓
Non-residents							✓	✓
All holders							✓	✓
Issue currency type								
All currencies	✓	✓		✓		✓	✓	✓
Domestic currency			✓	✓	✓	✓	✓	
Foreign currency			✓	✓[8]	✓	✓	✓	
Original maturity								
All maturities	✓	✓		✓		✓	✓	✓

See next page for sources and notes.

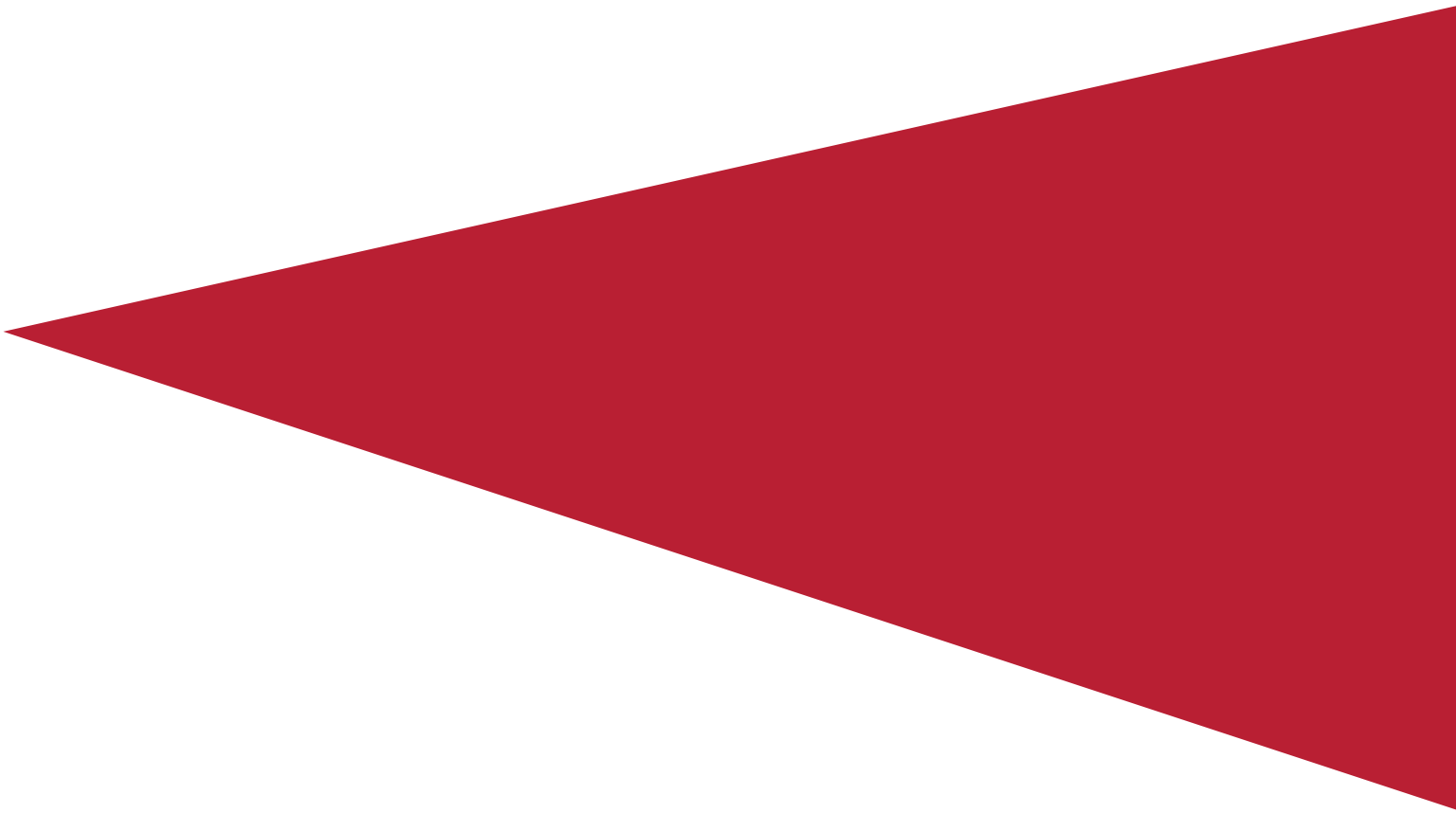
Overview of publication tables on the BIS debt securities statistics[1] Table A.1

	Table C1		Table C2	Table C3	Table C4	Table C5	Table C6	Table C7
Short-term (≤ 1 year)				✓		✓	✓	
Long-term (> 1 year)			✓	✓	✓	✓	✓	
> 1 year ≤ 2 years						✓	✓	
> 2 years ≤ 5 years						✓	✓	
> 5 years ≤ 10 years						✓	✓	
> 10 years						✓	✓	
Long-term at original maturity, with a remaining maturity ≤ 1 year)						✓	✓	
Interest rate type								
All interest rates	✓	✓		✓	✓	✓	✓	✓
Fixed interest rate			✓	✓		✓	✓	
Variable interest rate				✓		✓	✓	
Inflation-linked			✓			✓		
Interest rate-linked						✓		
Asset price-linked						✓		
Other			✓[8]					
Valuation	Nominal/ face/market	Face	Nominal	Face	Nominal	Nominal/ face/market	Market	Market
Position and flows	Position	Position	Position	Position/ net issuance	Position	Position/ net issuance	Position/ net issuance	Position
Frequency	Quarterly	Quarterly	Annual	Quarterly	Annual	Quarterly	Quarterly	Quarterly
Number of countries	59	All	30	All	55	59	42	43
Start[17]	2001	1965	1995	1965	1995	2020	2021	2021
Source	National data (aggregates)	Commercial data (security-by-security database)	National data (aggregates)	Commercial data (security-by-security database)	National data, commercial data, BIS estimates	National data (aggregates)	National data (aggregates)	National data (aggregates)

[1] The statistical tables can be found on the BIS Data Portal. Individual country observations may differ from the dimensions listed. The online documentation (metadata and reporting practices) provides further detail. [2] Debt securities issued by residents in all markets. [3] Debt securities issued by residents in their respective domestic market. [4] Debt securities issued by non-residents in all markets. [5] Data collected as part of the survey designed by the Committee on the Global Financial System working group on financial stability and local currency bond markets. [6] Average original and remaining maturity in years. [7] Non-financial corporations. [8] Additional breakdowns available. [9] Other monetary financial institutions. [10] Other deposit-taking corporations. [11] Money market funds [12] Other financial corporations. [13] Securitisation corporation. [14] Insurance corporations and pension funds. [15] Central government. [16] Households and non-profit institutions serving households. [17] Start date for majority of countries. Individual series may start earlier, or later.

Source: BIS debt securities statistics.

Promoting global monetary and financial stability



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ISBN 978-92-9259-883-9 (online)
ISSN 1683-0121 (online)