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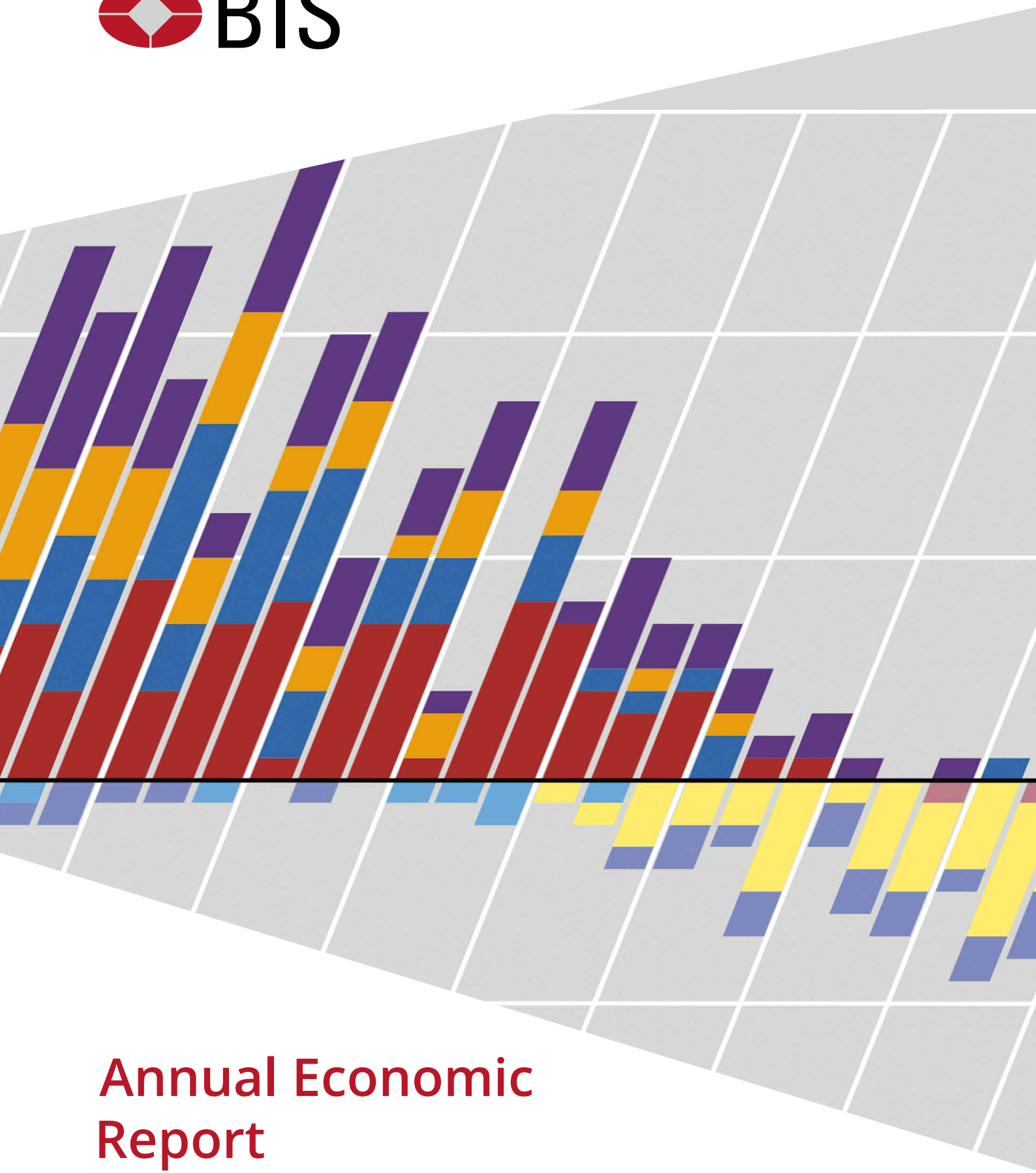

Annual Economic Report

June 2025

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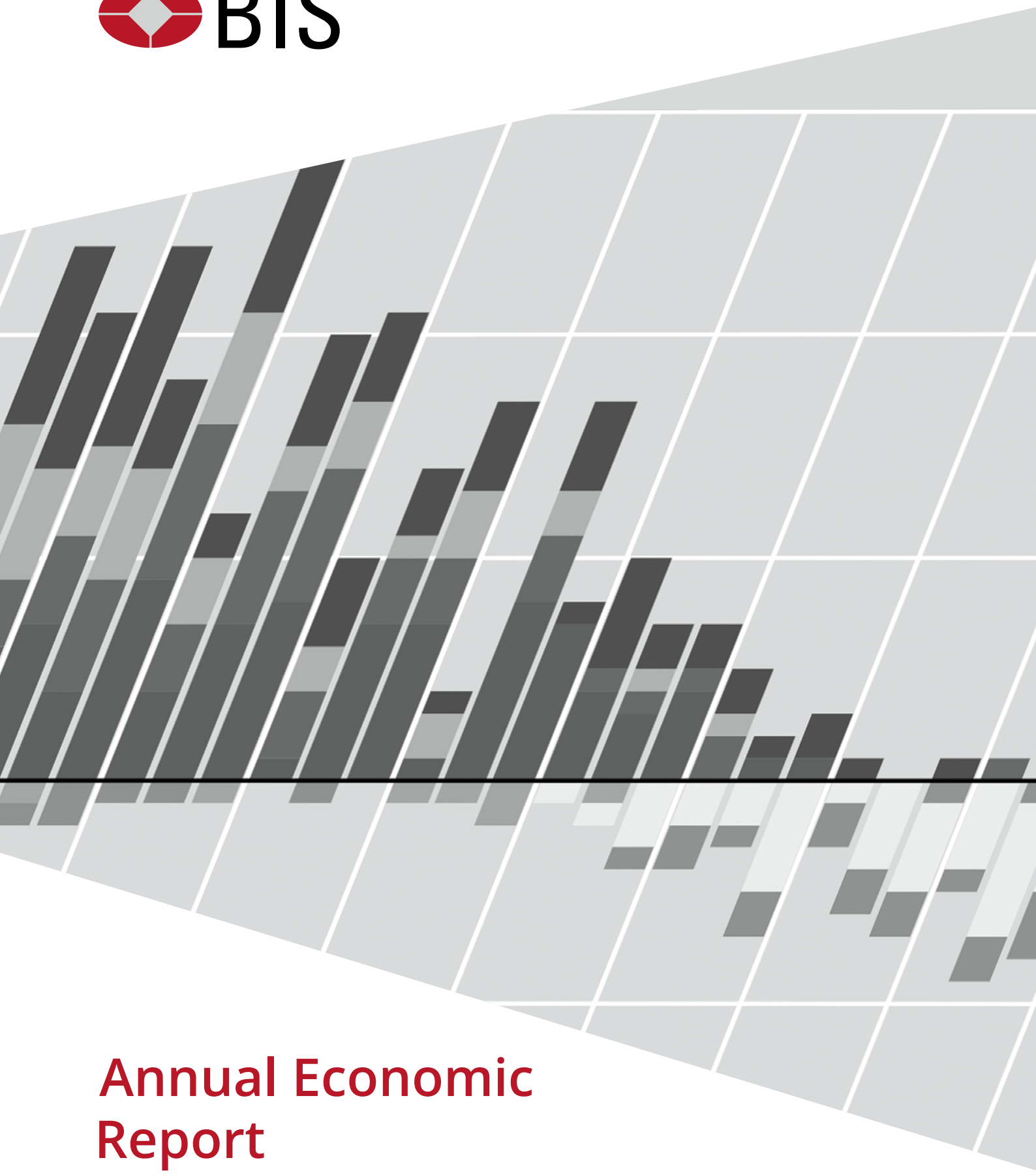

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Graphs

This Report went to press on 20 June 2025 using data available up to 30 May 2025.

A section in the endnotes containing detailed explanations for the graphs and tables is included at the end of each chapter.

Conventions used in the Annual Economic Report

std dev	standard deviation
σ^2	variance
$	US dollar unless specified otherwise
'000	thousands
mn	million
bn	billion (thousand million)
trn	trillion (thousand billion)
% pts	percentage points
bp	basis points
lhs, rhs	left-hand scale, right-hand scale
pa	per annum
sa	seasonally adjusted
saar	seasonally adjusted annual rate
mom	month on month
yoy	year on year
qoq	quarter on quarter
...	not available
.	not applicable
–	nil or negligible

Components may not sum to totals because of rounding.

The terms "country" and "economy" used in this publication also cover territorial entities that are not states as understood by international law and practice but for which data are separately and independently maintained. The designations used and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of the BIS concerning the legal status of any country, area or territory or of its authorities, or concerning the delimitation of its frontiers or boundaries. Names of countries or other territorial entities are used in a short form which is not necessarily their official name.

Country codes

AE	United Arab Emirates
AL	Albania
AM	Armenia
AR	Argentina
AT	Austria
AU	Australia
AW	Aruba
AZ	Azerbaijan
BA	Bosnia and Herzegovina
BB	Barbados
BE	Belgium
BG	Bulgaria
BH	Bahrain
BM	Bermuda
BO	Bolivia
BR	Brazil
BY	Belarus
CA	Canada
CH	Switzerland
CL	Chile
CN	China
CO	Colombia
CR	Costa Rica
CY	Cyprus
CZ	Czechia
DE	Germany
DK	Denmark
DO	Dominican Republic
DZ	Algeria
EA	euro area
EC	Ecuador
EE	Estonia
EG	Egypt
ES	Spain
FI	Finland
FR	France
GB	United Kingdom
GE	Georgia
GG	Guernsey
GI	Gibraltar
GR	Greece
GT	Guatemala
HK	Hong Kong SAR
HN	Honduras
HR	Croatia
HU	Hungary
ID	Indonesia
IE	Ireland
IL	Israel
IN	India
IS	Iceland
IT	Italy
JE	Jersey
JP	Japan
KR	Korea
KW	Kuwait
KY	Cayman Islands
KZ	Kazakhstan
LB	Lebanon
LT	Lithuania
LU	Luxembourg
LV	Latvia
MA	Morocco
MD	Moldova
ME	Montenegro
MK	North Macedonia
MN	Mongolia
MO	Macao SAR
MT	Malta
MU	Mauritius
MX	Mexico
MY	Malaysia
NG	Nigeria
NI	Nicaragua
NL	Netherlands
NO	Norway
NZ	New Zealand
PA	Panama
PE	Peru
PH	Philippines
PK	Pakistan
PL	Poland
PT	Portugal
PW	Palau
PY	Paraguay
RO	Romania
RS	Serbia
RU	Russia
SA	Saudi Arabia
SE	Sweden
SG	Singapore
SI	Slovenia
SK	Slovakia
SV	El Salvador
TH	Thailand
TM	Turkmenistan
TR	Türkiye
TW	Chinese Taipei
UA	Ukraine
US	United States
UY	Uruguay
UZ	Uzbekistan
VE	Venezuela
VN	Vietnam
ZA	South Africa

Currency codes

AED	UAE dirham	KRW	Korean won
ARS	Argentine peso	KWD	Kuwaiti dinar
AUD	Australian dollar	MAD	Moroccan dirham
BRL	Brazilian real	MXN	Mexican peso
CAD	Canadian dollar	MYR	Malaysian ringgit
CHF	Swiss franc	NOK	Norwegian krone
CLP	Chilean peso	NZD	New Zealand dollar
CNY (RMB)	Chinese yuan (renminbi)	PEN	Peruvian sol
COP	Colombian peso	PHP	Philippine peso
CZK	Czech koruna	PLN	Polish zloty
DKK	Danish krone	RON	Romanian leu
DZD	Algerian dinar	RUB	Russian rouble
EUR	euro	SAR	Saudi riyal
GBP	pound sterling	SEK	Swedish krona
HKD	Hong Kong dollar	SGD	Singapore dollar
HUF	Hungarian forint	THB	Thai baht
IDR	Indonesian rupiah	TRY	Turkish lira
ILS	new shekel	USD	US dollar
INR	Indian rupee	VND	Vietnamese dong
JPY	Japanese yen	ZAR	South African rand

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

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

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

Emerging market economies (EMEs): Algeria, Argentina, Brazil, Chile, China, Colombia, Czechia, Hong Kong SAR, Hungary, India, Indonesia, Israel, Korea, Kuwait, Malaysia, Mexico, Morocco, Peru, the Philippines, Poland, Romania, Russia, Saudi Arabia, Singapore, South Africa, Thailand, Türkiye, the United Arab Emirates and Vietnam.

Global: all AEs and EMEs, as listed.

Depending on data availability, country groupings used in graphs and tables may not cover all the countries listed. The grouping is intended solely for analytical convenience and does not represent an assessment of the stage reached by a particular country in the development process.

At a crossroads: policy challenges in a shifting world

The soft landing for the global economy that was coming into view suddenly seems more elusive. Long-established trade relationships began to fray as a wave of larger than expected tariff announcements in early April hit the global economy. Growth forecasts were cut, and financial markets were jolted as policy uncertainty surged. Even as some of the initial shock has dissipated, a sense of apprehension hangs in the air.

Long-standing economic relationships that have sustained global prosperity for decades are now under strain. Yet we should not look back with rose-tinted glasses. The global economy was already wrestling with structurally low productivity growth, persistently weak fiscal positions and the build-up of large and often opaque non-bank financial positions. Rapid and disruptive technological changes pose significant challenges of their own.

Central banks need to deal with the immediate fallout while keeping top of mind the deeper, structural weaknesses that threaten the resilience of the global economy. Success will depend on maintaining public trust – trust in central banks' capacity to act and do so in the public interest. Trust in their commitment to low inflation was decisive in quelling pandemic-era inflation. Now, trust in public institutions – including the trust in money – needs to serve as a fixed point for others to rally around.

This year's Annual Economic Report assesses the state of the global economy and discusses the key policy challenges. In addition, it offers an in-depth analysis of two important issues. The first is changes in the financial system, and their implications for the global transmission of financial conditions. The second is the design of a future monetary and financial system – one that embraces innovation to unlock new possibilities while preserving the trust in money that is fundamental to economic stability.

The year under review

Until early 2025, the global economy appeared firmly on track for a soft landing. In most countries, inflation was already at or converging to targets, and global growth in 2024, at just over 3%, matched the pace of the previous year. Labour markets had largely normalised, with unemployment rates still below pre-pandemic levels. Financial markets echoed this optimism, with equities rallying on solid growth prospects and expectations of deregulation, while credit spreads remained tight.

But the outlook for the global economy quickly darkened in the second quarter of 2025 following the announcements of larger than expected broad-based US tariffs. Adding to the uncertainty were growing doubts about the return of fiscal policy to a prudent path, and questions about the commitment to central bank independence.

Financial markets revolted, with volatility climbing to levels unseen since the pandemic as stock markets around the globe plunged and corporate credit spreads widened. Unusually, the US dollar depreciated even as US government bond yields rose. Stock markets staged a comeback as some of the announcements were reversed, but bond and currency markets reflect a sense of continuing apprehension about what comes next. Once they settle, tariffs are expected to be at levels unseen in decades, exerting a significant impact on both output and inflation in the following months.

Textbook effects of tariffs for countries imposing the tariffs resemble a supply shock, raising prices and costs and dampening growth. For economies on the receiving end, the effects are more akin to a negative demand shock, with adverse effects on both growth and inflation. Retaliation would impart supply shocks to receiving countries.

But the dynamics may well turn out to be far more complex than these simple textbook effects. The global economy is not a collection of islands; it consists of a dense web of interconnections among suppliers, customers, consumers and the financial intermediaries that knit them together. Activity straddles the border, so that traded goods undergo many rounds of value added before finding their eventual customers. As the pandemic-era inflation experience made clear, disrupting supply chains could once more lead to upside surprises in inflation. Such a jolt to inflation could rekindle inflation expectations that remain sensitive after the Covid-19-related inflation experience.

Even before the full effects of tariffs take hold, economies are expected to feel the impact of high uncertainty, as firms delay investment and hiring plans and households increase precautionary saving. The slowdown has yet to show up in the hard data, but elevated measures of uncertainty and weakening consumer and business confidence indicators clearly signal a deterioration of economic activity ahead. Growth projections for 2025 are down, and significantly so for several countries.

Inflation forecasts show a more diffuse picture. While they have been revised up in the United States, inflation expectations remain little changed in most other economies. Reflecting this divergence, some central banks have paused interest rate cuts as they wait for clearer signals on how recent developments will affect inflation, while others have continued easing, citing growth risks from trade and uncertainty.

Pursuing stability and growth in a shifting world

Beyond the volatility arising from trade policy, the outlook for the global economy is clouded by significant real and macro-financial vulnerabilities. These vulnerabilities are not new, but the recent turbulence has heightened their relevance. They have the potential to amplify the effects of current shocks and, in some cases, could also generate shocks themselves. As discussed in Chapter I, vulnerabilities fall into three broad categories: real vulnerabilities such as low potential output growth and less flexible economies; rising fiscal vulnerabilities; and related macro-financial vulnerabilities associated with deeper structural shifts in the global financial system.

Rising trade fragmentation adds to real vulnerabilities

The global economy is facing a combination of long-standing and emerging structural challenges. Productivity growth has been trending down in many advanced economies for decades and more recently also in several emerging market economies, acting as a drag on growth overall.

The imposition of broad-based tariffs represents a further step towards greater trade fragmentation. These tariffs could accentuate the decline in productivity growth as supply chains come under further pressure. Ageing populations and less migration will reduce supply capacity. The Phillips curve could become steeper, meaning that inflation could rear its head even with moderate increases in activity.

For inflation expectations, it is a story of "once bitten, twice shy". Having been surprised by the surge and persistence of inflation, households and firms respond more sensitively to inflation outcomes. A recent BIS survey of households across multiple countries reveals that their inflation perceptions have been deeply scarred by the experience of pandemic-era inflation.

Adding to these challenges is the concern that supply shocks could be more frequent and persistent in the future, driven by geopolitical tensions and extreme weather events. These developments pose further challenges to monetary policy.

Structural reforms are more critical than ever. When faced with supply shocks, reallocating resources efficiently is of first-order importance. Strengthening the supply side enhances resilience, and boosting potential growth is vital for debt sustainability.

Historically high public debt

Public debt levels have risen above peacetime highs in many countries. While elevated debt can be sustainable with robust growth and low interest rates, current and expected conditions look less favourable. Debt service can be too high even if debt is sustainable; in many economies, debt service is as high as spending on education, defence or public pensions.

High public debt increases the economy's vulnerability to adverse scenarios that could push up inflation or lead to stress in the financial system. Lack of fiscal consolidation and concerns about fiscal sustainability could lead to refinancing difficulties and sharp rises in interest rates. Central banks might come under pressure to maintain overly accommodative monetary policies, including by keeping balance sheets large. Strong institutions that protect central bank independence will be important.

High public debt also increases the vulnerability of the financial system to lower asset values when interest rates increase, especially when leverage within the system is elevated. Repricing of government debt can lead to losses for banks and non-bank financial institutions (NBFIs) with large sovereign debt holdings. Moreover, in sovereign bond markets increasingly dominated by highly leveraged hedge funds, a repricing could also trigger sharp deleveraging and a liquidity squeeze, leading to a tightening of financial conditions for the broader economy.

Maintaining fiscal sustainability is key to mitigating such risks. For many countries, this means reducing large deficits and rebuilding fiscal buffers in a growth-friendly way. This increases governments' ability to conduct countercyclical fiscal policy and creates space to accommodate future increases in essential spending, including on infrastructure and defence. But the benefits are broader than that. Lower risk premia also reduce average financing costs for the wider economy.

Shifting financial intermediation

While the Great Financial Crisis (GFC) was primarily a banking crisis, with mortgage markets at its core, the post-GFC landscape has government bond markets at its centre and asset managers of various stripes as the key intermediaries. As a result, a key risk today is liquidity stresses in government bond markets. Hedge funds, in particular, have become key providers of procyclical liquidity in government bond markets, often employing highly leveraged relative value trading strategies. By using government securities as collateral in the repo market to borrow cash for additional securities, these strategies boost returns but are also vulnerable to adverse shocks in funding, cash or derivatives markets. This vulnerability has increased further as financing terms have become increasingly lax. Haircuts have gone to zero or even negative in large sections of the repo market, meaning that creditors have stopped imposing any meaningful restraint on hedge fund leverage. This higher leverage leaves the broader market more vulnerable to disruptions, as even slight increases in haircuts can trigger forced selling and amplify financial instability. Such adverse dynamics were on display, for example, during the market turmoil of March 2020, and contributed to the volatility spike in Treasury markets in early April 2025.

NBFIs have also significantly expanded their role in cross-border transactions, primarily through bond portfolio investment. Many of these entities, including pension funds and insurance companies, manage globally diversified portfolios across multiple currencies while maintaining obligations to their beneficiaries in domestic currency. To hedge the associated currency risk, they rely heavily on derivatives markets (foreign exchange swaps, forwards and currency swaps), which had grown to $111 trillion globally by end-2024, mostly denominated in US dollars. While these instruments support cross-border positions, they also expose NBFIs to significant short-term rollover risks and funding pressures. In addition, they have amplified the role of global portfolio investors in transmitting financial shocks across borders, even among major AEs. As discussed in Chapter II, financial conditions have become more sensitive to global risk factors. This calls for a deeper understanding of the cross-border challenges inherent in a more market-based financial system and underlines the value of cooperation among central banks. Regular information-sharing and exchanges of views improve the assessment of global macroeconomic and financial developments, helping central banks to better anticipate international spillovers and calibrate their policies to minimise unintended consequences.

While strains in government bond markets have been at the core of recent financial tensions, private sector debt also remains a concern. High debt levels amplify economic downturns through wider credit spreads, rising defaults and reduced credit availability. One area to watch is private credit. Private credit markets provide a growing share of finance to smaller, highly indebted firms. Meanwhile, banks remain indirectly exposed to credit risks by lending to private credit firms.

These structural changes in the financial system call for a holistic approach by supervisors and regulators. For banking, timely and consistent adoption of Basel III across regions is a must. For NBFIs, this means aligning regulation so that activities posing similar financial stability risks are regulated with similar stringency.

Monetary policy priorities

One lesson from the pandemic era is that inflation can emerge suddenly and from supply restrictions, not only from strong aggregate demand. Structural shifts and increasing rigidity on the supply side heighten the risk of inflation potentially returning. Pandemic-era inflation has made inflation expectations more sensitive. Trade tensions exemplify the current challenges central banks face. Central banks must carefully balance supporting growth with preventing temporary price increases from turning into persistent inflation. If evidence of de-anchoring emerges, central banks must respond quickly and forcefully to inflationary shocks.

Periodic reviews, already undertaken by some major central banks, help to ensure that the monetary policy frameworks remain fit for purpose. Three key lessons from the experience of recent years stand out. First, inflation targeting must address both inflation surges and inflation undershooting targets. Second, central banks must remain agile, prioritising flexible tools and clear exit strategies to handle abrupt economic changes. Last, humility is vital. Central banks need to avoid over-reliance on baseline outlooks. Relatedly, the use of alternative scenarios can help communicate the extent of uncertainty and clarify the central bank's reaction function.

Building a monetary and financial system for the future

Monetary policy is about preserving trust in the value of money, which is essential for the monetary system itself. Digital innovation does not change the fundamental premise of trust in money underpinned by central banks. But it does open vast new potential for the functioning of the monetary and financial system. Technological

innovations hold the promise of improving existing financial services and enabling entirely new contracting possibilities. But they need to be built on a strong footing. Central banks must step up to the challenge and build the foundations for the next-generation monetary and financial system.

The next-generation monetary system is grounded on tokenisation. Tokenisation means representing financial claims in a programmable platform. This integrates the claims themselves with the rules and logic governing transfers, to enable the contingent execution of actions (ie "if", "then" and "else"). Having central bank money, private forms of money and other claims in the same venue opens up new economic arrangements. We laid out this vision in our 2023 Annual Economic Report in terms of a "unified ledger". Since then, innovation has taken further strides. In securities markets, tokenisation on a unified ledger both improves the old and enables the new. The application to correspondent banking is particularly promising. Project Agorá envisages a unified ledger for correspondent banking where the sequences of account updates and associated messaging and compliance checks can all be done in one go. The traditional separation of messaging, clearing and settlement gives way to the seamless operations of a unified ledger, while preserving sound money and the integrity of the monetary system.

These examples give just a glimpse of what can be achieved. The possibilities are limited only by the imagination and ingenuity of the developers.

Alternatives built on privately issued currencies that circulate on public blockchains, such as stablecoins, fall short when set against the three key tests that money must fulfil to serve society. The first test is the *singleness* of money, which refers to the property that money is accepted at par with no questions asked, whatever form it takes. The second test is *elasticity*, which refers to the ability to provide money flexibly so that obligations are discharged in a timely way without waiting for incoming funds and thus avoiding gridlock. Last but not least, the third test is the *integrity* of the monetary system against illicit activity. Stablecoins fare poorly on all three criteria, and so they cannot serve as the mainstay of the monetary system. Whether they can play some subsidiary role going forward beyond being the gateway to the crypto ecosystem remains to be seen.

Tokenisation can deliver the best of digital innovation if it is grounded in the indispensable trust in money provided by central banks. Tokenised platforms with central bank money at the core can unlock new possibilities while maintaining stability and trust. To start, they should integrate central bank reserves, commercial bank money and government bonds – key forms of money and financial assets that form the cornerstone of the financial system. With these foundations in place, there is scope for the public and private sectors to unlock new efficiencies and capabilities.

Central banks must play a catalytic role. As guardians of the monetary system, they have the mandate and the capacity to drive change. In this, they can work with the private sector and coalesce efforts around a shared vision of the monetary and financial system of the future. By playing this role, they can help to serve society and maintain the crucial trust in money for the next generation.

I. Sustaining stability amid uncertainty and fragmentation

Key takeaways

- The outlook for global growth deteriorated amid heightened uncertainty and the fraying of long-established economic ties. Financial markets experienced significant volatility in response to frequent, unpredictable trade policy announcements.
- The baseline outlook of soft economic growth and moderate inflation is clouded by heightened policy uncertainty, while existing vulnerabilities in the real economy and financial system have the potential to amplify the negative impact of shocks and adverse shifts in policy.
- Policymakers must act as a stabilising force by ensuring fiscal positions are sustainable, enhancing macro-financial resilience through a level playing field across different types of financial intermediation and prioritising price stability.

Introduction

The prospects for the global economy have become much more uncertain and unpredictable in recent months, marking a notable departure from the relative optimism of the previous year when a soft landing was in sight. Trade disruptions now threaten to reshape the global economic landscape, as long-standing political and economic relationships are being questioned. The new US trade policy, with its unknown eventual scope and impact, has elevated measures of economic uncertainty to levels typically associated with crises and sparked high volatility in financial markets. As a result, the outlook for global growth has been downgraded, with mixed implications for inflation across economies.

These developments are unfolding in a world already grappling with significant vulnerabilities. Trade-related challenges are likely to reinforce pre-existing shifts towards greater economic fragmentation and protectionism, further exacerbating the decade-long decline in economic and productivity growth across many economies. Coupled with ageing populations and emerging labour shortages, trade fragmentation could further reduce supply flexibility, leaving economies more prone to inflation pressures. Meanwhile, in several jurisdictions, high public debt makes the financial system vulnerable to interest rate rises, while reducing governments' ability to respond to adverse developments. Adding to these challenges, the shift of financial intermediation from banks to non-bank financial institutions (NBFIs) and towards financing public debt has heightened liquidity risks in bond markets, raising the potential for financial stability risks to emerge outside traditional banking systems.

Addressing these challenges requires efforts by policymakers on multiple fronts. Structural policy needs to address low productivity growth and improve the ability of the economy to scale up production and reallocate resources. The removal of barriers to trade, both within and across borders, would help offset the damage from the ongoing trade conflict. In addition to supporting structural reforms, fiscal policy needs to adjust to ensure debt sustainability and restore the space for supporting the economy when needed. The regulation and supervision of the financial system must take into account the shifting nature of financial risks arising from the structural

changes in the financial system described in Chapter II of this report. In this context, there is a need for a consistent regulatory framework for banks and other financial intermediaries that pose similar risks to financial stability. Finally, for monetary policy, the experience of recent years has been a forceful reminder of the primacy of price stability as a cornerstone for sustainable growth. In an era of heightened uncertainty, preserving this anchor is more important than ever.

To succeed in these challenges, policy needs to be conducted with credible frameworks that deliver reasonable outcomes in a broad range of scenarios. Policymakers must set clear targets against which their policies can be assessed and select appropriate tools to achieve them. They need to clearly explain their actions and decisions to the public and be held accountable when things do not go to plan. Periodic reviews aimed at strengthening these frameworks can help to ensure they remain fit for purpose in the face of a changing environment. This steadfast commitment to the pursuit of their goals will foster society's trust in policymakers and institutions, ultimately enhancing the effectiveness of measures taken.

From soft landing to turbulence and uncertainty

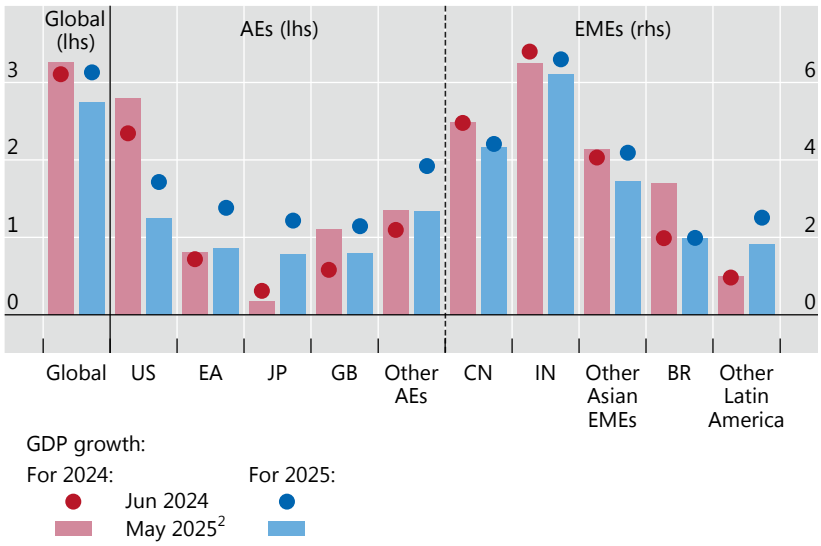
The outlook for the global economy, which until early 2025 seemed on track for a soft landing, has been overshadowed by heightened uncertainty. In the second half of 2024, inflation was projected to converge to central bank targets alongside ongoing moderate economic growth. However, the global environment is now characterised by disruptions to trade and rising geopolitical tensions punctuated by periods of heightened financial market volatility.

The global economy was growing at a moderate rate ahead of the disruptions that have defined recent months. Global GDP growth was just over 3% in 2024, broadly in line with mid-2024 expectations (Graph 1).

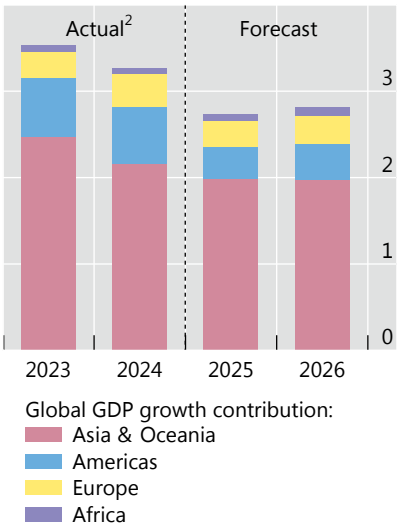
GDP growth by country and region[1]

Year on year, in per cent — Graph 1

A. GDP growth forecasts



B. Decomposition of global GDP growth by regions



[1] See endnotes for details. [2] For 2024, actual GDP growth or Consensus Economics estimates.

Sources: Consensus Economics; LSEG Datastream; national data; BIS.

The stable aggregate outcome for global growth in 2024 masked significant differences across economies. The United States stood out as the strong performer among advanced economies (AEs), with economic growth in 2024 once again surprising to the upside. By contrast, growth in Europe and Japan was weak.

A key factor behind these differences was the resilience of the US consumer (Graph 2.A). Household consumption was above its pre-pandemic trend in the United States with a lower saving rate, while households in most other AEs were much more cautious, with saving rates typically well above their pre-pandemic level (Graph 2.B).

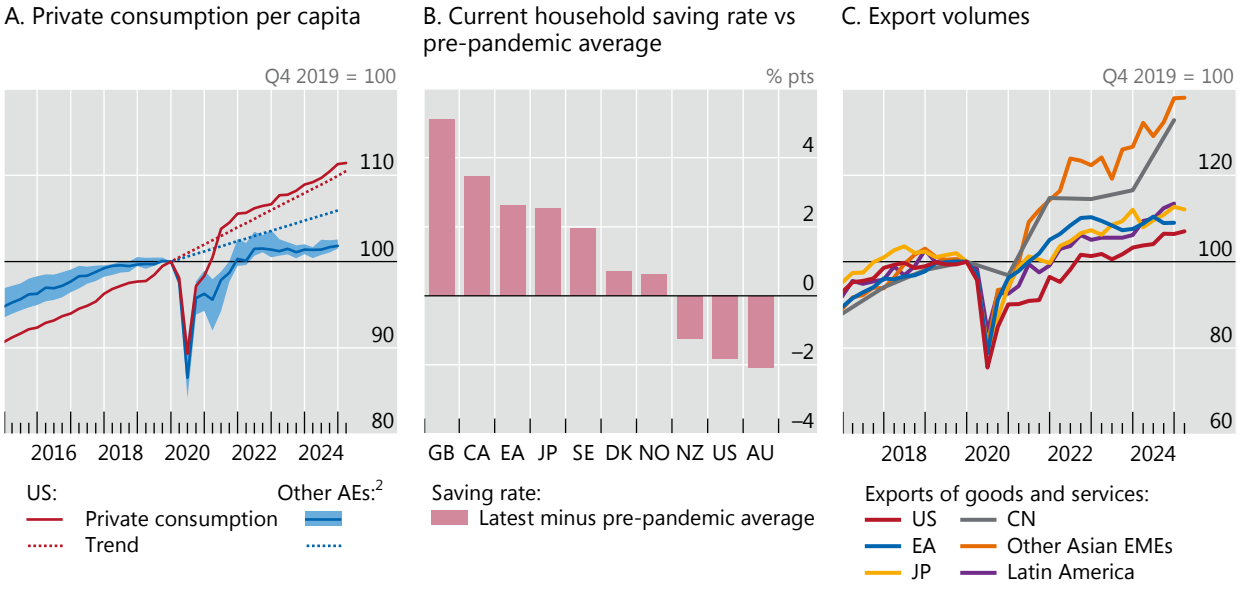
Economic trends in emerging market economies (EMEs) were also varied. In many East Asian economies, solid growth in export volumes helped offset weak domestic demand (Graph 2.C). In China, strong expansion in manufacturing output and exports enabled the country to achieve the authorities' GDP growth target of 5% for 2024, despite the ongoing adjustment in the property sector. Meanwhile, growth in India slowed, following an exceptionally strong performance after the pandemic. In Latin America, economic activity was generally subdued, except in Brazil where strong domestic demand was supported by a tight labour market and fiscal transfers.

Labour market conditions had largely normalised by the second half of 2024. While unemployment rates had increased relative to the very low levels reached in the immediate aftermath of the pandemic, they generally remained below pre-pandemic norms. As labour markets rebalanced, nominal wage growth generally eased but remained firmer than before the pandemic. One exception was Japan, where the growth rate of nominal wages continued to rise, reaching its highest level in decades.

Inflation continued to ease, reaching or approaching central bank targets in most economies (Graph 3). However, progress towards target slowed in some Latin American economies, such as Brazil, Chile and Colombia, due to domestic drivers, including private demand, adjustments in regulated prices and exchange rate depreciations. By contrast, inflation was generally at or below target in East Asia, highlighted by the persistent very low rates of inflation in China.

Most consumers remained cautious as exports underpinned growth in Asia[1]

Graph 2

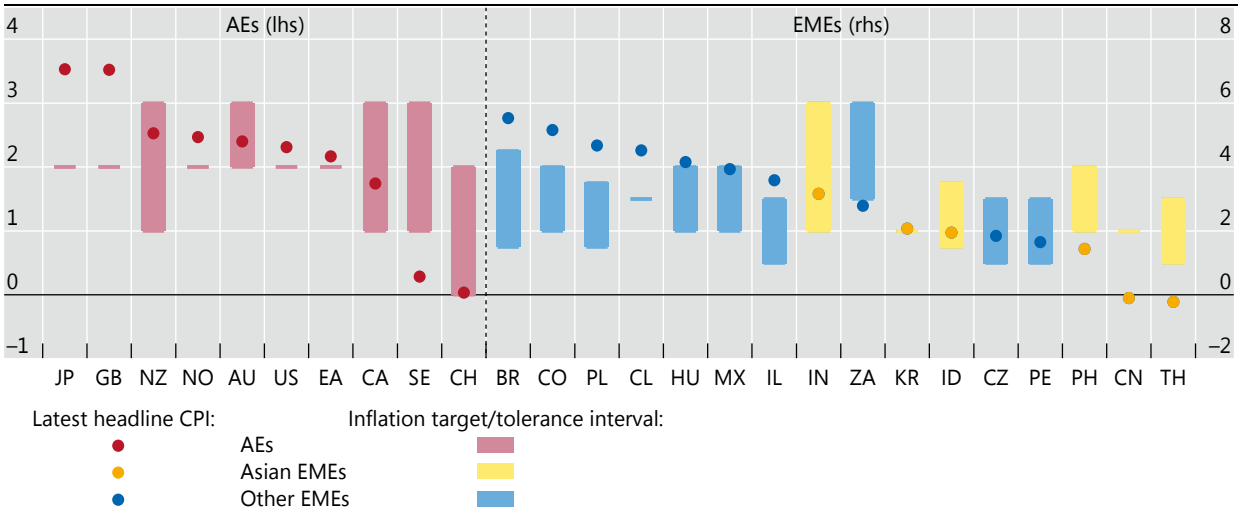


[1] See endnotes for details. [2] Median values and interquartile range.

Sources: IMF; LSEG Datastream; national data; BIS.

Current vs target inflation[1]

Year on year, in per cent — Graph 3



[1] Headline CPI used for cross-country comparability and may not correspond to the central banks' preferred measure. See endnotes for details.

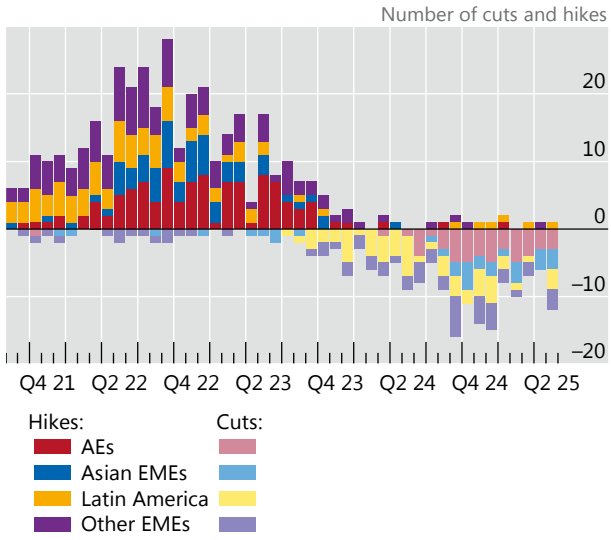
Sources: National data; BIS.

With inflation reaching or approaching targets, most central banks eased monetary policy over the past year to support economic growth (Graph 4.A). Similarly, the People's Bank of China adjusted its stance from "prudent" to "moderately loose". Two key exceptions to this broad easing trend were the Central Bank of Brazil, which raised rates rapidly in response to evidence that inflation expectations were de-anchoring amid high inflation, and the Bank of Japan, which lifted its policy interest rate to 0.5%, a level last seen about two decades ago.

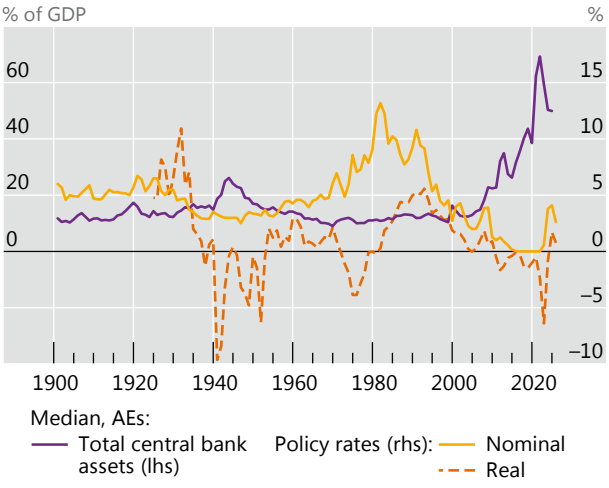
Central bank assets and policy rate cuts[1]

Graph 4

A. Central bank rate cuts (–) and hikes (+)



B. Policy rates and central bank balance sheets



[1] See endnotes for details.

Sources: IMF; Finaeon; Macrobond; national data; BIS.

In addition to reducing policy rates, several AE central banks continued to shrink their balance sheets (Graph 4.B). This was primarily done by contracting their government bond portfolios, largely through the passive roll-off of maturing securities. This process has generally proceeded smoothly.

As the soft landing for the economy came into view, financial markets performed strongly through 2024 and early 2025. In the United States, equities rallied on the back of solid growth throughout 2024 as well as expectations of looser regulation and tax cuts from the incoming administration. Similarly, European equity markets surged in late 2024, driven by growing optimism, partly related to the improvement in banks' earnings. This optimism was further bolstered by news that Germany eased its constitutional debt brake for defence-related expenditure and also committed to spending €500 billion – more than 10% of its GDP – on infrastructure over the next 12 years. Consistent with the favourable backdrop for markets, credit spreads generally remained compressed by historical standards. Meanwhile, the US dollar appreciated against most currencies in the second half of 2024, reflecting the relatively strong economic fundamentals of the US economy. Only the muted outlook for EMEs and the sustained gold price rally were out of sync.

Trade policy takes centre stage

The relatively favourable global outlook of early 2025 was overshadowed by major policy shifts and heightened financial market volatility. The announcement of significant US tariffs on Canada and Mexico in January came as a surprise to many and was followed by a series of product- and country-specific tariff proposals over subsequent months, culminating in the announcement of broad-based tariffs on US imports from all trading partners in early April. This marked a watershed moment for the global economy, with the potential to weaken demand, disrupt global supply chains and destabilise the global trading system. The April proposals included "reciprocal" tariffs of at least 10% on almost all countries, with significantly higher rates targeting those with large bilateral trade surpluses. These measures raised fears of retaliation, which materialised as a cycle of escalation between the United States and China. Tariffs peaked at 145% on most US imports from China and 125% on most Chinese imports from the United States.

Subsequent developments saw the US administration scale back the size and scope of its tariff proposals, introducing temporary pauses, carve-outs for certain goods and modest trade deals with select partners. US–China tensions eased as tariff rates were temporarily reduced to allow for further negotiations, calming financial market fears and reducing downside risks to the global economy. Later, at the end of May, a US court ruling that struck down a substantial share of the tariffs imposed by the US administration under existing law cast new doubts on how tariffs would eventually be implemented. Given the frequent reversals, the risk of further escalation and legal challenges, as well as the lack of historical precedents for shifts of this magnitude, the broader impact of these policy changes remains uncertain.

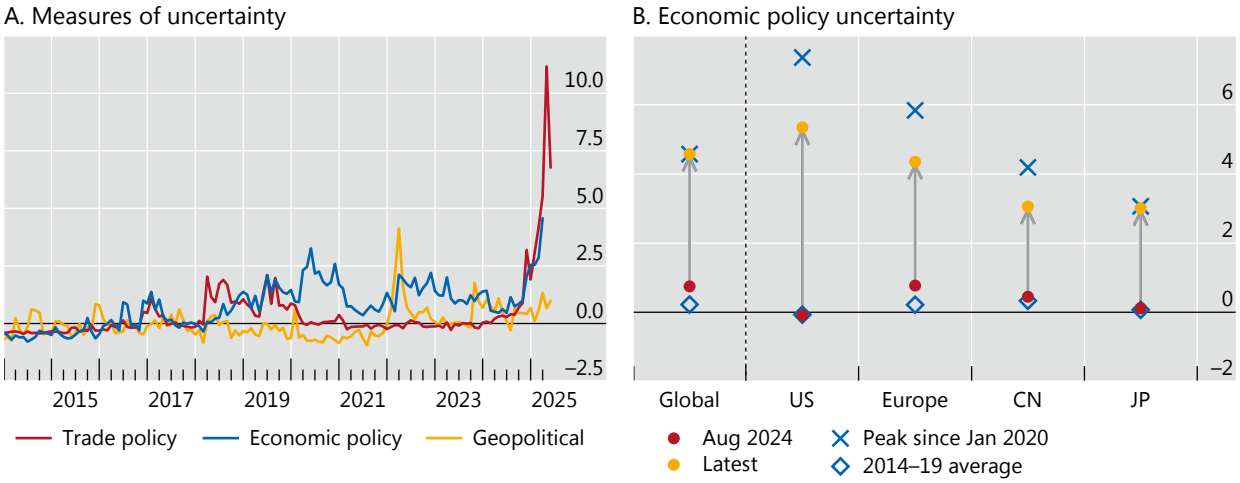
Tariffs were accompanied by several other major policy changes in the United States that heightened concerns about policy direction and stability. The administration also introduced significant shifts in immigration, regulatory and fiscal policy, while doubts were raised about its commitment to central bank independence. Beyond the policy measures themselves, the repeated cycle of announcements, adjustments and reversals has fostered an atmosphere of uncertainty and volatility, compounding the challenges for the global economy.

Common metrics of uncertainty have risen sharply. Trade policy uncertainty spiked to a record high in the first half of 2025 (Graph 5.A) and broader economic policy uncertainty also rose, albeit unevenly across regions (Graph 5.B). Moreover, the

Elevated trade and policy uncertainty could weigh on economic activity[1]

Z-score

Graph 5



[1] Based on news-based indices which show the share of articles related to a specified topic. See endnotes for details.

Sources: Baker et al (2016); Caldara et al (2020); Caldara and Iacoviello (2022); BIS.

geopolitical landscape, with active conflicts on multiple continents, remains fertile ground for unpredictable events that could compound challenges from the ongoing trade tensions.

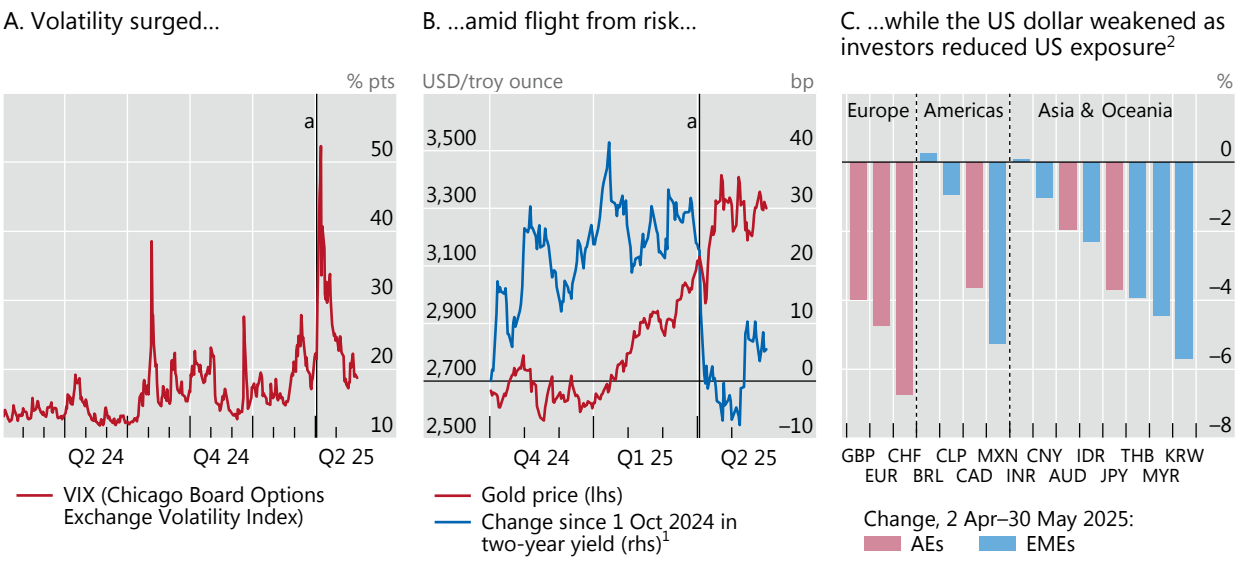
Frequent policy changes led to pronounced swings in financial markets

Global financial markets saw a dramatic escalation of volatility when the reciprocal tariffs announced in early April exceeded market expectations. With markets already on edge due to greater policy uncertainty, gauges of volatility surged to levels not seen since the pandemic, as investors scrambled to reduce risky exposures (Graph 6.A). Stock markets across the globe plunged and corporate credit spreads across the rating spectrum soared. As investors curbed US dollar exposures in April, safe haven flows accrued to gold and other major currency markets instead (Graph 6.B). Short-term yields in the euro area, Japan and the United Kingdom dropped swiftly, also driven in part by investors' anticipation of easing monetary policy (blue line). Long-term yields were less responsive, as investors appeared reluctant to increase duration risk exposure. This was particularly evident in US Treasury markets, with large price swings and an increase in long-term yields. Unusually for a risk-off episode, the US dollar depreciated against many currencies, particularly the euro, the yen and the Swiss franc, as investors proceeded to cover some of the currency risk of their US asset holdings (Graph 6.C).

As the larger proposed tariffs were walked back, financial markets stabilised and recovered. Measures of market volatility returned to the range observed in the second half of 2024. Equity markets rebounded, reaching fresh year-to-date highs in some jurisdictions. Credit spreads compressed again, particularly in the high-yield segment. Industrial metals rebounded to the range predating the tariff announcement. Oil prices initially stayed lower, weighed by large increases in supply, but subsequently increased as geopolitical tensions intensified in June. The US dollar, however, traded at the bottom of the range observed since the start of the tightening period in early 2022. And long-term yields in the United States and some other major markets have

Financial markets were shaken by the tariff surprise

Graph 6



[a] US administration unveils reciprocal tariffs (2 April 2025).

[1] Government bond yields, simple average of DE, GB and JP. [2] Bilateral USD exchange rates; a negative number indicates a depreciation of the US dollar.

Sources: Bloomberg; national data; BIS.

trended higher over recent months, consistent with growing investor concerns about fiscal sustainability.

The economic impact of tariffs and uncertainty was initially evident in a range of timely survey data, showing a significant deterioration in household and business sentiment, particularly in the United States. By contrast, the effect on conventional statistics – or hard data – has taken more time to emerge and has provided a mixed reading on the economy to date. Some indicators were boosted by the pull forward of spending to beat the imposition of tariffs. The associated variability in these hard data, highlighted by examples such as the contraction in US GDP in the first quarter, made the underlying trend in many economies difficult to distil. Lagging indicators, such as those from the labour market, generally remained firm.

Tariffs and uncertainty have overshadowed the economic outlook

The effects of recent policy developments are expected to have a material impact on the economic outlook. In assessing the economic effects of tariffs several channels are key, from the direct impact of the tariffs on the economy and the implications for supply chains, to the indirect effects associated with the reaction of financial markets and other policy responses. Yet assessing the strength of these channels is difficult, not only because of continuous shifts in policy but also because of the practical and legal complexity of enforcing them, as well as the lack of recent precedents to assess their effects. The related effects of policy uncertainty may add to the drag on the economy, even if trade negotiations are successful.

Consider first the impact of tariffs and their key transmission channels. Increased tariffs are a negative supply shock in imposing countries, reducing output and increasing prices. By making imported goods more expensive, tariffs erode real incomes, in turn reducing demand for imported *and* domestic goods. While higher import prices may encourage substitution towards domestically produced goods,

potentially boosting output in protected industries, empirical evidence suggests that this effect is limited. Importantly, this substitution often comes at the cost of efficiency, as capital and labour are redirected towards less competitive firms and sectors. Furthermore, while tariffs lead to changes in gross import and export flows, they barely affect net trade flows (see Box A).

Tariffs tend to act as a negative demand shock for targeted countries, primarily by lowering exports. Their impact on activity will depend on the strength of trade links, along with the scope to redirect exports to other markets. At the same time, their disinflationary impact will hinge not only on domestic slack but also on the potential increased supply of goods diverted from tariff-imposing countries. In the case of US tariffs, economic output in countries such as Mexico and Canada is likely to be among the largest affected, while the effects on European economies are expected to be smaller.

Further to the direct effects on individual economies, the introduction of higher tariffs could impose adjustment costs on the global economy as trade overall becomes less efficient. As supply chains adjust, there is the potential for significant disruptions to trade and temporary shortages of some goods. As witnessed during the pandemic, such disruptions can have significant and long-lasting ramifications for production and prices across the economy. Additionally, the effects of tariffs will be greatly influenced by the adjustment in monetary and fiscal policies as well as shifts in financial market conditions, including changes in nominal exchange rates. Such effects could be further amplified by existing vulnerabilities (discussed below).

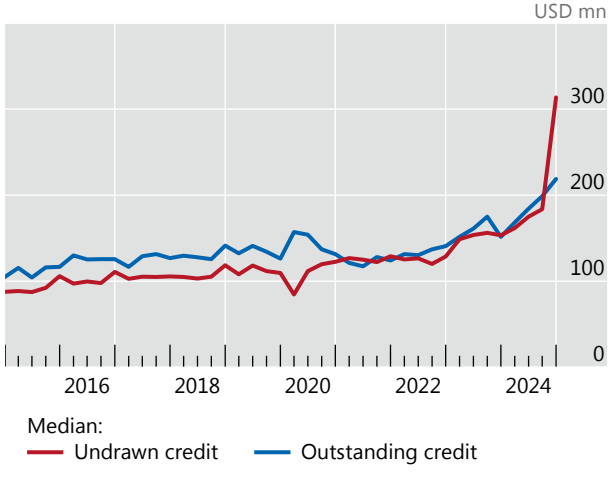
Until greater clarity emerges regarding the scope and coverage of the new tariffs, uncertainty is likely to remain one of the dominant factors shaping the near-term outlook. Evidence suggests that some firms anticipated the potential turbulence ahead, increasing credit lines towards the end of 2024 (Graph 7.A). The increase was most pronounced for firms in sectors exposed to trade policy changes.

The effects of uncertainty alone could have a major impact on the near-term economic outlook through several channels. For one, heightened uncertainty may

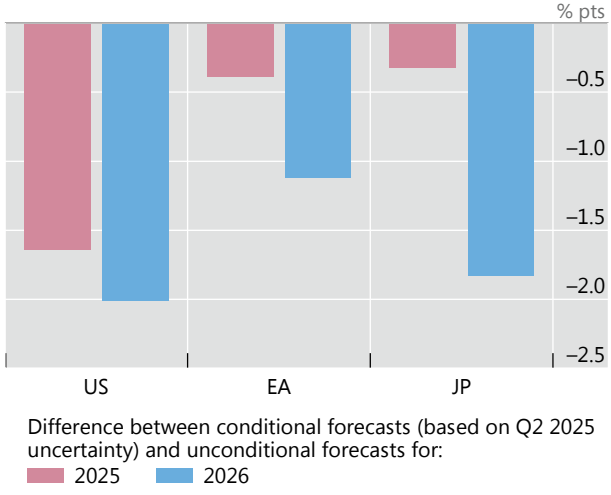
Uncertain firms expanded credit lines and may cut back on investment[1]

Graph 7

A. Non-financial corporations' median undrawn credit and outstanding credit[2]



B. Uncertainty impact on business investment



[1] See endnotes for details. [2] Outstanding credit includes commercial paper, revolving credit and term loans.

Sources: Baker et al (2016); Banerjee et al (2025); Burgert et al (2025); De Rezende and Ristiniemi (2023); Krippner (2013); OECD; Bloomberg; LSEG Datastream; national data; BIS.

Box A

Trade deficits and tariffs: why tariffs fall short

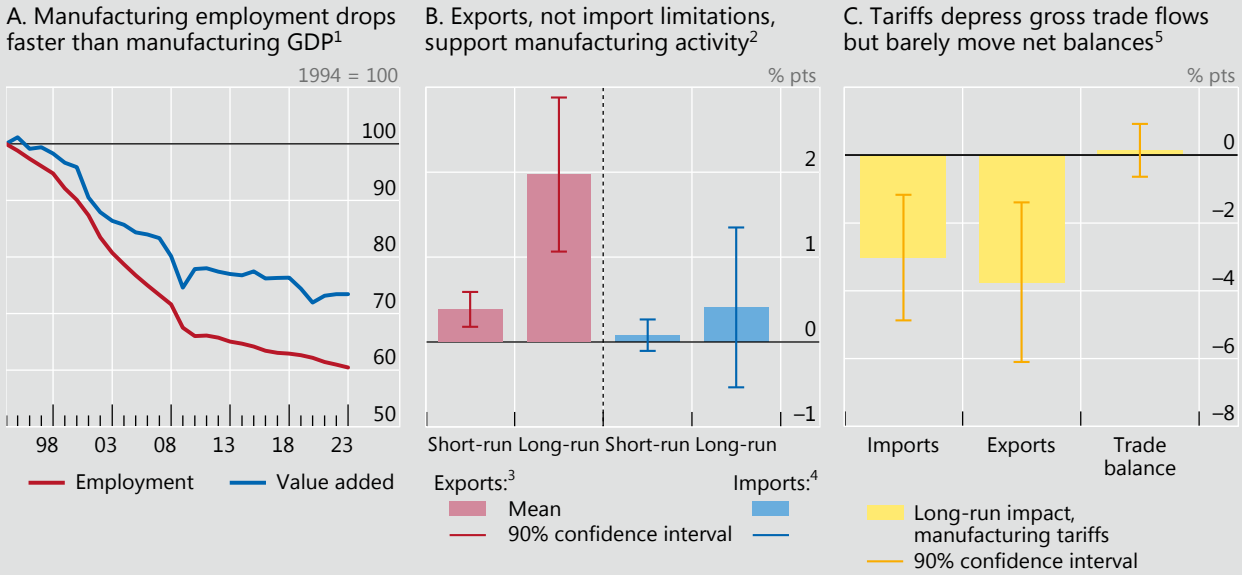
The imposition of tariffs on imports by the United States has renewed a debate over whether global trade has disproportionately harmed countries with persistent trade deficits. Critics argue that these deficits have contributed to declining jobs and wage stagnation in the manufacturing sector and increased income inequality, often attributing them to unfair practices by some trade partners. This box reviews these criticisms in light of the empirical literature.

Common criticisms of global trade are often unsubstantiated. For a start, trade has not expanded on the back of growing trade deficits. Indeed, since the 2000s the extent of trade deficits as a share of world GDP has declined. Another striking fact is that, while the share of manufacturing in total employment has generally fallen in advanced economies (AEs), its share of GDP has fallen by less (Graph A1.A). This indicates that part of the decline in manufacturing jobs has been driven by substitution between capital and labour, reflecting growing automation rather than international trade. Moreover, despite some local evidence linking higher import levels to a shrinking manufacturing sector, the weakness in manufacturing is better explained by sluggish exports than booming imports (Graph A1.B).[1] Finally, trade deficits are often associated with strong domestic growth, whereas a trade surplus can reflect weak domestic demand or underlying structural inefficiencies. Thus, there is little correspondence in the data between trade deficits and lower growth. Whether a trade deficit negatively impacts economic growth depends on the broader economic context and the factors driving it.

Even if there were merits to cutting trade deficits and boosting domestic production at the expense of imports, broad-based tariffs are an ineffective instrument for doing so. Empirical evidence shows that, unlike gross trade flows, trade balances hardly respond to the imposition or removal of tariffs (Graph A1.C).[2] This finding may reflect several factors. Imports are often reallocated across trading partners, exchange rate adjustments tend to offset the intended effects of tariffs and retaliatory measures by trade partners frequently curtail exports.[3] Conversely, trade balances are sensitive to other forces. On the aggregate demand side, trade balances reflect the underlying macroeconomic balance between domestic savings and investment. Unless

Tariffs unlikely to sustain manufacturing or reduce trade deficits

Graph A1



[1] Manufacturing employment and value added as a share of total employment and GDP, respectively; rebased to 100 in 1994. GDP-PPP weighted averages of CA, DE, ES, FR, GB, IT, JP, KR, SE and US. [2] Short-run is defined as the one-year-ahead impact. Long-run is defined as the asymptotic impact after taking into account the persistence of the dependent variable. The estimation period covers 2001–23. The sample covers AT, AU, BE, CA, CH, DE, DK, ES, FI, FR, GB, GR, IT, JP, KR, NL, NZ, PT, SE and US. [3] Bars show the change in manufacturing share in GDP following a 10 percentage point increase in the ratio of exports to GDP. [4] Bars show the change in manufacturing share in GDP following a 10 percentage point decrease in the ratio of imports to GDP. [5] Bars correspond to a 1 percentage point increase in average manufacturing tariffs. Exports, imports and trade balance relate to goods and services. Long-run is defined as the asymptotic impact after taking into account the persistence of the dependent variable. The sample covers AT, AU, BE, CA, CH, DE, DK, ES, FI, FR, GB, GR, IT, JP, NL, NO, NZ, PT, SE and US. The estimation period covers 2001–23.

Sources: OECD; World Bank; BIS.

tariffs can somehow boost national savings or suppress investment – which could happen temporarily if the economy falls into recession – they will do little to alter the trade balance in a structural way. On the aggregate supply side, the principle of specialisation remains key. Unless tariffs are set at prohibitively high levels, they are unlikely to override the forces that push countries to specialise in producing the goods they are most efficient at making. The result is that production patterns barely shift, while consumers and businesses are left to bear the burden of higher prices.[4]

In addition, there is little evidence that tariffs boost output in protected domestic industries. In fact, tariffs often depress economic activity, while imposing significant costs in the form of higher prices. One reason is that imports are predominantly intermediate goods and services that feed into domestic production processes. When tariffs are applied to upstream inputs such as, for example, steel or aluminium, they raise the cost of critical inputs for sectors using these materials as inputs – so-called downstream sectors – creating inefficiencies throughout the production chain. Rather than enhancing domestic supply, such measures risk undermining it by increasing costs for domestic producers and eroding their competitiveness.[5]

Macroeconomic policy offers a far more effective approach to steering trade balances. Fiscal consolidation, in particular, could narrow trade deficits substantially, because it directly affects the balance between national savings and investment. Empirical evidence underscores this point: a 1 percentage point reduction in fiscal deficits as a share of GDP has historically been associated with a narrowing of trade deficits by 0.3 to 0.5 percentage points of GDP.[6] At the same time, surplus countries can also help to reduce global trade imbalances by stimulating domestic aggregate demand and/or implementing structural policies to address medium- and long-term challenges. For example, in some surplus countries, increased public investment could close infrastructure gaps, while in others the strengthening of social safety nets could encourage domestic consumption, thus reducing the tendency towards excessive savings.

Complementing these efforts, governments have several policy options to support manufacturing output and employment without resorting to tariffs. These options often involve structural reforms aimed at enhancing competitiveness, such as increasing infrastructure investment, streamlining regulations or providing incentives for research and development spending. Additionally, governments can strengthen support for displaced workers by improving active labour market policies – an area in which some countries, including the United States, currently invest little to nothing.

While tariffs are ineffective in reducing trade imbalances, they could be used to pressure trade partners into lowering their tariffs or other non-trade barriers. Even so, tariffs could inflict significant costs on the global economy. In the short term, they risk triggering a sharp slowdown in growth in both the imposing and targeted countries. Yet, more damagingly, unilateral actions that break previous agreements erode trust, potentially leading to less durable agreements and a reduced willingness among trade partners to engage in meaningful cooperation in the future.

[1] This cross-country evidence is consistent with studies of the US tariff increases of 2018–19 which conclude that positive effects on employment due to import protection were more than offset by negative impacts of rising input costs and retaliatory tariffs (see Flaaen and Pierce (2024)). [2] Using local projection regressions, Furceri et al (2019) also conclude that the trade balance-to-GDP ratio is insensitive to tariffs, up to five years ahead. They find a positive and significant effect of tariffs on the trade balance in expansions, but the impact is short-lived and dies out within two years. [3] Fajgelbaum et al (2020) find that imports of varieties targeted by US tariffs of 2018–19 fell on average 31.7% while retaliatory tariffs resulted in a 9.9% decline in US exports. [4] Feenstra (1989) estimates the pass-through of tariffs on US prices of Japanese cars, trucks and motorcycles between 0.6 and 1. More recently, Cavallo et al (2021) confirm a unit pass-through of import tariffs on prices at the border. [5] Tariffs are also an ineffective means of generating fiscal revenue. For example, estimates for AEs based on a panel regression of custom revenues on tariff rates for the last two decades suggest that increasing the average tariff rate by 6 percentage points, say from 2% to 8%, would increase custom revenue by a negligible 0.05% of GDP, as the higher tariffs suppress trade flows. Boehm et al (2023) estimate the elasticity of trade flows to tariffs at –0.76 in the short run and –2 in the long run. In addition, proceeds from additional tariffs may barely cover compensation extended to industries facing retaliation (see Steil and Della Rocca (2020)). [6] Estimates are based on a panel regression for AEs during the period 2000–24 where the trade balance as a share of GDP is regressed on one-year lagged real growth in imports and exports. The impact on the trade balance of a 1 percentage point GDP increase in the fiscal balance is computed assuming a 50% fiscal multiplier and a unitary elasticity of real imports to real GDP.

lead firms to adopt a more cautious approach to investment and hiring because these decisions could be very costly to reverse. Likewise, consumers may choose to postpone durable goods purchases and increase savings as a precautionary measure. At the same time, elevated uncertainty might also increase the cost of external finance because of greater caution by lenders, further discouraging investment. Consistent with these channels, increases in measures of uncertainty have typically been followed

by weaker economic activity and particularly business investment. Estimates suggest a substantial negative contribution of the recent increase in uncertainty on business investment in 2025 and 2026 (Graph 7.B).[1]

Policymakers have responded to the shifting economic and geopolitical landscape. For example, the Canadian government has introduced a range of economic support programmes to help businesses and workers directly impacted by US tariffs. Authorities in China have announced fiscal support aimed at boosting consumer demand and infrastructure investment. Meanwhile, the European Central Bank, the People's Bank of China, the Bank of Mexico and the Bank of Thailand were among many central banks that cut their policy rates in recent months, citing growth risks from trade and uncertainty. Market pricing suggests central banks will provide additional support in the period ahead. Among the major economy central banks, further easing is expected by the Federal Reserve and European Central Bank. The Bank of Japan is expected to lift rates more gradually than previously projected.

Consensus forecasts for GDP growth have been revised lower as the direct and indirect impacts of the trade conflict have been factored in. Global growth is now expected to be 2.7% in 2025 and only a little firmer in 2026. These forecasts are around a quarter percentage point lower than expectations at the start of 2025. The most significant downward revisions have been observed in North America and parts of East Asia. Growth in the United States was downgraded by around 1 percentage point relative to expectations at the beginning of 2025 along with similar downgrades to growth in Mexico and Canada, which both have the United States as their largest trading partner. Elsewhere, the near-term outlook for GDP growth is generally somewhat weaker relative to expectations at the start of 2025.

The net effects of lower growth and trade policy changes on inflation vary by economy, particularly in the near term. In the United States, the cumulative effect of broad-based tariffs is expected to lead to a large increase in the price level over coming months. However, inflation is projected to ease in 2026, as weakness in the domestic economy weighs on price growth. The inflationary impact of the US tariffs for many other economies is generally expected to be small but will depend on the interaction of trade policy responses such as retaliatory measures, the redirection of trade flows and currency movements. Combined with the associated slowdown in global growth due to the trade frictions, the outlook for inflation has been revised a little lower for many economies.

Vulnerabilities on the path ahead

The existence of multiple vulnerabilities magnifies the risks to the global outlook. These fall into three broad categories. The first pertains to the real economy. Potential growth has been steadily declining for decades in many economies, while supply capacity is also becoming less flexible. Moreover, the pandemic-era surge in inflation may have heightened households' and firms' sensitivity to future inflation. Second, public debt has reached unprecedented levels in many countries. As a result, risks to inflation and financial stability can more easily originate from or be propagated through stress in sovereign bond markets. Finally, credit and liquidity risks have grown in parts of the non-bank financial sector, with implications for banks as well as the functioning of key financial markets. This section considers each of these vulnerabilities in turn.

Real vulnerabilities

The global economy faces a combination of long-standing and emerging structural problems. A major issue is the decades-long decline in economic growth, a trend

evident in many AEs and, more recently, in several EMEs (Graph 8.A). Slower growth not only limits improvements in living standards but also delays recovery from recessions, undermines debt sustainability and heightens risks to macroeconomic and financial stability. In addition, with population ageing and globalisation slowing, many economies are now beginning to grapple with a less responsive supply, which could make inflation more sensitive to output changes.

Consider lower trend economic growth first. In many AEs, productivity growth had been on a downward trend for decades.[2] This decline partly reflects diminishing productivity gains from new technologies. At the same time, the timeline for realising the full benefits of emerging technologies, including generative artificial intelligence (AI), remains uncertain. Adding to these challenges, population ageing means that most AEs can no longer count on the domestic labour force expanding (Graph 8.B).

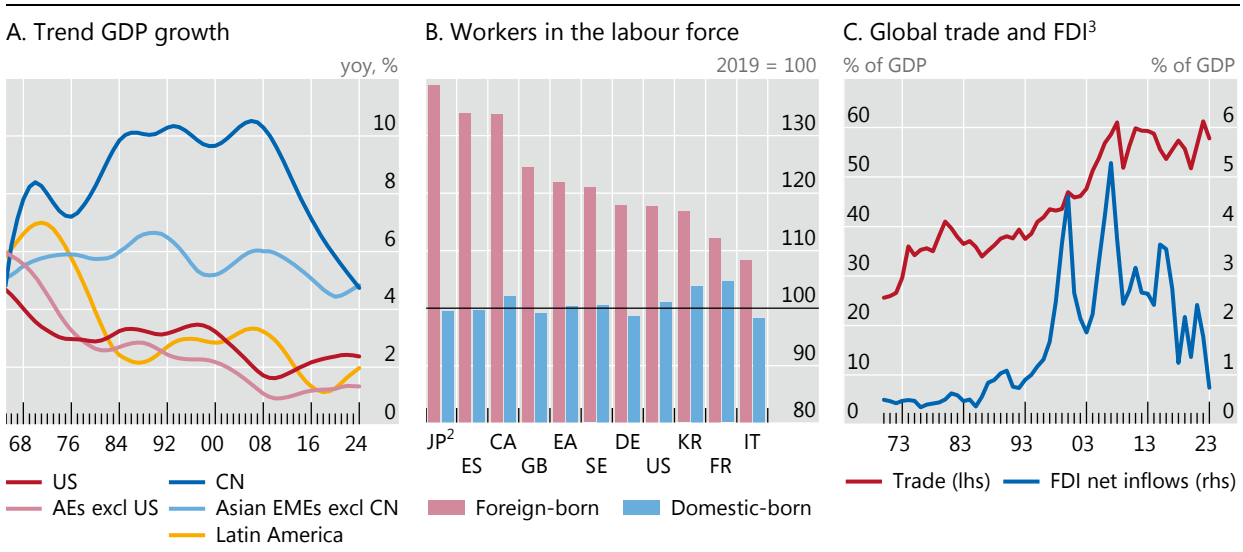
A similar growth slowdown is now also evident in many EMEs. After benefiting from catch-up growth, convergence with their AE counterparts has slowed, with many EMEs now beginning to face challenges similar to those of AEs, including ageing populations. Additionally, several of these EMEs remain highly reliant on foreign direct investment (FDI) for technology diffusion and, especially in Asia, on export-led growth.

That said, policy retains a crucial role in shaping long-term growth. Across many economies, including the most dynamic ones, the slowdown in productivity growth has been accompanied by weaker business dynamism – as shown in several countries by declining rates of business formation, expansion and exit – and lower allocative efficiency, as seen in greater dispersion of firms' productivity outcomes.[3] These declines stem from multiple causes that vary by country but often include insufficient competition, regulatory complexity, rigid labour markets, and high energy and logistics costs from inadequate infrastructure.[4, 5]

Against this backdrop, globalisation has been a vital force in sustaining income growth, countering other factors that have weighed on it. The integration of trade and capital flows has fostered greater specialisation, improved capital allocation and

Structural challenges for the real economy[1]

Graph 8



FDI = foreign direct investment.

[1] See endnotes for details. [2] Employment instead of labour force. [3] Trade: sum of global exports and imports of goods and services.

Sources: Federal Reserve Bank of St Louis; IMF; World Bank; Finaeon; LSEG Datastream; national data; BIS.

enhanced competition. It has also greatly facilitated technological diffusion through FDI, especially among EMEs.[6, 7]

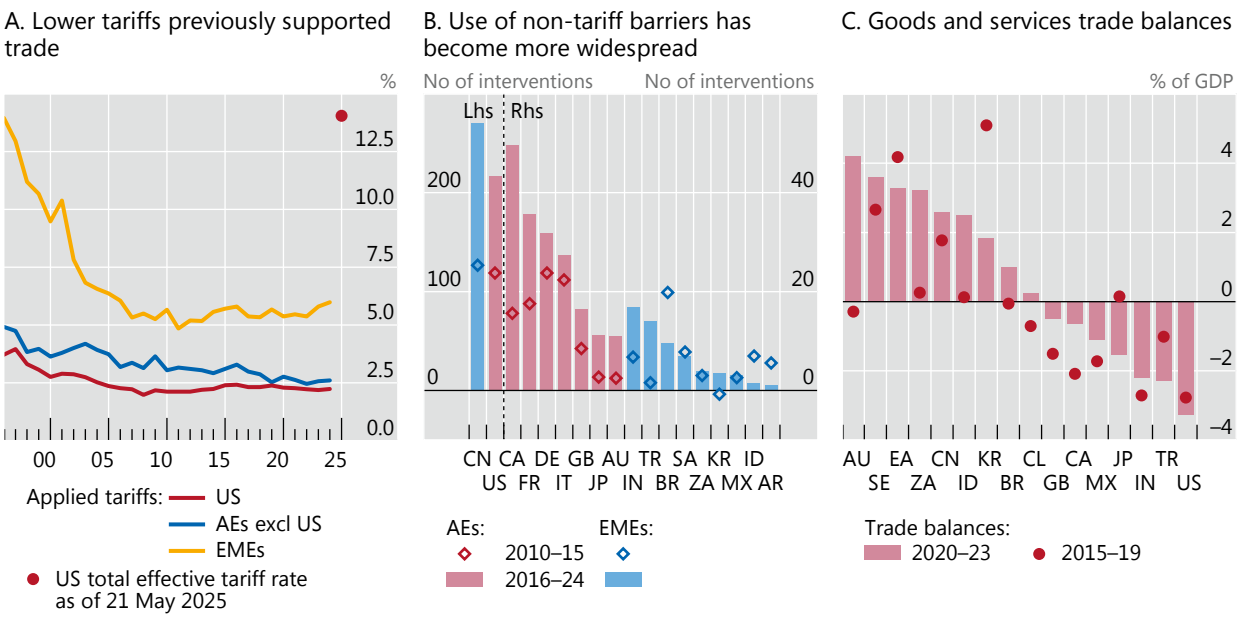
Yet these benefits are increasingly under threat from escalating trade and geopolitical tensions. Even before recent US tariff announcements, growth in global trade had slowed considerably and FDI had been falling following the Great Financial Crisis (GFC) (Graph 8.C; see Box B). To be sure, these trends partly reflect the maturity of global value chains, as well as the growth slowdown in China and other major EMEs. The benefits from earlier reductions in tariffs had waned, while non-tariff barriers and industrial policy measures had also been increasing, especially in AEs (Graphs 9.A and 9.B). This has coincided with a rise in protectionist sentiment, especially in countries with persistent trade deficits, fuelled by concerns over rising income inequality and job losses (Graph 9.C). The imposition of substantial trade tariffs by the United States marked a further intensification of these trends.

Broad-based import tariffs are, however, unlikely to address these concerns effectively. In countries imposing them, such tariffs risk lowering overall living standards and reducing employment, even in sectors competing with imports.[8] Instead, if the objective is to reduce trade imbalances, a more effective approach involves the adoption of appropriate fiscal and structural policies, including policies that help displaced workers to find jobs in other sectors (see Box A).

Recent structural developments not only exacerbate long-standing factors that limit trend growth but also reduce the economy's supply flexibility in responding to shocks. For instance, demographic shifts are contributing to labour shortages in several economies and a more inelastic labour supply. In many cases, reliance on foreign-born workers has been the only factor preventing outright declines in labour forces as older workers retire (see Graph 8.B). In less globally integrated goods markets, firms may face higher costs when expanding output, constrained by limited access to intermediate products, weaker competition and more rigid supply chains. Market rigidities that hinder resource allocation may further constrain firms' ability

Trade facing higher tariffs and non-tariff barriers[1]

Graph 9



[1] See endnotes for details.

Sources: IMF; World Bank; WTO; Global Trade Alert; Fitch; BIS.

Box B

Trade restrictions hinder FDI and reduce economic growth in EMEs

Foreign direct investment (FDI) is an important driver of economic growth in emerging market economies (EMEs), providing necessary capital and serving as a conduit for knowledge transfers.[1] As multinational enterprises (MNEs) from advanced economies (AEs) enter developing markets, they often introduce advanced technologies and managerial practices that generate positive externalities within EMEs. These externalities arise when local firms supply MNEs, gaining exposure to higher standards and adopting their best practices.[2] Labour mobility also facilitates the diffusion of knowledge between MNEs and EME firms.[3]

In addition to productivity spillovers, FDI can also foster stronger trade linkages between countries. Direct investments by MNEs often enhance the export capacity of EMEs by providing access to established international markets and distribution networks. This promotes greater integration of EME firms into global value chains, leading to an expansion and diversification of their export base, which, in turn, fosters economic growth.[4]

Since the Great Financial Crisis, trade restrictions have become more common. Policies such as tariffs, designed to shield domestic industries from foreign competition, have reshaped the risk-return trade-offs of FDI. As trade protectionism strengthens, it increasingly disrupts FDI, reducing the knowledge spillovers and export opportunities that have been central to the export-led growth strategy adopted by many EMEs. Abrupt changes to trade restrictions also disrupt global value chains, often extending their length without improving their efficiency,[5] while also creating uncertainty about future changes that complicate planning. Together, these trends contribute to reduced investments by MNEs in EME affiliates, as an increasing share of their imports from foreign affiliates either face new trade barriers or are at risk of doing so.

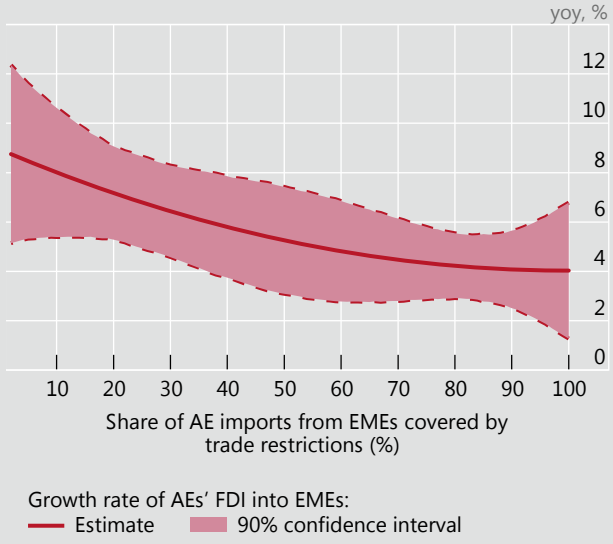
Data on trade restrictions between 2009 and 2023 show that the total number of newly implemented import restrictions by AEs on EME goods and services grew by an average of 8% per year. These new restrictions covered an increasingly larger share of imported goods from EMEs, rising from an average of about 5% of total imports in 2009 to 62% in 2023. As coverage of trade restrictions expanded, annual growth of outward FDI by AEs imposing new barriers declined. AEs that had more than 50% of imports from EMEs covered by trade restrictions saw much slower outward FDI growth to EMEs than those without trade restrictions (Graph B1.A).

With FDI flowing at a slower rate to EMEs from increasingly protectionist AEs, the prospects for strong economic growth in EMEs have deteriorated. EMEs that received a larger share of inward FDI from countries

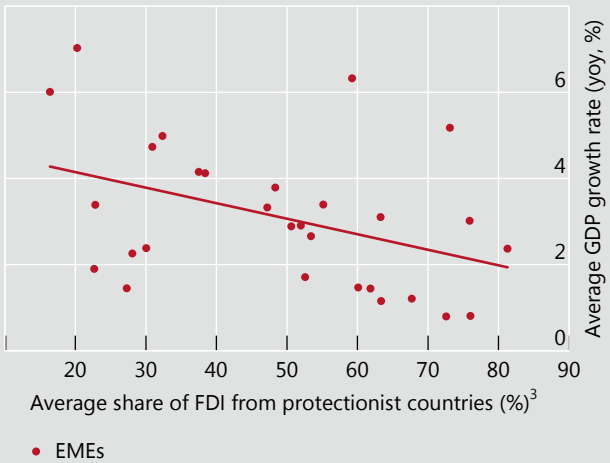
Trade restrictions and outward foreign direct investment[1]

Graph B1

A. Trade protectionism by AEs lowers the growth rate of their foreign direct investment (FDI) into EMEs[2]



B. EMEs that depend more on FDI from protectionist countries grow at a slower rate



[1] Data cover 2009–23; based on 22 AEs and 29 EMEs. [2] Estimation based on a second-degree polynomial. Outward FDI growth rates are truncated at the top and bottom 5% of the distribution before estimation. Shares of AE imports from EMEs are based on weighted averages of coverage shares for individual EMEs, with the value of goods imports by AEs from EMEs used as weights. [3] Protectionist country if more than 50% of inward trade is affected by harmful policies.

Sources: IMF; Global Trade Alert; BIS.

imposing trade restrictions on at least 50% of their imports experienced slower average GDP growth (Graph B1.B). This evidence suggests that as trade protectionism continues to rise, less FDI will flow from AEs to EMEs, reducing the growth potential of EMEs and worsening the prospects for economic convergence between EMEs and AEs. A reconfiguration of global trade towards less protectionist countries could reverse this trend, increasing FDI flows to EMEs and supporting stronger growth.

[1] See Alfaro and Chauvin (2020) for a review of how FDI affects the economic development of host countries. [2] See Javorcik (2004). [3] The extent to which these positive externalities of FDI by MNEs can have growth-enhancing effects in EMEs depends on the countries' capacity to absorb such investments. Their absorbative capacity hinges on two key economic characteristics of FDI host countries: (i) the level of human capital which complements FDI (Borensztein et al (1998)); and (ii) the sophistication of local financial markets, as these are crucial in helping local firms allocate resources faster to facilitate the absorption of FDI (Alfaro et al (2004)). [4] See Cheng et al (2015). [5] See Qiu et al (2023).

to adapt to shifts in demand. As a result, many economies might today face a steeper Phillips curve than in recent decades, with changes in output translating into larger changes in inflation.[9]

In addition, inflation expectations may have become less stable. Having been caught by surprise by the inflation surge during the pandemic recovery, business and household expectations of inflation are likely to react more quickly to future price increases. Indeed, recent surveys show that households' inflation expectations for the year ahead are closely related to their perception of the increase in the price level over the past five years. This link is stronger today than it was pre-pandemic (see Box C). As a result, the risk that inflation expectations could become unmoored seems greater post-pandemic.[10, 11]

Compounding these challenges is the increased likelihood that the economic landscape will face more frequent, intense and persistent adverse supply shocks. Key drivers of these shocks include climate change, with its extreme weather events, and geopolitical tensions, with their potential to disrupt commodity markets and value chains. Overall, inflation may be subject to more frequent and persistent deviations from targets in the future as economic activity suffers, making the conduct of monetary policy more challenging.

Fiscal vulnerabilities

The GFC and the pandemic have left many economies with higher public debt and large fiscal deficits, with debt levels in many cases reaching historic peacetime highs (Graph 10.A). These levels are projected to rise further, as deficits – which were 6–7% of GDP in several major economies in 2024 – are expected to close only partially or at a slow pace in the coming years. Debt levels will also face upward pressure from population ageing, which drives up pension and healthcare costs, as well as from emerging demands such as infrastructure investment, the transition to greener energy and growing defence needs. Furthermore, limited tolerance for further erosion in real incomes among households could lead to more immediate demands for compensation via fiscal support in the event of future shocks.

While higher public debt levels can be sustainable in the presence of strong income growth and low interest rates, current and future conditions look less favourable. As noted above, economic growth is expected to remain subdued for the foreseeable future. Moreover, interest rates may not return to the low levels observed in the pre-pandemic decade. Indeed, current interest rates are already putting pressure on fiscal accounts. For instance, among Organisation for Economic Co-operation and Development (OECD) countries with relatively high interest payments, average payments have risen from 3% of GDP in 2021 to more than 4% in 2024 (Graph 10.B), and they are projected to increase further, even if rates remain unchanged, as several

Box C

Will the inflation surge leave a mark on household inflation expectations?

Household short-term inflation expectations remain elevated even though inflation rates in most economies have returned close to central bank targets. This prompts the question of whether the large price increases in the post-pandemic years have heightened households' concerns about inflation, potentially leaving a lasting mark on inflation expectations.

Survey evidence across a sample of 29 advanced and emerging market economies shows that, on average, households expect inflation over the next 12 months to be about 8%, significantly higher than the current 2.4% average inflation level (Graph C1.A).[1] When asked about the highest and lowest possible rates of inflation over the next 12 months, the distribution of responses is broadly symmetric around the most likely outcome. The highest possible inflation rate is expected to be around 11% while the minimum is about 4%.

The survey further reveals households' understanding that prices have increased significantly faster in the years following the pandemic compared with the preceding period (Graph C1.B). On average across countries, the median household perceives that prices increased by about 9% between 2015 and 2019 and 18% between 2020 and 2024. These values are broadly in line with the actual rate of inflation. However, a considerable share of the population, almost 20%, perceive a much stronger increase in the price level, reporting it to be above 30%. When asked about the causes of the inflation surge, households attributed price increases primarily to rising commodity prices and pandemic-related shortages.[2]

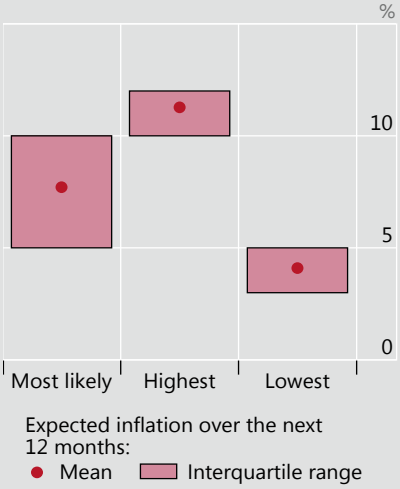
Regression analysis suggests that large perceived price increases during the post-pandemic years are contributing to elevated inflation expectations (Graph C1.C).[3] The quantitative effects are significant. Estimates indicate that a 1% perceived increase in price levels over the period 2020–24 raises inflation expectations by 0.12 percentage points. Perceived price increases during the pre-pandemic period also influence expectations, but the effect is about half as large.

These findings underscore how temporary inflation surges can leave a lasting imprint on household inflation expectations. Hence, they provide a cautionary message for policymakers: temporary inflation shocks,

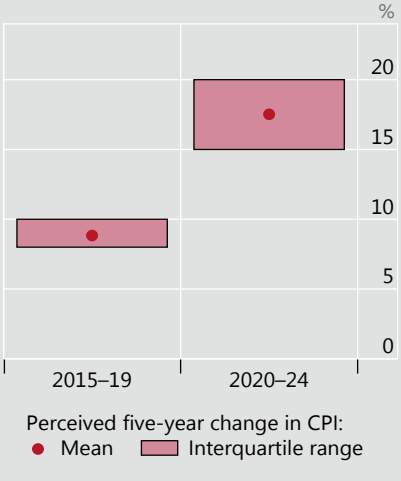
Household inflation expectations are elevated, still influenced by the experience of the inflation surge[1]

Graph C1

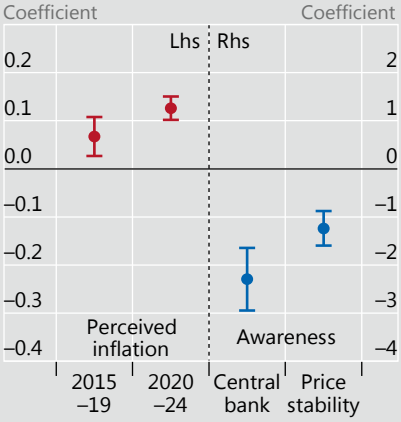
A. Inflation expectations are elevated[2]



B. Households perceive considerably higher inflation in the post-pandemic period[2]



C. Expectations are influenced by perceived price changes over long periods as well as by knowledge of the central bank[3]



[1] Based on the BIS international survey of household inflation expectations, conducted from March to April 2025. [2] Data on perceptions and expectations for each economy are measured as the median value across the survey respondents. The panels display the mean and interquartile range across economies. [3] Estimated coefficients and 95% confidence intervals of a household-level regression of expected inflation in the following 12 months against the perceived price level changes over 2015–19 and 2020–24 and dummy variables indicating awareness of the central bank and its price stability objective. The regression also controls for gender, financial literacy, age, education, support for the government, employment status and home ownership status. It excludes outliers, that is respondents whose inflation expectations are above 100% or below –10%.

Source: De Fiore et al (2025).

often viewed as relatively benign, may lead to persistent increases in inflation fed by upward shifts in expectations.

The analysis also reveals that inflation expectations are negatively correlated with households' knowledge of the central bank. Households that are aware of the central bank – recognising the name of the institution as the domestic central bank – and those that believe it seeks to maintain price stability tend to have significantly lower inflation expectations – by 2.3 and 1.2 percentage points, respectively. At the same time, survey results show that a large proportion of the population lacks a basic understanding of the central bank. When presented with the name of the institution, only about 60% of households recognise it as the country's central bank. Furthermore, only about half of the population believes that central banks have a price stability goal.

Enhanced communication efforts to improve public awareness of the central bank's role and objectives could help lower and further stabilise inflation expectations.

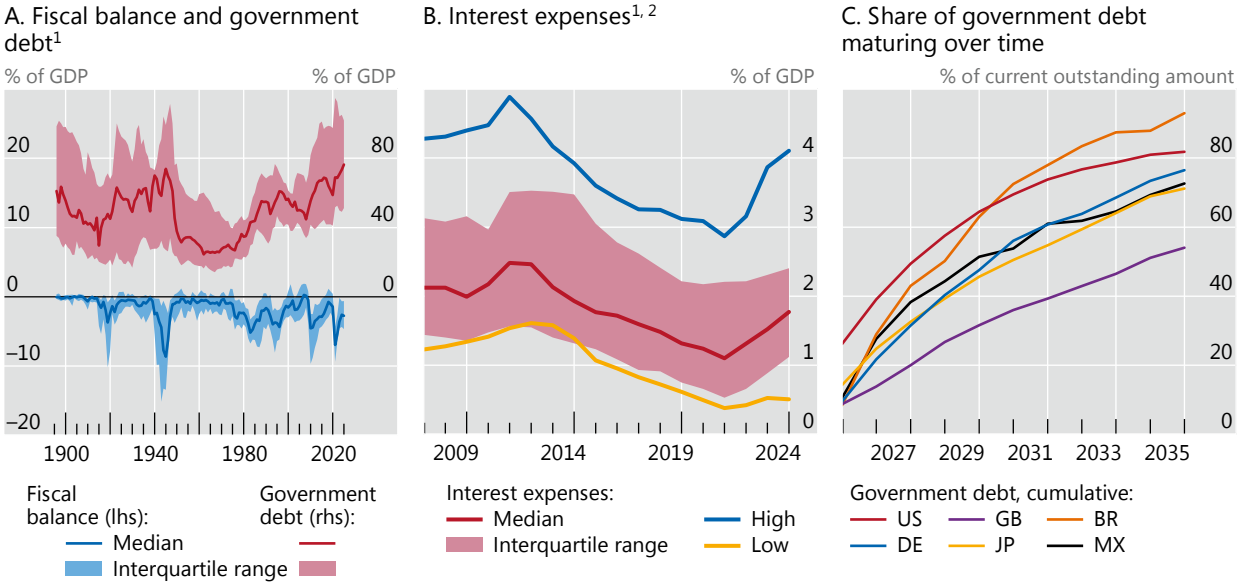
[1] These findings are based on an international household survey co-sponsored by the BIS, conducted in March and April 2025. The analysis covers 29 economies: AU, BE, BR, CA, CH, CN, CO, DE, ES, FR, GB, HK, ID, IN, IT, JP, KR, MX, MY, NL, PH, PL, SA, SE, SG, TH, US, VN and ZA. The survey randomly sampled approximately 1,000 respondents in each economy, aiming to reflect the gender and age distribution of the population. More details about the survey will be presented in D'Acunto et al (2025). [2] See De Fiore et al (2025). [3] The analysis controls for demographic and socioeconomic household characteristics.

countries are set to refinance up to half their public debt stock within the next two years (Graph 10.C). A significant risk for debt sustainability is that bond yields could rise even higher, especially if inflation were to prove more volatile and persistent or if governments delay tackling large fiscal deficits.

These risks could be compounded by shifts in the investor base. In major economies, the reduction in central bank holdings of government securities – as central banks unwind their quantitative easing programmes – tilts the supply-demand imbalance in sovereign markets, putting upward pressure on yields through term premia. Such reduction has already led to some widening in term premia from the lows seen in the aftermath of the GFC and the pandemic, as private investors stepped in to fill the gap (Graph 11.A). For example, the Federal Reserve's $1½ trillion reduction in Treasury holdings since mid-2022 is estimated to have increased long-term yields

Fiscal positions and government debt

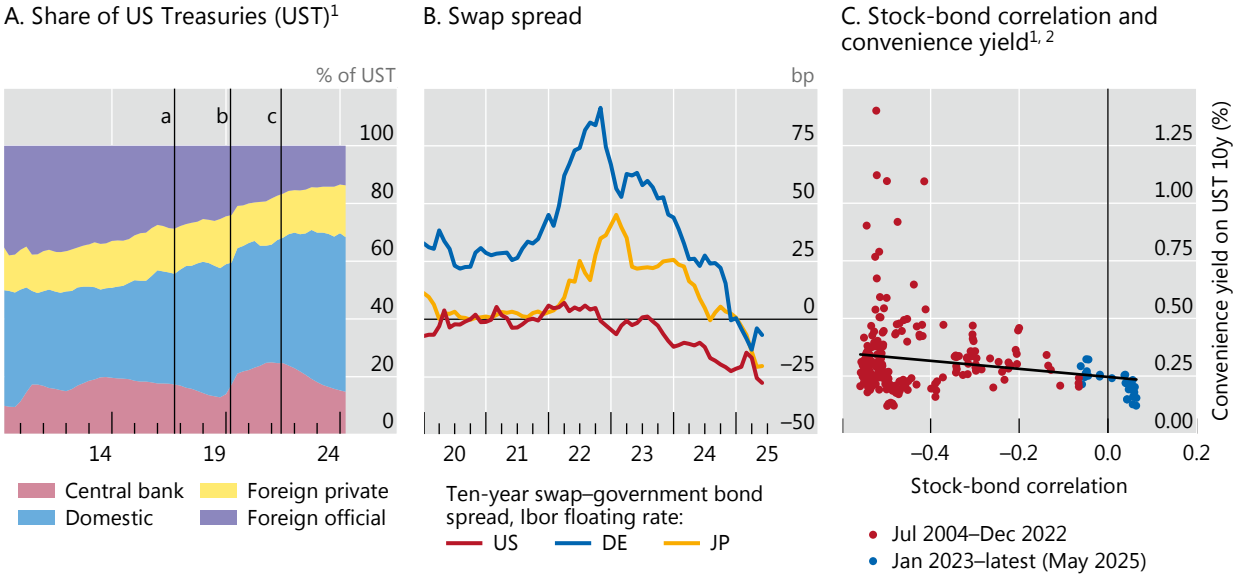
Graph 10



[1] See endnotes for details. [2] High/low: simple averages of the five economies where the ratios were the highest/lowest in 2024.

Sources: European Commission; IMF; OECD; Finaeon; LSEG Workspace; national data; BIS.

Market indicators suggest an abundant supply of government bonds Graph 11



[a] Quantitative tightening (October 2017). [b] Covid-19 pandemic (11 March 2020). [c] Quantitative tightening (June 2022).

[1] See endnotes for details. [2] Regression estimated between July 2004 and May 2025.

Sources: Arslanalp and Tsuda (2014); US Treasury International Capital (TIC) data; Bloomberg; LSEG Datastream; BIS.

by around 80 basis points, reversing around two thirds of the estimated impact of quantitative easing during the pandemic.[12]

At the same time, there are signs of some weakening in investor appetite for government bonds and rising intermediation challenges. One indicator is the recent decline of interest rate swap spreads – the difference between the fixed-rate leg of an interest rate swap and government bond yields of the same tenor – into negative territory for Japanese yen and German euro swaps, following in the footsteps of comparable US instruments (Graph 11.B).[13] Meanwhile, the rising correlation between stocks and bonds signalled a reduction in the traditional hedging properties of government bonds for investment portfolios, amid higher inflation expectations and rising concerns about inflation uncertainty. This is also reflected in lower convenience yields on US Treasuries – the premium investors place on holding these securities for their safety and liquidity (Graph 11.C).[14]

High public debt levels, if coupled with rising interest rates and sluggish economic growth, raise the chance of adverse scenarios that could compromise price and financial stability. For instance, growing concerns about fiscal sustainability could give rise to refinancing challenges and potentially dislodge inflation expectations, complicating the conduct of monetary policy. These challenges could be compounded by currency depreciation, as capital flees the country, amplifying inflationary pressures. That said, these risks are significantly mitigated by central bank independence and strong institutional safeguards, which shield monetary authorities from political interference and enable them to adhere strictly to their mandates. This reinforces public trust, anchoring inflation expectations even in periods of heightened concerns about fiscal sustainability.[15]

High public debt also makes the financial system vulnerable to lower asset values when interest rates increase, especially when it is accompanied by high leverage in the financial sector.[16] Whether it reflects changes in sovereign or inflation risk, or an unexpected but necessary tightening of monetary policy, a repricing of government

securities can lead to substantial losses for banks and NBFIs with significant sovereign debt holdings. Such losses could, in turn, potentially trigger deleveraging or even insolvencies and ultimately tighten financial conditions for the broader economy. The resulting economic slowdown can further erode sovereign creditworthiness, creating a feedback loop between fiscal and financial vulnerabilities that exacerbates risks to both sectors.

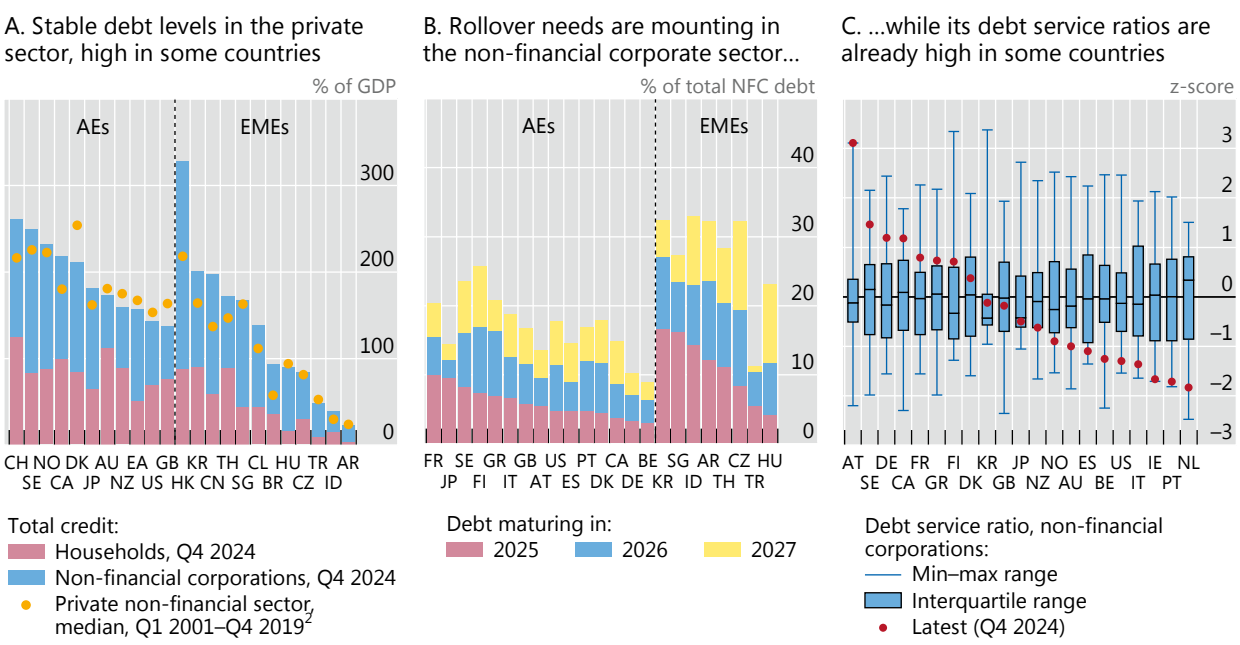
Recent events have highlighted how these vulnerabilities can play out in case of a sharp increase in perceived fiscal risks. For instance, bond losses were central to the turmoil in the UK gilt markets following the announcement of the mini-budget in September 2022. This episode also triggered a crisis in liability-driven investment (LDI) strategies used by UK pension funds, which faced sudden margin calls as gilt yields surged, forcing them to sell assets in a self-reinforcing spiral that further destabilised the market. Similarly, the rapid increase in US policy rates to combat inflation played a pivotal role in the March 2023 US regional banking crisis. Unrealised losses on government bonds became a critical issue when some banks faced sudden and substantial deposit withdrawals. In the future, the stress could be much more severe if the creditworthiness of some sovereigns is questioned.

Macro-financial vulnerabilities

Macro-financial vulnerabilities have the potential to amplify economic developments, including the anticipated slowdown triggered by the shift in trade policy and heightened uncertainty. While private sector debt levels have remained relatively stable in most countries since the GFC and throughout the pandemic, they remain historically high among non-financial corporations in several jurisdictions and households in several smaller economies (Graph 12.A).

At the same time, major changes in the financial system since the GFC have introduced new risks. Debt issuance by the government in the form of sovereign

Credit risk may be on the rise in the non-financial corporate (NFC) sector[1] Graph 12



[1] See endnotes for details. [2] Households plus non-financial corporations.

Sources: S&P Global Market Intelligence; national data; BIS.

bonds has outpaced the growth of claims on the private sector, while financial intermediation has increasingly shifted from banks to NBFIs. Private credit funds now play a larger role in providing credit to private firms, while asset managers and hedge funds have a larger footprint in sovereign bond markets and cross-border flows, supported by the expansion of short-term funding and hedging markets. As a result, financial conditions as well as financial stability risks are increasingly influenced by players outside traditional banking systems.[17]

Consider first the risks posed by high debt in the household and non-financial corporate sectors. One concern is that elevated debt could amplify any economic downturn by leading to wider credit spreads, rising defaults and reduced credit availability. In the household sector, debt service ratios suggest that risks in most countries remain contained. But a deterioration in labour market conditions, coupled with declining house prices, could slow consumer spending and pose significant challenges in countries with high household debt. In the corporate sector, the potential deflationary impact of recent economic events could worsen the credit worthiness of firms in some economies. Furthermore, non-financial corporations – particularly in EMEs – will continue to face substantial debt rollovers in the coming years (Graph 12.B). If benchmark rates increase further and spreads widen from today's compressed levels, the cost for firms of refinancing maturing debt could rise substantially, putting additional pressure on debt service ratios, which are already elevated in some jurisdictions (Graph 12.C).

In this context, the rapid growth of private credit markets in recent years could represent an emerging pocket of risk. A growing share of the long-term credit to small or medium-sized and highly indebted companies is provided by private credit funds, which are, in turn, typically funded by pension funds and insurance companies.[18] Compared with bank loans, this form of credit is less exposed to maturity transformation and liquidity risks but is also notoriously opaque.[19] Since these assets are not regularly marked to market, they are less likely to amplify reductions in credit supply during a downturn, but they may allow bad credit to accumulate in the corporate sector.[20] Moreover, recent trends such as efforts to attract retail investors and the offer of frequent redemption windows may reintroduce liquidity risks. Ultimately, the resilience of this relatively young sector to a sizeable downturn in the credit cycle remains largely untested.

While private credit providers present emerging risks, traditional banks are also exposed to credit risk through the support they provide to private markets. For example, banks supply loans to finance leveraged buyouts or warehouse portfolios of loans before they are securitised – that is, sold to private investors. As long as these loans are on banks' balance sheets, banks remain exposed to the associated credit and market risks.[21] When conditions for securitisation deteriorate, as occurred in 2022, banks' balance sheets may become encumbered with those loans, crowding out new lending.[22]

Aside from loan markets, the shifts in financial intermediation activity towards NBFIs has increased the likelihood that financial instability could originate or be amplified by liquidity stresses. For instance, with broker-dealer balance sheets having smaller heft in the financial system post-GFC, liquidity in sovereign bond markets increasingly relies on open-ended mutual funds, hedge funds and other asset managers. These entities often face significant liquidity mismatches, rely on short-term funding backed by government securities as collateral or are either frequently highly leveraged or exhibit leverage-like behaviour. As a result, their liquidity provision is less stable and more likely to evaporate during periods of market stress.

Hedge funds, in particular, have increasingly become a significant source of procyclical liquidity, especially in government bond markets. These investors actively pursue relative value trading strategies that seek to exploit small price differences

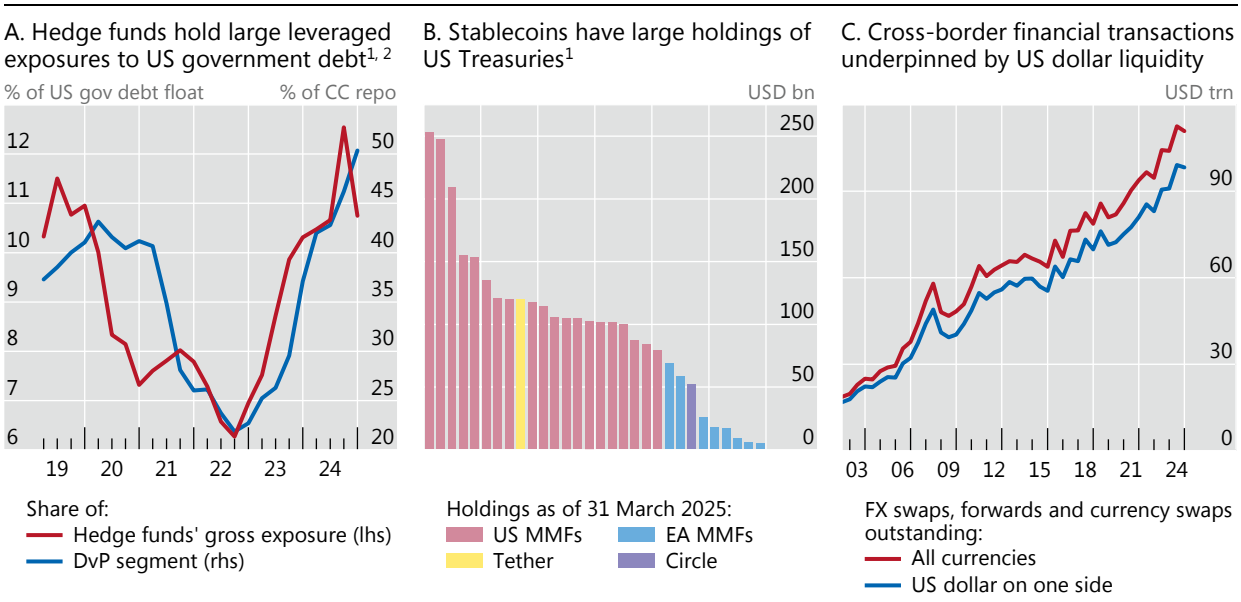
between related financial instruments.[23] To boost the returns on these small price differences they heavily leverage their positions. One method often used is to pledge government securities as collateral in the repo market to borrow more cash with which to purchase additional government securities. This practice has further evolved in recent years, with investors borrowing amounts equal to or higher than the market value of the collateral provided – that is, without any discount, or haircut, protecting the cash lender from market risk.[24] In turn, that means that the borrower can obtain more leverage, leaving the overall market exposed to dislocations if haircuts are increased even slightly, leading to forced selling. The increased heft of hedge funds is reflected, for instance, in their growing US Treasury gross exposure – now exceeding 10% of the outstanding free float (Graph 13.A, red line) – and the expansion of the US repo market segment catering to leveraged investors (blue line).[25]

Hedge funds' relative value strategies are highly vulnerable to adverse shocks in funding, cash or derivative markets, as evidenced by some recent episodes. During the market turmoil of March 2020, for instance, margin calls in Treasury futures markets triggered fire sales, resulting in destabilising deleveraging spirals.[26] More recently, a more orderly unwinding of relative value trades – this time tied to interest rate swap markets, where investors had bet on a narrowing in spreads due to potential deregulation – seems to have contributed to the heightened volatility observed in Treasury markets in early April 2025.

Another potential source of liquidity risk stems from the growing presence of stablecoins in the Treasury market. Although relatively small in terms of aggregate capitalisation, some major issuers, such as Tether and Circle, hold significant reserves in US Treasuries and provide substantial repo market funding through dedicated money market funds (Graph 13.B). Their increasing heft raises financial stability concerns, as it exposes traditional finance to the ebbs and flows of the crypto ecosystem. On the one hand, as stablecoins grow, they will absorb an increasing share

NBFIs have become sizeable liquidity providers in key financial markets

Graph 13



DvP = delivery versus payment; MMFs = money market funds; NBFIs = non-bank financial institutions.

[1] See endnote for details. [2] US gov debt float: US government debt outstanding, excluding securities held by Federal Reserve Banks; CC repo: centrally cleared repo market.

Sources: Federal Reserve Bank of St Louis; Office of Financial Research; Circle; EPFR iMoneyNet; Tether; BIS OTC derivatives statistics; BIS.

of safe assets that traditional financial institutions could otherwise use. On the other hand, negative shocks in the crypto market could lead to sizeable sell-offs which could disrupt the orderly functioning of Treasury markets (see Chapter III).

NBFIs have also significantly expanded their role in cross-border financial transactions, mainly through portfolio investment in bonds. Many rely on short-term dollar funding and hedging markets through repos and foreign exchange (FX) swaps to finance positions and manage currency exposures. Notably, non-US pension funds and insurers hold substantial US assets hedged with short-maturity FX derivatives that are continuously rolled over. By end-2024, dollar borrowing through FX swaps, forwards and currency swaps accounted for 90% of the $111 trillion in these instruments globally outstanding (Graph 13.C). While these tools facilitate funding and hedging of large cross-border positions, they also expose NBFIs to significant short-term rollover risks and funding squeezes, as highlighted by the sharp volatility in early August 2024 (see Chapter II).

Policies to deal with a more uncertain and fragmented world

Economic policy should strive to promote sustainable economic growth while preserving economic and financial stability. Its success depends not only on the specific measures chosen but also on how they are implemented. Central to effective policymaking is building and maintaining society's trust, defined as the expectation that policymakers will act predictably in the pursuit of legitimate and predefined goals and that they will achieve these goals over time. For this, policymakers must set clear targets against which their policies can be assessed and select appropriate tools to achieve them. They must remain steadfast in pursuing them, addressing deviations promptly and transparently, while clearly explaining their actions and decisions to the public.

When trust exists, the public aligns its behaviour with policymakers' actions and is more willing to accept short-term costs for long-term gains. This not only enhances the effectiveness of policy but also strengthens its ability to adapt to changing circumstances – a trait that becomes even more vital in periods of sudden disruptions and heightened uncertainty. Trust and policy effectiveness reinforce each other, forming a virtuous circle. But the dynamic can also work in reverse. From this viewpoint, threats to central bank independence or drastic changes in international policies risk not only failing to achieve their stated objectives but also undermining the effectiveness of future policy measures. Thus, policymakers should continuously strive to strengthen their policy frameworks, ensuring they remain fit for purpose in the face of evolving challenges.[27]

Against this backdrop, the rest of this section discusses the main policy priorities needed to support long-term growth and preserve monetary and financial stability in the face of the vulnerabilities described earlier.

Structural policy

Structural reforms are key to addressing the persistent challenges of low economic and productivity growth experienced by many economies in recent decades, as well as the growing rigidity of the supply side of these economies.

Despite their importance, structural reforms have often lagged behind. Yet the need to implement them has now become more pressing. For one, if higher tariffs and other trade barriers become permanent, or if the fragmentation of the global economy along geopolitical lines continues, the global economy might see significant reconfigurations of supply chains, changes in the patterns of capital flows and shifts in the final destinations of goods and services. This puts a premium on

improving the capacity of domestic markets to reallocate resources efficiently across firms and sectors. In addition, with higher public debt and still elevated private sector debt, raising potential growth is crucial for improving debt sustainability and ensuring broader macroeconomic stability.[28] Finally, structural reforms that strengthen the supply side are the only means to achieving sustainable economic growth. Neither expansionary monetary policy nor expansionary fiscal policy can act as a lasting driver of long-term growth. At the same time, a stronger and more flexible supply side also improves the economy's resilience to adverse shocks, easing the trade-offs faced by central banks.

Structural policies should focus on at least three key interrelated areas, with a balance that depends on the specific needs and priorities of each country.

One is to reduce market rigidities and strengthen administrative capacity. In tight labour markets, reforms to fiscal incentives, pension systems and immigration policies are crucial to expand the labour supply. Business dynamism could be enhanced by reducing bureaucracy, streamlining administrative processes and offering targeted tax relief, among other measures.[29] To lessen these rigidities, an efficient administration is also key. This may require attracting top talent, changing staff incentives and reviewing planning laws and regulations to make regular government spending and major public investment projects more efficient.

Another area of reform is to remove barriers to trade, both within and across borders, which could help offset the loss of trade from the ongoing trade conflicts. Remarkably, internal barriers can be quite large. For instance, estimates indicate that intra-EU trade barriers amount to tariffs of 45% on manufacturing and 110% on services trade, while provincial trade barriers in Canada resemble a 7% tariff.[30] Reducing these barriers, including those preventing the full integration of internal capital markets, can foster business growth and improve credit flow to new investment projects.

Given ongoing trade tensions, revamping existing regional trade arrangements or striking new ones has gained greater urgency. For example, increasing the breadth of the Southern Common Market (Mercosur/Mercosul) in Latin America and the Regional Comprehensive Economic Partnership in the Asia-Pacific region has the potential to offset the current drop in cross-border investments. Moreover, the trade conflict may accelerate the conclusion of long-stalled trade agreements (eg EU-Mercosur) and the full ratification of repeatedly delayed treaties (eg Canada-EU).

Finally, greater public investment is essential in many countries not only to address low trend growth and supply rigidities but also to tackle emerging challenges such as the impact of climate change and increased defence needs. It may also prove key to helping the economy adapt to shifting trade patterns in the future. Importantly, public investment also serves as a catalyst for private business investment. By improving infrastructure and supporting research in areas like energy, biomedicine and AI, public investment can reduce costs, create new markets and stimulate private sector activity. [31] Furthermore, the additional demand generated by public investment can amplify private investment through acceleration effects.

Unfortunately, the share of public investment as a share of public expenditure has been on a declining trend in many economies, contributing in part to the persistent slowdown in productivity growth.[32] The German government's recent announcement of a large infrastructure fund is a step towards reversing this trend, and similar initiatives may follow in other countries with sufficient fiscal space.[33] However, limited capacity to complete large projects on time and within budget poses significant challenges in some countries, while others may struggle to fully utilise available funds, as evidenced by the low uptake of the European Union's Recovery and Resilience Facility in certain cases. Moreover, without addressing supply side rigidities, substantial public investment risks fuelling higher inflation. To succeed, large investment plans need to be complemented by structural reforms in many countries.

Fiscal policy

A key priority for fiscal policy is to ensure debt sustainability and the rebuilding of fiscal buffers. This reduces the risk of destabilising scenarios that threaten price and financial stability, while creating the fiscal space needed to accommodate future increases in essential expenditures, such as increased public investment or support for broader structural reforms.

In practice, this means that countries facing large fiscal deficits and limited fiscal space must pursue fiscal consolidation. Research shows that fiscal consolidation is more likely to succeed when certain conditions are met.[34] For a start, consolidation should be gradual to minimise short-term output costs, as long as markets have not raised concerns about fiscal sustainability. A large negative output impact would make it harder to stabilise debt ratios, making a gradual approach more effective.

Equally important is the quality of the fiscal adjustment, as the composition of spending and tax changes must be carefully designed to not only achieve the fiscal targets but also minimise short-run costs and enhance long-term supply potential. In countries with already high levels of spending and taxation, relying heavily on tax-based consolidation could hinder growth further. Adjustments to the composition of taxes and spending are part of structural reforms needed to boost sustainable growth and are better carried out with other structural measures, as discussed above.[35]

A strong fiscal framework – including well designed budget rules to guide short-term decisions, fiscal rules to meet longer-term objectives and an independent fiscal council – helps reinforce the credibility of fiscal plans, thereby allowing for gradual consolidation and smaller output costs. An added benefit of strong fiscal institutions is that they tend to be associated with lower risk premia and hence lower financing costs for the broader economy, even outside periods of consolidation.[36] These are clear examples of how trust in policy institutions strengthens policy effectiveness.

Fiscal consolidation also tends to be more successful when implemented during periods of robust economic growth and stable global financial conditions. From this perspective, the recent deterioration of the global economic outlook risks complicating consolidation efforts. Should a downturn materialise, the pace of consolidation would have to be carefully calibrated to avoid deepening the slowdown, yet without endangering investors' confidence. For governments with limited fiscal space, a prudent approach could focus on stabilising the structural balance while allowing automatic stabilisers to operate fully. Countries that have robust fiscal institutions and are already implementing needed structural reforms would be in a better position to do so.

Regulation and supervision

Key risks to financial stability include a growing range of potential sources of liquidity stress in core financial markets, such as those for government bonds. At the same time, the myriad linkages between banks and non-banks have expanded the way stress in the NBFI sector could spill over to the banking sector.

Two key priorities for prudential policies and financial regulation will help address growing vulnerabilities in the financial system: first, ensuring the consistent implementation of Basel III across jurisdictions; and second, adopting a more holistic approach by applying consistent regulatory frameworks to financial intermediaries that pose similar risks to financial stability.

Some jurisdictions have considered delaying the implementation of Basel III or deregulating their financial sector in an attempt to balance growth objectives with financial stability risks. Proponents argue that easing regulations can stimulate credit

supply and economic activity. However, history demonstrates that any short-term gains come at the cost of long-term instability. Adequate capital and liquidity regulation, together with supervision and the appropriate macroprudential overlay, have been shown to reign in excessive risk-taking by financial institutions, preventing financial crises that could have jeopardised the broader economy.[37] Moreover, higher capital ratios have been associated with higher loan growth, highlighting the importance of bank capital as a robust funding source for credit supply.[38]

The timely and consistent adoption of Basel III across regions remains central to addressing regulatory shortcomings revealed by the GFC. Moreover, the insights on interest rate and liquidity risk management gained from the 2023 banking turmoil should also be used to inform and adapt national and international standards.[39]

Further, regulators need to be mindful of the risks and vulnerabilities that have migrated to the NBFI sector. As explained above, two key developments are the migration of credit risk from well regulated to less regulated entities and rising liquidity risks, especially in government bond markets. Examples include strong growth and rising leverage in private credit,[40] the increasing presence of internationally active NBFIs and stablecoins' growing ties to traditional finance. Left unaddressed, these developments could amplify shocks and pose financial stability risks, for example when margin calls force fire sales and trigger deleveraging spirals. At the same time, such vulnerabilities have become harder to assess because more of the activity is conducted by less regulated entities, often with high levels of leverage.

This requires regulatory frameworks that apply similar stringency to financial intermediaries posing similar risks to financial stability, regardless of legal form or business model. A holistic approach, or "congruent regulation", would ensure that even if traditional banking activities migrate to the NBFI sector, they are subject to similar regulation, in turn reducing the potential for dangerous build-ups of systemic risk.[41] Examples could include requiring minimum haircuts in all securities financing transactions and appropriately calibrated margin requirements even in transactions that are not centrally cleared. Such changes could improve the functioning and stability of bond markets in stress events and reduce the risks of liquidity spirals. Similarly, regulation of stablecoins and cryptoassets should follow a technology-neutral, "same activities, same risk, same regulatory outcomes" approach. The most pressing issues relate to integrity and financial crime – including adherence to anti-money laundering/countering the financing of terrorism reporting requirements – and the backing of stablecoins.

Such a holistic approach to regulation would ensure that regulatory adjustments are made with careful consideration of systemic consequences, avoiding the unintended effect of merely diluting existing safeguards.[42]

Monetary policy

The post-pandemic experience and recent trade tensions demonstrated that broad-based inflationary pressures could emerge from multiple sources, not just strong aggregate demand. Structural shifts and the growing rigidity of the supply side of many economies might translate into shocks having a larger impact on inflation than in the past. Added to that, the scars from the post-pandemic inflation surge might leave a lasting imprint on inflation expectations with implications for the outlook for inflation (see Box C). In such an environment, central banks' role as anchors of price stability becomes even more important.

For some central banks, including that of the United States and those of countries that retaliate strongly to US tariffs, these developments are expected to resemble a supply shock. They therefore present a difficult trade-off for monetary

policy. In choosing the extent and pace of ongoing monetary easing – or whether to pause it altogether – central banks must carefully balance the need to cushion the impact on output and employment against the risk that the expected one-off rise in prices morphs into persistently higher inflation. Assessing this trade-off is particularly challenging given a lack of clarity surrounding the combined effect of the tariffs so far implemented and uncertainty regarding potential future measures. The initial impact on the price level will depend on the extent to which tariffs could be absorbed by firms' margins and on the response of exchange rates, both of which are hard to predict.

This uncertainty is further compounded by the interplay of forces that could either amplify or mitigate the initial impact on inflation and its subsequent trajectory. On one hand, wage- and price-setters may have become more responsive to new inflation shocks. Households, in particular, may show less tolerance for real wage declines following the sharp rise in living costs after the pandemic. On the other hand, a large negative impact of tariffs and uncertainty on domestic output and unemployment could put downward pressure on inflation. Additional disinflationary forces may arise from declining commodity prices, particularly in the event of a pronounced global economic slowdown, as well as from trade diversion and lower prices from tariff-affected countries like China and other surplus economies. These mitigating factors are likely to be especially relevant for economies other than the United States.

In countries that have not imposed tariffs or retaliatory measures, the trade shock is likely to be more akin to an adverse demand shock. As a result, the disinflationary effects in these economies are likely to dominate, including from lower prices for manufactured goods and lower commodities prices. Economies in this group, particularly Asian EMEs experiencing inflation at or below target, may therefore have greater room to continue supporting growth with monetary easing.

Whatever course of action they take, central banks should continue to foster a stable economic environment with a medium-term orientation for policy. By adhering firmly to their mandates, especially against political pressures, and communicating their decisions with clarity and consistency, they can build trust and anchor expectations, providing a sense of predictability in an otherwise uncertain environment. Importantly, central banks should protect their independence and credibility by remaining grounded in realistic views of what monetary policy can and cannot deliver, focusing on the objectives they are well equipped to achieve, namely price and financial stability.

Looking ahead, it is important that monetary policy frameworks remain fit for purpose in a rapidly evolving economic landscape characterised by a wider range of supply shocks and increased uncertainty and unpredictability. Periodic reviews of these frameworks, as currently undertaken by some major central banks, serve this purpose and are informed by three key lessons from recent experience.

First, the experience of the post-pandemic inflation surge and the rising prevalence of supply shocks highlights the need for a symmetric approach to inflation targeting. Such an approach allows central banks to respond forcefully not only to the risks of inflation undershooting the target and interest rates hitting the effective lower bound but also to the risks of inflation surges.

Second, in the face of high and rising uncertainty central banks should remain agile and responsive, continuously adapting their tools to evolving economic conditions. Flexible policy tools and exit strategies should be prioritised to address the potential for abrupt macroeconomic changes. The policy rate should remain the primary instrument, while the use of balance sheet instruments outside crisis periods should be approached with caution. Large-scale asset purchases, in particular, tend to exhibit diminishing returns and are difficult to reverse. Similarly, forward guidance should be employed judiciously, along with clear communication emphasising its

state-contingent nature and the dependence of future policy paths on economic developments.

Tools for restoring market functioning should be carefully designed with a clear exit strategy to alleviate moral hazard concerns and to ensure that they do not interfere with the appropriate monetary policy stance.[43] Instead, macroprudential tools should play a pre-emptive, complementary role, containing the build-up of vulnerabilities and increasing the resilience of the financial system in the face of shocks, thereby reducing the likelihood of financial crises throughout the interest rate cycle.[44] Central banks, in particular in EMEs, would continue to benefit from frameworks that combine inflation targeting and greater exchange rate flexibility with judicious use of FX intervention to shield against destabilising external developments.

Finally, policymakers must be humble in the face of high uncertainty, acknowledging the inherent limits of economic forecasting. Relying too heavily on a single baseline outlook may hinder policymakers' ability to effectively communicate the risks to the outlook and their potential responses to alternative outcomes. By incorporating information such as sensitivity analyses and alternative scenarios, central banks can provide greater transparency around their decisions. While this approach in communication is more complex, as it can dilute the message or overemphasise unlikely outcomes, it can offer the public a more nuanced understanding of the risks to the outlook and the trade-offs the central bank is facing.

Endnotes

[1] The estimated impact of uncertainty is also uncertain. For further evidence on the relationship between uncertainty and economic activity, see Cascaldi-Garcia et al (2023) and Londono et al (2025). The impact of the increase in uncertainty following the imposition of US trade tariffs is discussed in Burgert et al (2025).

[2] After temporarily rising during the pandemic, productivity growth has fallen back to or below pre-pandemic trends. The strong performance of the United States was the notable exception. See Igan et al (2024).

[3] Dispersion in firm-level productivity outcomes has risen in both the United States (Akcigit and Ates (2021)) and other countries (Banerjee et al (2024)). The growing disparity is mostly attributed to a lack of catch-up in productivity by laggard firms, rather than changes in frontier firms (Andrews et al (2019)). Demographic trends that inhibited entrepreneurship and firm entry are partly responsible for the poor performance of laggard firms (Hopenhayn et al (2022) and Karahan et al (2024)).

[4] Very low interest rates and easy financial conditions have also contributed to reducing incentives to screen investment projects (Kharroubi et al (2023) and Gopinath et al (2017)). Too large a financial system may compete for highly skilled workers, diverting them from more productive sectors (Cecchetti and Kharroubi (2019)). Credit may not flow to more innovative firms, as they have insufficient collateral (eg Caballero et al (2025) and Kharroubi et al (2023)).

[5] Higher taxation and low public investment may have further stifled private initiatives and innovation, particularly in countries burdened by high public debt. See eg Fornaro and Wolf (2025) and Cecchetti et al (2011).

[6] FDI may be more important for growth in EMEs than domestic investment, especially in countries that have a minimum stock of human capital (Borensztein et al (1998)). FDI facilitates knowledge transfer both to the firms receiving the investments and to those that later hire their workers (Poole (2013)). Aside from the effects transmitted through labour mobility, FDI in EMEs also generates positive spillovers through local suppliers in upstream sectors (Javorcik (2004)).

[7] Globalisation has substantially reduced poverty rates and income inequality among countries. AEs have also benefited, despite slower growth from other forces, as their income levels would be significantly lower without globalisation. See Gambacorta et al (2025) for a discussion of the factors that have led to rising trade tensions.

[8] See eg McKibbin et al (2024).

[9] It also suggests that global measures of economic slack, which have been found to be relevant in explaining domestic inflation (eg Borio and Filardo (2007) and Ciccarelli and Mojon (2010)), may lose relevance going forward.

[10] For a detailed description of how the economy can transition from a low- to a high-inflation regime, see Borio, Lombardi, Yetman and Zakrajsek (2023).

[11] Additionally, the pandemic-era inflation surge highlighted the non-linear nature of the Phillips curve. When inflation rises sharply, the frequency of price

adjustments increases, amplifying the transmission of the initial inflationary shock and intensifying its impact on the broader economy.

[12] See Eren et al (2023) for a discussion of the effects of the composition of government debt holders.

[13] Interest rate swaps are contracts in which counterparties exchange fixed rate payments for floating rate payments linked to a benchmark. The swap spread is the difference between the swap rate (the fixed rate) and the yield on a government bond of the same maturity. Swap rates and bond yields are connected by arbitrage, so swap spreads should typically stay close to zero, barring costs and risk compensation. Negative swap spreads are not arbitraged away because they capture intermediation costs rather than a "free lunch". Negative spreads compensate intermediaries for holding government bonds on their balance sheets and entering swaps as fixed rate payers.

[14] For further information on the signals about government debt demand in market activity, see Aquilina et al (2024) and Acharya and Laarits (2023) on stock-bond correlations, inflation expectations and the convenience yield on Treasuries.

[15] For example, a credible monetary policy greatly reduces the impact of fiscal deficits on inflation even when fiscal policy is not stabilising public debt. See Banerjee et al (2022).

[16] See Borio, Farag and Zampolli (2023) for a detailed description of the relevant channels and the associated evidence.

[17] See Borio, Claessens, Schrimpf and Tarashev (2023).

[18] The search for yield appears particularly intense in private credit. See Aramonte and Avalos (2021).

[19] Aramonte and Avalos (2021) and Avalos et al (2025).

[20] Valuation losses in public markets can sometimes amplify economic fluctuations by reducing the net worth of firms and households, thus tightening their borrowing constraints. Bank loans are not marked to market either, but banks do have provisions for non-performing loans, which can be detrimental to their lending capacity, possibly amplifying economic fluctuations too.

[21] Banks warehouse leveraged loans – ie hold them temporarily on their balance sheet – during the process of gathering the pool of loans to be securitised as a collateralised loan obligation (CLO). In addition to domestic warehousing banks, foreign institutional investors and banks are large holders of CLOs and private assets exposures, sometimes highly concentrated. See Aramonte and Avalos (2019).

[22] Banks also provide "subscription lines" to asset managers operating in private markets to bridge the gap between investments and capital calls to investors. Those credit lines are typically collateralised with the capital commitments of the very same investors, so the credit risk is relatively low. Moreover, investment banks provide prime brokerage services to hedge funds, family offices and other institutional clients. Those services involve trade execution, custody of assets, securities lending, leveraged trading and risk management, in some cases

representing significant market and credit risks for the banks. The collapse of Archegos Capital Management in March 2021 illustrates the vulnerabilities involved.

[23] Within fixed income markets, the cash-futures basis trade, which exploits narrow price gaps between futures and cash bonds, has been under scrutiny in recent years. Other common strategies include yield curve arbitrage and swap spread arbitrage, both of which have been associated with episodes of market stress in the post-pandemic period (eg in October 2021 and April 2025, respectively). Many other strategies exist, including in interest rate, equity and commodity markets, often involving an array of derivative instruments in addition to futures, such as swaps, forwards and options.

[24] More than 70% of the non-centrally cleared bilateral repos are transacted with zero haircut (Hempel et al (2023)). For evidence of repos transacted at negative haircuts, see Hermes et al (2025) and Lu and Wallen (2025).

[25] This is the delivery-versus-payment (DvP) segment of the repo market, where transactions settle against specific securities. In these transactions, a dealer facilitates non-dealer counterparties' access to the Fixed Income Clearing Corporation (FICC) cleared repo platform. In terms of amounts, they are the exact mirror image of the hedge fund basis trade volume (Aldasoro and Doerr (2023)).

[26] See Schrimpf et al (2020) and Avalos and Sushko (2023). Moreover, the repo linkage means stress in one sector can quickly spill over to another – arguably one of the contributing factors to the market stress in September 2019 and March 2020 – highlighting the fragility of financing highly leveraged positions with very short-term funding. See Avalos et al (2019) and Eren et al (2020a, 2020b).

[27] See eg Carstens (2023, 2024).

[28] Many of the required structural reforms to boost growth are fiscal in nature, involving long-lasting changes in the level and composition of taxes and expenditures and requiring policymakers and societies to agree on and adopt a long-term view on the broader role of government in the economy.

[29] See eg Nagel (2025) and Draghi (2024) on the structural reforms that could boost growth.

[30] For estimates regarding the European Union and Canada, see IMF (2024) and Bemrose et al (2020), respectively.

[31] See, for example, Antolin-Diaz and Surico (forthcoming), who find that public spending boosts private sector productivity and innovation in the medium term, leading to a large and persistent increase in output at longer horizons.

[32] While public investment accounted for 7.5–8% of government expenditures on average up to the early 2010s, this share has fallen significantly during the last decade, down to 6.5%.

[33] The Draghi (2024) report calls for €750–800 billion in investment annually (or about 5% of EU GDP).

[34] For a review see eg Balasundharam et al (2023) and IMF (2023).

[35] See eg Adarov and Panizza (2024) for evidence. See also Fornaro and Wolf (2025) for a theoretical model in which fiscal austerity coupled with pro-growth policies can help economies escape from a high debt, large fiscal distortion and low productivity regime.

[36] On the impact of fiscal rules on sovereign spreads and ratings, see eg Chrysanthakopoulos and Tagkalakis (2024), Gomez-Gonzalez et al (2022) and Sawadogo (2020).

[37] The Basel Committee on Banking Supervision (BCBS) finds that "there are clear net long-term economic benefits from increasing the minimum capital and liquidity requirements from their current levels in order to raise the safety and soundness of the global banking system". The benefits mainly stem from a lower probability of a financial crisis (BCBS (2010)).

[38] See Gambacorta and Shin (2018).

[39] See BCBS (2023).

[40] Aldasoro and Doerr (2025) and Aldasoro et al (forthcoming).

[41] See Metrick and Tarullo (2021).

[42] Efforts to strengthen macroprudential regulation of NBFIs have been under way since the GFC at both national and international levels. The Financial Stability Board, for instance, has recommended robust domestic frameworks to identify and monitor NBFI leverage vulnerabilities, alongside measures to address these risks through adjustments to legal and regulatory frameworks and the adoption of targeted policy tools, such as activity-, entity- and concentration-based approaches.

[43] See BIS (2024).

[44] See BIS (2024).

Additional notes to graphs

Graph 1.A: Actual figures, Consensus Economics estimates and forecasts. For IN, for fiscal years beginning in April. For the regions, GDP-PPP weighted averages of seven other AEs, eight other Asian EMEs and five other Latin American economies. Global is the GDP-PPP weighted average of 65 economies, based on data availability.

Graph 1.B: Actual figures, Consensus Economics estimates and forecasts as of May 2025. GDP-PPP weighted averages. The sample consists of 65 economies, based on data availability. Asia & Oceania = AM, AU, AZ, CN, GE, HK, ID, IL, IN, JP, KR, KZ, MY, NZ, PH, SA, SG, TH, TM, TR, UZ and VN; Americas = AR, BO, BR, CA, CL, CO, CR, DO, EC, GT, HN, MX, NI, PA, PE, PY, SV, US, UY and VE; Europe = AL, BA, BG, BY, CH, CZ, DK, EA, GB, HU, MD, ME, MK, NO, PL, RO, RS, RU, SE and UA; Africa = EG, NG and ZA. For IN, for fiscal years beginning in April.

Graph 2.A: Real private consumption per capita; seasonally adjusted series. The trend is based on Q1 2015–Q4 2019 data. Other AEs includes 10 economies.

Graph 2.B: Households and non-profit institutions serving households (NPISHs), or closest based on data availability. Definitions differ among economies; seasonally adjusted series. Latest: for CA, SE and US, Q1 2025; Q4 2024 otherwise. Pre-pandemic average: for NZ, Q2 2016–Q4 2019; Q1 2015–Q4 2019 otherwise.

Graph 2.C: GDP-PPP weighted average of eight other Asian EMEs and six Latin American economies. For CN, annual series from IMF, *World Economic Outlook*; seasonally adjusted quarterly national series otherwise.

Graph 3: Latest: for AU and NZ, Q1 2025; April 2025 otherwise. Inflation targets/tolerance intervals are official point targets, target bands, tolerance ranges or unofficial objectives announced by authorities.

Graph 4.A: The sample covers 11 AEs, nine Asian EMEs, six Latin American economies and 13 other EMEs.

Graph 4.B: Median across AT, AU, BE, CA, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, JP, LU, NL, NO, NZ, PT, SE and US, where data are available. End-year central bank assets and annual average policy rates. The real policy rate is calculated by adjusting the nominal rate for headline inflation. For policy rates in 2025, averages of available data.

Graph 5.A: Trade policy uncertainty index refers to the number of articles related to trade policy uncertainty as a share of the total number of articles in seven newspapers each month (data downloaded from www.matteoiacoviello.com/tpu.htm). Economic policy uncertainty index refers to the number of articles related to economic policy uncertainty as a share of the total number of own-country articles in each month; GDP-PPP weighted average of 21 economies (data downloaded from www.policyuncertainty.com). Geopolitical risk index refers to the number of articles related to adverse geopolitical events as a share of the total number of articles in 10 newspapers each month (data downloaded from www.matteoiacoviello.com/gpr.htm). Series are demeaned and divided by their standard deviation based on the period starting in January 2000.

Graph 5.B: Economic policy uncertainty index refers to the number of articles related to economic policy uncertainty as a share of the total number of own-country articles in each month (data downloaded from www.policyuncertainty.com). For global, GDP-PPP weighted average of 21 economies. For CN, index based on mainland newspapers; DE, ES, FR, GB and IT represent Europe. Series are demeaned and divided by their standard deviation based on the period starting in January 2000. Latest: for global, March 2025; for CN, April 2025; for Europe, JP and US, May 2025.

Graph 7.A: Seasonally adjusted medians. The sample covers AR, AT, AU, BE, BR, CA, CH, CL, CN, CO, CY, CZ, DE, DK, ES, FI, FR, GB, GR, HK, HU, ID, IE, IL, IN, IT, JP, KR, LU, MT, MX, MY, NL, NO, NZ, PH, PL, PT, RU, SA, SE, SG, SI, TH, TR, US and ZA. See Banerjee et al (2025).

Graph 7.B: The uncertainty impact on business (non-residential private) investment is derived from conditional forecasts using a BVAR model running the following country-specific regressions at quarter t: $\boldsymbol{y}_t = \boldsymbol{\alpha}_0 + \boldsymbol{A}_1\boldsymbol{y}_{t-1} + \cdots + \boldsymbol{A}_p\boldsymbol{y}_{t-p} + \boldsymbol{\epsilon}_t$, where $\boldsymbol{y}_t$ is an $M \times 1$ vector of endogenous variables, $\boldsymbol{\alpha}_0$ is an $M \times 1$ intercept vector, $\boldsymbol{A}_j$ ($j = 1, \ldots, p$) are $M \times M$ coefficient matrices and $\boldsymbol{\epsilon}_t$ is an $M \times 1$ vector of Gaussian exogenous shocks with zero mean and variance-covariance matrix $\boldsymbol{\Sigma}$. $\boldsymbol{y}_t$ encompasses a range of key economic indicators, including non-residential private investment, labour productivity (measured as real GDP per hour worked), public investment, real GDP, consumer price index (CPI), term premium (ie 10-year minus three-month yield), shadow rate and economic policy uncertainty index (EPU) by Baker et al (2016) (data downloaded from www.policyuncertainty.com). The model includes four lags and is estimated using the Minnesota prior with a hierarchical approach to prior selection (Giannone et al (2015)). The uncertainty impact is measured as the difference between a forecast conditioned on Q2 2025 uncertainty levels and an unconditional forecast. Specifically, the uncertainty conditions for Q2 2025 are an average over the EPUs for April and May 2025. Conditional forecasts are computed based on a range of structural shocks (monetary policy shock, uncertainty shock, fiscal policy shock, supply shock, demand shock and other shocks). See the online annex of Burgert et al (2025) for further details.

Graph 8.A: Hodrick-Prescott filtered trend of year-on-year real GDP growth rates. For the regions, GDP-PPP weighted averages of 10 AEs; nine Asian EMEs and six Latin American economies.

Graph 8.B: Latest observations: for US, April 2025; for CA, average of February to April 2025; for GB, Q1 2025 and 2024 otherwise. Monthly and quarterly series are seasonally adjusted. JP shows end-October values.

Graph 8.C: World trade and foreign direct investment (FDI) from World Bank.

Graph 9.A: Based on trade-weighted averages of all products for each country. For the regions, median across economies: AEs = AU, CA, CH, GB, JP, NO and NZ; EMEs = AE, AR, BR, CL, CN, CO, DZ, ID, IL, IN, KR, KW, MA, MX, MY, PE, PH, RU, SA, SG, TH, TR, VN and ZA; where data are available. The US total effective tariff rate is defined by Fitch as the total duties as a percentage of total imports and changes with shifts in import share by country of origin and product mix.

Graph 9.B: The panel shows net interventions, which are defined as all harmful interventions minus all liberalising interventions as defined by the Global Trade Alert. The number of net interventions for each bilateral country relationship are weighted using the bilateral goods imports as a share of sample country goods imports. Non-tariff interventions include all harmful trade interventions except tariff interventions. The timing is based on the implementation date of an intervention.

Graph 9.C: Trade balance = exports minus imports. For the periods, simple averages are used.

Graph 10.A: The sample covers AR, AT, AU, BE, CA, CH, CO, DE, DK, ES, FI, FR, GB, GR, IE, IN, IT, JP, KR, MX, NL, NO, NZ, PH, PT, SE, TH, US and ZA, where data are available. Definitions may vary across time and countries. Estimates, if actual is not available.

Graph 10.B: The sample covers AT, AU, BE, CA, CH, CZ, DE, DK, ES, FI, FR, GB, GR, HU, IE, IT, JP, KR, LU, NL, NO, NZ, PL, PT, SE and US. Gross general government interest payments. OECD estimates, if actual is not available.

Graph 11.A: Based on data from the US Treasury International Capital (TIC) System. Sovereign investor base estimates by Arslanalp and Tsuda (2014); last updated on 2 May 2025.

Graph 11.C: Stock-bond correlation = 10-year rolling correlation between the three-month log returns of bonds and equity. For bonds, total return index of the 10-year US Treasury; for equity, S&P 500. Convenience yield = 10-year TIPS yield + 10-year inflation swap rate – 10-year Treasury yield.

Graph 12.A: Households = households and NPISHs.

Graph 12.B: Annual data, 2024 if available, 2023 otherwise.

Graph 12.C: Each series starts in 1980 or with the earliest available observation; demeaned and divided by the standard deviation.

Graph 13.A: Gross exposure represents the sum of long and short positions. The US government debt asset class includes debt issued by US federal, state and local entities, such as cash Treasury securities, Treasury bond futures, other Treasury security derivatives, municipal bonds and obligations issued by government-sponsored entities. CC repo market includes the tri-party market, the Fixed Income Clearing Corporation's (FICC) DvP service and FICC's General Collateral Financing (GCF) Repo service. Hedge funds' gross exposure: quarterly data. Repo data correspond to quarterly averages of daily values.

Graph 13.B: Tether's and Circle's reported holdings of Treasuries including indirect (eg via repo), compared with US and EA government money market funds (MMFs). Full fund size (including non-US treasuries) for EA MMFs.

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II. Financial conditions in a changing global financial system

Key takeaways

- Since the Great Financial Crisis, the focus of financial intermediation has shifted from lending to the private sector towards financing governments. In addition, the footprint of internationally active asset managers in sovereign bond markets has grown, facilitated by FX swaps.
- Global financial markets have become more connected, which has made it easier for financial conditions to spread across borders, including to major advanced economies.
- While monetary policy retains traction on domestic financial conditions, central banks need to be attuned to changes in financial conditions in other economies and calibrate their policy actions accordingly to fulfil their mandates.

Introduction

The Great Financial Crisis (GFC) was a watershed event that set in motion two related structural changes in the global financial system which define the state of the system today. First, the focus of financial intermediation has shifted from lending to private sector borrowers to claims on the government, especially in the form of sovereign bonds. Second, non-bank financial institutions (NBFIs) have assumed a greater role. While the GFC was primarily a banking crisis in which regulated banks were the main characters, portfolio managers investing in sovereign bonds have taken centre stage in the post-GFC financial system.

The global reach of internationally active portfolio managers makes the currency dimension an integral part of their investment decisions. Many NBFIs, such as pension funds and life insurance companies, have obligations in domestic currency but hold a globally diversified asset portfolio in several currencies. Currency risk hedging is therefore a key theme, and the system has evolved to allow such hedging. In this process, the banking system has played a pivotal role by facilitating the market for foreign exchange (FX) swaps. This has made money fungible across currencies, allowing investors to gain international exposure while hedging currency risk.

This chapter explores how the reshaping of the financial system in recent years has affected the dynamics of financial conditions. One key finding is that post-GFC structural changes have led to stronger cross-country transmission of financial conditions. Furthermore, this transmission has become increasingly multi-directional. Contrary to conventional wisdom, the United States is not the only major source of international transmission of financial conditions. Instead, US financial conditions are increasingly affected by developments in other advanced economies (AEs). Yet the analysis also suggests that while external factors have a significant effect on financial conditions, domestic monetary policy still retains traction.

These findings have important implications for central banks. The increasing influence of external financial factors makes it more challenging to align domestic financial conditions with the intended monetary policy stance. To fulfil their mandates, central banks need to stay attuned to developments in the global

financial system and calibrate their policy actions accordingly. The increased connectedness of global financial markets also underscores the critical role of central bank cooperation.

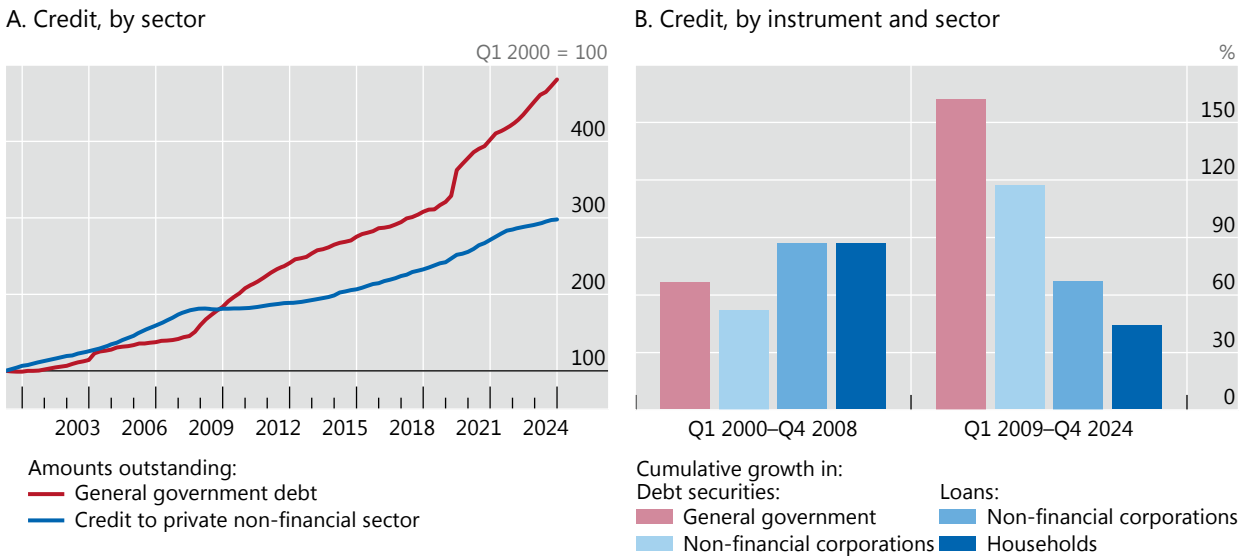
Structural changes in the global financial system

The GFC originated in the regulated banking sector, which had engaged in headlong expansion through the rapid growth of claims on private sector borrowers. These came mainly in the form of household mortgages and were primarily held directly on the balance sheets of regulated banks and broker-dealers. However, some were warehoused in special purpose vehicles that provided additional balance sheet capacity.[1]

Since then, two related structural changes have shaped the global financial system. The first is the shift in financial intermediation from lending to the private sector towards financing governments. Claims on the government replaced credit to the private sector as the main driver of overall credit growth (Graph 1.A). The stock of sovereign bonds started to expand significantly in the wake of large and persistent fiscal deficits since the GFC, with an additional upward boost as a result of the Covid-era fiscal expansions. As a result, sovereign bond markets grew at a considerably faster pace than loans and non-financial corporate bond markets (Graph 1.B).

This shift has been accompanied by an increasingly central role of certain NBFIs in core bond markets. These include collective investment vehicles (mutual funds, exchange-traded funds (ETFs)), long-term institutional investors such as pension funds, insurance corporations and sovereign wealth funds, as well as hedge funds.[2] As a consequence, NBFIs' footprint in the global financial system has grown considerably.[3] Between 2009 and 2023, their total assets surged from 167% to 224% of global GDP (Graph 2.A). The growth in banks' total assets during the same period was more modest (from 164% to 177% of global GDP).

Government bond issuance has outpaced lending to the private sector[1] Graph 1

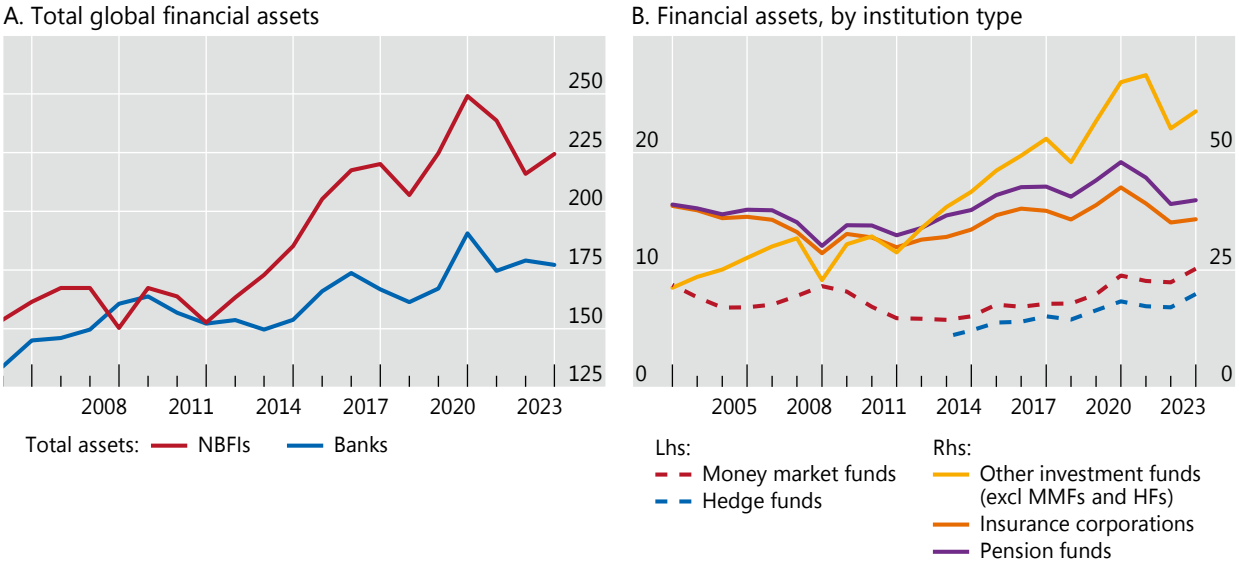


[1] See endnotes for details.

Sources: IMF; national data; BIS.

Financial intermediation has shifted from banks to NBFIs[1]

As a percentage of global GDP — Graph 2



HFs = hedge funds; MMFs = money market funds; NBFIs = non-bank financial institutions.

[1] See endnotes for details.

Sources: FSB (2024); IMF; BIS.

To be sure, the NBFI universe is vast and varied, covering a diverse set of players with a wide range of business models and subject to very different regulatory regimes, if regulated at all. While most NBFIs expanded post-GFC, the growth of investment funds and hedge funds has been particularly striking (Graph 2.B). Private credit is another important NBFI-related area that has grown rapidly. Private credit funds' assets under management have surged from $0.2 billion in the early 2000s to over $2.5 trillion in 2024.[4]

These structural changes have also been reflected in the pattern of cross-border credit flows. Before the GFC, international capital flows were mostly intermediated by banks. As a result, financial conditions were transmitted across borders mainly through the activities of internationally active banks. For this reason, the risk-taking channel, as reflected in fluctuations of global banks' leverage, was a key factor behind the co-movements in financial conditions across economies.[5]

After the GFC, the focus of international financial intermediation shifted from the activities of global banks engaged in cross-border lending to the activities of international portfolio investors in global bond markets.[6] This "second phase of global liquidity" had several key drivers. On the borrowing side, it was largely driven by expansive fiscal policies in major jurisdictions and the surge in the supply of sovereign bonds. On the lending side, internationally active NBFIs' growth and need for diversification induced them to hold portfolios in a variety of currencies.[7]

Internationally active asset managers' greater role in government bond markets has been facilitated by institutional developments in capital markets, such as the increasing role of custodians, trading venues and hedging markets. Foremost among these changes has been the growth of collateralised short-term borrowing markets.

Global banks have been the pivotal players in the above areas, facilitating the expansion of internationally active NBFIs via several on- and off-balance sheet channels. Banks' on-balance sheet lending to NBFIs has grown considerably.[8] Nevertheless,

their off-balance sheet links with NBFIs, notably through FX swaps, are much more important (next section).

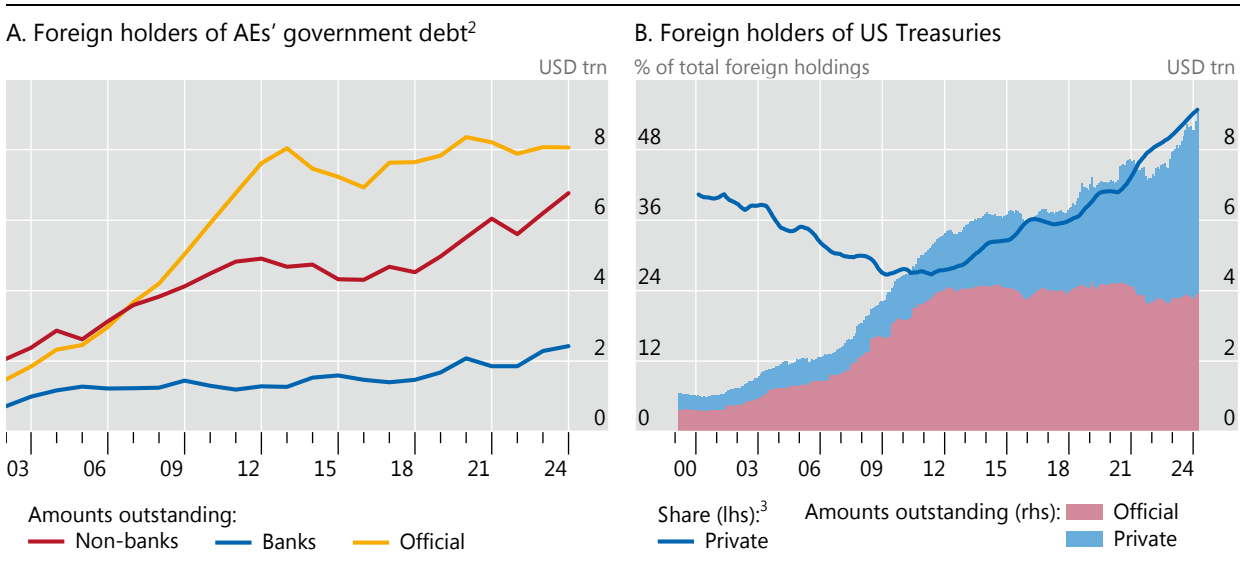
As a result of the above developments, NBFIs expanded their position as sovereigns' main foreign private creditors (Graph 3.A). More broadly, foreign private sector lenders have grown in importance relative to foreign official holders. In the US Treasuries market, the largest bond market in the world, foreign private sector lenders (mainly NBFIs) have increased their holdings of Treasuries rapidly over the past decade. During that time, their accumulation of Treasuries has considerably outpaced that of foreign official holders (Graph 3.B). As a result, they currently account for more than half of all foreign holdings of Treasuries.

Taking a more global perspective yields a clearer picture of NBFIs' greater role in the geography of global bond markets. Graph 4 showcases the changes in private investors' cross-border bond holdings across major regions of the world between 2015 and 2023.[9] Blue arrows represent increased, and grey ones decreased, holdings. The numbers do not include official reserve holdings. The largest increase in US bond holdings – of around $1.3 trillion – is accounted for by European investors. The second largest increase (of $575 billion) is due to investors from "other advanced economies". In both cases, there were also substantial bond flows in the opposite direction, from the United States to Europe and other advanced economies.

The pattern in Graph 4 strikingly illustrates why portfolio decisions should be viewed through the lens of gross rather than net positions.[10] Changes in bilateral portfolio (gross) positions are only loosely related to current account imbalances and associated net capital flow positions. Indeed, many of the largest post-2015 increases in cross-border bond holdings were reported by private investors from AEs that did not run large current account surpluses during that period. This is not surprising considering that the largest internationally active NBFIs are based in AEs and naturally tend to direct their investments towards the large bond markets of other AEs. The increases in the holdings of investors located in emerging market economies (EMEs), even those running large current account surpluses, were much smaller than those of AEs. Thus, the focus on net measures like current account imbalances misses the

Foreign holdings of government debt[1]

Graph 3

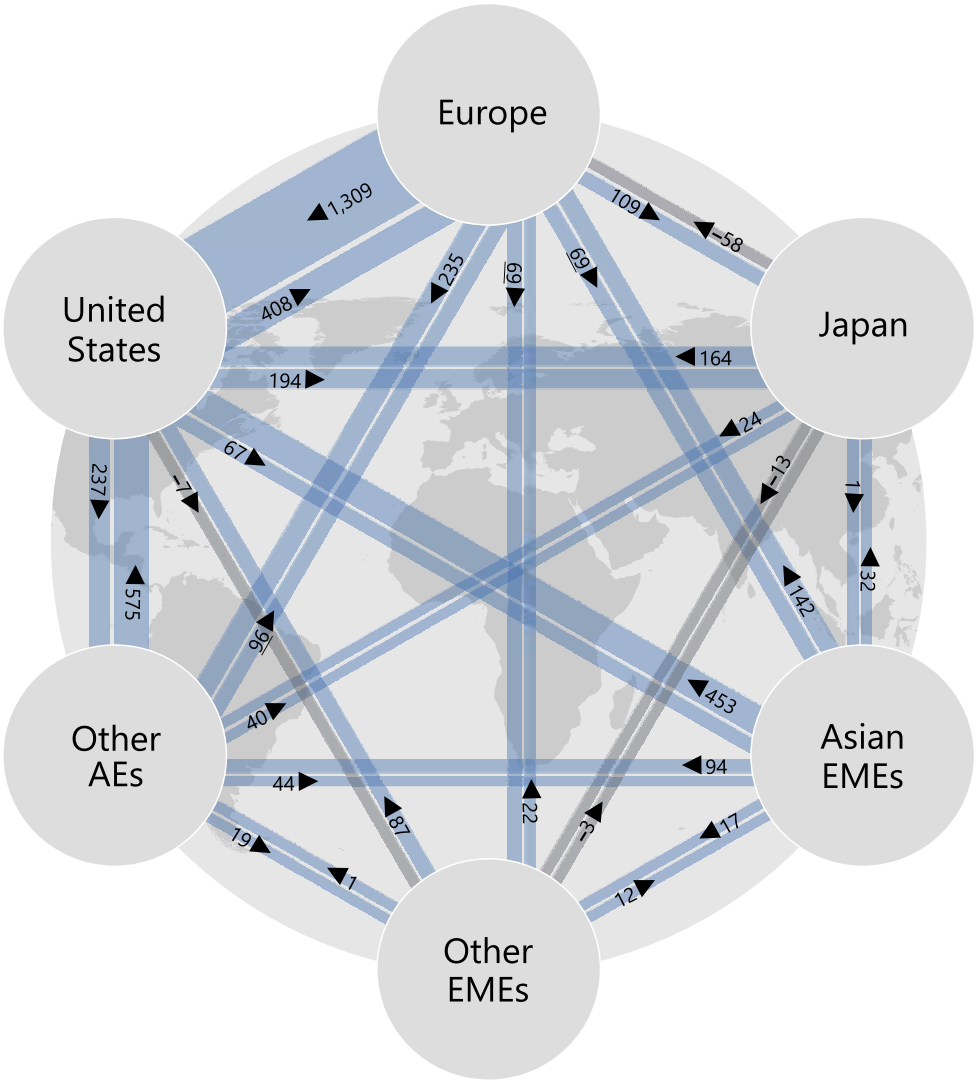


[1] See endnotes for details. [2] Sum of AU, CA, CH, DK, EA, GB, JP, NO, NZ, SE and US. [3] Twelve-month moving average.

Sources: Arslanalp and Tsuda (2014); US Treasury International Capital (TIC) data; BIS.

Global cross-border bond holdings, excluding official reserves[1]

Changes in outstanding stocks over 2015–23, in billions of US dollars — Graph 4



[1] Changes in international portfolio debt investment holdings excluding official reserves. Blue (grey) arrows indicate increase (decrease) in holdings. See endnotes for details.

Sources: IMF; BIS.

role of large gross portfolio positions between AEs, which are key to the international transmission of financial conditions.

The FX swap market as linchpin

The global nature of internationally active NBFIs' portfolios means that currency denomination is an integral dimension of their investment decisions. For example, pension funds and life insurance companies have obligations to their beneficiaries or policyholders (and evaluate their returns) in domestic currency. Nevertheless, they hold a globally diversified asset portfolio in several currencies. Currency hedging is therefore a key theme, and the system has evolved to facilitate such hedging. In this process, the banking system has played a crucial role. Banks, as key intermediaries in

over-the-counter FX derivatives markets, enable the market for FX swaps, allowing investors to hedge currency risk.

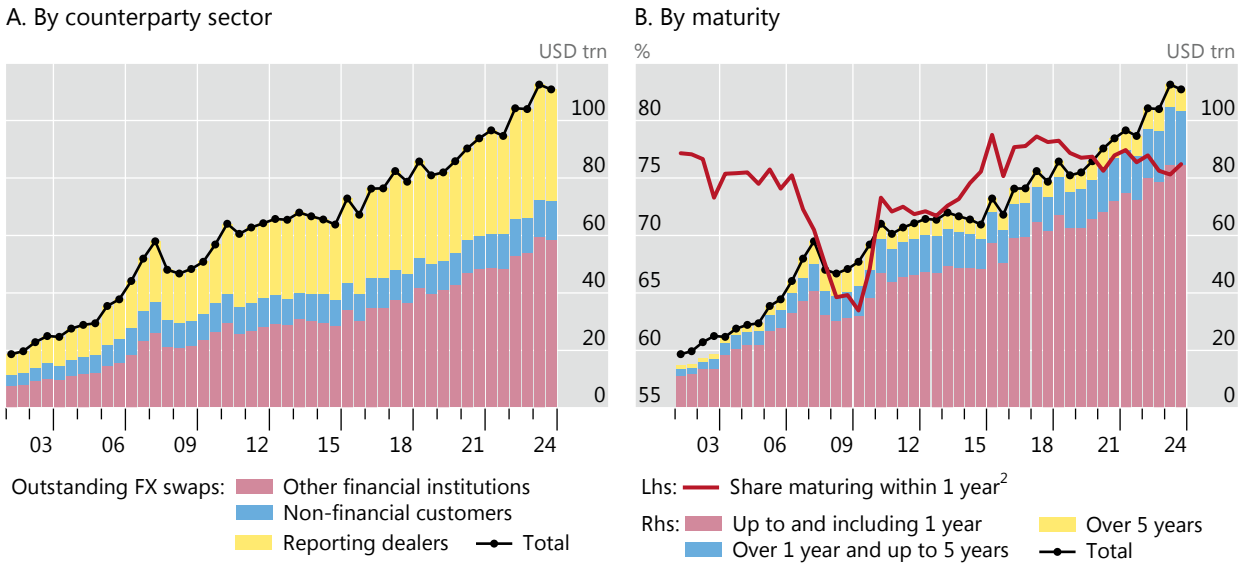
FX swaps make money fungible across currencies. An FX swap is essentially a collateralised borrowing operation. For example, a euro area pension fund borrows US dollars to invest in dollar bonds by pledging euros as collateral, with a promise to unwind the transaction at a pre-agreed exchange rate. More formally, an FX swap is an arrangement in which two parties exchange currencies at the spot rate today (spot leg) and agree to unwind that transaction (exchanging the full principal amount) at a pre-agreed exchange rate at some pre-agreed time (forward leg). Despite the full exchange of principal at the end of the contract, accounting convention does not count FX swaps as debt, but as off-balance sheet obligations (Box A).[11] Currency swaps operate similarly, but typically have a longer maturity and also trade income streams from interest payments in each currency.

The FX swap market is large. Outstanding FX swaps (including forwards and currency swaps) reached $111 trillion at end-2024, with FX swaps and forwards accounting for roughly two thirds of that amount.[12] The largest and fastest growing segment has been contracts with "other" (ie non-dealer) financial institutions (OFIs), primarily NBFIs (Graph 5.A, red bars). This segment has nearly tripled in size since 2009. Roughly 90% of FX swaps have the dollar on one side, underlining the currency's linchpin role in the global financial system. Over three quarters of all outstanding FX swap contracts have a maturity of less than one year (Graph 5.B).[13]

FX swaps have enabled internationally active NBFIs (eg asset managers, hedge funds, pension funds) to increase their cross-currency bond investments by making the universe of bonds across the world more accessible on a hedged basis. FX swaps have thus been a crucial factor fostering the globalisation of sovereign bond markets. Given US capital markets' centrality in the global financial system, FX swaps have particularly facilitated greater access to US dollar-denominated bonds, especially Treasuries.

Data on FX swaps can enhance tracking and understanding of cross-currency portfolio flows. Since accounting rules leave FX swaps off balance sheet and do not

FX swaps[1] Graph 5



[1] Including FX swaps, outright forwards and currency swaps; notional amounts outstanding. See endnotes for details. [2] The share is calculated as a percentage of the data for which maturities are reported.

Sources: BIS OTC derivatives statistics; BIS.

Box A

FX swaps and hedged cross-border portfolio investments

FX swaps enable cross-currency investment by making money fungible across currencies. Accordingly, NBFIs, which account for a large portion of cross-border portfolio investment, also drive much of the growth in FX swap usage (Graph 6.A). Indeed, NBFIs' FX swap positions largely track their international portfolio allocation, reflecting their use to hedge cross-border investment. The cross-border investment flows captured through NBFIs' FX swap activity shed light on the growing connectedness between advanced economy markets and flesh out a key channel through which financial conditions in advanced economies including the United States can be affected by foreign NBFIs' portfolio choices.

FX swaps comprise the bulk of global FX derivatives activity (which also includes forwards and futures, currency swaps and options). They are derivatives contracts where one party borrows one currency from, and lends another currency to, another party. They are effectively collateralised borrowing, where the lending currency is used as collateral, but accounting convention leaves the positions off balance sheet and does not count them as debt. Consider, for example, a European investor who has euros, but wishes to invest in a dollar bond without exposing themself to exchange rate risk (Graph A1.A). This investor lends euros (ie pledges euros as collateral) to a counterparty in the FX swap market at the start of the contract, and receives dollars evaluated at the spot exchange rate (Graph A1.B). The investor also incurs an off-balance sheet obligation to repay the dollars at the pre-agreed forward rate. This is known as a forward obligation. The investor can use the cash proceeds from the FX swap to invest in a dollar-denominated security (Graph A1.C). At the contract's maturity, the investor receives the euros back and pays his or her swap counterparty the equivalent dollars owed. Alternatively, the swap contract can be renewed ("rolled") to maintain the position.

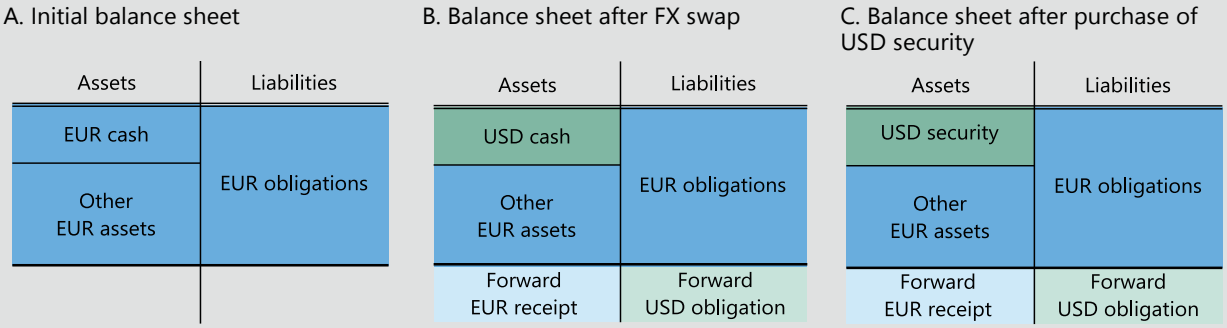
Linking BIS data on FX swaps by non-dealer financial institutions ("other financial institutions" (OFIs) – mostly NBFIs)[1] with cross-border investments in US bonds reveals important interactions with financial conditions. FX hedging motives related to such investment help to explain dynamics in the volume of FX swaps entered into by OFIs. For instance, asset managers' portfolio allocation decision between domestic and US bonds crucially depends on the expected return of US bonds relative to domestic bonds and the total cost of hedging the exchange rate risk of the foreign bond investment.[2] In addition, the degree of hedging may be affected by changes in the broader investor risk appetite or by valuation changes to the dollar asset.

The determinants of hedging motives can largely explain changes in the outstanding notional values of FX swaps taken up by OFIs in five major currencies – the euro, Japanese yen, pound sterling, Swiss franc and Canadian dollar.[3] In particular, OFIs' FX swap activity is higher when any of the following apply: cross-border investment in the US dollar bonds is more attractive (ie the long-term bond return is higher than the short dollar rate); the local bond return is less attractive (ie the local yield curve is flatter); deviations from covered interest parity imply greater funding cost for dollars in the FX swap market relative to money market rates; financial conditions are looser (lower financial conditions index); or the spot exchange rate is lower (Table A1, column I). Overall, these hedging-related factors can explain up to a quarter of the dynamics of these institutions' FX swap positions and rationalise the strong empirical link between NBFIs' cross-border bond investments and FX derivatives activity (Graph 6).

These connections between hedging and cross-border investment provide a channel through which changes in domestic financial conditions can affect broader financial conditions in other countries. For example,

FX swap-enabled bond investment

Example euro area investor — Graph A1



Source: BIS.

Hedging-related determinants of OFIs' FX swaps outstanding[1]

Table A1

	OFIs' FX swaps	
	(I)	(II)
Slope USD (10y–3m)	1.798	7.786***
	(0.963)	(1.897)
Slope local (10y–3m)	–4.730**	–13.762***
	(1.537)	(4.835)
GS US FCI	–3.647**	–4.703***
	(1.035)	(1.724)
Spot exchange rate (local per dollar)	–0.502*	–0.159
	(0.185)	(0.457)
CIP deviation (3m)	–4.774*	–3.938
	(1.976)	(2.771)
Observations	258	218
Adjusted R-squared	0.26	0.15
Estimation	OLS	IV

CIP = covered interest parity; FCI = financial conditions index; GS = Goldman Sachs; IV = instrumental variables; OLS = ordinary least squares.

[1] Estimates from panel regressions with currency fixed effects. Standard errors reported in brackets. ***/**/* denotes statistical significance at the 1/5/10% level.

Source: Nenova et al (2025).

a flatter yield curve in the investor's country is associated with a greater incentive to invest in US dollar bonds, all other things equal. More inflows into the US bond market may loosen financial conditions in the United States as a result. One type of economic shock that could flatten the local yield curve is monetary policy, which through various tools can affect long- and short-term interest rates to different degrees. Column II of Table A1 estimates the same relationship with OFIs' FX swaps – but this time using only variation in the hedging determinants due to monetary policy shocks of the Federal Reserve or the respective local central bank.[4] The negative effect of the local yield curve slope on FX hedging by NBFIs strengthens, suggesting the mechanism highlighted here operates even when it comes to the transmission of advanced economy monetary and financial conditions to the US bond market.

[1] NBFIs account for the majority of the category "other financial institutions" (OFIs) reported in the counterparty sector breakdown of BIS derivatives statistics (alongside reporting dealers and non-financial customers). However, OFIs can also include smaller non-reporting banks or central banks. [2] The total cost of hedging a US dollar investment for a foreign investor through an FX swap or forward equals the differential between the dollar and local interest rates with the same tenor as the FX derivative plus the cross-currency basis (Ahmed et al (2023)). [3] See Nenova et al (2025). Both FX swaps and hedging demand variables enter the analysis in semiannual changes. To account for seasonality in the FX swap data, we confirm all results are unchanged when using year-on-year changes instead or adding an end-of-year dummy to the semiannual regressions. [4] In econometrics jargon, this corresponds to estimating the same regression using monetary policy shocks as instrumental variables for the yield curve slopes, financial conditions and exchange rate variables. Monetary policy shocks are measured as high-frequency surprises in a range of asset prices around the six respective central banks' announcements as in Kearns et al (2023).

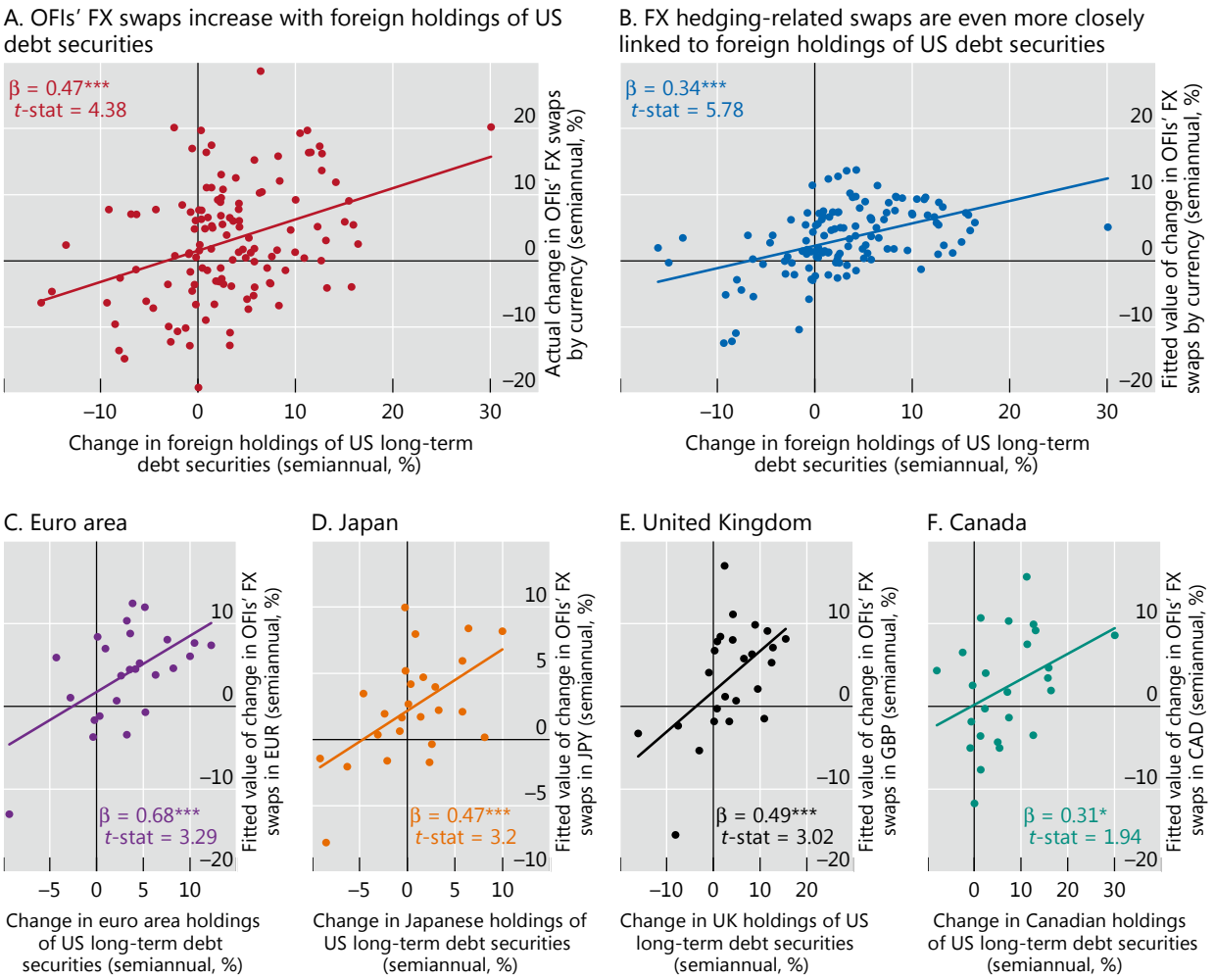
treat them as debt, most data sets do not comprehensively capture NBFIs' cross-currency investment. BIS data on the outstanding notional values of FX swaps, broken down by currency and counterparty sector (with NBFI positions captured in the OFI segment) fill an important gap by capturing the currency exchange behind such investments. Data sources on the underlying cross-border portfolio investment (eg the IMF's Portfolio Investment Positions (PIP) and the US Treasury International Capital (TIC) System) cannot speak to the funding currency of the investors (and thus the degree of cross-currency investment in which they engage). They often do not cover a sufficiently long time span of NBFIs' bilateral exposures and cannot see through to

the ultimate investor for flows re-routed via financial centres. NBFIs' FX swaps by currency proxy for the home currency of the investor and thus provide complementary information on the underlying portfolio flows through the lens of the accompanying hedging activity. In addition, they capture the large gross off-balance sheet positions from FX swaps that are not recorded in such cross-border investment due to their accounting treatment. These data therefore deepen our understanding of how bilateral NBFIs' portfolio flows can trigger cross-border spillovers and shape global financial conditions.

Indeed, the fluctuations in FX swap volumes reflect non-US investors' appetite for dollar bonds and hence mirror the fluctuations in portfolio flows into the United States. Graph 6.A provides evidence that portfolio flows into US debt securities from major AEs co-move with the volume of FX swaps used by NBFIs. FX hedging is critically important to many NBFIs that have less discretion to have exchange rate exposures in their portfolios, such as pension funds and insurance companies. For NBFIs with more latitude, hedging currency risk is still prudent from a risk management perspective.

FX swaps and US portfolio inflows[1]

Graph 6



[1] Including FX swaps and outright forwards; notional amounts outstanding. The sample spans H1 2012–H1 2024. ***/* denotes statistical significance at the 1/10% level. Other financial institutions (OFIs) are one of the three main sectors reported in the counterparty sector breakdown of the BIS OTC derivatives statistics (alongside reporting dealers and non-financial customers). See endnotes for details.

Source: Nenova et al (2025).

Digging deeper, further evidence that FX swaps enable portfolio flows across economies comes from the stronger relationship between FX swap growth and portfolio flows once the cost of hedging is taken into account. As FX swaps tend to be short-term contracts, the key input in the cost of hedging is the short-term interest rate in the destination currency (in relation to the short-term rate in the investor currency).[14] In addition, since investors predominantly use short-term FX swaps to hedge longer-term portfolio investments, hedged investment becomes less attractive when the short-term interest rate increases or the long-term bond yield falls, ie when the yield curve in the destination currency flattens (see Box A for more details on the hedging cost components). Taking account of these hedging costs provides even clearer evidence of the close empirical relationship between portfolio investment and hedging-related changes in FX derivatives (Graph 6.B). More directly, this relationship also holds separately for investors from four other (non-US) major currency-issuing jurisdictions with FX swaps in those currencies (Graphs 6.C–F). This link between FX hedging and bond flows highlights an important channel through which financial conditions can transmit across countries, and to AEs in particular (Box A).

Implications for financial conditions

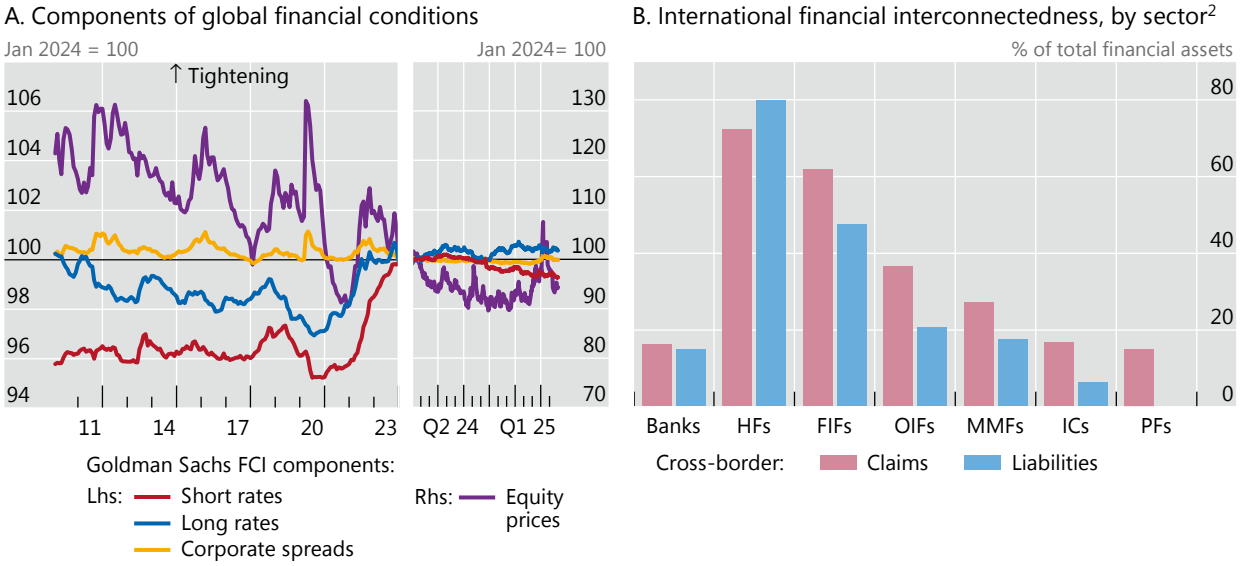
The structural changes outlined in the previous section have important implications for central banks' pursuit of their macroeconomic and financial stability mandates. Maintaining macroeconomic stability hinges on the pass-through of monetary policy actions to financial conditions, which in turn affect the availability and cost of financing for real economic activity.[15] Market-based finance ties financial conditions more closely to market prices of all kinds, which tend to be more volatile than bank lending rates. This potentially makes them more sensitive to shocks, including those originating abroad.

The sovereign yield curve is a key channel of monetary policy transmission, as it underpins all rates on riskier assets in an economy. Central banks influence it by steering reference overnight rates and by shaping expectations on the evolution of short-term rates, as well as by directly affecting yields through balance sheet policies. But risk premia also shape broader financial conditions, such as the rates and prices firms and households face in their saving and borrowing decisions. These, in turn, are driven by swings in risk attitudes, as well as the risk-bearing capacity of NBFIs, especially in the case of market-based financing.[16]

When the monetary policy stance is tightened, risk premia typically rise. This is because financial market participants moderate their risk-taking, not least due to the anticipation of a slowdown in real economic activity. Yet risk appetite may remain elevated even amid a policy tightening in certain circumstances. For example, this may occur when other factors support greater risk-taking in certain financial market segments – such as frothy equity valuations due to excessive optimism over the prospects of certain businesses. If so, different "ingredients" of aggregate measures of financial conditions would drag in opposite directions. Both the post-GFC and post-Covid periods are examples of such a configuration, which is also visible in the divergent behaviour of various elements of broader financial conditions in recent years (Graph 7.A). Looking more closely at the latest readings, in the first half of 2024 short- and long-term government bond yields increased, tightening overall financial conditions. Nevertheless, credit spreads stayed compressed and equity prices surged, pushing financial conditions in the opposite (easing) direction. Subsequently, as central banks started to lower policy rates, the short-term rate component of financial conditions eased, while long-term rates increased on the back of higher term premia.[17]

Global financial conditions and international financial interconnectedness[1]

Graph 7



FCI = financial conditions index; FIFs = fixed income funds; HFs = hedge funds; ICs = insurance corporations; MMFs = money market funds; OIFs = other investment funds; PFs = pension funds.

[1] See endnotes for details. [2] Based on jurisdictions' 2024 submissions.

Sources: FSB (2024); IMF; Goldman Sachs Global Investment Research; BIS.

When the underlying components diverge, aggregate indices of financial conditions will be subject to forces pulling in opposite directions and hence may be difficult to interpret. For this reason, it is illuminating to organise the data in a way that highlights the key determinants of financial conditions. In this spirit, the BIS has developed a factor model of financial conditions, where market variables are gathered so as to distil two main factors: one capturing the dynamics of the level of interest rates and safe yields and the second capturing riskier market segments. Indeed, measuring financial conditions using a broad range of data reveals a relatively simple two-factor structure (Box B). The first (the "level factor") broadly reflects the level of various interest rates, while the second (the "risk factor") is more connected to risk perceptions and risk appetite, depending broadly on the dynamics of spreads and equities. Hence, swings in risk attitudes and risk perceptions have a bearing on overall financial conditions. And, in turn, financial conditions are more susceptible to those swings in an environment where market financing becomes more prominent.

Internationally active asset managers are a key conduit for transmitting financial conditions across countries.[18] Indeed, they tend to be much more internationally interconnected than traditional financial intermediaries (Graph 7.B). Hedge funds and other investment funds are both highly internationally interconnected NBFIs, and their portfolios tend to adjust most rapidly to swings in risk attitudes and perceptions.[19] When risk appetite is high, cross-border positions of global investors are likely to build up quickly. But they can unravel suddenly, leading to fire sales and sharp drops in asset prices in different markets. In both phases, significant cross-border flows by asset managers may boost cross-country co-movements in financial markets.

One implication is that NBFIs' greater role in global portfolio flows may have contributed to more correlated financial conditions across countries. As a first indication, the cross-country co-movement of key asset returns, measured by the

Measuring financial conditions

Financing conditions are a key intermediate step of the monetary transmission mechanism. While central banks' ultimate objectives are inflation and output, they steer the economy by influencing the decisions of firms and households through adjustments in financial conditions. Hence, monitoring financial conditions – intended as a summary measure of the ease and cost of financing firms and households face in a broad sense – is crucial in taking the pulse of the transmission of the monetary policy stance.

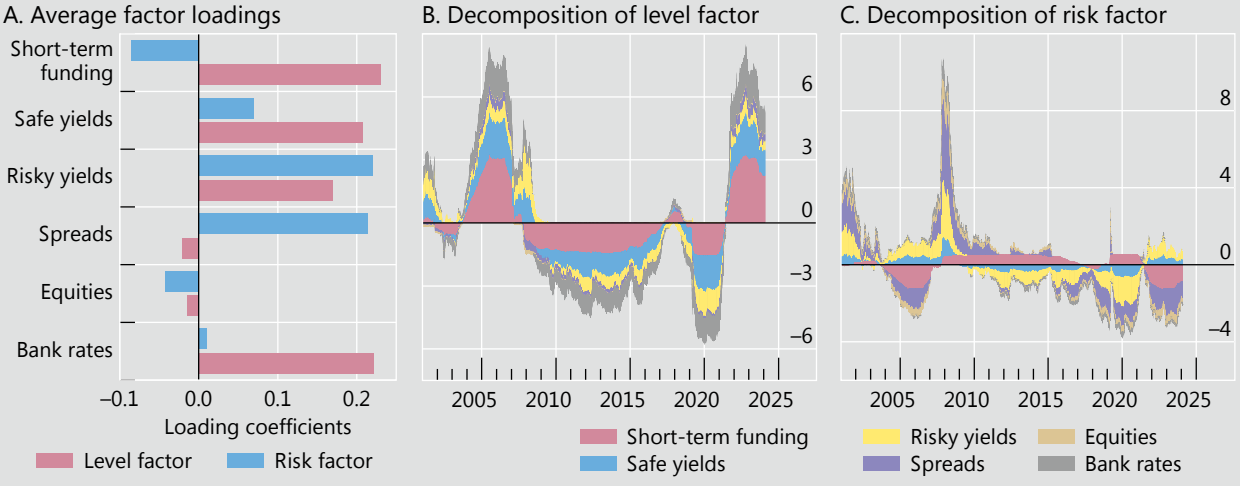
In practical terms, one challenge is that "financial conditions" are, by their nature, a multifaceted concept, so measuring them requires the construction of composite indices. In general terms, these can be thought of as weighted averages of a certain set of financial market prices. Yet the weights, and hence the role played by some specific prices, tend to be sensitive to individual choices. Several summary measures of financial conditions have been proposed, and can be taken off-the-shelf, but their indications obviously differ depending on the data sets on which they are based, and the methodologies on which they rely. For example, the popular Goldman Sachs financial conditions indices (FCIs) are based on the selection of a small number of key variables representative of different segments of the monetary transmission mechanism; weights are assigned on the basis of each variable's predictive power for one-year-ahead GDP growth.[1]

To shed light on the key drivers of the dynamics of financial conditions, the BIS introduced a new index constructed using a dynamic factor model applied to a large set of rates and prices playing different roles throughout the various steps of the monetary transmission mechanism.[2] This makes it possible to summarise the contributions of individual financial variables through a few homogeneous subcomponents, determined by the joint dynamics of the data. Dynamic factor models are particularly useful in the analysis of large data sets: they reduce the data dimension by extracting a small number of common components from a large amount of available information. The common components, or factors, are chosen so as to maximise the proportion of total variability of the data set they can explain.[3]

The data set described above possesses a strikingly stark factor structure. The first two factors explain about 60% of the total variance, and the factor loadings on individual market prices have a distinctive pattern. More specifically, the first factor loads positively on all the "rates" blocs, especially the safe ones (Graph B1.A). Hence, it can be thought of as a summary of the prevailing level of interest rates, in short a "level factor". The second factor, instead, loads distinctively on risky assets: risky yields and spreads and equity returns. As such, it

The factor structure of the BIS FCI[1]

Graph B1



FCI = financial conditions index.

[1] Factors are obtained from a dynamic factor model applied to a large set of financial indicators for the United States over 2 January 2002–5 February 2025. The level factor reflects the prevailing level of various interest rates, while the risk factor loads on corporate bonds, risky spreads and equity returns. The set of variables includes short-term rates and funding costs for banks and financial institutions, the yield curve of government bonds, yields on corporate bonds of different ratings as well as various spreads, and returns and measures of valuations in equity markets as well as various "bank rates" (prime rates, rates on loans to small businesses and 15- and 30-year mortgage rates); note that this latter bloc is only observed at monthly frequency.

Source: Lombardi et al (2025).

can be labelled a "risk factor". If anything, it loads negatively on short-term funding costs, highlighting the endogenous monetary policy easing that is typically elicited by financial stress.

The time series dynamics of the two factors are also quite telling on their relative roles. The level factor (Graph B1.B) follows the monetary policy interest rate cycle: it increases during the 2004–06 policy rate hike, to then plummet swiftly during the Great Financial Crisis (GFC), and then decline gradually as unconventional policy measures lowered long-term interest rates. The post-pandemic easing represents another phase in which the level factor declines to even lower levels than post-GFC, to then swiftly increase in parallel with the surge of inflation and the associated policy tightening. The dynamics of the risk factor instead reflect the evolution of risk attitudes, and as such are dominated by the GFC, as well as by the prolonged period of risk-taking in the runup to it (Graph B1.C).

The two factors have a different bearing on subsequent outturns in economic activity and, hence, monetary policy. Taken individually, both are significant predictors of one-year-ahead GDP growth. Yet the risk factor has considerably higher explanatory power. Such a prominent role by the risk factor in anticipating macroeconomic developments has important implications for monetary policy. While the dynamics of the level factor closely follow the policy cycle, monetary policy appears to have less immediate control over the risk factor. However, empirical evidence shows that monetary policy does also affect the risk factor. Hence, policy easing packages – including through unconventional measures – can mitigate a tightening of financial conditions due to surging risk aversion.

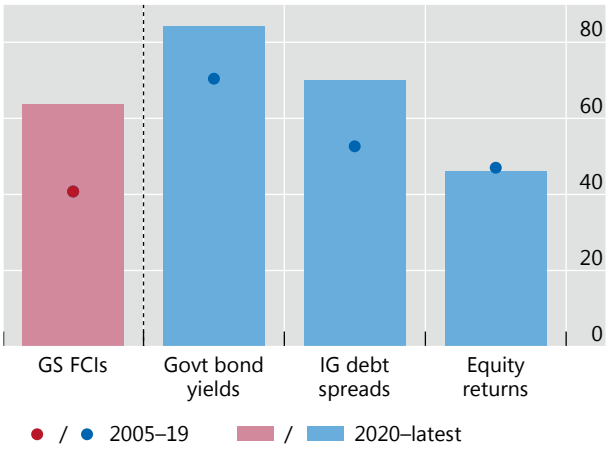
[1] See Hatzius and Stehn (2018); for a similar early attempt, see Goodhart and Hofmann (2003). Other approaches are more data-driven; they rely on larger sets of data, and exploit observed correlations without imposing a specific structure. See eg Brave and Kelley (2017), IMF (2017) and Arregui et al (2018). [2] For the details of the series included, see Graph B1 footnote 1. [3] For further details, see Lombardi et al (2025).

share of variance explained by the first principal component of the individual country returns, has increased in recent years (Graph 8.A). This is especially the case for government bond yields and corporate spreads. Hence, the co-movements of composite measures of financial conditions have also generally risen over the past

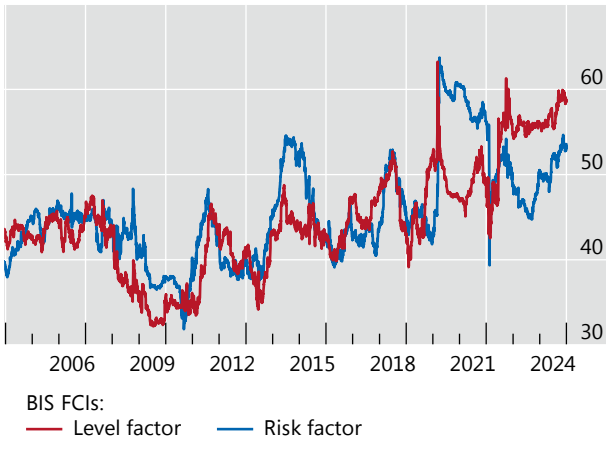
Global financial market connectedness[1]

As a percentage of variance explained — Graph 8

A. Cross-country co-movement[2]



B. Global financial market connectedness[3]



FCIs = financial conditions indices; GS = Goldman Sachs; IG = investment grade.

[1] See endnotes for details. [2] Share of variance explained by the first principal component in the cross-section of the variables. [3] The total connectedness is the share of variance (over a 10-business day horizon) that is not explained by domestic market developments, and is instead attributed to transmission across countries. The level factor reflects the prevailing level of various interest rates, while the risk factor loads on corporate bonds, risky spreads and equity returns. For the construction of the factors, see Box B.

Sources: Korukmez et al (2025); Bloomberg; Goldman Sachs Global Investment Research; LSEG Datastream; BIS.

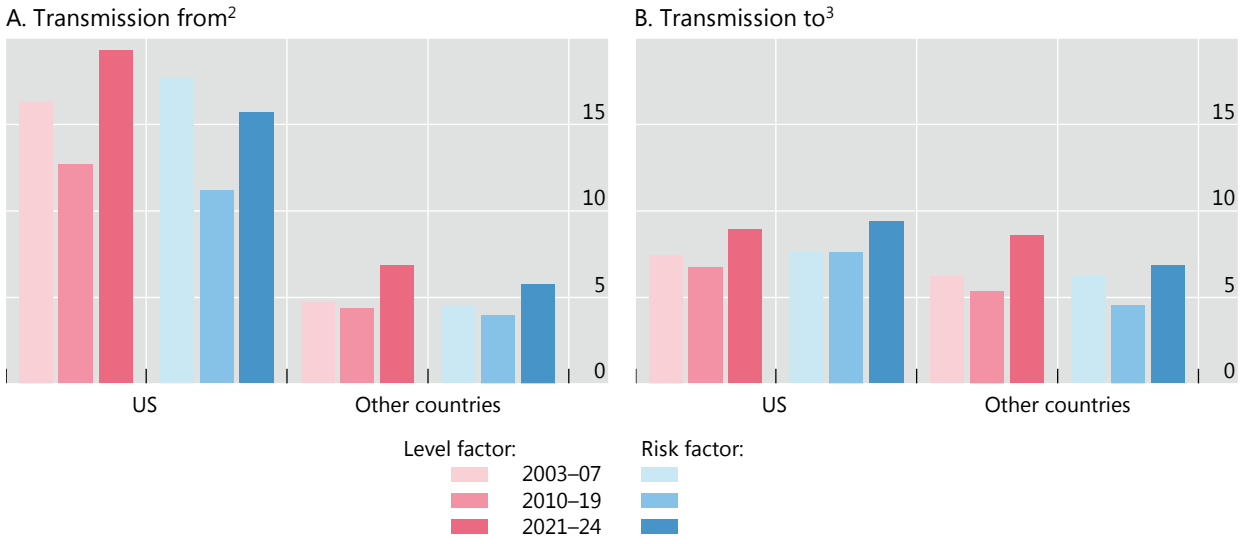
five years. The most recent manifestation of this phenomenon occurred in May 2025, when long-dated government bond yields spiked synchronously in several major AEs.

Increasing global co-movement of financial conditions is also captured by time-varying measures of global financial market connectedness. These measures aim to capture not only contemporaneous co-movements, but also the international transmission of financial conditions over a given time horizon. More specifically, we consider the share of variance that is explained, over a 10-day horizon, by market fluctuations transmitting across countries, as opposed to purely domestic ones.[20] Graph 8.B shows such measures for the level and risk factors of FCIs (as described in Box B). These connectedness measures vary substantially over time, spiking during times of financial stress, but have been growing since the GFC. For example, at the beginning of the pandemic over 60% of the variability of the FCI risk factors (blue line) could have been explained by the overall connectedness across markets; that share was below 50% at the height of the GFC. The connectedness in the FCI level factor (red line) tends to be somewhat lower, even though it has recently increased in the wake of the synchronised monetary easing and tightening triggered by the pandemic and the ensuing inflation surge.

The directional transmission of financial conditions across jurisdictions has also evolved over time. Consistent with a large literature documenting powerful global transmission of US financial shocks,[21] the United States tends to transmit its financial conditions to other countries more than the other way around (Graph 9). But in aggregate, other countries role as sources of transmission of financial conditions has been growing for both the level and risk factors. This is true not only in terms of the United States becoming more susceptible to developments in other countries, but also of the mutual connectedness across other countries.

Directional transmission of BIS FCIs[1]

As a percentage of variance explained — Graph 9



FCIs = financial conditions indices.

[1] See endnotes for details. The level factor reflects the prevailing level of various interest rates, while the risk factor loads on corporate bonds, risky spreads and equity returns. For the construction of the factors, see Box B. For other countries, the average across six economies is shown. [2] Share of variance that is explained by each country (over a 10-business day horizon) in market developments occurring in other countries. [3] Share of variance that is not explained (over a 10-business day horizon) by domestic market developments, and is instead attributed to transmission from other countries.

Sources: Korukmez et al (2025); BIS.

The exchange rate plays an important role in the global propagation of financial conditions, in particular for EMEs. Traditionally, EME sovereigns were able to borrow from abroad only in foreign currency, mainly with dollar-denominated bonds.[22] In this situation, any change in foreign financial conditions or the exchange rate was directly transmitted to domestic financial conditions. The deepening of local currency sovereign bond markets has gradually enabled many EME sovereigns to borrow from abroad in local currency. But foreigners' investments in these markets are typically unhedged due to thin hedging markets and carry trade motives. The currency exposure has thus migrated from the borrowers' balance sheets to those of investors who fund themselves and evaluate gains and losses in a different currency. Hence, exchange rate changes, especially vis-à-vis the US dollar, affect the balance sheet valuations of foreign lenders and potentially their supply of credit to EMEs. This gives rise to a broader financial channel of the exchange rate that also influences EME local currency bond markets.[23]

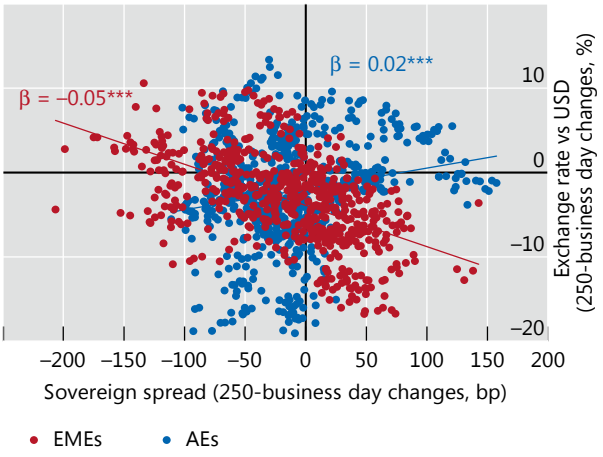
These effects are reflected in the links between exchange rate movements and financial conditions in EMEs. Consistent with the financial channel of the exchange rate, there is a highly significant systematic negative correlation between changes in the value of an EME's domestic currency against the US dollar and changes in the EME's local currency sovereign bond spreads over US Treasury yields (Graph 10.A, red dots). This pattern is absent in AE spreads (blue dots). There is also formal empirical evidence that exchange rate appreciation of EME currencies is associated with a significant drop in local currency bond spreads (Graph 10.B, red line). This drop turns out to be driven by lower credit risk premia embedded in sovereign bond spreads (blue line), consistent with the idea that risk perceptions play a key role in the international transmission of financial conditions.

For foreign portfolio flows to AEs, hedging of currency risk is more common as carry trade motives are typically less strong and currency hedging markets are better developed for large AE currencies. Here, NBFIs' activity in FX derivatives markets offers

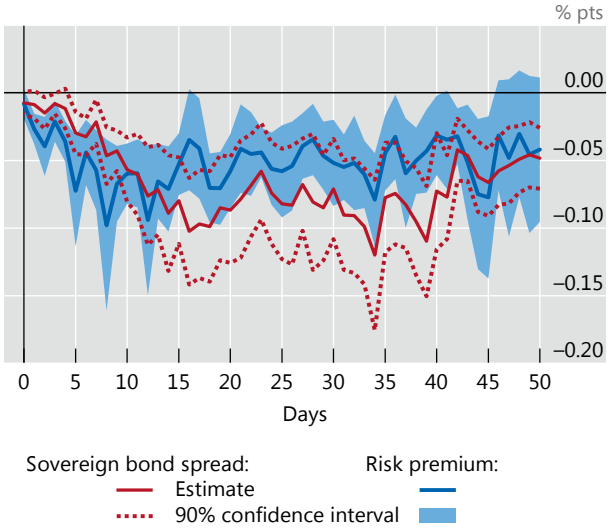
Exchange rates and financial conditions in EMEs[1]

Graph 10

A. Exchange rates and local currency sovereign spreads[2]



B. Impact of an exogenous exchange rate appreciation shock on EME local currency sovereign bond spreads[3]



[1] Spreads of long-term local currency sovereign bond yield over long-term US Treasury yield with comparable maturities. See endnotes for details. [2] *** denotes statistical significance at the 1% level. [3] Impact of a 1% appreciation shock to the bilateral US dollar exchange rate (ie an appreciation against the US dollar) on EME local currency bond spreads (five-year local currency sovereign bond yield over five-year US Treasury yield) and the embedded credit risk premium.

Sources: Hofmann et al (2020); Bloomberg; JPMorgan Chase; national data; BIS.

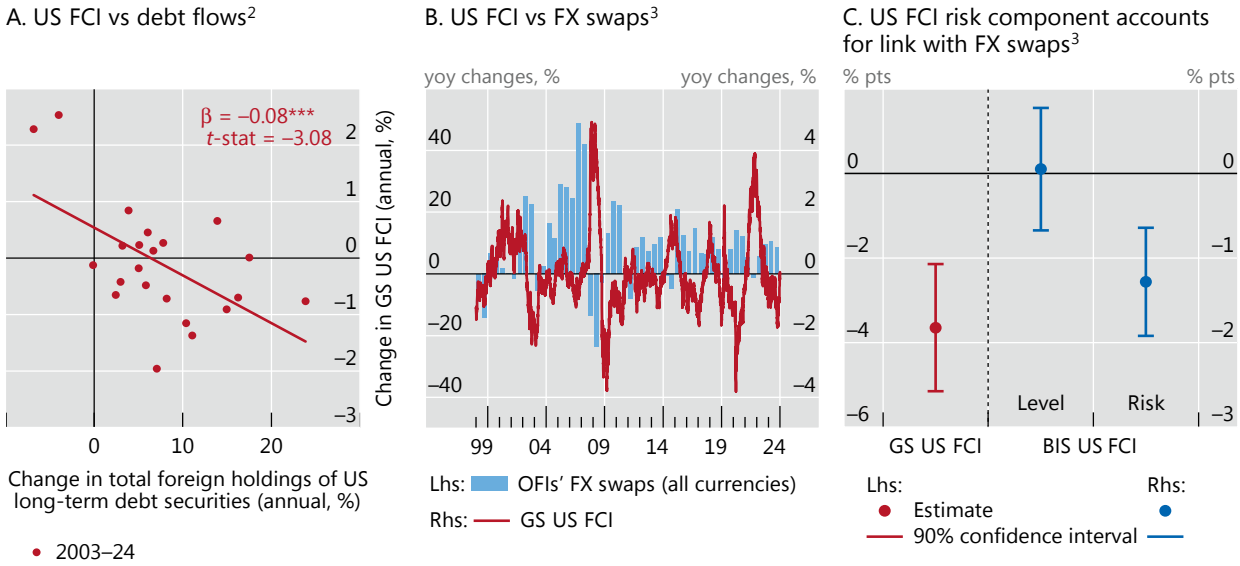
a lens through which to evaluate the link between foreign portfolio flows and financial conditions. Indeed, there is a significant negative correlation between portfolio bond flows into the United States on the one side, and US financial conditions as measured by the Goldman Sachs index on the other (Graph 11.A). One interpretation of this link is that international spillovers affect even US financial conditions via the international portfolio flows coming from other AEs.

FX swap volumes are closely related to these portfolio flows from AEs to the United States, because they enable the FX hedging of cross-border portfolio exposures (as discussed in the previous section and Box A). Graph 11.B highlights the close link between US financial conditions and OFIs' FX swap activity. These patterns suggest that NBFIs' hedged portfolio investment in international bond markets goes hand in hand with looser financial conditions. Indeed, the regression results, reported in detail in Box A, confirm that the negative co-movement of FX swaps with the US FCI is significant even after taking into account other key drivers of NBFIs' FX hedging demand (regression coefficient on the left-hand scale of Graph 11.C). Yet international transmission via FX-hedged cross-border portfolio investments seems to reflect only changes to the risk factor. This suggests that shifts in global investors' portfolio allocation are mainly related to swings in risk appetite and perceptions.

While portfolio flows between AEs tend to be accompanied by hedging of currency risk, large interest rate differentials can nevertheless set in motion unhedged flows motivated by carry trades. When risk appetite recedes, the unwinding of such trades can strengthen the transmission of financial conditions. These trades are often constructed synthetically, using derivatives like FX swaps and outright forwards. Consider a dollar-based investor (Graph 12.A). This investor provides dollars in an FX swap transaction and receives yen, agreeing to repay the yen at a future date (Graph 12.B). However, instead of using the proceeds to obtain safe yen-denominated assets in anticipation of the yen repayment, the yen proceeds of the swap could be

Financial conditions, FX swaps and debt flows to the United States[1]

Graph 11



FCI = financial conditions index; GS = Goldman Sachs; OFIs = other financial institutions.

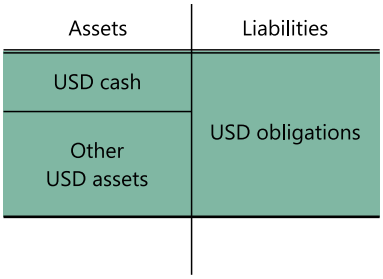
[1] See endnotes for details. [2] *** denotes statistical significance at the 1% level. [3] Including FX swaps and outright forwards, notional amounts outstanding. OFIs are one of the three main sectors reported in the counterparty sector breakdown of the BIS OTC derivatives statistics (alongside reporting dealers and non-financial customers).

Sources: Nenova et al (2025); Goldman Sachs Global Investment Research; BIS OTC derivatives statistics; BIS.

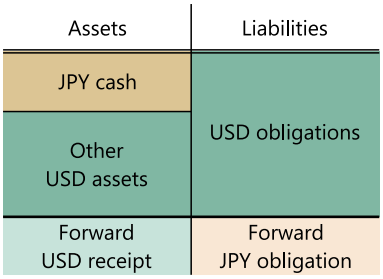
Yen carry trade with FX swaps

Graph 12

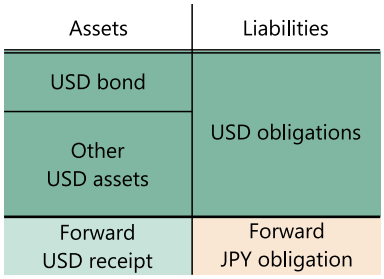
A. USD-based investor…



B. …lends dollars via FX swap, receives yen…



C. …and sells yen cash in spot market, leaving unhedged yen obligation



Source: BIS.

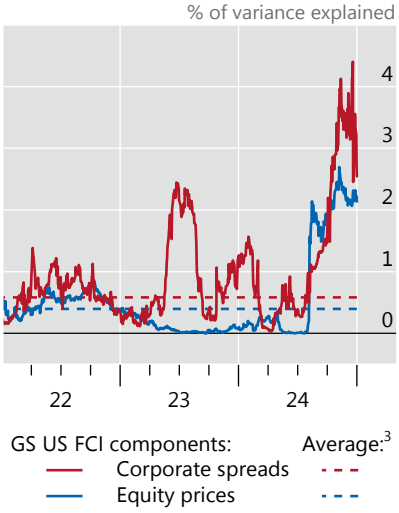
sold in the spot market for dollars. These dollar sums could then be further invested in a higher-yielding asset, such as a US dollar-denominated bond (Graph 12.C). This could also extend to investing in local currency EME sovereign bonds. This sequence of transactions leaves the investor with an unhedged short yen obligation – a carry trade. It is also common to obtain this carry trade position with a forward contract, which is then rolled over using FX swaps, or via other instruments like options.[24]

The impact of the recent yen carry trade episode on financial conditions in the United States is a notable illustration of the transmission of domestic financial shocks across major AEs.[25] Despite the post-Covid tightening of US monetary policy, financial conditions in the country had remained fairly loose. This was in part due to the transmission of easier financial conditions from Japan to the United States (Graph 13.A).

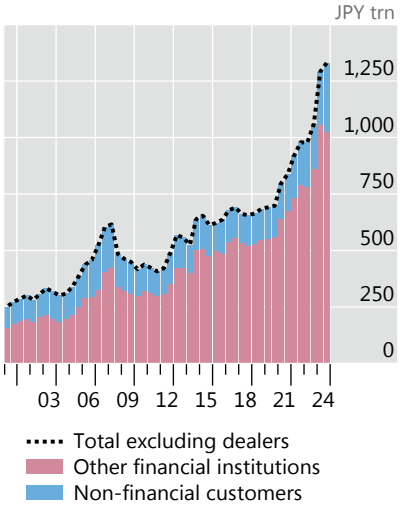
Financial conditions and the yen carry trade[1]

Graph 13

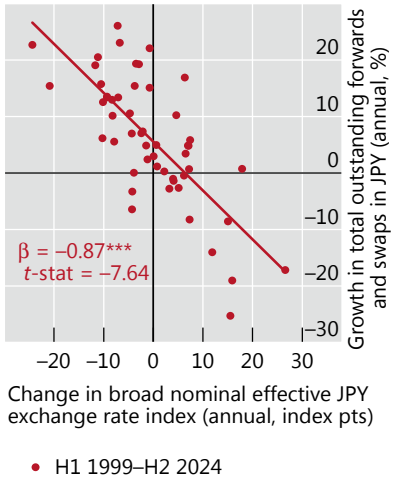
A. Financial condition spillovers from Japan to the United States[2]



B. FX swaps outstanding, with yen on one side[4]



C. Yen exchange rate and FX swaps with yen on one side[4, 5]



FCI = financial conditions index; GS = Goldman Sachs.

[1] See endnotes for details. [2] Share of variance (over a 10-business day horizon) in the respective components of the GS US FCI that is explained by market developments in Japan. [3] Average over the period January 2021–June 2024. [4] Including FX swaps, outright forwards and currency swaps, notional amounts outstanding. [5] *** denotes statistical significance at the 1% level.

Sources: Goldman Sachs Global Investment Research; BIS OTC derivatives statistics; BIS.

In August 2024, a partial but sudden unwinding of yen carry trades triggered further spillovers of external financial conditions into the United States – this time in the opposite (ie tightening) direction. The transmission of financial conditions from Japan to the United States appears to have in part been channelled by leveraged trades of speculative investors like hedge funds that used yen funding and their subsequent (partial) unwinding.[26]

The dynamics of FX swaps in yen provide a useful, albeit rough, indication of the relative size of those yen-funded trades.[27] They rose sharply during the 2023–24 period when the above indicators (of the transmission of financial conditions from Japan to the United States) spiked (Graph 13.B). In the end, the August 2024 turbulence was short-lived and had limited effects. Nevertheless, the episode illustrates the importance of vigilance in the rising carry trade totals that are vulnerable to rapid reversals.

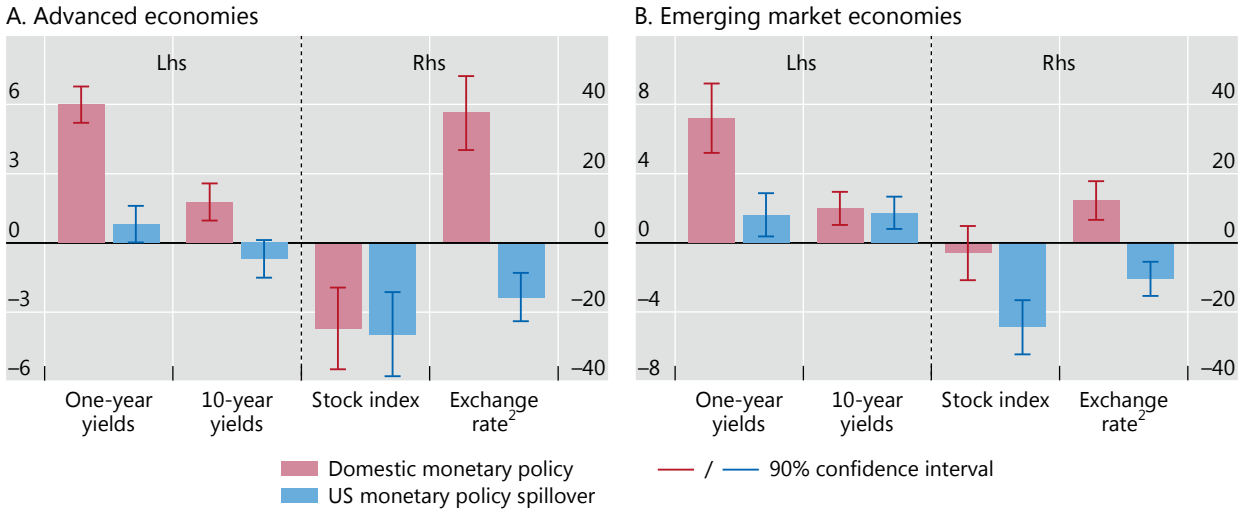
Besides carry trades, the proceeds from yen borrowing have been deployed to fund a wide array of positions. This has included a broad range of risky asset positions (eg AE equities), in which investors have taken advantage of cheap yen funding while hedging the FX risk. Indeed, FX swaps in yen tend to expand when the broad yen index falls, as financial institutions seek to hedge their yen-funded investments in other currencies (Graph 13.C).

The analysis above underscores the highly connected nature of global financial markets and highlights how domestic financial conditions can be significantly shaped by foreign developments.[28] This raises the question whether monetary policy's influence on domestic financial conditions has become more limited.

Empirical evidence for relatively small AEs and EMEs suggests that foreign factors have a significant effect on their financial conditions, yet domestic monetary policy retains firm traction (Graph 14).[29] The analysis considers the effects of unexpected changes in short-term policy rates, which can be constructed for a broad sample of countries. In both AEs and EMEs, monetary policy exerts a significant influence on domestic short- and long-term government bond yields. As expected, the impact is more pronounced at shorter maturities but remains significant at longer maturities

Impact of domestic monetary policy and US spillovers[1]

In basis points — Graph 14

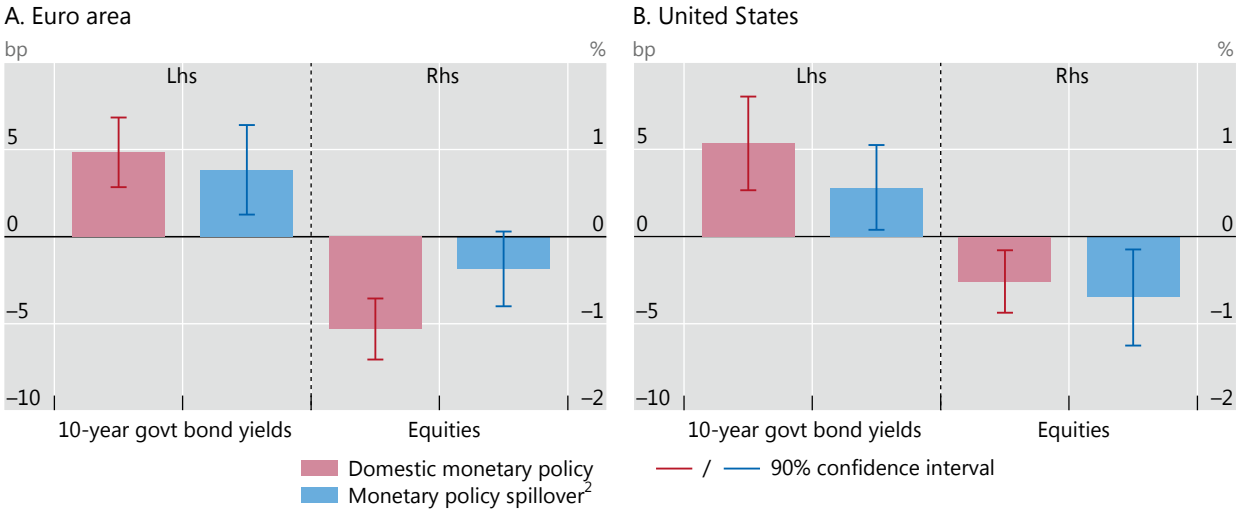


[1] The sample includes six AEs (excluding the United States, Japan and the euro area) and 19 EMEs (excluding China). See endnotes for details. [2] Bilateral exchange rate against the US dollar. A negative value denotes a depreciation of the local currency.

Sources: Checo et al (2024); Bloomberg; LSEG Datastream; national data; BIS.

Cross-border effects of unconventional monetary policies in the euro area and the United States[1]

Graph 15



[1] See endnotes for details. [2] For the euro area, spillovers from US monetary policy, and vice versa for the United States.

Sources: Miranda-Agrippino and Nenova (2022); BIS.

as well. The effects generally exceed the spillover effects from abroad, proxied here by US monetary policy.[30] Overall, this suggests that domestic monetary policy retains strong sway over the domestic government bond yield curve.

However, the empirical evidence also highlights some limitations regarding the transmission of monetary policy to risky asset classes, especially in the case of EMEs. For example, stock prices tend to be more heavily affected by global financial conditions (represented here by US monetary policy shocks) than domestic monetary policy. Furthermore, exchange rates tend to be equally influenced by domestic monetary policy and global financial shocks. More generally, global spillovers tend to affect financial conditions more rapidly than domestic monetary policy, complicating timely policy responses.[31]

As highlighted above, the cross-border transmission of financial conditions is not limited to small open economies but can also affect major AEs. At the same time, evidence for major AEs also suggests that monetary policy retains good traction relative to the spillovers. In particular, examining the effects of unconventional monetary policy measures in the United States and the euro area (Graph 15) shows that these policies have significant domestic effects on both government bond yields and stock prices. However, the cross-border spillovers – both from the United States to the euro area and vice versa – are in some cases comparable with the effects of domestic transmission. The growing role of internationally active NBFIs has probably played an important role in shaping these patterns.[32]

Conclusions

The global financial system has undergone profound structural changes since the GFC, with internationally active portfolio managers investing in sovereign bonds playing a much more central role. These changes have been facilitated by the expansion of FX swap markets that enable asset managers to invest globally while hedging currency risk.

As a result, financial shocks – especially those stemming from changes in risk capacity – can now transmit more strongly across borders, at times moving domestic financial conditions away from the intended monetary policy stance. This chapter has shown how developments in financial conditions can be viewed through the lens of two factors: one related to the level of risk-free rates, and the other to risk attitudes and perceptions. Cross-border spillovers in the risk factor, especially those occurring at times of swings in risk preferences, raise the chances of a disconnect between broader financial conditions and the desired monetary policy stance. While these issues have long been examined and discussed in the context of EMEs, they have become increasingly relevant for AEs as well.

Despite the challenges, the analysis presented here suggests that monetary policy remains an effective tool for steering domestic financial conditions. While global shocks can significantly influence domestic conditions, they do not inherently inhibit central banks' ability to steer financial conditions. In fact, empirical evidence indicates that central banks generally retain strong traction on domestic financial conditions, especially over the domestic yield curve.

However, the findings presented in this chapter highlight how the conduct of monetary policy has become more complex. Central banks must be attuned to the dynamics of global financial conditions, including the potential impact of their own policy decisions. This underscores the importance of continually enhancing analytical frameworks and deepening the understanding of the cross-border challenges embedded in a more market-based financial system. In particular, gaining clearer insights into the significance and nature of global spillovers is essential for a more precise and effective calibration of monetary policy. Central banks should also continue to make effective use of their broader policy toolkit to navigate the complexities posed by increasingly globalised financial conditions. If appropriately deployed, these tools can help to ease possible trade-offs posed by shifts in global financial conditions and enhance monetary policy autonomy.[33]

The challenges associated with tighter financial connectedness also underscore the critical role of central bank cooperation. Regular information-sharing and exchange of views is essential to improve understanding and assessment of global macroeconomic and financial developments. Such exchanges also help central banks to anticipate better the international ramifications of their decisions and calibrate their policies accordingly to minimise unintended consequences. Moreover, central bank cooperation is vital for strengthening the monitoring and oversight of global financial markets given the growing influence of internationally active NBFIs.

Finally, the growing connectedness of global financial markets and the increasing role of NBFIs pose significant new challenges for financial stability. Enhancing regulatory standards to keep pace with the evolving structure of global financial markets is critical to ensure the resilience of the financial system.

Endnotes

[1] The nomenclature "Great" Financial Crisis rather than the alternative "Global" Financial Crisis highlights the fact that the crisis in the regulated banking sector was far from a global phenomenon, even though the unwinding of the excesses did have global repercussions. See Adrian and Shin (2010) and Shin (2013).

[2] See IMF (2011, 2014) and Eren and Wooldridge (2021).

[3] See IMF (2023) and FSB (2024).

[4] See Avalos et al (2025).

[5] See Shin (2013).

[6] See Shin (2013) and Avdjiev et al (2020).

[7] See Shin (2023).

[8] Banks have lending links with many different types of NBFIs. These include reverse repos and derivatives with central counterparties, hedge funds and broker-dealers, loans to or debt securities holdings issued by insurance companies and pension funds, other investment funds and finance companies, or even equity investment in funds or special purpose vehicles. See Aldasoro et al (2020) and García Luna and Hardy (2019).

[9] In order to present a more comprehensive overview of the global portfolio debt flows, Graph 4 is based on the cross-border bond holdings of all (NBFI and other) investors other than official reserve holders. The respective IMF PIP data on the cross-border bond holdings of NBFIs, which are available for a smaller set of countries, suggest that NBFIs accounted for roughly two thirds of all cross-border bond holdings (excluding official reserves) as of end-2023.

[10] See Avdjiev et al (2016).

[11] See Shin (2025).

[12] This far exceeds the global stock of cross-border bank credit ($40 trillion) and international bonds ($29 trillion).

[13] See BIS (2022). In the 2022 BIS Triennial Central Bank Survey of Foreign Exchange and Over-the-counter Derivatives Markets, 92% of the turnover in FX swap and forwards contracts have a maturity of three months or less, and 62% of one week or less.

[14] See Shin et al (2025).

[15] See Dudley (2017) and Caballero et al (2024) for a detailed discussion.

[16] See Aramonte et al (2023).

[17] Note that the partial disconnect between movements in the short and the long end of the curve experienced over the past few years can be ascribed to multiple factors. These include uncertainty about the path of monetary policy and the

terminal rates amid the inflation wave, as well as the lingering effects on term premia of large central banks' balance sheets. For a discussion, see BIS (2024).

[18] See Adrian et al (2024), Chari (2023), Carney (2019), Avdjiev et al (2020), Bertaut et al (2021), Converse et al (2023), Arslanalp et al (2020), Raddatz et al (2017), Avdjiev et al (2025), Eren and Wooldridge (2022) and Zhou (2025).

[19] See Coppola (2025) and Zhou (2025).

[20] This corresponds to the "global connectedness" measure introduced by Diebold and Yilmaz (2012).

[21] See eg Obstfeld (2015), Hofmann and Takáts (2015), Albagli et al (2019) and Kearns et al (2023).

[22] Eichengreen and Hausmann (1999) refer to this pattern as "original sin" because it largely reflected EMEs' inherent inability to borrow from abroad in their domestic currency.

[23] See eg Avdjiev et al (2019), Hofmann et al (2020, 2022) and Gelos et al (2024).

[24] See Aquilina et al (2024) and McGuire and von Peter (2024).

[25] A carry trade involves borrowing funds at a low interest rate in one currency (the funding currency) and buying a higher-yielding asset in another (the target currency). In recent years, low interest rates for the Japanese yen relative to other currencies have made it a funding currency of choice. The use of leverage makes these positions sensitive to changes in exchange rates, interest rates and volatility. See McGuire and von Peter (2024).

[26] See McGuire and von Peter (2024) and Aquilina et al (2024).

[27] Just as FX swaps can be used for hedging, they can be used to construct exposures to particular market movements. For example, a carry trade investor can provide dollars in return for yen in the FX swap market. The yen can then be sold in the spot market and the proceeds used to buy some other asset in a different currency (eg EME government bonds, AE equities). The investor is left with yen obligations via the forward leg of the swap while holding other non-yen assets.

[28] See also the evidence in Rey (2015) and Miranda-Agrippino and Rey (2020) about the global financial cycle and the influence of US monetary policy.

[29] See Grigoli et al (2025).

[30] In contrast, taking a longer-run perspective focused on the cumulative effect of monetary policy announcements, Hofmann et al (2025) document a dominant role of US monetary policy shocks in the secular downward trend in global long-term interest rates.

[31] See Arregui et al (2018).

[32] NBFIs' balance sheets appear to be more affected by euro area unconventional monetary policy shocks than banks' balance sheets. See Holm-Hadulla et al (2023).

[33] See BIS (2019, 2022) and IMF (2020).

Additional notes to graphs

Graph 1: GDP-PPP weighted average across AU, CA, EA, GB, JP and US.

Graph 1.A: Outstanding amounts of credit in local currency rebased to 100 at Q1 2000. General government debt at nominal value; it covers debt securities, loans and currency and deposits. Private non-financial sector includes non-financial corporations, households and non-profit institutions serving households.

Graph 1.B: Debt securities at market value.

Graph 2: For the global GDP, world GDP from IMF World Economic Outlook.

Graph 2.A: The sample covers AR, AU, BR, CA, CH, CL, CN, EA, GB, HK, ID, IN, JP, KR, KY, MX, RU, SA, SG, TR, US and ZA, subject to data availability. For RU, data up until 2020. NBFIs refer to non-bank financial institutions, including all financial institutions that are not central banks, banks or public financial institutions. See FSB (2024) for details.

Graph 2.B: The sample covers AR, AU, BE, BR, CA, CH, CL, CN, DE, ES, FR, GB, HK, ID, IE, IN, IT, JP, KR, KY, LU, MX, NL, SA, SG, TR, US and ZA, subject to data availability. Other investment funds (excl MMFs and HFs) also exclude real estate investment trusts and real estate funds and include equity funds, fixed income funds and other funds (mixed funds, referenced investment funds, external debt investment funds, currency funds and asset allocation funds etc). See FSB (2024) for details.

Graph 3.A: Sovereign investor base estimates by Arslanalp and Tsuda (2014); last updated on 2 May 2025. Missing values at the beginning of the sample are estimated using the growth rate of total government debt.

Graph 3.B: "Private" refers to total foreign holdings minus foreign official holdings.

Graph 4: Changes in outstanding stocks of cross-border bond holdings between 2015 and 2023. Data do not include reserve assets. The sample consists of 78 economies, based on availability of reported bilateral assets data in the IMF Portfolio Investment Positions by Counterpart Economy (formerly CPIS). Missing values between mid-2000 and 2023 are filled using linear interpolation. Missing values at the beginning and end of the sample are estimated using the growth rate of the respective reporting country's positions vis-à-vis the rest of the world. The reported changes in outstanding stocks also include valuation effects. Asian EMEs = CN, HK, ID, IN, KR, KZ, MN, MO, MY, PH, PK, PW, SG and TH; Europe = AT, BE, CH, CY, DE, DK, EE, ES, FI, FR, GB, GG, GI, GR, IE, IS, IT, JE, LT, LU, LV, MT, NL, NO, PT, SE, SI and SK; other AEs = AU, AW, BM, CA and NZ; other EMEs = AL, AR, BB, BG, BH, BO, BR, BY, CL, CO, CR, CZ, EG, HN, HU, IL, KW, LB, MU, MX, PA, PL, RO, SA, TR, UA, UY and ZA; United States = KY and US.

Graph 5: The BIS OTC derivatives statistics comprise data reported every six months by dealers in 12 jurisdictions (AU, CA, CH, DE, ES, FR, GB, IT, JP, NL, SE and US) plus data reported every three years by dealers in more than 30 additional jurisdictions. For periods between Triennial Surveys, the outstanding positions of dealers in these additional jurisdictions are estimated by the BIS.

Graph 6: Foreign holdings based on data from the US Treasury International Capital (TIC) System from monthly SLT reports. The BIS OTC derivatives statistics comprise data reported every six months by dealers in 12 jurisdictions (AU, CA, CH, DE, ES, FR, GB, IT, JP, NL, SE and US) plus data reported every three years by dealers in more than 30 additional jurisdictions. For periods between Triennial Surveys, the outstanding positions of dealers in these additional jurisdictions are estimated by the BIS. Other financial institutions (OFIs) consist primarily of non-bank financial institutions, which may be considered as financial end users (eg mutual funds, pension funds, hedge funds, currency funds, money market funds, building societies, leasing companies and insurance companies) although they can also include smaller non-reporting banks or central banks.

Graphs 6.A and 6.B: The sample covers CA, CH, EA, GB and JP and respective currencies.

Graphs 6.B, 6.C, 6.D, 6.E and 6.F: The fitted values on the y-axis are obtained from a panel regression of semiannual changes in OFIs' FX swaps and outright forwards notional amounts outstanding (in Graph 6.B, with five advanced economy currencies (CAD, CHF, EUR, GBP, JPY); in Graph 6.C to 6.F, with respective currencies). The regression includes the following explanatory variables: (i) expected returns of 10-year US government bonds in excess of the short USD interest rate; (ii) the respective currency government bond's expected excess return; (iii) the cost of hedging the respective currency exchange rate risk in the FX swap market in excess of the money market rate differential (ie the CIP deviation); (iv) changes in financial conditions; (v) valuation changes associated with the dollar exchange rate against the respective currency; and (vi) currency fixed effects (in the panel regression, Graph 6.B). See Nenova et al (2025) for further details.

Graph 7.A: GDP-PPP weighted averages of selected components of Goldman Sachs financial conditions indices for AU, BR, CA, CH, CL, CZ, EA, GB, HU, ID, IL, IN, JP, KR, MX, MY, NO, NZ, PH, PL, RO, SE, TH, TR, US and ZA.

Graph 7.B: Based on FSB (2024). Jurisdictions' submissions, based on national sector balance sheet and other data. The total reported linkages of all participating jurisdictions as a percentage of total claims and liabilities of each sector. The sample covers AR, AU, BE, BR, CA, CH, CL, CN, DE, ES, FR, GB, HK, ID, IE, IN, IT, JP, KR, KY, LU, MX, NL, SA, SG, TR, US and ZA.

Graph 8.A: For government bond yields, 10-year sovereign bond yields in local currency. For investment grade debt spreads, the Bloomberg Global-Aggregate Index OAS to Treasury curve. For equity returns, LSEG Datastream total market return indices. The sample covers AT, AU, BE, BR, CA, CH, CL, CZ, DE, ES, FI, FR, GB, HU, ID, IL, IN, IT, JP, KR, MX, MY, NL, NO, NZ, PH, PL, PT, RO, SE, TH, TR, US and ZA; subject to data availability. Latest is 30 May 2025.

Graph 8.B: The methodology follows that proposed by Diebold and Yilmaz (2012): the share of variance is derived from the generalised forecast error variance decomposition (GFEVD) matrix of vector autoregressions (VARs) featuring, respectively, the level and the risk factors for a sample of countries comprising AU, CA, EA, GB, JP, KR and US. The time variation in the GFEVD matrices is obtained by estimating the VARs over 500-business day rolling windows. The years shown refer to the end year of the estimation window.

Graph 9: The methodology follows that proposed by Diebold and Yilmaz (2012): the shares of variance are derived from the GFEVD matrix of VARs featuring, respectively, the level and the risk factors for a sample of countries comprising AU, CA, EA, GB, JP, KR and US, estimated on different subsamples.

Graph 10.A: On the x-axis, the local currency sovereign spread for EMEs is the JPMorgan GBI-EM Broad Diversified index spread over the 10-year US Treasury yield; for AEs, it is the JPMorgan GBI-Global excluding US Index spread over the 10-year US Treasury yield. The y-axis shows weighted average percentage changes in bilateral exchange rates against the US dollar (expressed as USD per unit of local currency), using weights from the JPMorgan GBI-EM Broad Diversified index as of April 2025 for EMEs, and weights from the JPMorgan GBI-Global index as of April 2025 for AEs. EMEs = BR, CL, CN, CO, CZ, DO, HU, ID, IN, MX, MY, PE, PL, RO, RS, TH, TR, UY and ZA; AEs = AU, BE, CA, DE, DK, ES, FR, GB, IT, JP, NL and SE. The data are weekly, with a sample period from January 2013 to May 2025.

Graph 10.B: Exogenous exchange rate shocks are identified as changes in the bilateral exchange rate against the US dollar on days of ECB monetary policy announcements, assuming that these exchange rate changes do not reflect news from either EMEs or the United States. The local currency credit risk premium, following Du and Schreger (2016), is the spread between the local currency government bond yield and the synthetic local currency yield available to a dollar-based investor. This synthetic yield is given by the sum of the US Treasury yield and the cross-currency swap rate, achievable by a dollar-based investor who has access to the local currency bond as well as the cross-currency swap contract of the same maturity. The sample period is from January 2005 to December 2017 and the sample covers BR, CO, HU, ID, IL, KR, MX, MY, PE, PH, PL, TH, TR and ZA.

Graph 11.A: Foreign holdings based on data from the US Treasury International Capital (TIC) System from annual SHL reports showing holdings as of end-June each year.

Graphs 11.B and 11.C: The BIS OTC derivatives statistics comprise data reported every six months by dealers in 12 jurisdictions (AU, CA, CH, DE, ES, FR, GB, IT, JP, NL, SE and US) plus data reported every three years by dealers in more than 30 additional jurisdictions. For periods between Triennial Surveys, the outstanding positions of dealers in these additional jurisdictions are estimated by the BIS. Other financial institutions (OFIs) consist primarily of non-bank financial institutions, which may be considered as financial end users (eg mutual funds, pension funds, hedge funds, currency funds, money market funds, building societies, leasing companies, insurance companies) although they can also include smaller non-reporting banks or central banks.

Graph 11.C: Estimated coefficients on the respective FCI measure (GS US FCI, level and risk factors of the BIS US FCI) from the regression of OFIs' FX swaps and outright forwards that also controls for: (i) the expected returns of 10-year US government bonds in excess of the short USD interest rate; (ii) the respective currency government bond's expected excess return; (iii) the cost of hedging the respective currency exchange rate risk in the FX swap market in excess of the money market rate differential (ie the CIP deviation); (iv) valuation changes associated with the dollar exchange rate against the respective currency; and (v) currency fixed effects. The sample covers CA, CH, EA, GB and JP over H2 1998–H1 2024. Percentage point change with respect to a unit change in the respective FCI measure (percentage point change in GS US FCI and unit change in BIS US FCI factors). See Nenova et al (2025) for further

details. For the BIS FCI, the level factor reflects the prevailing level of various interest rates, while the risk factor loads on corporate bonds, risky spreads and equity returns. For details on the construction of factors, see Box B.

Graph 13.A: The methodology follows that proposed by Diebold and Yilmaz (2012). Share of variance is derived from the generalised forecast error variance decomposition (GFEVD) matrix of VAR models estimated on the respective GS US FCI components of AU, BR, CA, EA, GB, JP, KR, MX and US on rolling windows of 250 business days.

Graphs 13.B and 13.C: The BIS OTC derivatives statistics comprise data reported every six months by dealers in 12 jurisdictions (AU, CA, CH, DE, ES, FR, GB, IT, JP, NL, SE and US) plus data reported every three years by dealers in more than 30 additional jurisdictions. For periods between Triennial Surveys, the outstanding positions of dealers in these additional jurisdictions are estimated by the BIS.

Graph 14: Impact of an unexpected one standard deviation increase in the policy rate on asset prices, measured between one business day before and one business day after the monetary policy announcement. Changes in stock prices and exchange rates are measured as the difference in the logarithm of the stock index and the exchange rate, respectively. The impacts are estimated using ordinary least squares regressions and the confidence intervals are constructed based on heteroskedasticity-robust standard errors. Each regression includes country fixed effects. The estimation sample is 2010 to 2024, subject to data availability. AEs = AU, CA, GB, NO, NZ and SE. EMEs = BR, CL, CO, CZ, HU, ID, IL, IN, KR, MX, MY, PE, PH, PL, RO, RU, TH, TR and ZA.

Graph 15: Estimated using local projections with shock identification as in Miranda-Agrippino and Nenova (2022). The estimates for monetary policy spillovers are the peak impact within 10 days after a shock; the domestic monetary policy estimates are measured at the same time horizon as the corresponding monetary policy spillover estimates. The sample period is from January 1999 to June 2019. See Miranda-Agrippino and Nenova (2022) for details.

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III. The next-generation monetary and financial system

Key takeaways

- Tokenisation represents a transformative innovation to both improve the old and enable the new. It paves the way for new arrangements in cross-border payments, securities markets and beyond.
- Tokenised platforms with central bank reserves, commercial bank money and government bonds at the centre can lay the groundwork for the next-generation monetary and financial system.
- Stablecoins offer some promise on tokenisation but fall short of requirements to be the mainstay of the monetary system when set against the three key tests of singleness, elasticity and integrity.

Introduction

The story of the monetary system, and its role in the economy, is one of continuous evolution. Throughout history, technological progress in the monetary system has gone hand in hand with major leaps in economic activity. The innovation of money recorded as book entries managed by trusted intermediaries gave rise to new financial instruments that helped trade and commerce flourish. Paper ledgers gave way to digital ones, bringing profound changes to the economy and society.

The past several years have seen a wave of digital innovation that opens up unprecedented possibilities for money and finance. This chapter discusses how central banks can light the path to the next generation of the monetary and financial system. This is a system designed to expand the quality, scope and accessibility of financial services by leveraging innovative technologies backed by sound regulation, while preserving the solid foundation of the existing system: central bank reserves as a trusted final settlement asset, supporting private financial sector innovation.

At the heart of this vision is the concept of tokenisation, the process of recording claims on real or financial assets that exist on a traditional ledger onto a programmable platform. Tokenisation represents the next logical progression in the evolution of the monetary and financial system, as it enables the integration of messaging, reconciliation and asset transfer into a single, seamless operation. Its potential lies in its ability to knit together operations encompassing money and other assets that would reside on the same programmable platform. This could be made possible by a new type of financial market infrastructure – a "unified ledger" – which may or may not use distributed ledger technology (DLT).[1] By bringing together tokenised central bank reserves, commercial bank money and financial assets into the same venue, a unified ledger can harness tokenisation's full benefits.

Tokenisation is poised to both improve the old, by overcoming the frictions and inefficiencies of the current architecture, and enable the new, by opening up new contracting possibilities. In cross-border payments, tokenisation could replace the complex chain of intermediaries and the sequential updating of accounts in today's correspondent banking transactions with a single, integrated process. Together with state-of-the-art compliance tools made available on the platform, tokenisation would thereby reduce operational risks, delays and costs. Similarly, it would enhance capital

markets by enabling the contingent execution of actions in terms of collateral management, margining adjustments and delivery-versus-payment arrangements.

Core to this vision of the future is trust in money. The foundation of any monetary arrangement is the ability to settle payments at par, ie at full value. Money is information-insensitive in that agents use it with "no questions asked", ie without due diligence. In this way, money underpins coordination in the economy through common knowledge of its value by all agents, just as a common language coordinates social interactions. If this common knowledge fails, so does coordination, and the monetary system becomes unmoored, with large societal costs. Common knowledge of the value of money has a shorthand – the "singleness of money" – where money can be issued by different banks and accepted by all without hesitation. It does this because it is settled at par against a common safe asset (central bank reserves) provided by the central bank, which has a mandate to act in the public interest.

In addition to *singleness*, practical considerations suggest two further tests for viability as the backbone of the monetary system. One is elasticity, referring to money being provided flexibly to meet the need for large-value payments in the economy, so that obligations are discharged in a timely way without gridlock taking over.[2] The other is the system's integrity against financial crime and other illicit activity.

Modern real-time gross settlement (RTGS) systems are the canonical example of the need for *elasticity*. In a two-tier banking system, the central bank is ready to provide reserves to financial institutions elastically at the policy rate against high-quality collateral. When needed, the central bank can provide intraday settlement liquidity so that transactions can be settled in real time. Banks, in turn, can decide how much money (in the form of deposits) they want to provide to the real economy. Importantly, in a two-tier banking system banks can issue money without full bank reserve backing, whether in the form of gold or silver coins (as was the case in gold- or silver-backed monetary regimes) or as bank reserves (as is the case in today's fiat currency regime). The sheer size of payment values in a modern economy means that carting gold and silver coins, maintaining cash piles or retaining large holdings of pre-funded accounts to discharge obligations are simply impractical – they would be recipes for payment system gridlock.

Another concrete manifestation of elasticity is the banking system's role in creating money through lending activities, including overdrafts and lines of credit. Through overdrafts, payments with values that exceed deposit balances can be made at the payer's discretion, while lines of credit provide liquidity on demand. This allows complex interlocking obligations in the economy to be discharged in a timely manner.

The third test is that of the *integrity* of the monetary system against illicit activity. This imperative flows from the recognition that a monetary system that is open to widespread abuse from fraud, financial crime and other illicit activities will not command trust from society or stand the test of time. Considerations of monetary sovereignty (the ability of a jurisdiction to make decisions and exercise influence over the monetary system within its borders) in the face of potential currency substitution raise related issues.

Measured against the three tests, today's two-tier monetary system, with the central bank at its core, stands above other models in ensuring that money is fit for purpose. Central banks provide the highest form of money, support settlement finality and ensure stability and trust in the unit of account. Commercial banks and other private sector entities provide crucial services to support economic activity within and across borders, facilitating the means of payment that support economic transactions. There is, no doubt, considerable room for improvement in the current system. The vision outlined here gives a glimpse of what is possible. Nevertheless, the merits of the core architecture of the system with the central bank at its centre should be recognised and preserved.

The next-generation monetary system with central bank reserves at the core promises to deliver far-reaching benefits. A key step towards this transformation is the trilogy of tokenised central bank reserves, tokenised commercial bank money and tokenised government bonds, all residing on a unified ledger. Together, these elements could form the foundation of a vibrant tokenised financial system, unlocking new efficiencies and capabilities. Tokenised central bank reserves provide a stable and trusted settlement asset for wholesale transactions in a tokenised ecosystem, ensuring the singleness of money. They could also enable monetary policy implementation on a tokenised platform. Tokenised commercial bank money could build on the proven two-tier system, offering new functionalities while preserving trust and stability. Tokenised government bonds, as the cornerstone of financial markets, could enhance liquidity and support various financial transactions, from collateral management to monetary policy operations.

The role that cryptoassets and stablecoins will ultimately play in the next-generation monetary and financial system is an open question. Crypto instruments operate on strikingly different principles to those of the conventional monetary system. They strive to redefine money according to a decentralised notion of trust by repudiating intermediaries in favour of peer-to-peer transactions. In spite of this initial promise, unbacked crypto coins have given rise to an ecosystem where a new breed of intermediaries operating hosted wallets (ie cryptoasset wallets for which a third-party provider manages private keys and assets) play the dominant role. Moreover, with their large price gyrations, they do not resemble a stable monetary instrument, but rather a speculative asset.[3]

Stablecoins were designed as a gateway to the crypto ecosystem, promising stable value relative to fiat currencies (overwhelmingly the US dollar) while operating on public blockchains. As a transaction medium in the crypto ecosystem, and due in part to their backing mechanism, they exhibit some attributes of money. Their pedigree in the crypto ecosystem has also led to use cases as on- and off-ramps to cryptoassets and, more recently, as a cross-border payment instrument for residents in emerging market economies lacking access to the dollar. However, stablecoins perform poorly when assessed against the three tests for serving as the mainstay of the monetary system.

As digital bearer instruments on borderless public blockchains, stablecoins have been the go-to choice for illicit use to bypass integrity safeguards. The pseudonymity of public blockchains, where individual users' identities are hidden behind addresses, can preserve privacy but also facilitates illegal use. The absence of know-your-customer (KYC) standards like those of the traditional financial system exacerbates this issue.[4] The bearer nature of stablecoins allows them to circulate without issuer oversight, raising concerns about their use for financial crime, such as money laundering and terrorism financing. While demand for stablecoins may persist, they perform badly against the integrity test at the system level.

Stablecoins also fare poorly on singleness and elasticity. As digital bearer instruments, they lack the settlement function provided by the central bank. Stablecoin holdings are tagged with the name of the issuer, much like private banknotes circulating in the 19th century Free Banking era in the United States. As such, stablecoins often trade at varying exchange rates, undermining singleness. They are also unable to fulfil the no-questions-asked principle of bank-issued money. Their failure on elasticity stems from their construction: they are typically backed by a nominally equivalent amount of assets, and any additional issuance requires full upfront payment by holders, which undermines elasticity by imposing a cash-in-advance constraint.

Stablecoins raise a number of other concerns. For one, there is an inherent tension between their promise to always deliver par convertibility (ie be truly stable) and the need for a profitable business model that involves liquidity or credit risk.

Moreover, loss of monetary sovereignty and capital flight are major concerns, particularly for emerging market and developing economies. If stablecoins continue to grow, they could pose financial stability risks, including the tail risk of fire sales of safe assets. Finally, bank-issued stablecoins may introduce new risks, depending on their legal and governance arrangements – a subject of ongoing debate.

While stablecoins' future role remains uncertain, their poor performance on the three tests suggests they may at best serve a subsidiary role. One guiding principle in any such role would be to channel legitimate use cases into the regulated monetary system in a way that does not undermine financial stability nor the proven advantages of the current system. Illicit use will stay outside the regulatory cordon.

Society has a choice. The monetary system can transform into a next-generation system built on tried and tested foundations of trust and technologically superior, programmable infrastructures. Or society can re-learn the historical lessons about the limitations of unsound money, with real societal costs, by taking a detour involving private digital currencies that fail the triple test of singleness, elasticity and integrity. Bold action by central banks and other public authorities can push the financial system along the right path, in partnership with the financial sector.

As the stewards of monetary and financial stability, central banks need to drive this transformation. They can do so in four ways. First, they can articulate a vision of which key features of today's financial system must be replicated in a tokenised ecosystem. Second, they can provide the necessary regulatory and legal frameworks to ensure the safe and sound development and adoption of tokenised finance. Third, they can provide the basic foundational assets and platforms required for a tokenised financial system. Most importantly, such a system will require settlement in a tokenised form of central bank reserves. Finally, they can foster public-private partnerships to encourage joint experimentation and coalesce industry efforts.[5]

Money and trust

Money is a social convention fundamental to the functioning of any modern economy. It is sustained by a shared expectation that money accepted for payments today will also be accepted for payments tomorrow. This requires trust in money, its stability and its ability to scale with economic activity.

The linchpin of modern monetary arrangements is ultimate settlement at par, meaning that the price of money relative to the unit of account is fixed at one. Sometimes referred to as the singleness of money, this is the key coordination mechanism of the economy that sustains the social convention of money. When singleness is maintained, money is information-insensitive in that agents in the economy accept it at par without due diligence, ie with no questions asked.[6]

In modern monetary systems, the settlement of payments at par is supported by a two-tier structure, with central bank reserves and commercial bank money playing complementary roles. Central banks ensure trust in money, a fundamental public good, by providing the ultimate safe medium for settling transactions in the form of central bank reserves. In the case of short-term liquidity pressures, central banks also serve as lenders of last resort to banks.[7] Meanwhile, commercial banks issue money to the private sector in the form of deposits.[8] Prudential regulation and supervision ensure their safety and soundness, with deposit guarantee schemes protecting depositors in the event of bank failures. This division of roles ensures stability and banks' ability to respond rapidly to private sector needs. Moreover, it underscores the importance of the system's ability to provide money elastically and in a discretionary way – a key stabilising mechanism in the monetary system. In modern economies, central banks can expand their liabilities, easing stress for agents who use those

liabilities as money; commercial banks can expand their own liabilities to ease credit constraints for agents using bank liabilities as money.

History shows that private sector innovation thrives on the stability of central banks, whose foundational role remains as critical as ever. By virtue of being guarantors of singleness, central banks act as anchors sustaining coordination and common knowledge in the value of money. Critically, the trust in central banks allows for this coordination and common knowledge to be achieved at scale, meeting the needs of a growing, diverse and decentralised market economy.

The singleness of money is not a statement about the credit risk embedded in bank deposits but a statement about the payment. Any payment goes through at par because it can be settled with central bank reserves. In other words, singleness of money does not imply that all commercial bank liabilities are or should be equal in value. For example, negotiable certificates of deposits or bank bonds can and often do trade at varying spreads to government bonds. But payments always go through at par, because the central bank homogenises the credit risk of deposits from different banks, making them into a uniform payment instrument.

The emphasis on payments and the two-tier structure of the monetary system helps dispel a common misunderstanding of how modern money operates. "Sending a payment" often evokes the image of a transfer of an object or funds flowing from one place to another, by analogy with the relatable experience of handing over a banknote or coin for payment. However, in a typical payment transaction, when a customer of one bank pays a customer of another bank, no physical object changes hands. No money "flows". Rather, a series of updates are made on the accounts maintained by intermediaries and the central bank. In a domestic payment, there are three account updates: the sender's bank debits the sender's account, the receiver's bank credits the receiver's account and the central bank credits the receiver's bank and debits the sender's bank. (In a cross-border payment, there are more steps, as described below.) The receiver does not acquire a claim on the sender's bank. Singleness is achieved in this context because the final *settlement* happens on the central bank's accounts. In effect, the payment is made using central bank reserves, with finality. This allows the payee to have more deposits in her account (ie a larger claim on her bank) rather than any new type of claim. As discussed in more detail below, this contrasts with the situation when a stablecoin payment is received.

Trust in money extends beyond its acceptance at par and the execution of payments. It also requires confidence in money's stable value over time. Price stability, achieved through low and predictable inflation, and financial stability, which prevents large-scale defaults and disruptions to the functioning of the financial system, are essential for sustaining this trust.[9] Strong institutions underpin these goals. Central bank independence ensures monetary policy frameworks focused on price stability, and sound financial regulation and macroprudential measures provide further safeguards. On a deeper level, trust in money relies on fiscal sustainability, as the state's ability to tax and maintain a credible fiscal position ultimately backs the value of money. History shows that without these foundations, monetary regimes can collapse. This underscores the importance of modern arrangements that have successfully delivered stability in most major economies, despite recent global inflationary pressures.[10]

New technologies do not change the economics of these arrangements, but they bring important opportunities to strengthen the features of money. The persistent demand for new functionalities of money signals societal appetite for the benefits that such technologies promise. Public authorities may neglect this reality at their peril. The advent of tokenisation can change how records of ownership and transfers of claims are done. In this respect, new programmable platforms that leverage tokenisation of money, such as unified ledgers, could be as transformative as the move from physical to digital ledgers.[11] However, maintaining trust, underpinned by

the singleness of money, requires constant striving on the part of the central bank and other public authorities. Achieving this transformation responsibly will require bold experimentation and significant cooperative efforts by the public and private sectors.

Stablecoins and the integrity imperative

How do new forms of digital money fare when assessed against the lessons just discussed? It remains to be seen what role innovations like stablecoins will play in the future monetary system. They do offer novel programmability functions, easy access for new users and pseudonymity features. But stablecoins do not stack up well against the three desirable characteristics of sound monetary arrangements and thus cannot be the mainstay of the future monetary system. Despite their limitations, some inherited from crypto more broadly, there is significant demand for stablecoins (see below). As such, they signpost where policy responses may help to foster more efficient and resilient financial systems to reap the benefits of technological innovations. Such policy responses can ensure that legitimate use cases are appropriately regulated, and that illicit use is blocked to protect the monetary and financial system. However, adequate regulation can only go so far in addressing some important structural flaws that are likely to persist, such as the limitations placed by cash-in-advance constraints. Accordingly, even a future of well regulated new forms of money would still require proper anchors of trust to underpin sound monetary arrangements.

The genesis of stablecoins was the quest for a different foundation for monetary arrangements, away from trusted intermediaries and towards decentralisation. Unbacked cryptoassets like bitcoin emerged from this same pursuit.[12] Despite the idea's initial allure, crypto falls short on several core features of money. As such, unbacked cryptoassets have established themselves as a speculative asset rather than a means of payment.[13] Additionally, the inherent characteristics of blockchains generate a key trade-off between decentralisation, security and scalability. Blockchains work by appending blocks of transactions through consensus in the decentralised network of validators, who must be compensated to perform this role since validation is costly. This generates a tension between setting rigorous standards on what counts as consensus and having a system that reaches that consensus at scale (Box A).

Stablecoins emerged as an on- and off-ramp to the crypto ecosystem and a means to enable transactions on the blockchain without the inherent volatility of other forms of crypto. In a nutshell, they are crypto tokens that live on decentralised ledgers and promise to always be worth a fixed amount in fiat currency (eg one dollar). Unlike unbacked crypto coins, most stablecoins are issued by a single, central entity. The issuer's reserve asset pool backing the stablecoins in circulation and its capacity to meet redemptions in full back this promise.[14] Stablecoins can differ by the type of asset backing. There are three main variants for such backing: fiat-denominated short-term assets, crypto collateral and algorithmic arrangements.[15] The discussion here focuses on the first variant, which accounts for the lion's share of the market.

Despite the frequent inability of stablecoins of various stripes to live up to their promise of par convertibility, they continue to attract demand. This is evident in their remarkable growth, concentrated in the two largest stablecoins, USDT (Tether) and USDC (Circle) (Graph 1.A). Demand for stablecoins is a function of both users' motivations and some of their features, including accessibility, privacy, their role as an alternative to the current financial system, their ability to facilitate access to foreign currencies and their attractiveness in cross-border payments.

First, stablecoins are traded on public, permissionless blockchains, allowing anyone with an internet-connected device to access them. Many users do so through hosted wallets provided by crypto exchanges that perform onboarding processes,

Box A

Limits to decentralised money

Money is a social convention, sustained by the shared expectation that it will be accepted for payments tomorrow just as it is today. Economic theorists have explored how the convention of money resembles a record-keeping device that records all past transactions. Once the convention has taken root, holding money is evidence that the holder acquired money by providing goods and services in the past.[1] In this early work, maintaining a complete history of past transactions through a master ledger was a fanciful theoretical fiction, not intended to be taken literally. However, the advent of crypto turned the debate on its head by offering the tantalising prospect that such a master ledger might be a realistic proposition.

Crypto repudiates trusted intermediaries such as central banks and instead envisages a dispersed network of self-interested record keepers – "validators" – who update and maintain a record of transactions. Blockchain functions by appending a new block of transactions through consensus among the network of validators. This consensus is maintained by rewarding validators so that they have the incentive to follow the blockchain's rules when other validators do so.

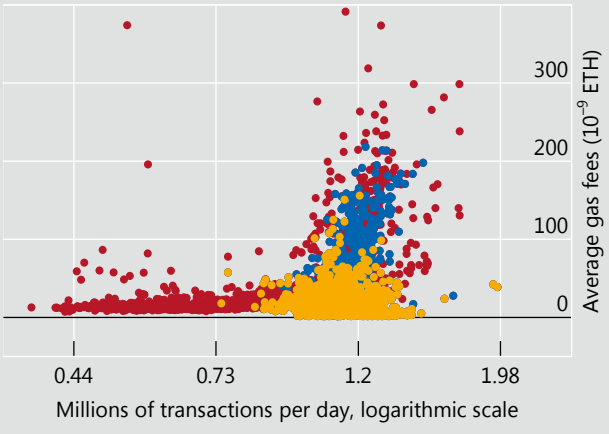
Granting rewards to validators introduces a fundamental trade-off between setting rigorous standards on what counts as consensus and having a "scalable" system where consensus is easily reached. This is because validating each block is costly, so playing an honest role in validation is a matter of self-interested calculations. The most rigorous standard on what constitutes consensus (ie unanimity) is incompatible with self-interested validators.[2] Practical, usable decentralised money is insecure.

The incentive design for validators in Auer, Monnet and Shin (2025) is based on the assumption that validators are self-interested and respond to incentives. In an infinitely repeated game, incentive mechanisms can encourage validators to act honestly through appropriate rewards. Validators can monitor one another, report misconduct to earn additional rewards and ensure that wrongdoers face penalties. A clean, reconciled ledger has attributes of a public good, and acting honestly is akin to providing a public good. However, the incentive to act honestly entails giving rents to the validators that are sufficiently large to overcome the risks

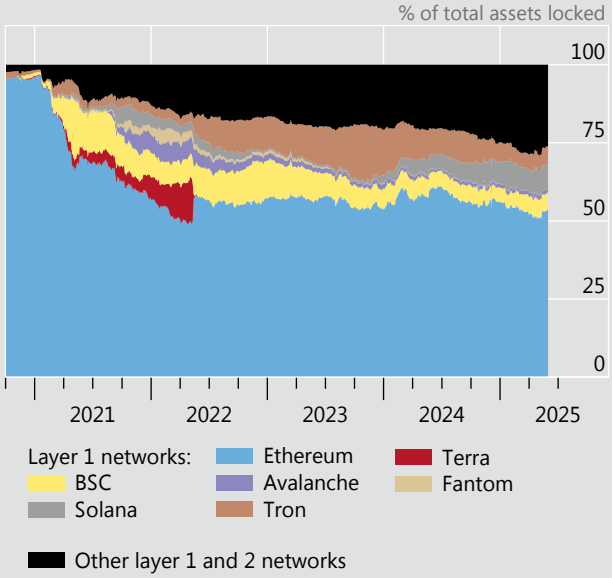
Blockchain is subject to congestion and fragmentation, undermining scalability

Graph A1

A. Network congestion leads to high fees on the Ethereum network[1]



B. Growing fragmentation of layer 1 blockchains[4]



[1] Outliers larger than 450 Gwei (10^{-9} ETH) are excluded from the graph. ETH = ether. [2] As part of the Ethereum London hard fork, Ethereum Improvement Proposal 1559 (EIP-1559) introduced a new fee structure aimed at making transaction fees more predictable and reducing fee volatility. It included a base fee that is burned and a priority fee (tip) that incentivises miners. [3] The Ethereum merge marked the transition of the Ethereum blockchain from the Proof of Work (PoW) consensus mechanism to the Proof of Stake (PoS) consensus mechanism. This aimed to improve the network's energy efficiency, security and scalability. [4] Based on total value locked, which corresponds to the aggregate of all the funds locked in a decentralised finance (DeFi) smart contract.

Sources: Boissay et al (2022); DeFiLlama; Etherscan; BIS.

of miscoordination in the public good provision game. The more stringent the degree of consensus needed, the more wasteful the rents required. In the extreme case where unanimity is needed to update the ledger, no amount of rents are sufficient to achieve consensus. Any benefits of the system are dissipated as rents to the validators.

The upshot is that crypto lacks the scalability and coordination benefits of money. As the size of the ledger grows with the volume of transactions, it becomes harder to update it quickly. The cost of transacting with crypto increases with the volume of transactions and cryptoassets cannot scale without compromising security or their decentralised underpinning. In practice, blockchains such as Ethereum have seen high fees in periods of high transaction volumes – even after reforms such as the so-called London hard fork in August 2021, and the merge in September 2022 (Graph A1.A). Meanwhile, congestion has continued to drive users from Ethereum onto other so-called layer 1 blockchains (Graph A1.B). This fragmentation cannot be easily solved with interoperability of different blockchains since each blockchain is a separate recording of settlements.

Due to impediments to scalability and susceptibility to congestion, cryptoassets cannot harness the network effects of money. The fragility of trust is exacerbated by the fact that the robustness of decentralised consensus depends on who has access to the ledger and how they update it.[3]

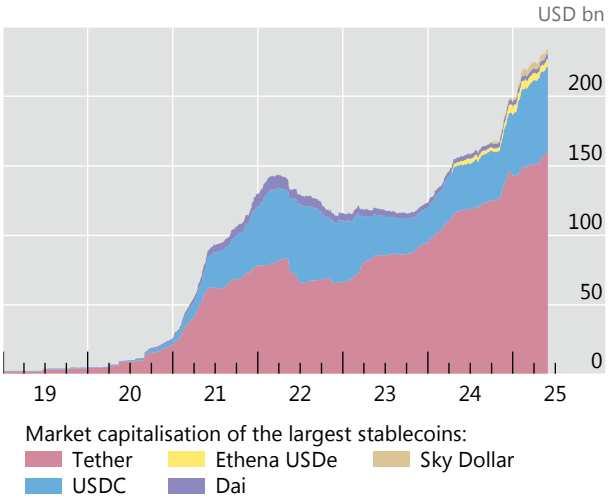
[1] Kocherlakota (1998) and Kocherlakota and Wallace (1998). [2] Auer, Monnet and Shin (2025). [3] On congestion and scalability issues, see Boissay et al (2022) and Budish (2025), respectively. The broader trilemma of having a ledger that is simultaneously decentralised, secure and scalable was originally laid out by Buterin (2021).

which in principle should be similar to banks. But it is also possible to access stablecoins directly via unhosted wallets, which are readily available to any user with an internet connection. These eschew interactions with any intermediary (whether from the crypto or the traditional financial system) and thus are not subject to any KYC checks. With an unhosted wallet, users transact without identification and have sole control through a password (private key).

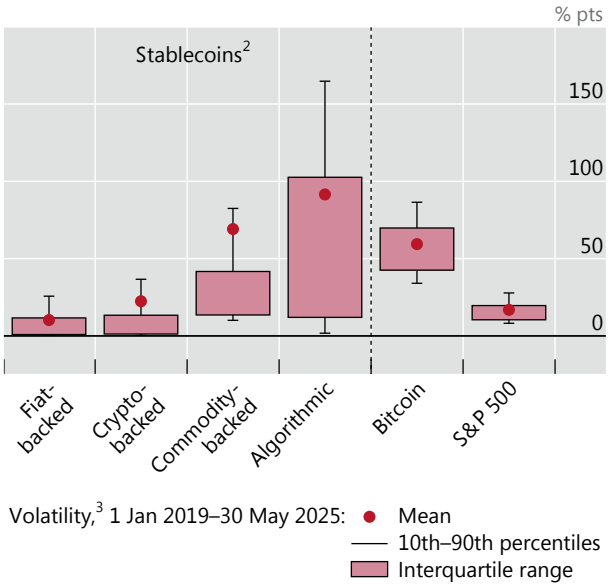
Stablecoins continue to grow, but volatility remains[1]

Graph 1

A. Stablecoin market cap growing quickly amid high concentration



B. Volatility is lower for fiat-backed stablecoins than for crypto, but still not absent



[1] See endnotes for details. [2] Based on data availability and the classification by Kosse et al (2023), with the exception that we refer to "algorithmic" rather than "unbacked" stablecoins, to avoid confusion with unbacked cryptoassets as used elsewhere in this chapter. Algorithmic stablecoins are those that maintain their value through algorithms that mint or burn tokens and adjust their supply based on market demand. [3] Volatility is defined as the annualised standard deviation of daily returns computed on 21-trading day moving windows.

Sources: Kosse et al (2023); Bloomberg; CoinDesk Data; BIS.

Second, once on a public blockchain, transactions are pseudonymous, with individual users' identities hidden behind wallet addresses. Unlike traditional bank accounts, which require personal information, stablecoins rely on wallet addresses as a substitute for identity. While useful for protecting privacy, pseudonymity can also lead to a lack of accountability and raises financial integrity concerns (see below).

Third, stablecoins provide access to foreign currencies – to date, overwhelmingly the US dollar. They present an attractive alternative for users in countries with high inflation, capital controls or limited access to dollar accounts. Individuals and firms that face restrictions on accessing dollar-based international payment networks may find stablecoins particularly appealing for cross-border payments and trade settlement. However, the widespread use of stablecoins could undermine affected jurisdictions' monetary sovereignty. Currency competition can create impediments for monetary policy implementation.[16]

Fourth, stablecoins' technological attributes mean they can potentially offer lower costs and faster transaction speed, especially for cross-border payments. There is anecdotal evidence of lower costs for some corridors than with traditional channels.[17] Moreover, funds can be transferred directly between wallets without intermediaries, regardless of banking hours or public holidays. This can make them appealing to consumers with limited access to traditional financial systems, such as migrant workers. However, risks to consumer protection remain significant, while lower costs and faster speed are not always guaranteed given high fees for validation.

How do stablecoins measure up as money?

Stablecoins fall short on the three key tests for money. This subsection discusses each in turn and closes with a discussion of additional concerns.

Stablecoins and the singleness of money

Asset-backed stablecoins are akin to digital bearer instruments. They behave like financial assets and typically fail the test of singleness.[18]

In this light, when a payee receives a stablecoin as payment, it is the liability of a particular stablecoin issuer. In other words, she checks her phone and sees she has received 10 "red dollars", which add to her balances of, say, 10 "blue dollars" and 10 "white dollars". The issuers of these various dollars will differ, and the payee will hold bilateral claims against each one only by accepting payment. Moreover, in the background, there is no settlement on the central bank balance sheet. Therefore, singleness cannot be guaranteed: red dollars might trade at a discount or premium to blue or white dollars, depending on the relative creditworthiness of their issuers.

To date, stablecoins are traded in secondary markets at an "exchange rate" that can deviate from par, similar to deviations observed between the price of exchange-traded funds (ETFs) and the net asset value of the portfolio they reference. Granted, small deviations from par could be viewed as consistent with a somewhat looser definition of singleness. But deviations from par undermine the no-questions-asked principle. And money-like claims that are not able to circulate with no questions asked cannot really function as money. More generally, in contrast to predictable deviations arising from frictions such as fees, stablecoins of various stripes have seen substantial deviations from par (Graph 1.B), highlighting the fragility of their peg.[19]

Stablecoins and elasticity

Stablecoins also fail the elasticity test. This is because the issuer's balance sheet cannot be expanded at will.[20] Any additional supply of stablecoins thus requires full

upfront payment by its holders – ie a strict cash-in-advance setup with no room to create leverage when it is required for the functioning of the system. This differs fundamentally from banks, which can elastically expand and contract their balance sheets within regulatory limits.

Two examples illustrate the critical importance of the elastic provision of liquidity. Both are based on large-value payments rather than retail applications. Large-value payments require substantial liquidity for settlement, and banks, supported by central banks' standing facilities, are uniquely positioned to provide this liquidity.

The first example of the importance of elasticity comes from the workings of RTGS systems. The requirement to settle large amounts in real time heightens the need to have the required settlement assets (reserves) at the right time, place and quantity. Compared with, for example, deferred net settlement systems, this increases liquidity demands. The way the system meets this challenge is through the central bank's provision of credit to banks (against collateral), particularly with intraday overdrafts. Without such on-demand liquidity resources, the system could not operate smoothly. Of course, a system with tokenised central bank reserves would also be able to offer this benefit.

The second example comes from the role of loans and loan commitments (ie arrangements for firms to borrow money on demand), particularly during stress. The importance of elasticity is particularly evident for the manufacturing sector, where the prevalence of supply chains makes high demands on liquidity. Unused loan commitments offer the flexibility to meet a payment obligation immediately, and are substantial in both advanced and emerging market economies. In 2025, such unused loan commitments became a crucial lifeline for firms faced with tariffs. This led to a spike in unused loan commitments for affected sectors.[21]

Stablecoins and the integrity of the monetary system

The integrity of the payment system is a crucial imperative. Precisely because money and payments are widely accessible, there must be safeguards to combat fraud, financial crime and the financing of illicit activities. Criminal organisations, terrorist groups and malicious state actors are continually looking for ways to move, hide and launder money. In today's system, a large apparatus is in place to help combat financial crime and sanctions evasion. Anti-money laundering and combating the financing of terrorism (AML/CFT) regulation puts the onus on banks and other intermediaries to uphold KYC rules, file suspicious activity reports and have the capacity to stop payments. These safeguards are necessary in any monetary system, but not all forms of money lend themselves equally well to integrity against financial crime.

Stablecoins have significant shortcomings when it comes to promoting the integrity of the monetary system. As digital bearer instruments, they can circulate freely across borders onto different exchanges and into self-hosted wallets. This makes them prone to KYC compliance weaknesses. Transactions originating from self-hosted wallets are traceable on public blockchains. Nevertheless, this traceability can be disrupted using mixers, which amalgamate funds from multiple users and subsequently distribute them to newly generated addresses. Individuals may maintain anonymity until they encounter KYC requirements when converting stablecoins into fiat currency. But holders of a stablecoin are probably not the customers of its issuer, who may not know if holders have had their identity verified. More worryingly, stablecoins may be sent to individuals who have definitely not verified their identities. Importantly, stablecoins' KYC limitations are also problematic in the light of geopolitical constraints (such as sanctions) on existing payment systems.[22]

Currently, the burden is on authorities to seek out and stop illicit stablecoin flows. To be sure, stablecoin issuers and exchanges can undertake AML/CFT measures by freezing balances, and have occasionally done so. Blockchain analytics companies work with law enforcement to track financial crime on public blockchains. This can be useful for high-profile cases (like ransomware attacks on prominent targets). Still, it probably cannot realistically scale for billions of AML/CFT checks in everyday payments. In practice, stablecoins are attractive for use by criminal and terrorist organisations.[23]

In contrast, in a deposit-based system, or even in the case of non-bank electronic money (e-money), the onus for maintaining integrity is on customer-facing intermediaries, who know their customers better than public authorities. Penalties and reputation risk for the intermediary are key to ensuring that they have thorough KYC protocols and AML/CFT measures. The non-bearer nature of the two-tier system, where transactions occur through account updates, means that all clients must be onboarded in line with KYC rules. The receiver needs the explicit update from her intermediary to be credited with a payment. Thus, controls are far better maintained.

Technological improvements can enhance the integrity of the current system. AI and data integration advances, particularly through the development of machine learning tools, present opportunities to help combat financial crime. These innovations help reduce false positives (ie legitimate transactions flagged as illicit) and increase detection of fraudulent transactions. Box B explores how machine learning algorithms can be applied to filter transactions for AML/CFT compliance. It also discusses how nascent AI agents can serve as co-pilots, enhancing the efficiency of human efforts in reporting transactions related to money laundering or the financing of terrorism.

Additional concerns around stablecoins

There is an inherent tension between stablecoin issuers' ability to fully uphold their promise of stability and their pursuit of a profitable business model. When issuers invest in assets with some credit or liquidity risk, they cannot fully guarantee stability under all possible contingencies, since holders can redeem their stablecoins at short notice. This reflects the status quo, where promises are generally – but, importantly, not always – honoured, and the business model remains highly profitable, as assets yield at least risk-free rates and liabilities pay zero. Alternatively, stringent liquidity risk management implies that reserve assets must be held in highly liquid risk-free assets – in the extreme, unremunerated central bank reserves.[24] In such a scenario, stablecoins would operate as fully backed payment instruments, with a business model largely based on payment fee income that is likely to deliver thin profits relative to the status quo.

The prospect of broader use of stablecoins for payments and real economy transactions raises at least three additional concerns.

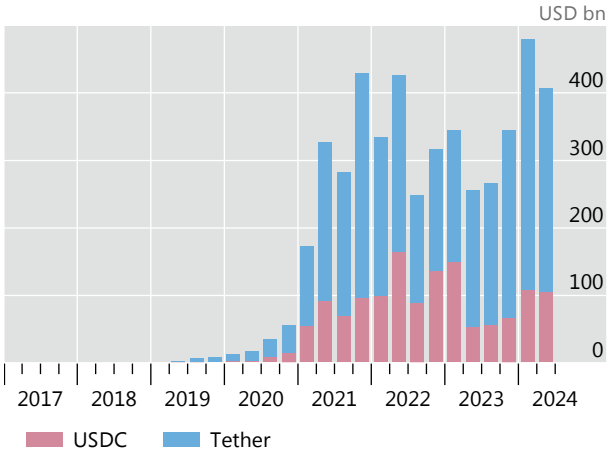
First, jurisdictions may face challenges to their monetary sovereignty. Over 99% of stablecoins are US dollar-denominated, with a growing cross-border presence (Graph 2.A). Cross-border transaction volumes tend to rise following episodes of high inflation and foreign exchange volatility in sending and receiving countries (Graph 2.B). Stablecoins could thus enable stealth dollarisation, with users relying on the dollar for transactions and financial contracts. Of course, in economies that suffer from unstable monetary conditions, this is understandable from a user perspective. Factually, such currency competition will heighten the importance of committing to price and financial stability and upholding fiscal sustainability.

Second, if stablecoins continue to grow, they are poised to have a large footprint in the markets in which they are invested, especially under stress conditions. Major stablecoins invest largely in safe assets, and their expansion risks crowding out other investors. Currently, their investment in US Treasury markets stands on par with large

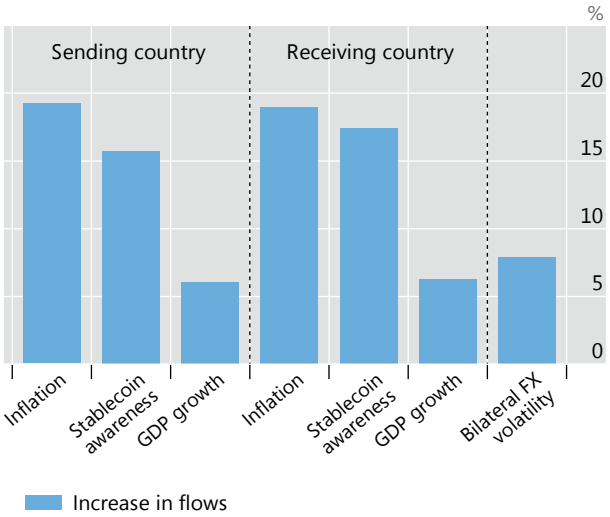
Cross-border use of stablecoins has been rising, reflecting a mix of drivers

Graph 2

A. Cross-border stablecoin flows back on the rise



B. Country-level drivers of cross-border stablecoin flows[1]



[1] Estimated increase in bilateral cross-border tether flows for sending and receiving countries that experience high inflation (ie top quartile of a large sample of countries from 2017 to 2024), GDP growth, stablecoin awareness or bilateral exchange rate (FX) volatility.

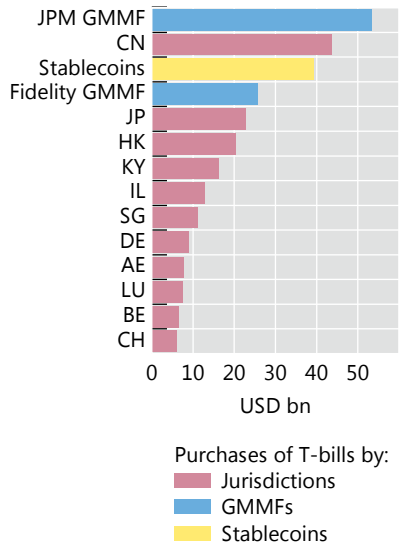
Sources: Auer, Lewrick and Paulick (2025); Chainalysis.

jurisdictions and government money market funds (MMFs) (Graph 3.A). Continued growth could put additional downward pressure on yields: evidence suggests that a $3.5 billion increase in stablecoin market capitalisation can already depress Treasury yields by around 2.5–5 basis points (Graph 3.B), with effects up to three times larger

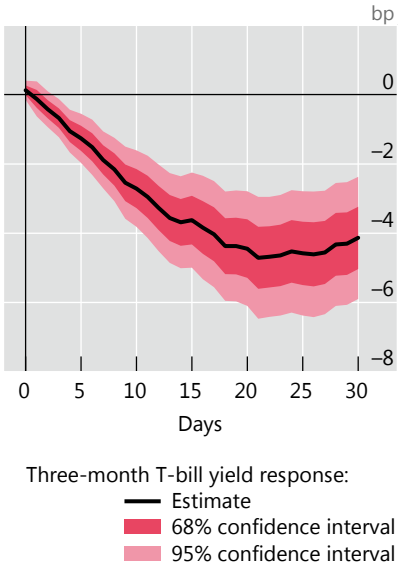
Stablecoins' effects on safe asset markets and reaction to monetary policy[1]

Graph 3

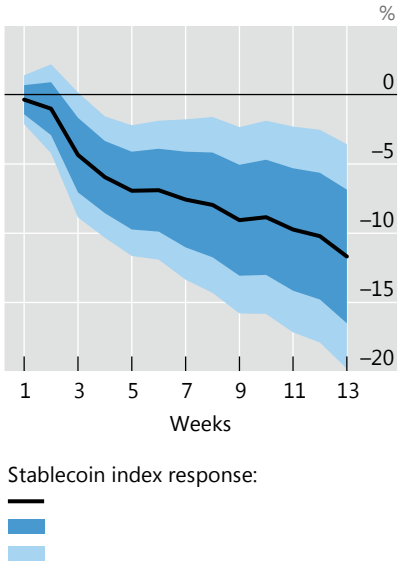
A. Stablecoins among top buyers of T-bills in 2024, on par with MMFs



B. Stablecoin inflows can put downward pressure on T-bill yields



C. Stablecoins respond to monetary policy shocks like risk assets



GMMF = government money market fund.

[1] See endnotes for details.

Sources: Ahmed and Aldasoro (2025); Aldasoro et al (2025a).

Box B

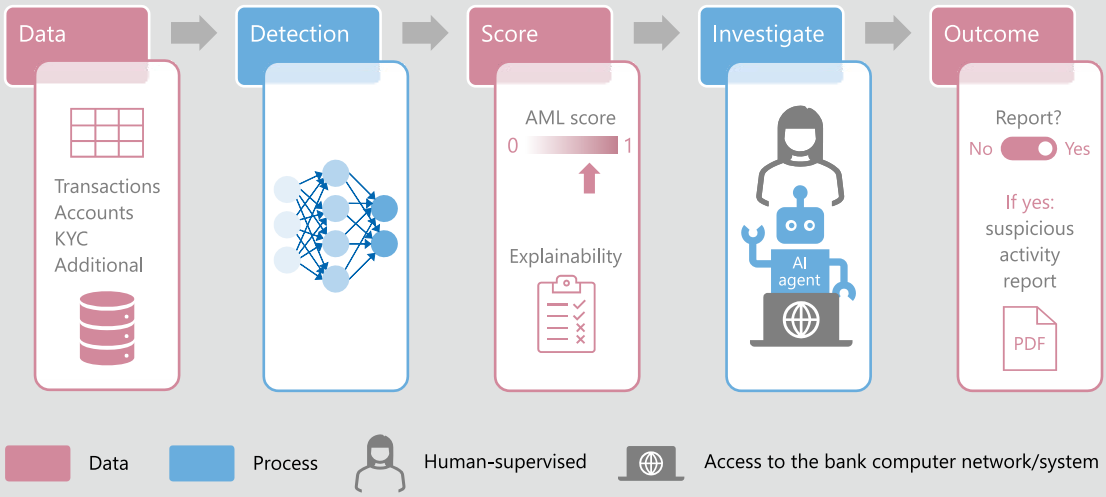
Artificial intelligence to combat money laundering

Anti-money laundering (AML) regulation in payment systems is aimed at requiring individual financial institutions to detect and report suspicious activity to authorities. There are two approaches to using artificial intelligence (AI) to combat money laundering and financial crime (Graph B1). One is to use the capacity of machine learning (ML) methods to detect patterns in payment data to identify possible cases of money laundering. Relative to rules-based methods that rely on narrow transaction-level attributes of the payment, ML methods aim to "find needles in the haystack".[1]

ML tools can leverage account and transaction behaviour, know-your-customer (KYC) and other investigator-identified information to deliver explainable detections to prevent fraud, reducing false positives.[2] Furthermore, ML methods can rely on the pattern of payments across the whole network. If the transaction is conducted across multiple jurisdictions, data from more jurisdictions must be used in money laundering detection. However, data governance frameworks can limit data pooling across jurisdictions. Cryptographic solutions are often insufficient to assuage data privacy concerns.

The AI future of AML compliance

Graph B1



AML = anti-money laundering; KYC = know your customer.

Source: BIS.

The second approach is to harness AI agents to aid with individual financial institutions' compliance burden. The use of AI agents presents promising opportunities to use their capability to operate a computer just as a human would.[3] These agents replicate prototypical human computer interactions by taking screenshots, and using the mouse and keyboard to perform routine tasks involved in preparing suspicious activity reports.

These AI agents can conduct investigations in the same manner a human would, requiring no adaptations to the tasks themselves. They just need to learn how a human does it. These agents can initially act as copilots,[4] assisting by autonomously handling tasks and identifying areas where human involvement is required.

[1] BIS (2024d) and Desai et al (2024). [2] See MAS (2024), SAS-KPMG (2024) and Google Cloud (2025). [3] See Project Mariner (2025), Operator (2025), Claude (2024) and Manus (2025). [4] See Bell et al (2025).

in absolute terms during redemption episodes. Their expanding market presence thus also creates a tail risk of fire sales. This can be exacerbated because stablecoins have so far reacted negatively (ie exhibited larger redemptions) to monetary policy tightening, similar to risky assets such as stocks (Graph 3.C).[25]

Third, with rising interconnectedness, there may be new channels for risks to spill over to the traditional financial system. If banks issue stablecoins, there are risks

associated with a new class of liabilities that circulate on public blockchains, without clarity as to whether and how they would benefit from deposit insurance. Particularly in times of stress, there may be rapid and unpredictable flows between different types of bank liabilities. More generally, if banks and other existing financial institutions become active in crypto markets, there is the risk of spillovers that undermine banks' ability to lend to households and businesses, trade in traditional markets and perform their role in supporting the real economy.

Policy approaches to stablecoins

Securing the stability and integrity of an evolving financial system requires active, technology-neutral regulation based on the principle of "same activities, same risk, same regulatory outcomes". Targeting specific technologies risks distorting the playing field for years to come.[26] Recent international guidelines on crypto and stablecoin regulation provide a solid starting point for designing regulatory frameworks in a rapidly evolving tokenised environment.[27]

Addressing integrity and financial crime is a priority, beginning with proper KYC compliance for hosted wallets. Many jurisdictions already require crypto exchanges and wallet providers to meet standards similar to banks, custodians and other payment intermediaries. Some enforce the so-called travel rule for unhosted wallets (where users have full control over their private keys), requiring that key information, such as beneficiary names, is transmitted. Engagement with blockchain analytics firms and stablecoin issuers can help to monitor and, if needed, block or freeze funds in cases of known infractions. However, these measures only mitigate – not eliminate – risks to the monetary system's integrity.[28]

Regulation should also mandate AML/CFT compliance. Most stablecoins can block specific addresses from holding their tokens. By defaulting to a system where all addresses are blocked unless KYC compliance has been verified, these stablecoins could be brought within the scope of AML/CFT frameworks. However, stablecoins' borderless nature complicates regulatory efforts. Without global coordination, there is the risk of a race to the "weakest regulatory links".

Stabilisation mechanisms also need attention. Their stability hinges on the quality and transparency of their reserves, as well as the credibility of the issuing entities. Lessons from pre-funded payment service providers (PSPs), which provide useful payment services and bring greater competition to payment markets, could inform stablecoin regulation.[29] While regulatory regimes differ, they generally must hold sufficient safe and liquid assets to ensure they can always honour commitments to clients. These PSPs are generally prohibited from paying interest.[30] These institutions have been regulated in a way that promotes singleness of money and market integrity, and thus play an ancillary role to bank deposits in the monetary system.

Regulators remain focused on the quality of assets backing stablecoins and the appropriate level of reserves. Requiring reserves of high-quality liquid assets can help to mitigate risks, while transparency measures, such as regular audits and public disclosure requirements, can support accountability. Parallels with government MMFs, which feature a similar balance sheet structure, offer useful insights.[31] BIS Project Pyxtrial highlights the potential for technology to supervise compliance with reserve-related regulation. Aligning stablecoins with existing frameworks, such as those for MMFs or e-money, could provide consistent oversight, guided by the principles of proportionality and technology neutrality.

Already in 2023, the yearly BIS survey of central banks on digital currencies found that more than 60% of responding jurisdictions had or were developing regulatory frameworks for stablecoins.[32] Many focus on asset backing, disclosure, investor and consumer protection, financial stability, countering illicit activities and ensuring fair

and transparent markets. Beyond the scope of the survey, some jurisdictions prohibit paying interest to stablecoin holders, whereas others have left this possibility open. This can help align regulatory requirements for stablecoins with those of MMFs, e-money or related financial instruments.[33]

Still, regulating stablecoins is not straightforward. Because they circulate on public permissionless blockchains, the regulatory surface is narrower than for traditional intermediaries. There are, to date, fewer forms of recourse to address regulatory concerns. There is also a lack of mechanisms to stop or reverse mistaken or fraudulent payments; given the immutable nature of blockchains, an inadvertent payment or the loss of a private key means that funds are irretrievable.

Moreover, stablecoins' borderless nature poses significant challenges to national regulatory frameworks, making it difficult to manage cross-border risks effectively. Some jurisdictions, such as the European Union, Japan and Singapore, require stablecoin issuers to obtain authorisation from supervisory authorities and establish locally incorporated entities.[34] This approach helps to place unregulated, overseas-issued stablecoins outside the regulatory perimeter, thereby minimising the risks they may pose. Still, without international coordination regulatory gaps could arise, particularly in jurisdictions with limited oversight capacity.

Notwithstanding the challenges stablecoins present and their links to traditional markets, they have brought to the fore the value of technological development, most notably tokenisation. Making these functions available on a sounder footing could hold significant potential. The next two sections chart this path.

The promise of tokenisation

Tokenisation stands to be the next logical step in the evolution of money and payments. Tokens are not merely digital entries in a database. Rather, they integrate the records of the underlying asset with the rules and logic governing the transfer of that asset. Tokenisation enables the contingent performance of actions, meaning that specific operations are triggered when certain preconditions are met.

The canonical example of the contingent performance of actions is delivery versus payment (DvP). With DvP, the transfer of an asset is a precondition for payment, and vice versa. DvP can greatly enhance the efficiency of securities markets by reducing counterparty risk and removing the need for escrow and other mechanisms. It can also reduce the need for reconciliation and other post-trade operations. But beyond this, contingent actions can enable entirely new use cases, particularly by automating different types of financial transactions. Households and businesses can benefit from the contingent execution of actions. For example, businesses can better manage cash flows through DvP. Efficiencies in capital markets can increase the returns on household investments, for instance in their pension savings.

Recent proposals for a unified ledger provide a blueprint for the tokenised financial system of the future. The key elements of the blueprint are tokenised central bank reserves, tokenised commercial bank money and other tokenised claims on financial and real assets, brought together in a new type of financial market infrastructure. By providing an enhanced representation of money in the same venue as other claims, such a blueprint enhances the functionalities of money and other financial assets. The full benefits of tokenisation can be harnessed in a unified ledger through settlement finality in central bank reserves.

A unified ledger transforms intermediary interaction by addressing frictions in standard transactions like cross-border payments. By combining programmability and transaction bundling ("composability"), it integrates and automates sequences of financial transactions. This eliminates delays and reduces manual interventions and

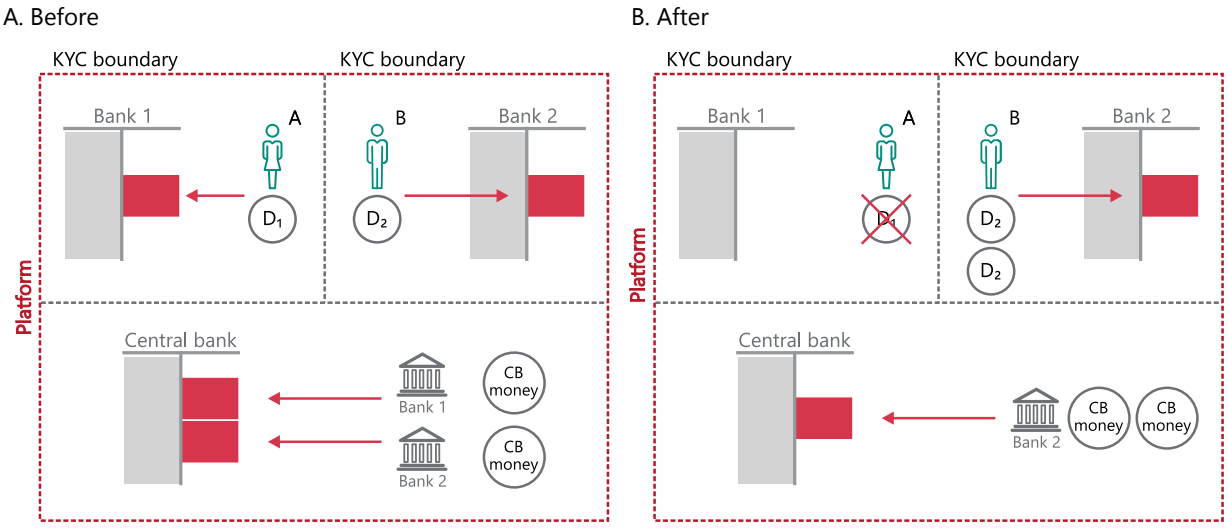
reconciliations arising from the traditional separation of messaging, clearing and settlement. Instantaneous settlement in central bank reserves reduces credit risk and ensures the singleness of money and payment finality. Tokenisation further enhances this system by enabling seamless integration of trading activities, such as pre-trade collateral verification and post-trade payment flows, into single automated actions. Tokenisation enables the creation of new contracting outcomes, such as an insurance contract triggered by predefined conditions, transferring the ownership of collateralised assets without manual intervention. Such innovations streamline processes and create new financial instruments. Much like the unforeseen growth of smartphone app ecosystems, the financial system's evolution will be limited only by the creativity of developers building on this foundation.

Tokenisation of the two-tier monetary system

Tokenised money allows for a sea change in the monetary and financial system. Today, even a simple domestic payment is made up of several operations involving intermediaries at distinct stages. Tokenisation enables the joint execution of three previously separate steps: the debiting of the payer's account, the crediting of the receiver's account and settlement on the central bank balance sheet. This allows for atomic settlement (ie synchronous exchange of assets, such that the transfer of each occurs only upon transfer of the others) and other new functions, while removing the need for separate messaging and reconciliation. And it does so while preserving the core features of the two-tier monetary system.

A simple example illustrates this possibility, using tokenised commercial bank money issued by commercial banks on a programmable platform. In this example, the platform enables atomic settlement of all components of a domestic payment. Graph 4 shows how tokenised commercial bank money can be used for domestic payments.[35] Panel A shows the situation before a payment is made from person A (Maria) to person B (Sven). Maria banks with Bank 1, and Sven with Bank 2. Three partitions (indicated by grey dotted lines) represent the respective domains of a unified ledger maintained by the two private tokenised money issuers and the central

Domestic payment using tokenised commercial bank deposits — Graph 4



CB = central bank; D = tokenised deposit; KYC = know your customer.

Source: Adapted from Garratt and Shin (2023).

bank. Ownership of claims is denoted with red arrows. Graph 4.B illustrates a payment from Maria to Sven. The token previously held by Maria (D1) is deleted, and Bank 2 issues a new token (D2) to Sven. Deleting and creating private money tokens entails a corresponding movement of central bank reserves in the central bank's partition. Both central bank reserves ("CB money") tokens belong to Bank 2 in Graph 4.B. Central bank reserves can be transferred, as both commercial banks have accounts at the central bank.

A central feature of this model is that no new credit exposures are created across institutions. Payments between individuals simply alter the balance sheets of their banks, which then settle in central bank reserves. Unlike bearer instruments such as stablecoins, there is no transfer of private liabilities. Settlement in central bank reserves ensures that the wholesale portion of the payment is executed at par and singleness is respected.

Singleness between private tokenised money and cash would be supported in the same way it is now for commercial bank deposits. This requires that all private tokenised money issuers comply with the same regulatory standards and have access to the same safeguards (including access to the lender of last resort). Singleness between the private tokenised money issued by non-banks (eg e-money) and cash could also be maintained under the proper arrangements. Broader access by non-bank financial institutions to central banks' balance sheets, coupled with proper regulation and supervision, would help promote competition and greater financial inclusion.

Tokenisation and next-generation correspondent banking

Separating messaging, reconciliation and settlement creates additional frictions in international payments. Cross-border transactions require not only domestic but also international messaging systems. Differences in operating hours and/or holidays and inconsistencies across operating systems can cause delays, increasing settlement risk.[36] Errors may remain undetected longer, increasing resolution costs and operational risk.

To understand and address these inefficiencies, it helps to examine how cross-border transactions work today. Most rely on correspondent banking, where commercial banks transact through a network of so-called nostro and vostro accounts. Sending a cross-border payment involves no movement of any physical or digital object. Instead, intermediaries in different jurisdictions make a series of account updates. Specifically, the payer's bank sends the payment instruction to another bank in the home jurisdiction with a correspondent banking relationship with a bank in the payee's jurisdiction. The correspondent bank, in turn, sends the instruction to the payee's bank. Each step involves separate account updates. Since different fiat currencies are involved, no single settlement asset can be used throughout the transaction chain.

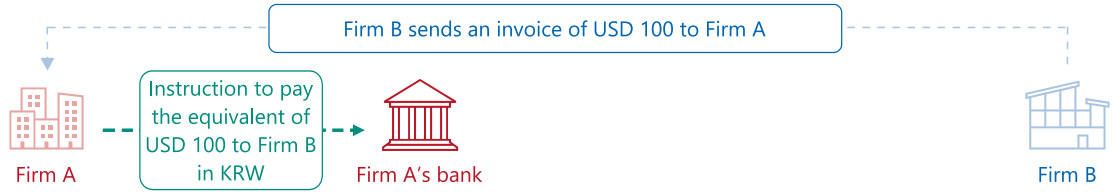
Graph 5.A provides an illustrative example.[37] Firm A, a US manufacturer, receives a 100 US dollar (USD) invoice from Firm B, its Korean supplier. Firm A instructs its bank to process the payment. If Firm B has a US bank account, the process is straightforward: the payer's bank debits Firm A's account, the payee's bank credits Firm B's account, and the central bank (the Federal Reserve) settles between the two banks by transferring reserve balances.[38] However, if Firm B requires the payment in Korean won (KRW) in its Korean bank account, the process becomes more complex, involving foreign exchange conversion and cross-border settlement.

Graph 5.B shows how correspondent banks enable cross-border payments. Firm A's bank pays USD 100 to its correspondent bank, a domestic transaction settled via the Federal Reserve, increasing the correspondent bank's reserve balance by USD 100. The correspondent bank credits the Korean bank's account with USD 100, which the Korean bank confirms before crediting Firm B's account in KRW. Importantly, no money moves across borders; settlement in central bank reserves

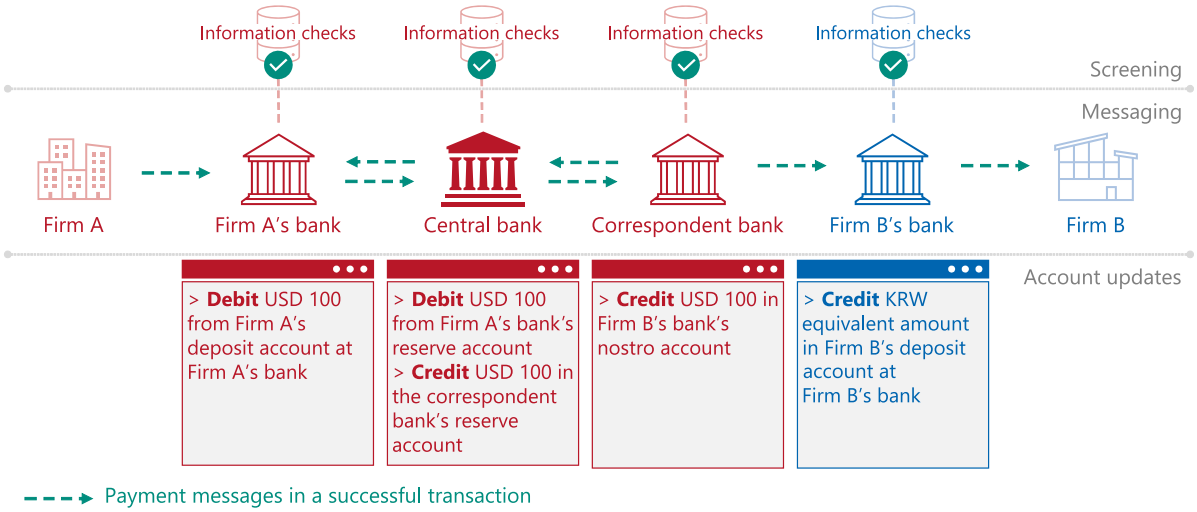
Correspondent banking and balance sheet updates

Graph 5

A. Cross-border payment entails bridging the gap between the payer's and payee's banks



B. Correspondent banking bridges the gap through messages and balance sheet updates



Source: Garratt et al (2024).

occurs entirely within the United States. Coordinating these balance updates requires multiple message exchanges.

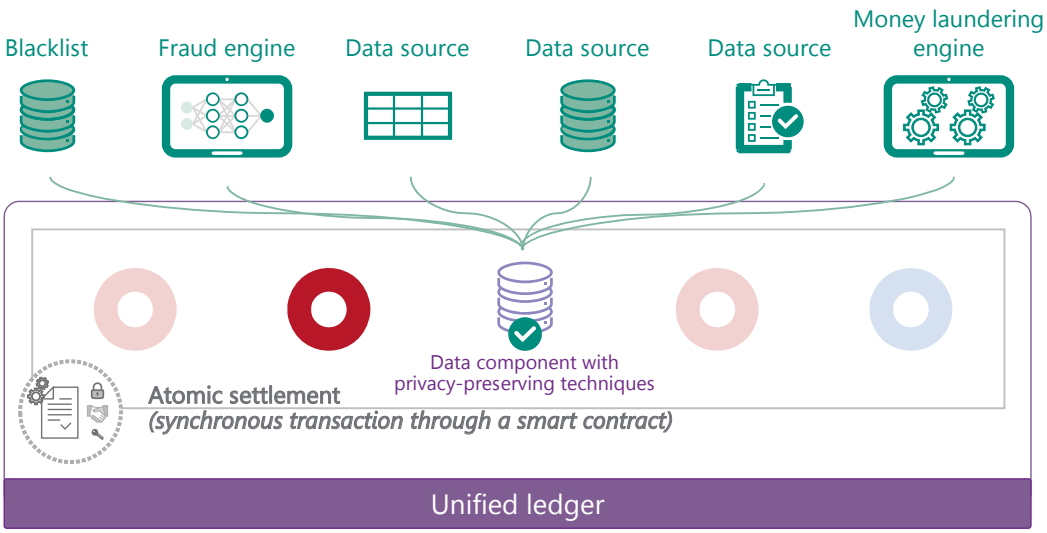
A next-generation correspondent banking system would leverage tokenisation and the unified ledger to streamline the sequential nature of cross-border payments. Such a platform brings together tokenised forms of central bank and commercial bank money to perform all critical functions involved in cross-border payments, including payment instructions, settlement and post-transaction monitoring. It would require flexibility from the outset to accommodate different jurisdictions' needs and regulatory approaches. At the same time, it would need to ensure sufficient harmonisation to achieve composability and atomic transactions.

A unified ledger for correspondent banking would harness three new capabilities.

First, it would merge payment instructions and account updates into a single transaction. Leveraging the programmable nature of the unified ledger (Graph 6), all parties in a cross-border transaction would collaborate to gather the necessary data for payment execution and perform account updates. Instead of relying on separate systems to exchange information through messaging networks, a single set of contingent transactions, represented by composable smart contracts, would be executed to initiate the payment.

Second, the platform would settle all the steps in the payment atomically rather than sequentially. When several intermediaries are involved, either all accounts are updated as an atomic transaction or none are. Transactions require approval from all parties before settlement, including pre-screening AML/CFT checks. Only after

AML/CFT compliance in next-generation correspondent banking Graph 6



Source: Garratt et al (2024).

collecting payment data and securing necessary approvals does atomic settlement take place. While data collection guarantees that the relevant parties to a transaction are properly identified, atomic settlement eliminates the risks associated with partial or failed transactions. This feature enhances trust and reliability, particularly in scenarios involving multiple parties.

Third, the platform would make available platform resources to enhance AML/CFT compliance and promote "integrity by design". Parties to a transaction could collaborate on the platform to gather and utilise information needed for pre-screening and post-transaction monitoring. Screening for sanctioned individuals often encounters the challenge of false positives, which can occur when someone has the same name or similar identifying details as a sanctioned person. Supervised AI can analyse historical transaction patterns to address this issue of false positives to differentiate genuine matches from errors.

Enhancing AML/CFT efforts to identify suspicious networks and illicit fund flows can be achieved through two distinct approaches. One involves centralising transaction data within a secure infrastructure. Here, the unified ledger would contain the entire network of transactions. The other adopts a more decentralised model using federated learning, where local data are analysed and only aggregated information is shared, preserving privacy and supporting data sovereignty.[39] The latter method has been explored in initiatives like Project Aurora,[40] which aims to enable cross-border collaboration while respecting jurisdictional data requirements.

In strengthening AML/KYC compliance, next-generation correspondent banking builds on innovations in compliance technology. The BIS Innovation Hub has explored pre-screening capabilities, showcasing the potential to encode jurisdiction-specific policies and regulatory requirements within a unified protocol for cross-border applications. Project Mandala is one example.[41] In next-generation correspondent banking, further efficiency can be achieved by embedding pre-screening checks directly into the payment instruction and compliance reporting capabilities through AI agents (Box B).

Notwithstanding the benefits, any platform underpinning next-generation correspondent banking must grapple with governance and data management

Box C

Considerations for the technical architecture of a unified ledger

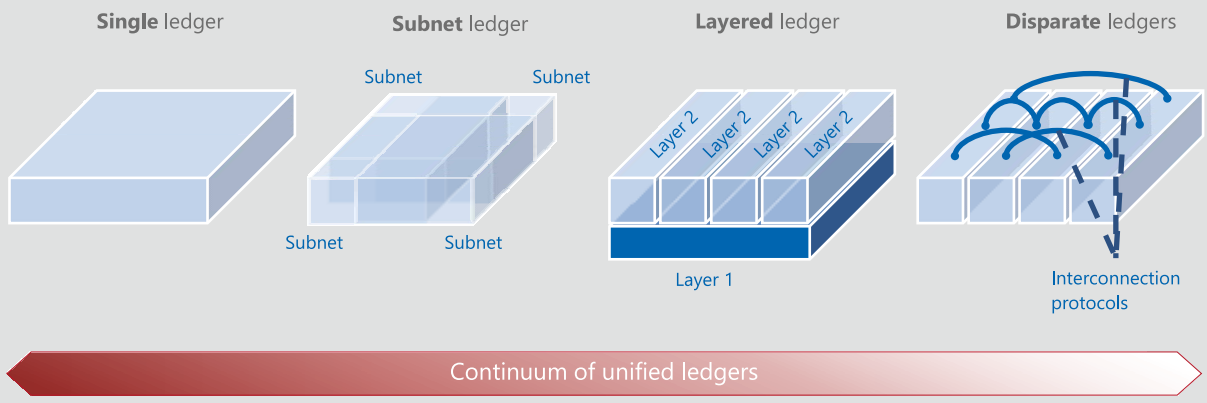
At a high level, the technological architecture for a DLT-based unified ledger can be represented on a "continuum of unification". This ranges from a single distributed ledger architecture on one end to a coupled set of disparate ledgers on the other. In between these options sit two alternative architectures, subnet ledgers and layered ledgers, which aim to combine elements of both (Graph C1). The choice of architecture for a unified ledger depends on its use case (eg securities settlement or cross-border payments) and the associated requirements around programmability, composability, governance and data localisation.

The ends of the continuum of unification highlight the main trade-off between autonomy and composability in the architectures. Single ledgers are suitable when foundational requirements for data and governance are uniform, allowing for efficient programmability and composability. A single ledger is like a mobile phone, where applications interact seamlessly in one operating system. In contrast, an architecture of disparate ledgers is justified when there are diverging requirements around data and governance (eg different jurisdictions or asset classes). However, this flexibility introduces more complexity for cross-ledger coordination via interconnection protocols to achieve programmability and composability. Disparate ledgers are akin to applications (eg instant messaging systems) running seamlessly on different independent mobile phone operating systems.

The intermediate options in the continuum seek to strike a balance between autonomy and composability. A subnet ledger architecture is a set of overlapping subnetworks within a common primary network. These subnetworks can partition users into one or more subnets based on various attributes, such as jurisdiction, asset class and preferred transaction processing rules. The primary network ensures consistency to enable programmability and composability across subnets, while the varying subnetworks accommodate diverging data and governance requirements. A layered ledger architecture is a hierarchical arrangement of ledgers, each with distinct functionalities. The common base layer, layer 1 (L1), connects multiple layer 2 (L2) ledgers. The L1 anchors cryptographic proofs of transactions in the L2s. This imposes minimal requirements on the L2s and allows each L2 to operate autonomously. The L1 provides common settlement between L2s, while programmability and composability remain independent. A layered ledger architecture allows for diverging data and governance, leveraging different L2s, while maintaining uniformity of settlement (eg cross-jurisdictional or multi-asset transactions).

The range of options on the continuum of architectural choices for a unified ledger underscores the trade-off between composability and programmability on one side, and data management and governance autonomy on the other. The choice ultimately depends on the use case. In Project Agorá, where various jurisdictions are involved, the trade-offs between autonomy and composability require careful consideration.

The choices of architecture for a unified ledger lie along a continuum — Graph C1



Source: BIS.

imperatives. These involve two key principles. First, central banks must retain final say over access to their payment balances, and hence over the use of their currency. Having final say entails, among other things, keeping control of how their balance

sheet is accessed in any transaction. Therefore, policies on access to central bank settlement accounts are critical. Second, data should be managed consistently with proper governance arrangements. This includes respecting the constraints of legal frameworks across jurisdictions.

Technological choices for the platform therefore depend on the governance imperatives. Unlike the case of purely domestic payments, monetary control and data governance loom large as key concerns in the international context – especially with several central banks (each with its own currency) and stringent data governance requirements for each jurisdiction. This is even more pressing in cases involving multiple asset classes and, thus, multiple financial sectors and their regulators in different jurisdictions.

Data protection is critical for designing unified ledgers, especially for applications across borders. Data protection laws differ across jurisdictions, with the most stringent policy choices requiring data to be physically stored within the jurisdiction. In such cases, cryptographic techniques are unlikely to be sufficient to assuage concerns about data protection and location. Architectural options for unified ledgers can be placed on a continuum ranging from a single shared ledger at one extreme to separate ledgers connected through bridges at the other (Box C). The choice along this continuum will need to balance the benefits of a centralised design for ease of programmability against the governance requirements towards some degree of separation between domains on the ledger.

Project Agorá is a concrete example of next-generation correspondent banking. It brings together tokenised central and commercial bank money from seven jurisdictions. In addition to seven central banks, it includes 43 regulated financial institutions and is thus a hallmark of public-private joint experimentation on money and payments.[42] The project concluded its conceptual phase and is moving towards the building phase of a prototype.

Data and governance considerations will be a key factor in the choice of architecture in Project Agorá, given the breadth of approaches across the various jurisdictions. More specifically, some level of distributed governance and data needs to coexist with a unified approach for transactions involving multiple parties. Governance requirements, particularly around data access, suggest the use of a permissioned DLT platform that can implement the appropriate level of controls.

Importantly, the project builds on the foundations of the existing financial system, while innovating on the technology. It maintains the established roles of institutions such as central banks and commercial banks, ensuring the benefits of the two-tier system. Money in Project Agorá passes the three tests outlined above. Central bank reserves and commercial bank deposits would remain unchanged from today.

Beyond money: tokenisation of government securities

A unified ledger marks a transformative step in modernising payment systems and revolutionising securities markets. It does so by uniting the components of a financial transaction – money and assets – in the same venue. In this system, financial claims become "executable objects" transferable through programming instructions. At its core is a trilogy of tokenised central bank reserves, tokenised commercial bank money and tokenised government bonds, forming the backbone of a tokenised financial system. Central bank reserves ensure trust and settlement finality, acting as the ultimate monetary anchor. Together with central bank reserves, commercial bank deposits ensure the singleness of money and the elasticity needed to support the real economy. Finally, government bonds serve as the benchmark safe assets,

underpinning financial markets and enabling collateralised transactions essential for liquidity, risk management and monetary policy operations.

Sixty years ago, purchasing a security or using it as collateral required a physical certificate. Interest payments involved literally clipping off pieces of the physical certificate (coupons). Transactions settled in five days.[43] While this system functioned for decades, the growing scale of securities markets made physical settlement impractical and risky. This led to electronic bookkeeping at central securities depositories (CSDs) and settlement across electronic books at securities settlement systems. The process first involved "immobilising" securities by securely storing the physical certificates in a central location and creating electronic records. They were then "dematerialised", meaning that physical certificates or documents of title were eliminated, so that securities existed solely as accounting records. These records were governed by a legal framework ensuring ledger updates reflected ownership changes.

Today, securities trading and settlement involve a complex web of intermediaries, messaging instructions, reconciliation efforts and money flows. CSDs provide securities accounts, central safekeeping services and asset services for securities either directly or through custodians. Buyers and sellers rely on brokers to initiate trades and custodians to settle and hold securities. The separation of trading and settlement exposes parties to replacement cost risk during the settlement cycle, which can take up to two business days. Verifying account holder identities and reconciling transactions with clearing agents adds further complexity.

A unified ledger could simplify securities settlement by hosting tokenised money and securities on a shared programmable platform. Contingent execution of actions would allow atomic payment and ownership transfer, reducing risks and costs associated with separate ledgers. With nearly $80 trillion in outstanding amounts of government bonds, even modest efficiency gains could yield significant benefits.

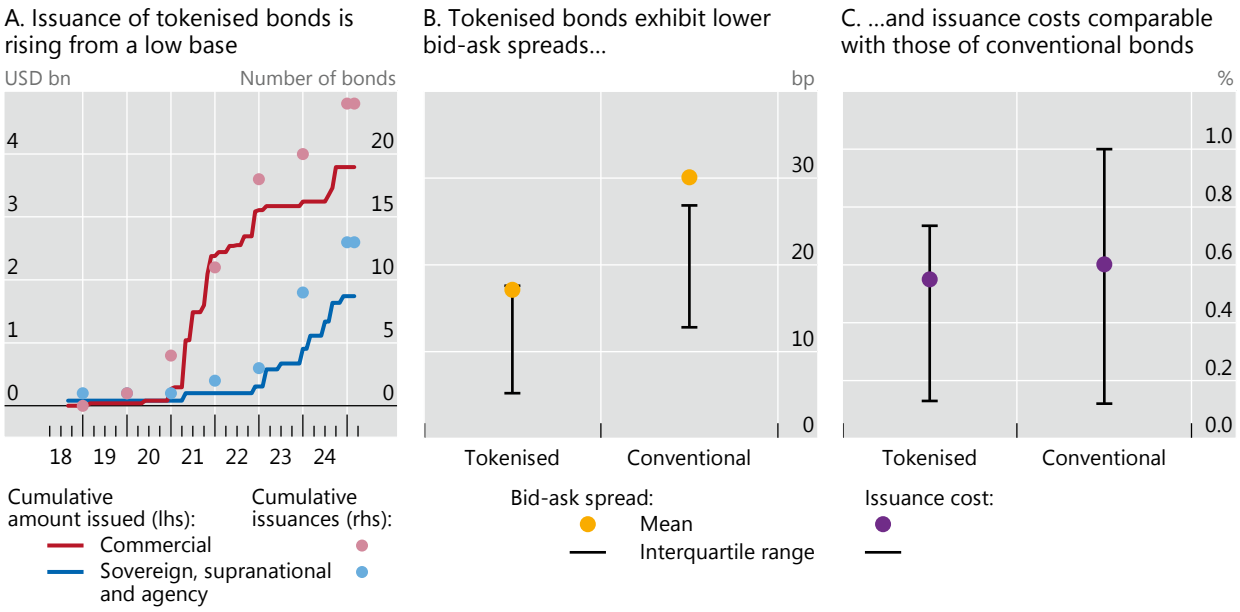
Securities markets are especially fertile ground for harnessing the capabilities of the contingent performance of actions enabled by tokenisation. In a unified ledger, complex collateral operations could be automated, enabling participants to issue programming instructions without account manager intervention. Collateral transfers, for instance, could include continuous verification of counterparty collateral criteria, such as eligibility to satisfy margin calls. Through atomic settlement, the simultaneous execution of delivery and payment can mitigate principal risk and expand the scope of DvP arrangements. In particular, it can reduce counterparty dependencies and accelerate reconciliation and confirmation times.[44]

There are different possible approaches to tokenising government securities. These build on existing financial infrastructure to varying degrees. One implies tokenising securities which reside with CSDs off-platform. In this case, the holder of the token has a claim on the immobilised asset at the CSD, with many of the asset servicing functions remaining embedded in the existing infrastructure. However, leveraging the full benefits of tokenisation requires including "native" assets that are both issued and reside on the platform. Departing from existing infrastructure, this enables full use of the platform's programmable features, such as automated servicing (eg interest payments, valuation) or instantaneous transfer of collateral to creditors in case of borrower defaults.

The tokenisation of government bonds is still in its infancy but has been gaining momentum in recent years (Graph 7.A). Several sovereigns, supranationals and agencies (SSAs) have issued tokenised securities. To date, more than 20 tokenised SSA bonds have been issued, amounting to over $4 billion across nine different currencies. While most issuers have used private permissioned DLT, some have explored alternative technologies.[45]

Despite being in an experimental phase, initial evidence suggests that tokenised bonds have issuance costs and liquidity like those of conventional bonds, with

Government bond markets are a growing focus of tokenisation initiatives[1] Graph 7



[1] See endnotes for details.

Source: Aldasoro et al (2025b).

liquidity potentially improving. A comparison shows tighter bid-ask spreads for tokenised bonds (17 basis points versus 30 basis points) and no significant differences in issuance costs (Graphs 7.B and 7.C).[46] While liquidity and cost do not appear to be barriers, legal and regulatory uncertainty and limited market experience remain challenges. These can be addressed through regulatory reforms and will probably diminish as market participants gain more experience with tokenised bonds.

Markets for repurchase agreements ("repos"), where government bonds are a key collateral source, are the next natural setting to apply the tokenised trilogy. Repos are borrowing arrangements where one party sells securities (as collateral) to another party, with an agreement to repurchase them at a specified price and date in the future (eg a day or week ahead). They are heavily used to invest or raise cash at short notice and help support liquidity in the underlying securities markets.

A key advantage of tokenised repos lies in their ability to facilitate intraday transactions by enabling instant transfer of collateral simultaneously with the payment. Such functionality, largely absent in conventional repo markets, can reduce risks and support financial institutions' liquidity management, eg meeting intraday margin calls. Margin calls have become increasingly significant due to more prevalent margin requirements. Given the size of the repo market and the critical role repos play in funding and liquidity management, even small efficiency improvements could translate into substantial cost savings.[47] Accordingly, industry and public initiatives have been exploring ways to make use of programmability to enhance automation, speed and efficiency beyond what traditional repo transactions offer.[48]

Central banks have started to explore tokenisation's potential and implications for their operational frameworks. The aim is to shape future market design while keeping up with technological developments. Many initiatives build on central banks' expertise in cross-border cooperation, as facilitated and supported, for instance, by the BIS Innovation Hub. A prime example of cooperation is Project Promissa. It shows how traditional paper-based governmental promissory notes – used eg in member

states' funding of multilateral development banks – could be turned into tokenised assets issued on a DLT platform.[49] This would sidestep time-consuming and error-prone manual handling of promissory notes and frequent reconciliation requirements, streamlining the notes' entire life cycle from issuance to payment and archiving. These features would enhance transparency and robustness, enabling secure multiparty collaboration while preserving all participants' ownership, control and decision-making authority.

At a broader scale, the prospect of a tokenised trilogy could significantly shape monetary policy implementation. As discussed below, initial findings from experimental applications suggest that gains are tangible for market participants, central banks and the system as a whole – generating benefits that can be passed on to end users of financial services.

Assessing the benefits of a tokenised financial system

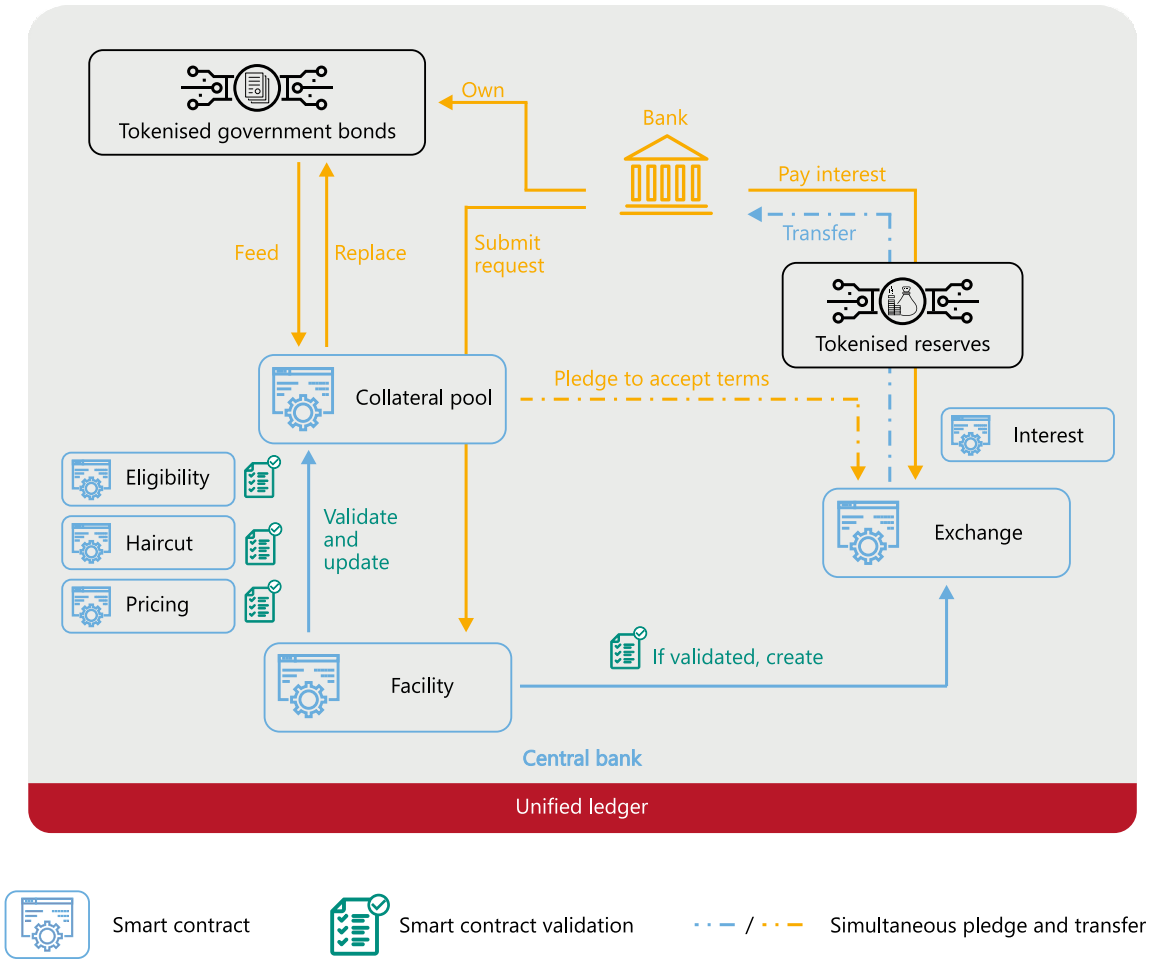
Project Pine, a joint initiative of the New York Federal Reserve and the BIS Innovation Hub, illustrates the potential benefits of a fully tokenised financial system.[50] The project shows, in a simulated setting, how monetary policy implementation could be carried out when central bank reserves, commercial bank deposits and other financial assets are tokenised. By using smart contracts on a programmable platform, central banks can calculate, accrue and pay interest, and exchange tokens to create the facilities that create or absorb liquidity in the wholesale financial system today.

In this setup, a tokenised repo transaction as part of the central bank's monetary policy operations could take the form shown in Graph 8. For example, banks needing liquidity could request tokenised reserves and pledge tokenised collateral (eg government bonds). They could do so through a collateral pool contract as part of the central bank's standing facility. The central bank's facility contract would validate the request by checking the bank's access rights, the eligibility of the collateral and its post-haircut value, using dedicated smart contracts that interact with each other. Upon approval, the central bank would establish an exchange contract for the repo that locks the collateral in the collateral pool contract for the duration of the transaction. It would transfer the tokenised reserves to the bank instantly. While the repo exchange contract is active, pricing contracts would continuously update the market value of pledged collateral and eligibility. If the central bank made any changes, haircut contracts could adjust values. If the bank wanted to change its collateral during the repo, it could do so, assuming there was sufficient value. At maturity, banks would repay the reserves with interest, triggering the release of the collateral.

This example illustrates how tokenisation could offer flexibility and speed in monetary policy operations. Smart contracts enable central banks to instantly create and adjust their tools (eg deploy new facilities, adjust parameters like interest rates or collateral requirements). The availability of standardised and consolidated unified ledger data, protected by effective privacy measures, could unlock even more benefits. For example, combining a view of market participants' financial positions in real time with the flexibility and speed provided by smart contracts could enhance central banks' capacity to respond to adverse market shocks, such as sudden shifts in liquidity demand.

Tokenisation could also improve operational efficiency and promote automation in back office tasks. For example, Project Pine automated collateral management and interest accrual on reserves. Today, many central banks publish collateral eligibility and haircut schedules in PDF or Excel files. Integration into smart contracts effectively combines the publication with the automated operational task of checking eligibility and applying the haircut transparently and efficiently. These efficiencies might bring staffing benefits, allowing more time to be spent on monitoring and policy evaluation.

Collateralised central bank lending in a tokenised environment Graph 8



Source: BIS.

And finally, as tokenised platforms could, in principle, operate continuously, smart contracts could support extended or even 24/7 market operations.

To be sure, the transition to a fully tokenised financial system is not without its challenges. Interoperability between existing account-based systems and emerging tokenised infrastructures must be ensured.[51] Changes to existing systems will be needed, including adjustments to booking and reconciliation processes or messaging standards.[52] Fragmentation across both legacy and new networks poses a key challenge in this context. Obstacles to collateral mobility are a case in point. The emergence of tokenised repo transactions, including intraday or multi-currency repo arrangements, adds to demands on sound collateral management.

Central banks and the official sector more broadly will need to coordinate industry efforts to promote sound innovation. The findings from Project Pine illustrate how central banks can play such a catalytic role, by supporting trust to encourage private sector participants to adopt tokenised systems with confidence in their reliability and the soundness of their governance. By offering tokenised central bank reserves and facilities, central banks could lay the foundation for the adoption of tokenised money and securities across financial markets. This could ensure that these arrangements align with public policy objectives such as financial stability and efficient monetary policy implementation.

Conclusions

Trust in money remains crucial for the economy's functioning, regardless of technological change. Money is the coordination device for the economy, subject to important network effects. The singleness of money sustains this coordination. Elasticity and integrity are further crucial features that ensure money is fit for purpose.

Technology offers many paths forward, but not all are equally promising. The issuance of private currencies like stablecoins satisfies a demand for new technological features. Yet even with regulation, stablecoins' limitations cast serious doubts about their ability to be the mainstay of the monetary system. There are better ways to meet the legitimate demand for new functions in the monetary and financial system. Innovation built on unified ledgers is promising, unlocking efficiency gains and new contracting possibilities. The tokenisation of central bank reserves, deposits and government securities could represent stepping stones towards the next-generation monetary and financial system.

To make this future a reality, central banks must play a catalytic role. Where new forms of money are demanded for a tokenised system, central banks have to be the ones providing them. More broadly, central banks can articulate their vision of the future monetary system to provide a guidepost for all stakeholders. They can also help align regulatory frameworks and standards to ensure interoperability across jurisdictions and minimise hurdles in coordination.[53] By fostering trust and public-private collaboration, central banks can also help ensure that unified ledgers are designed to meet the needs of diverse entities while upholding robust governance, resilience and compliance standards. Central bank leadership is essential to unlocking the full potential of tokenised systems safely, efficiently and inclusively.

The BIS is not just theorising but is working with central banks to develop these ideas. BIS Innovation Hub projects, including Agorá, Mandala, Pine and Promissa, demonstrate innovative technology's potential for the monetary and financial system. Central banks and private sector innovators are drawing on the lessons from this work to build the future financial system.

Endnotes

[1] On tokenisation, see Aldasoro et al (2023); on the unified ledger, see BIS (2023).

[2] Gridlock refers to a situation in which participants are each waiting for others to pay first. See Chapters 15–17 in Leibbrandt and De Teran (2022).

[3] The advent of cryptoassets, marked by the mining of the first bitcoin in 2009, was heralded as the start of a new era in money and payments. Bitcoin was conceived as a peer-to-peer payment system operating independently of central banks and trusted intermediaries. However, almost 20 years later, it is clear that it is not a currency in any meaningful sense. Unbacked cryptoassets are not widely used for payments nor do they serve as a unit of account. They are better understood as speculative assets, characterised by large price swings that attract investors in search of yield (Auer et al (2025)). These deficiencies have limited their utility and raised questions about their role in the financial system.

[4] While many users go through hosted wallets of a crypto exchange that are tasked with onboarding customers, much like a bank, it is also possible to access the crypto ecosystem directly through unhosted wallets (ie cryptoasset wallets where the user has complete control over their private keys and assets), widely available in smartphone app stores. Unhosted wallets give users direct access to the public blockchain without relying on an intermediary, with no KYC checks.

[5] Historical experience shows how central banks leading the way have helped the private sector in adopting new technologies – see Desch and Holden (2024) for a discussion of how the Federal Reserve promoted the adoption of new technologies in financial markets. In recent years, central banks have been piloting public-private initiatives to advance the tokenisation agenda. These include, among many others, Project Helvetia in Switzerland, exploring the settlement of tokenised assets using tokenised reserves; Project Guardian in Singapore, assessing the design of open and interoperable digital asset networks based on tokenised real economy assets; and Projects Genesis and Ensemble in Hong Kong SAR, studying the use of tokenisation for securities, including green bonds, and real-world assets.

[6] On the role of settlement at par, see Borio (2019). On money as a record of goods sold or services rendered in the past, see Kocherlakota (1998) and his timeless motto, "money is memory". On the role of common knowledge in sustaining coordination (in settings beyond money), see Morris and Shin (2012). On the no-questions-asked principle, see Holmström (2015). For a general discussion about the role of information sensitivity in financial crises, see Dang et al (2020).

[7] For the classic reference on this, see Bagehot (1873).

[8] In many jurisdictions, there is also a role for non-bank electronic money (e-money) as a complement to bank deposits. However, in most instances e-money issuers do not hold accounts at the central bank, but hold funds with commercial banks, which in turn have access to central bank reserves.

[9] Price stability is crucial given long-term nominal debt contracts, and even multi-year salary contracts, and the implied stability of associated purchasing power in real terms. The value of financial stability has been repeatedly demonstrated by its absence: in the severe economic and social costs of financial crises.

[10] See Carstens (2018) for an overview of the role of central banks in the age of digital money, and Borio (2019) for a broader discussion of the role of price and financial stability. For the critical role of central bank independence, see Carstens (2025). Bell et al (2024) discuss the importance of credible and sustainable fiscal backing. Amatyakul et al (2023) assess the contribution of central banks' monetary policy in containing the recent inflation surge.

[11] See BIS (2023).

[12] For the seminal work on decentralised trust, see Nakamoto (2008).

[13] This volatility does not reflect an expansion in their use as a payment network but rather a sharp influx of speculative funds driven by expectations of price increases. These funds are channelled mostly through centralised exchanges, which facilitate conversion between crypto coins and fiat currencies, creating a self-reinforcing loop that has contributed to rising crypto prices. Conversely, negative news, such as the collapse of major exchanges, has exerted downward pressure on crypto prices, leading to significant volatility. In this context, crypto has been driven primarily by speculative demand rather than its intended use as a peer-to-peer means of transferring value on a decentralised public ledger.

[14] In this regard, stablecoins resemble bearer instruments (see eg Garratt and Shin (2023)). For a discussion of the importance of liquidity considerations in the defence of promises of par convertibility, see Aldasoro et al (2024).

[15] See Aldasoro et al (2024) and Kosse et al (2023).

[16] See BIS-CPMI (2023) and Fernández-Villaverde and Sanches (2019).

[17] See BIS-CPMI (2023) for a discussion of cost reduction in cross-border payments. According to Chainalysis (2024), the average cost of sending a $200 remittance from sub-Saharan Africa is approximately 60% lower when using stablecoins compared with traditional remittance methods.

[18] See Garratt and Shin (2023) for a discussion of stablecoins as digital bearer instruments. Recently, several proposals have been offered that seek to promote singleness and achieve greater interoperability of blockchain-based systems. These include private, centralised custodians and clearing houses, and so-called bridges between different blockchains. These solutions require extensive trust in private custodians or the technical code supporting bridges. More generally, these solutions represent a return to the Free Banking Era of the 19th century United States, when local clearing houses emerged to ensure exchange at par for their members, eg Suffolk Bank and the so-called Suffolk System during 1825–58. On this, see Mullineaux (1987), Rolnick et al (1998) and Weber (2012).

[19] See Ma et al (2023) for an analysis of stablecoins as a combination of features of money market funds and ETFs. On looser definitions of singleness and a comparison with bank fees, see Bidder et al (2025). For an analysis of various instances of stablecoins' failure to sustain parity, see Ahmed et al (2025). Finally, on the importance of backstops, see Aldasoro et al (2024).

[20] In some sense, they are akin to a narrow bank; see Pennacchi (2012).

[21] See Banerjee et al (2025).

[22] See Blustein (2025) and Fishman (2025) for a discussion of geopolitics and payment systems.

[23] Stablecoins have been used as a funding vehicle for terrorist organisations like Hamas (Berwick and Talley (2024)). Moreover, stablecoins have been used to launder the proceeds of romance scams, in which a (frequently coerced) person targets victims through social engineering. See Chainalysis (2025).

[24] The alternative of remunerated reserves begs the question of why the central bank should subsidise such a business model.

[25] Doerr et al (2023) present evidence of how MMFs, important investors in US Treasury markets, can affect the yields of Treasury securities. Ahmed and Aldasoro (2025) provide evidence for stablecoins, including the asymmetric effects of positive and negative market developments. Aldasoro et al (2025a) compare the reaction of MMF assets and stablecoin market capitalisation to monetary policy shocks.

[26] See Awrey (2024).

[27] See FSB (2023a,b) for high-level recommendations on the regulation, supervision and oversight of cryptoassets and global stablecoin arrangements. See BCBS (2022, 2024) for prudential treatment of banks' cryptoasset exposures. See CPMI-IOSCO (2022) for the application of the principles for financial market infrastructures to stablecoin arrangements. At a general level, there are broadly three possible approaches available to authorities to address risks in the crypto ecosystem: bans, containment and regulation (Aquilina et al (2023)).

[28] For an overview of regulatory approaches, see Garcia Ocampo et al (2023).

[29] Examples include PayPal, Venmo, AliPay, WeChat Pay, Kakao Pay, Mercado Pago and various other fintech and big tech payment services. These can be regulated, depending on jurisdiction, as e-money, money transmission businesses or through other frameworks. Some non-bank PSPs simply perform payment initiation services; this is distinct from what is discussed here.

[30] A key difference is thus that stablecoins operate on permissionless blockchains. Today's non-bank, pre-funded PSPs generally operate without DLT.

[31] To be sure, there are fundamental differences in that MMFs are designed as investment products that offer interest income while stablecoins are primarily intended to facilitate payments and entry/exit into the crypto ecosystem and, accordingly, have not offered interest income so far. As such, regulatory frameworks for MMFs – which seek to avoid "breaking the buck" and financial stability risks arising from spillovers to other markets – have some relevance, but are not fully comparable. See Anadu et al (2023) and Aldasoro et al (2025a) for similarities and differences between MMFs and stablecoins.

[32] See Di Iorio et al (2024) for the description and results of the survey.

[33] The underlying rationale for regulation – based on known market failures – resembles that of traditional finance. But due to the unique features of crypto and stablecoins, some risks are more acute, implying a potentially more rigorous regulatory approach; see Aquilina et al (2025) and Cantú et al (2025). On the distinction

between requirements on asset composition and disclosures, see Ahmed et al (2025). On options for stablecoin regulation, see Goel et al (2025).

[34] The EU's Markets in Crypto-Assets Regulation requires issuers of e-money tokens to be authorised as either credit or electronic money institutions. Asset-referenced token issuers must have a registered office in the EU, and cryptoasset services may only be provided by legal entities with a registered office in a member state. The Monetary Authority of Singapore (MAS) mandates that stablecoin issuers meet regulatory requirements within Singapore to qualify as MAS-regulated stablecoins under the single-currency stablecoin framework. In Japan, the Payment Services Act restricts the issuance of electronic payment instruments to banks, fund transfer service providers and trust companies, as per guidelines from the Financial Services Agency.

[35] This passage draws on Garratt and Shin (2023).

[36] See CPMI (2022) and CPMI (2024).

[37] This example draws on Garratt et al (2024).

[38] The Clearing House Interbank Payments System (CHIPS) may play a role in the settlement by clearing and netting the transaction. CHIPS is a private, large-value payment system that facilitates the clearing and netting of US dollar payments between its participants. CHIPS processes payments through a real-time netting mechanism, where multiple transactions between participants are offset to determine a single net amount owed to or receivable by each participant. While CHIPS clears and nets the payments, ultimate settlement occurs at the Federal Reserve via the Fedwire Funds Service. This is because CHIPS uses a deferred net settlement (DNS) model, which requires participants to fund their net debit positions at the end of the day using their accounts at the Federal Reserve.

[39] See IFC (2025) for a more detailed overview on data access and sharing practices in the central banking community.

[40] See BIS (2024a).

[41] See BIS (2024c).

[42] The jurisdictions in Project Agorá are the Eurosystem, Japan, Korea, Mexico, Switzerland, the United Kingdom and the United States. See BIS (2024b).

[43] Until the 1920s, the settlement cycle for US securities was one day. In the late 1960s, due to the rising volume of transactions and resulting operational bottlenecks ("paperwork crisis"), the settlement time in US equity markets was actually increased – to up to five days. Physical certificates were prevalent until the 1980s or even 1990s in most jurisdictions.

[44] See Euroclear (2024) and Ledger Insights (2024).

[45] The number of tokenised bonds used for analysis differs, due to the availability of bond characteristics. See Aldasoro et al (2025b) for a detailed discussion.

[46] See Aldasoro et al (2025b). Leung et al (2023) find lower issuance costs, yields and bid-ask spreads for tokenised bonds against a matched sample of conventional

bonds. It is important to note that due to the limited take-up of tokenised bonds, the sample size is small, and matching of tokenised and non-tokenised bonds involves a number of assumptions.

[47] According to industry estimates, outstanding amounts of repos and reverse repos accounted for nearly €11 trillion in Europe at mid-2024 and $6.5 trillion in the United States at end-2024.

[48] See eg Chiapetta (2025) and Securities Finance Times (2025).

[49] A promissory note is a financial instrument with a written and signed commitment by one party to pay a specified sum of money to another over an agreed period. See BIS (2025) for further details on Project Promissa.

[50] See Federal Reserve Bank of New York-BIS (2025).

[51] See Bech et al (2020).

[52] Efforts are already under way to harmonise messaging standards across borders, for instance with the move to the ISO 20022 standard. These efforts become even more important as jurisdictions advance towards new tokenised systems.

[53] See eg Leong (2024).

Additional notes to graphs

Graph 1.A: As of 30 May 2025.

Graph 1.B: It includes 34 fiat-backed, 29 crypto-backed, 11 commodity-backed and nine algorithmic stablecoins.

Graph 3.A: Stablecoin T-bill purchases are the sum of T-bill holdings changes for Tether and Circle from December 2023 to December 2024.

Graph 3.B: Results from local projections measuring the impact of a $3.5 billion stablecoin inflow (about two standard deviations), computed by regressing five-day stablecoin flows on *h*-day-ahead three-month T-bill yield changes. Regressions also control for *h*-day-ahead and five-day T-bill, T-note and T-bond yield changes across various maturities, five-day log changes in bitcoin and ether, where *h* goes from zero to 30 days. Based on daily data from January 2021 to March 2025. For further details, see Ahmed and Aldasoro (2025).

Graph 3.C: Impulse response to a monetary policy shock scaled to contract the price of bitcoin by 10%. For more details, see Aldasoro et al (2025a). Stablecoin index corresponds to the sum of the market capitalisation of tether, USDC and dai.

Graph 7.A: Based on the subset of tokenised bonds with an available ISIN.

Graph 7.B: Based on a matched sample of conventional and tokenised bonds for the same issuer, currency of denomination and coupon type. Data as of 26 March 2025.

Graph 7.C: Based on a matched sample of conventional and tokenised bonds for the same issuer, currency of denomination and coupon type. The issuance cost is measured as the difference between the initial price offered to the public and the price paid by the underwriter to the bond issuer.

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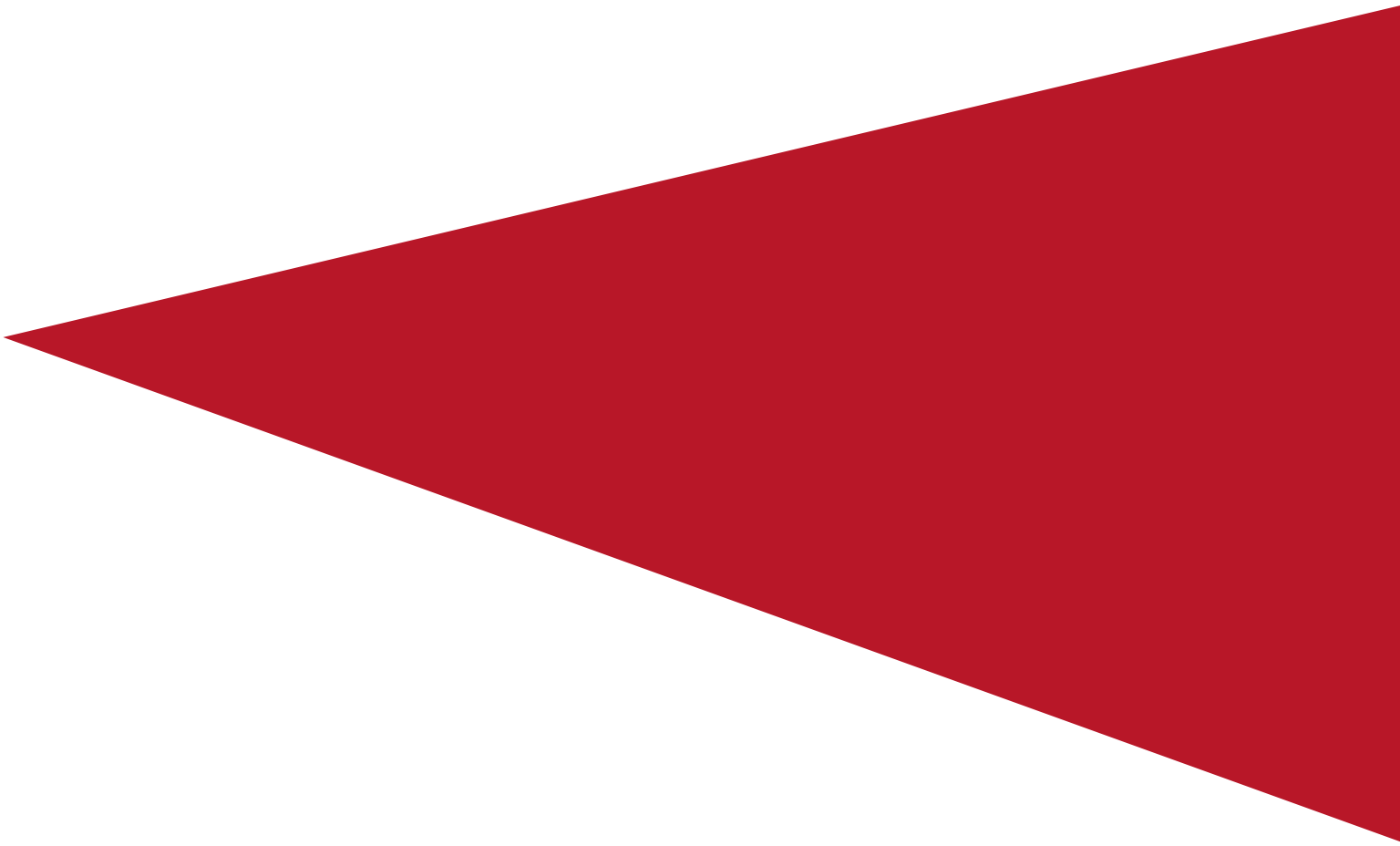

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