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International banking and financial market developments

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Monetary and Economic Department

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Articles

Notations used in this Review

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

Differences in totals are due to rounding.

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

Glossary

Back-to-back trade: A linked trade where the liabilities, obligations and rights of the second trade are exactly the same as those of the original trade or set of trades.

Bid-ask spread: The difference between the price a dealer receives for selling a security or currency (ask) and the price a dealer pays for buying a security or currency (bid).

Broker: A financial intermediary that matches counterparties to a transaction without being a party to it. A broker can operate electronically (electronic broker) or by telephone (voice broker).

Broker-dealer: A financial intermediary whose activities include acting as both broker and dealer in financial markets.

Cash-futures basis: The difference between the price of a cash bond (typically a government bond) and the price of the corresponding futures contract.

Central counterparty (CCP): An entity that interposes itself between the two sides of a transaction, becoming the buyer to the seller and the seller to the buyer and thereby ensuring the performance of the transaction.

Centralised limit order book (CLOB): A trading protocol whereby outstanding offers to buy or sell are stored in a queue and filled in a priority sequence, usually by price and time of entry. Orders to buy at prices higher than the best selling price and orders to sell at prices lower than the best buying price are executed. The use of a CLOB is common for highly standardised securities and small trade sizes.

CLS Group: CLS offers several services to facilitate risk management by FX market participants including CLSSettlement, which is a PvP system (see below) launched in 2002 and currently covering 18 currencies.

Credit default swap (CDS): A contract whereby the seller commits to repay an obligation (eg bond) underlying the contract at par in the event of a default. To produce this guarantee, a regular premium is paid by the buyer during a specified period.

Credit derivative: A derivative whose redemption value is linked to specified credit-related events, such as bankruptcy, credit downgrade, non-payment or default of a borrower. For example, a lender might use a credit derivative to hedge the risk that a borrower might default. Common credit derivatives include credit default swaps, total return swaps and credit spread options.

Cross-currency basis: The difference between the implied interest cost of borrowing one currency against another in the currency swap market, and the actual interest rate for borrowing that currency directly in the cash market.

Currency option: A contract that gives the buyer the right (but not the obligation) to purchase or sell a currency at an agreed exchange rate at or by a specified date.

Currency swap: A contract between two parties to exchange sequences of payments during a specified period, where each sequence is tied to a different currency. At the end of the swap, principal amounts in the different currencies are usually exchanged. In a cross-currency basis swap, the counterparties also exchange floating interest payments that are determined by fluctuations in reference rates denominated in the two currencies

Dark pool: A trading platform in which pre-trade transparency is deliberately limited, typically by withholding information about market depth or likely transaction price. Dark pools limit transparency to induce liquidity suppliers to offer greater quantities for trade.

Dealer: A financial intermediary that stands ready to buy or sell assets with its clients.

Derivative: An instrument whose value depends on some underlying financial asset, commodity or predefined variable.

Electronic communication network (ECN): A system for the electronic matching of buy and sell orders for financial instruments.

Electronic direct trading: Bilateral trade conducted electronically without the involvement of a third party. This includes trades conducted via single-bank trading platforms but also via direct electronic price streams with API connectivity.

Electronic indirect trading: Trade executed over an electronic matching system. This could include trades conducted via multi-dealer platforms, ECNs operating on a CLOB or dark pools.

Electronic trading: Trade execution via electronic systems (GUIs or APIs) rather than voice, including both direct bilateral channels and electronic venues.

Exchange-traded derivative (XTD): A derivative traded on an organised exchange, eg standardised options and futures.

Foreign exchange swap: A transaction involving the exchange of two currencies on a specific date at a rate agreed at the time of the contract's conclusion (the short leg), and a reverse exchange of the same two currencies at a date further in the future at a rate (generally different from the rate applied to the short leg) agreed at the contract's initiation (the long leg).

Forward contract: A contract between two parties for the delayed delivery of financial instruments or commodities in which the buyer agrees to purchase and the seller agrees to deliver, at an agreed future date, a specified instrument or commodity at an agreed price or yield. Forward contracts are generally not traded on organised exchanges, and their contractual terms are not standardised.

Forward rate agreement (FRA): An interest rate forward contract in which the rate to be paid or received on a specific obligation for a set period of time, beginning at some time in the future, is determined at contract initiation.

FX settlement risk: The risk that one party to an FX trade fulfils its obligation to deliver currency but does not receive the corresponding currency in return.

Gross credit exposure: Gross market value minus amounts netted with the same counterparty across all risk categories under legally enforceable bilateral netting agreements. Gross credit exposure provides a measure of exposure to counterparty credit risk (before collateral).

Gross market value: The sum of the absolute values of all outstanding derivatives contracts with either positive or negative replacement values evaluated at market prices prevailing on the reporting date. The term "gross" indicates that contracts with positive and negative replacement values with the same counterparty are not netted.

Hedge fund: An unregulated investment fund, including various types of money managers, such as commodity trading advisers, that share (a combination of) the following characteristics: often follow a relatively broad range of investment strategies that are not subject to borrowing and leverage restrictions (with many of

them therefore using high levels of leverage); often have a different regulatory treatment from that of institutional investors and typically cater to high net worth individuals or institutions; often hold long and short positions in various markets, asset classes and instruments; and frequently use derivatives for position-taking purposes.

High-frequency trading (HFT): An algorithmic trading strategy that profits from incremental price movements with frequent, small trades executed in milliseconds for very short investment horizons. HFT is a subset of algorithmic trading.

Institutional investor: A long-term investor such as a mutual fund, pension fund, insurance company, reinsurance company or endowment fund. Sometimes referred to as real money investors.

Interest rate option: A contract that gives the buyer the right (but not the obligation) to pay or receive an agreed interest rate on a predetermined principal at or by a specified date.

Interest rate swap (IRS): An agreement to exchange periodic payments related to interest rates in a given currency. Such payments can be for fixed against floating rates or for floating against floating rates (based on different floating rate indices).

Internalisation: A process whereby a dealer seeks to match staggered offsetting client trading flows on its own books instead of immediately laying off the associated inventory imbalance in the inter-dealer market.

London interbank offered rate (Libor): A benchmark rate for short-term unsecured borrowing among banks. Used as the floating rate for interest rate swaps before the benchmark reform.

Market-maker: A financial intermediary that stands ready to buy or sell assets by continuously quoting bid and ask prices that are accessible to other traders or registered participants of a trading platform.

Multi-bank trading platform: An electronic trading system that aggregates and distributes quotes from multiple FX dealers.

Non-deliverable forward: A contract for trading the difference between an agreed forward exchange rate and the spot rate at maturity, settled with a single payment for one counterparty's net profit.

Non-financial sector or customer: A sectoral classification that refers collectively to non-financial corporations, general government and households.

Notional amount outstanding: The gross nominal or notional value of all derivatives contracts concluded and still open on the reporting date.

Notional value: The value of assets underlying a derivatives contract at the spot price.

Official sector financial institutions: A sectoral classification that refers collectively to central banks, sovereign wealth funds, international organisations, development banks and other public financial agencies.

Offshore trading: Trading of an instrument denominated in a given currency reported by sales desks outside the respective currency area. For instance, US dollar offshore trading is global trading of US dollar instruments minus turnover in US dollar instruments reported by sales desks in the United States. This implies that cross-border trades in which one of the counterparties is located in the respective currency area are excluded from the offshore definition of trading.

Onshore trading: Trading of an instrument denominated in a given currency, where at least one counterparty is residing in the respective currency area (ie local counterparty). Trades of local reporting dealers with cross-border counterparties ("onshore-offshore" trades) are included in onshore trading.

Over-the-counter (OTC) market: Refers to bilateral trading between two counterparties which takes place outside an organised exchange. In contrast to exchange-traded derivatives.

Overnight index swap (OIS): An interest rate swap in which the floating leg is tied to an overnight rate index, such as SOFR in the United States or ESTR in the euro area.

Payment-versus-payment (PvP) systems: A system that eliminates FX settlement risk by ensuring that the final payment of one currency occurs if and only if the final payment of the other currency occurs.

Prime broker: An institution (usually a large and highly rated bank) that facilitates trading for its clients (often institutional funds, hedge funds and other proprietary trading firms). Prime brokers enable their clients to conduct trades, subject to credit limits, with a group of predetermined third-party banks in the prime broker's name.

Principal trading firm (PTF): A firm that invests, hedges or speculates for its own account. This category may include specialised high-frequency trading firms as well as electronic non-bank market-making firms. Sometimes referred to as proprietary trading firm.

Replacement-cost risk: The risk of loss of unrealised gains on unsettled transactions with a counterparty. The resulting exposure is the cost of replacing the original transaction at current market prices.

Reporting dealer: A bank that is active as a market-maker (by offering to buy or sell contracts) and participates as a reporting institution in the Triennial Central Bank Survey.

Request for quote (RFQ): A request for a price quotation from a trading platform member to another member. Systems for sending RFQs vary according to: whether the direction of the order (buy or sell) is revealed; how many and what kind of participants may receive a quote; and whether the quotes are executable or indicative.

Risk-free rate (RFR): They are benchmark interest rates designed to represent the cost of borrowing or lending over a specific period with minimal credit risk. Unlike traditional interbank offered rates (such as Libor), which were based on estimates of unsecured interbank lending rates, RFRs are calculated using actual transaction data from active and liquid overnight markets. These rates are considered nearly risk-free because they are derived from highly secure transactions, such as overnight loans or repos, and are largely insulated from credit and liquidity risks. RFRs have become the new global benchmark rates following the benchmark rate reform.

Sales desk: The unit of a dealer bank responsible for taking client orders and other aspects of client service and relationship banking.

Single-dealer trading platform: A proprietary electronic trading system operated by an FX dealer for the exclusive use of its customers.

Spot transaction: An outright transaction involving the exchange of two currencies at a rate agreed on the date of the contract for value or delivery (cash settlement) in two business days or less.

Trading desk: The unit of a dealer bank responsible for trade execution once client orders have been received.

Transaction: An economic flow that results in the creation, exchange, or extinction of financial instruments.

Turnover: The value of transactions within a given time period. In the Triennial Survey, daily average turnover is calculated as monthly turnover divided by the number of business days within the period.

Voice direct trading: Trade originated personally by phone, fax, email or other messaging system.

Voice indirect trading: Trade agreed by a voice-based method but intermediated by a third party (voice broker).

Abbreviations

Currencies

AED	United Arab Emirates dirham	KRW	Korean won
ARS	Argentine peso	LTL	Lithuanian litas
AUD	Australian dollar	LVL	Latvian lats
BGN	Bulgarian lev	MXN	Mexican peso
BHD	Bahraini dinar	MYR	Malaysian ringgit
BRL	Brazilian real	NOK	Norwegian krone
CAD	Canadian dollar	NZD	New Zealand dollar
CHF	Swiss franc	OTH	all other currencies
CLP	Chilean peso	PEN	Peruvian new sol
CNY (RMB)	Chinese yuan (renminbi)	PHP	Philippine peso
COP	Colombian peso	PLN	Polish zloty
CZK	Czech koruna	RON	Romanian leu
DKK	Danish krone	RUB	Russian rouble
EEK	Estonian kroon	SAR	Saudi riyal
EUR	euro	SEK	Swedish krona
GBP	pound sterling	SGD	Singapore dollar
HKD	Hong Kong dollar	SKK	Slovak koruna
HUF	Hungarian forint	THB	Thai baht
IDR	Indonesian rupiah	TRY	Turkish lira
ILS	Israeli new shekel	TWD	New Taiwan dollar
INR	Indian rupee	USD	US dollar
JPY	Japanese yen	ZAR	South African rand

Short-term interest rates

EONIA	Euro overnight index average	ESTR	Euro short-term rate
Euribor	Euro interbank offered rate	SOFR	Secured overnight financing rate
SONIA	Sterling overnight index average	Tibor	Tokyo interbank offered rate
TONA	Tokyo overnight average rate		

Countries

AR	Argentina	LT	Lithuania
AU	Australia	LV	Latvia
BG	Bulgaria	MX	Mexico
BH	Bahrain	MY	Malaysia
BR	Brazil	NO	Norway
CA	Canada	NZ	New Zealand
CH	Switzerland	PE	Peru
CL	Chile	PH	Philippines
CN	China	PL	Poland
CO	Colombia	RO	Romania
CZ	Czech Republic	RU	Russia
DK	Denmark	SA	Saudi Arabia
EE	Estonia	SE	Sweden
GB	United Kingdom	SG	Singapore
HK	Hong Kong SAR	SK	Slovakia
HU	Hungary	TH	Thailand
ID	Indonesia	TR	Turkey
IL	Israel	TW	Chinese Taipei
IN	India	US	United States
JP	Japan	ZA	South Africa
KR	Korea		

Volatility challenges risk-taking

The risk-on mood that prevailed for much of the review period[1] in global financial markets faced mounting challenges from spells of market volatility. These coincided with broader policy uncertainty amid growing concerns about an economic slowdown and unease around stretched equity valuations. Yet despite some retrenchment, valuations of risk assets remained at historically elevated levels, prompting questions about the consequences of any swing in investor sentiment.

The artificial intelligence (AI)-related boom in equity prices continued to shape financial market developments. Large cap technology stocks continued to outperform for much of the review period, buoyed by strong earnings. However, they showed signs of retrenchment towards the end of the period due to greater investor wariness about stretched valuations. Japanese stocks rallied following political changes, which raised expectations of an expansionary fiscal stance. European stocks similarly benefited from positive sentiment. Equity prices in emerging market economies (EMEs) rallied and in many cases posted larger gains than in advanced economies. Nevertheless, the positive tone was punctuated by episodes of volatility.

Credit markets were mostly unswayed by equity market volatility. Credit spreads remained compressed, even if some cracks started appearing in the weakest segments of credit markets. Following highly publicised defaults in October, leveraged loan spreads edged up, with some spillovers to investment vehicles providing credit via private markets. Yet these tremors proved short-lived and did not lead to any impairment of primary corporate credit markets.

Expectations of future monetary policy easing helped to keep long-term rates in check and provided a cushion to risk asset valuations. While the Federal Reserve cut rates twice, a lack of hard data due to the US government shutdown injected some uncertainty over the policy path ahead. Nevertheless, weakening labour markets and a restrained outlook for inflation led market participants to anticipate further cuts in the medium run. Amid upward pressure on repo rates and volatility in money markets, the Federal Open Market Committee (FOMC) announced that it planned to halt its balance sheet reduction in December. After having cut their policy rates at an earlier stage, other major central banks stayed on hold, but signalled readiness to provide support should economic conditions deteriorate. These developments were reflected in largely stable longer-term bond yields across many jurisdictions, despite growing strains on fiscal balances.

In the early part of the review period, gold prices surged in parallel with other risk assets. This is at odds with the historical pattern of lacklustre gold performance during risk-on phases. Appetite for precious metals may underscore market participants seeking at least some safe asset exposure in the event that things turn sour. But part of the surge can also be traced to investors trying to take advantage of the momentum in search of price appreciation, consistent with elevated risk-taking.

The US dollar halted the downward path it had entered in April and recovered some ground. It appreciated vis-à-vis major advanced economy currencies – and especially so against the Japanese yen and other Asian currencies, while depreciating against Latin American ones.

[1] The review period covers 5 September to 28 November.

Key takeaways

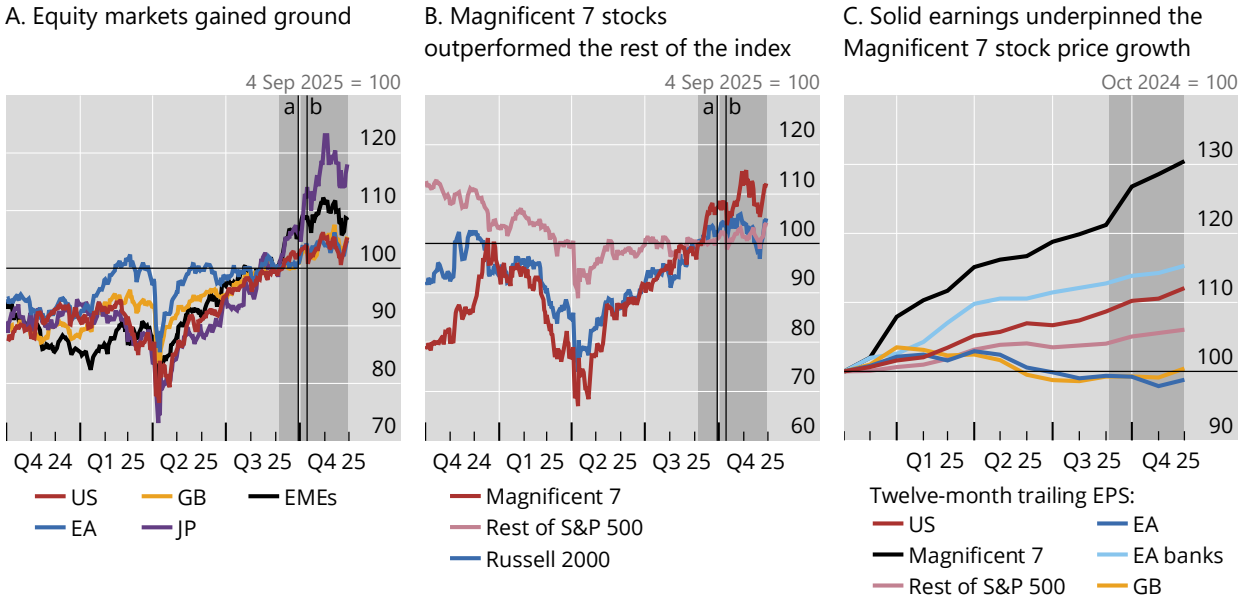
- *Strong risk sentiment and expectations of policy easing supported risk assets, but growing wariness and higher volatility increasingly challenged the risk-on mood.*
- *Despite some tensions in US money markets and lingering fiscal concerns in some countries, bond yields moved sideways amid expected monetary easing.*
- *Emerging market economy assets weathered the trade tensions and benefited from benign investor risk sentiment.*

Risk assets held ground despite growing concerns

Over the review period, investors' risk appetite was challenged by bouts of volatility ignited by renewed trade conflicts, mounting concerns about stretched valuations in parts of the equity market and fiscal woes in certain jurisdictions. That said, the risk-on mood proved resilient, hence risk asset valuations remained elevated, and tech stocks even posted additional gains.

The buoyancy in equity markets that characterised the last review period broadly carried over, even as concerns about a potential overvaluation of US tech stocks grew and resulted in higher volatility. Strong risk appetite, aided by solid earnings, propelled US equity markets to new all-time highs (Graph 1.A, red line). European equities also rallied, in lockstep with their US counterparts, despite weaker earnings

The rally in equity markets continued[1] Graph 1



EPS = earnings per share.

The shaded area indicates 5 September–28 November 2025 (period under review).

[a] First Brands bankruptcy (29 September 2025). [b] US-China tariff escalation (10 October 2025).

[1] See endnotes for details.

Sources: Bloomberg; LSEG Datastream; LSEG Workspace; BIS.

growth (blue line). Japanese equities saw a particularly strong rise (purple line), boosted by political developments and their overall attractiveness to international investors. Towards the end of the review period, global equity prices underwent a correction amid spells of volatility, but nevertheless posted gains compared with the beginning of the review period. Most major EME equity indices also gained ground during the review period. Asian equity markets weathered the US-China trade tensions well and gained momentum as they waned. Korean equity markets, in particular, posted double-digit returns on the back of the strong performance of semiconductor stocks. In Latin America, the Argentine and Brazilian stock markets had a sustained rally.

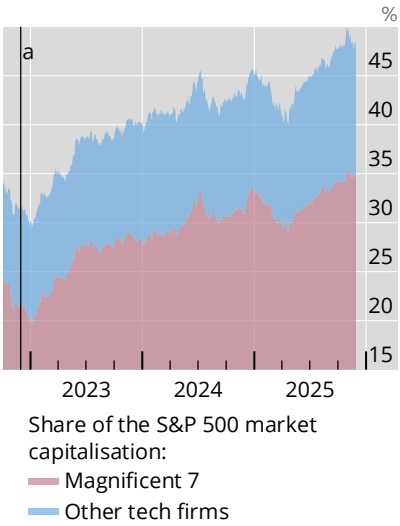
The "Magnificent 7" (M7) stocks continued to outperform the rest of the index (Graph 1.B). The recent rally in M7 stock prices was fuelled by both optimistic expectations about the future profitability of AI and data centre investment and solid earnings growth (Graph 1.C). This is dissimilar to the dotcom bubble of the late 1990s, which was largely fuelled by over-optimistic expectations that were not underpinned by realised earnings growth. Nevertheless, the rally of M7 stocks has raised concerns about stretched valuations and the risks a price correction would entail for the broader stock markets and the economy.

As a consequence of their price surge, the weight of M7 stocks in the broad S&P 500 index has become sizeable. Since the first breakthroughs in mainstream use of AI, the M7 share in the total index market capitalisation has grown to nearly 35%, from about 20% in November 2022 (Graph 2.A, red area). M7 stocks became a linchpin for other tech stocks, whose share in market capitalisation also grew by 5 percentage points, from 10% to about 15% (blue area).

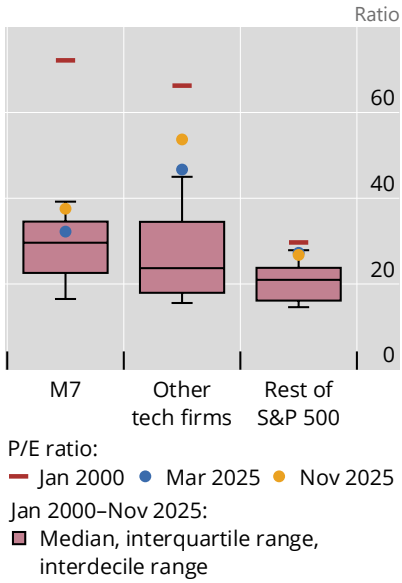
Rising concentration and valuation concerns started weighing on markets[1]

Graph 2

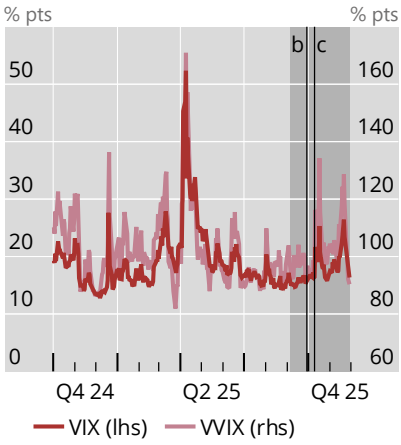
A. The technology sector market share surged during the AI boom…



B. …dragging valuations of the rest of the market higher



C. Bouts of volatility became more frequent



M7 = Magnificent 7; P/E = price/earnings.

The shaded area indicates 5 September–28 November 2025 (period under review).

[a] OpenAI released an early demo of ChatGPT (30 November 2022). [b] First Brands bankruptcy (29 September 2025). [c] US-China tariff escalation (10 October 2025).

[1] See endnotes for details.

Sources: Bloomberg; LSEG Datastream; LSEG Workspace; BIS.

The tech industry's increasing share in the overall market capitalisation magnifies risks of spillovers to risk assets more generally, should investors reassess their expectations about their profitability. While so far isolated disappointing news on the earnings of certain firms did not spill over to the broader M7 or tech sector, some of the recent bouts of volatility can be traced to mounting concerns over the profitability of massive investments in data centres and AI-related technologies.

The attractiveness of the returns on tech stocks, as well as on US equities more generally, fuelled portfolio inflows. Flows into US equities rebounded strongly in mid-September 2025, particularly within the exchange-traded fund (ETF) segment, and outpaced those into European markets. Yet these recent inflows into equities were characterised by some divergence across investor types: retail investors continued to pour money into US equity funds, even as institutional investors gradually withdrew.

Driven by the rally, valuations of tech firms have become hefty by historical standards. While still well below the levels reached at the peak of the dotcom bubble, price/earnings multiples have been approaching the top 10% of the historical distribution for the M7 (Graph 2.B, yellow dots), significantly above the levels before the tariff turbulence (blue dots). What is more, the valuations of other tech firms, with a less established earnings track record than the M7, have been dragged even higher, approaching the levels reached at the peak of the dotcom bubble (red dash). Although the rest of the S&P 500 index posted smaller gains, aggregate valuations also appear elevated by historical norms, arguably because of more lacklustre growth in the earnings of non-tech sectors in the index. The M7's performance also stands out from a cross-country perspective, as these firms have exhibited notably different performance over time compared with, for instance, their Chinese peers (Box A).

As is commonplace in a late-cycle risk-taking environment, volatility ticked up amid more frequent flare-ups. The VIX experienced several notable spikes, and touched a seven-month high, driven by renewed US-China trade tensions, as well as concerns about frothy equity valuations (Graph 2.C, red line). The bankruptcies of First Brands and Tricolor affected financial institutions with direct exposure to these businesses but did not lead to broader contagion. The disclosure of borrower fraud at two US regional banks, sparked a wider sell-off, fuelled by concerns over the health of regional lenders. However, neither of these episodes led to major spillovers beyond the sector, even though they might herald the possibility of further credit market strains. While all these bouts of volatility were short-lived, volatility overall settled at a somewhat higher level. Forward-looking measures of VIX volatility (pink line) witnessed similar upsurges, reflecting shifting market expectations of such spikes being more frequent in the future.

Corporate credit markets in advanced economies appeared rather insulated from equity market volatility and generally retained a risk-on mood, while in EMEs risk-appetite was more fragile. Investment grade credit spreads hovered well below the historical norms in both the United States and the euro area (Graph 3.A). Consistently with this, common gauges of expected default probabilities actually fell in both the United States and Europe, reflecting the overall risk-on sentiment (Graph 3.B). In EMEs, corporate credit spreads edged higher on renewed trade tensions between the United States and China and remained elevated, particularly in Latin America, underpinning the fragility of the risk-on mood (Graph 3.C).

Box A

Tech stock performance around the globe: what explains the differences?

*Livia Pancotto and Yui Ching Li*①

Tech stock performance has diverged markedly around the globe in recent years. Large technology firms in the United States and China have followed different trajectories, driven by earnings prospects, business models, regulatory conditions and risk premia. While advances in artificial intelligence (AI) – and the investor interest surrounding them – have boosted valuations of a subset of firms, they do not fully explain the differences across global technology markets. This box examines the market performance and global footprint of US and Chinese big tech firms and compares their valuation patterns with those of major technology firms in other economies.

The stocks of US technology firms have risen much faster than the overall market and Chinese counterparts (Graph A1.A). The US "Magnificent 7" (M7) have consistently outperformed the S&P 500, especially since the public release of ChatGPT in late 2022. Such strong gains were underpinned by solid earnings (as discussed in the main text), improved operating efficiency and sustained AI-related investment and demand. These dynamics have strengthened the M7's global footprint, with their share in global equity benchmarks recently approaching one quarter of total market capitalisation (Graph A1.B).

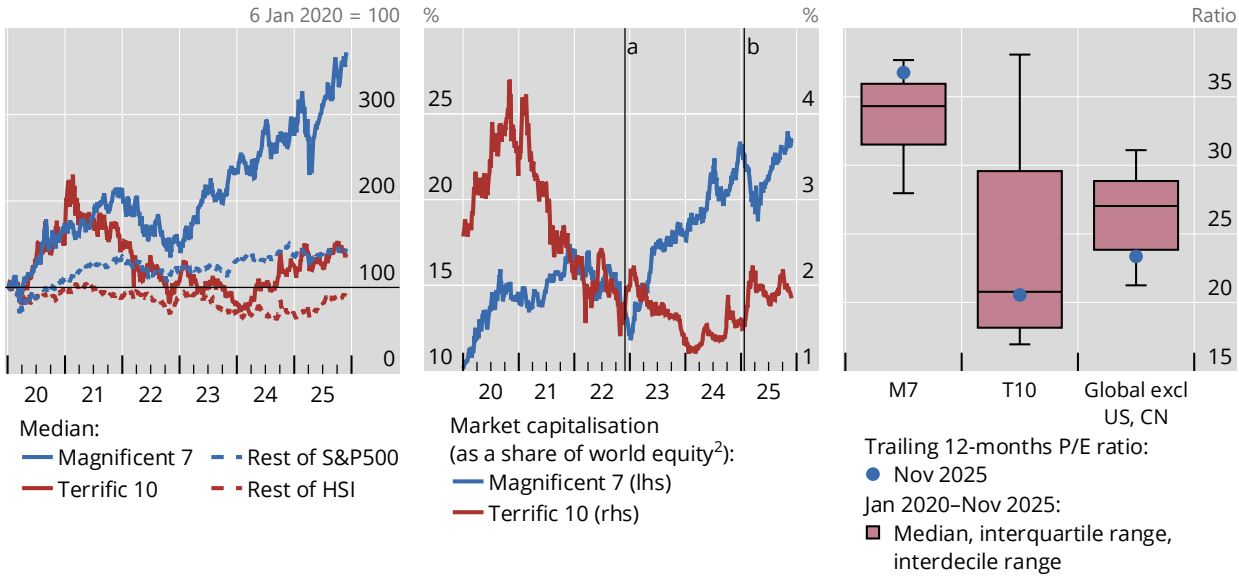
Global tech stocks differ in performance, market share and valuations

Graph A1

A. M7 and T10 stock performance diverged substantially[1]

B. M7 gained increasing global presence[1]

C. Valuation ranges differed across tech groups, with M7 at the upper end[3]



M7 = Magnificent 7; P/E = price/earnings; T10 = Terrific 10.

[a] OpenAI released an early demo of ChatGPT (30 November 2022). [b] DeepSeek-R1 released (20 January 2025).

[1] Magnificent 7 = Alphabet, Amazon, Apple, Meta, Microsoft, Nvidia and Tesla; Terrific 10 = Alibaba, Baidu, BYD, Geely, JD.Com, Meituan, NetEase, SMIC, Tencent and Xiaomi. The composition of the S&P 500 and Hang Seng Index (HSI) is fixed on 28 November 2025. [2] MSCI All Country World Index (ACWI), covering approximately 85% of the global investable equity universe. [3] Median for each group. For Global (excluding the United States and China), the sample includes the 10 largest tech companies by market capitalisation as of 24 November 2025, including Accenture, Arm, ASML, Hon Hai, Samsung, SAP, Shopify, SK Hynix, Tata Consultancy Services and TSMC.

Sources: Bloomberg; LSEG Datastream; S&P Global Market Intelligence; authors' calculations.

By contrast, China's "Terrific 10" (T10) experienced a sharp rally through 2020 and early 2021, fuelled by strong earnings momentum and the pandemic-driven surge in digital adoption. The upswing, however, gave way to a prolonged correction due to regulatory tightening, weak domestic demand and a shift in global investor appetite away from Chinese assets. More recently, prices have begun to recover amid renewed interest

in domestic AI developments following the DeepSeek release in January 2025 and signs of a more supportive policy stance for the tech sector, which have helped lift investor sentiment. Nonetheless, their global presence remains well below previous peaks and modest compared with M7.

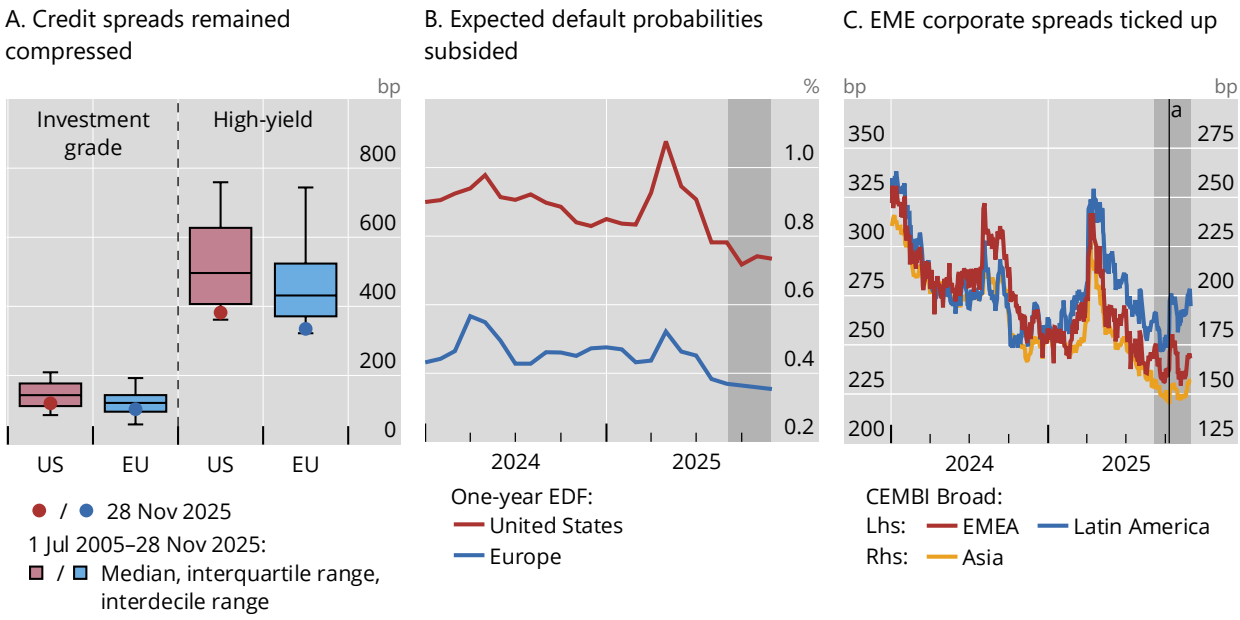
Valuation patterns mirror these divergences. The M7 have elevated valuations within a relatively narrow range, consistent with investor beliefs of strong earnings growth prospects, established business models and investor optimism about potential AI-driven productivity gains. T10 valuations are generally more subdued and more varied, reflecting higher risk premia, regulatory uncertainty and pronounced swings in investor sentiment. Global tech peers outside the United States and China show intermediate valuation levels with moderate dispersion, possibly due to broader business model diversification and lower sensitivity to region-specific shocks (Graph A1.C).

① The views expressed here are those of the authors and not necessarily those of the BIS or its member central banks.

The isolated corporate bankruptcies had a stronger effect on riskier segments of credit markets. High-yield corporate credit spreads edged higher amid concerns about US regional banks, although they later retraced and remained close to historical lows (Graph 3.A). Leveraged loan spreads ticked up by 10 basis points in the weeks following the First Brands bankruptcy filing, while spreads on covenant-lite loans, the riskier subsegment, increased by nearly 15 basis points and settled at this higher level (Graph 4.A). ETFs tracking business development companies – investment vehicles providing credit in private markets – also showed signs of investors' unease regarding a possible deterioration in asset quality, while the asset price reactions in junk bonds and bank loan ETFs were more subdued. All these pressures in credit markets, while indicating increased wariness, were mostly short-lived (Graph 4.B), as risk-taking reasserted itself.

Credit markets remained unruffled despite corporate bankruptcies[1]

Graph 3



EDF = expected default frequency; EMEA = Europe, the Middle East and Africa.

The shaded area indicates 5 September–28 November 2025 (period under review).

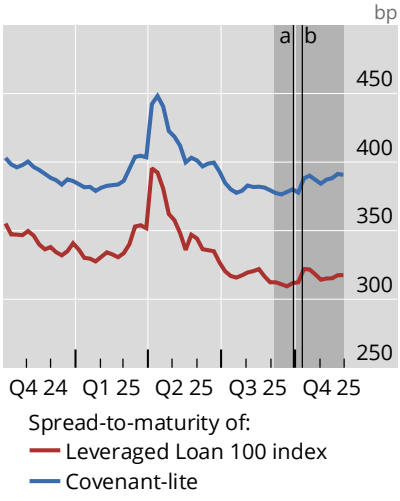
[a] US-China tariff escalation (10 October 2025).

[1] See endnotes for details.

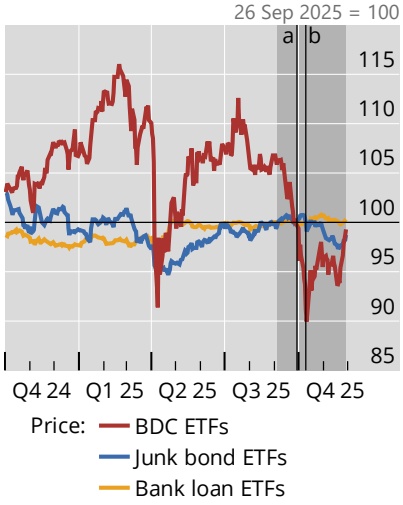
Sources: Bloomberg; ICE Data Indices; JPMorgan Chase; Moody's; BIS.

Corporate bankruptcies remained isolated, but dealmaking activity slowed Graph 4

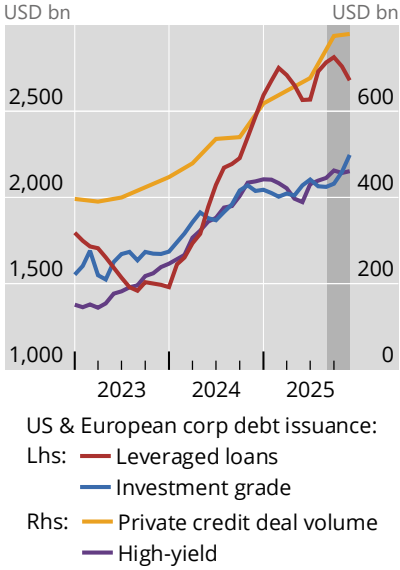
A. Leveraged loan spreads rose, especially in the riskier segment



B. Riskier credit ETFs showed strain amid bankruptcies[1]



C. Riskier dealmaking activity slowed[1]



BDC = business development company; ETF = exchange-traded fund.

The shaded area indicates 5 September–28 November 2025 (period under review).

[a] First Brands bankruptcy (29 September 2025). [b] US-China tariff escalation (10 October 2025).

[1] See endnotes for details.

Sources: Dealogic; LSEG Datastream; PitchBook Data Inc | LCD; BIS.

Against the backdrop of a somewhat higher pricing of risk, activity in primary markets for riskier credit instruments slowed. Mounting concerns about credit market quality were reflected in a slowdown in high-yield bond and leveraged loan issuance (Graph 4.C, purple and red lines). Private credit deal-making also cooled (yellow lines) amid concerns over a potential erosion in the lending standards in these transactions and growing awareness that the two recent bankruptcies may not have been isolated episodes. Moreover, recent issuances of corporate bonds by large tech firms to fund investment in data centres were not received favourably by markets, with spreads to government bonds ticking higher. While a swing in the risk-on mood might have far-fetched consequences for credit markets and broader financial conditions, the relatively subdued pace of credit growth compared with the run-up to the Great Financial Crisis could allay some concerns.

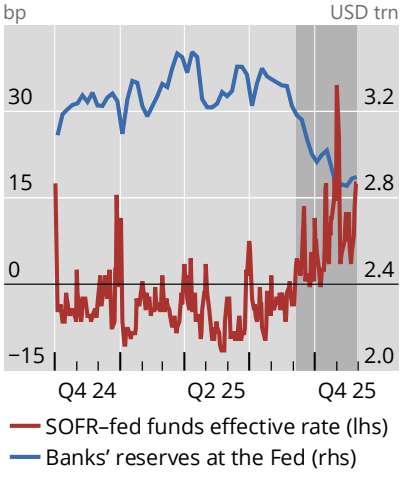
Sovereign yields moderate with monetary easing

US money markets also saw a pickup in volatility since September, with repo rates spiking. The SOFR spread – the difference between secured overnight financing rate and the effective federal funds rate – rose to levels not seen since March 2020 (Graph 5.A, red line). Such money market pressures reflected the interplay of demand and supply factors.

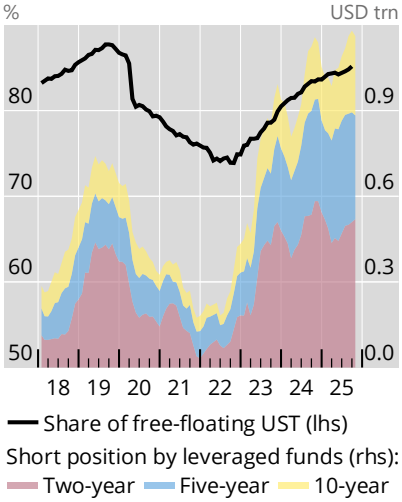
Money market jitters in the United States did not spill over

Graph 5

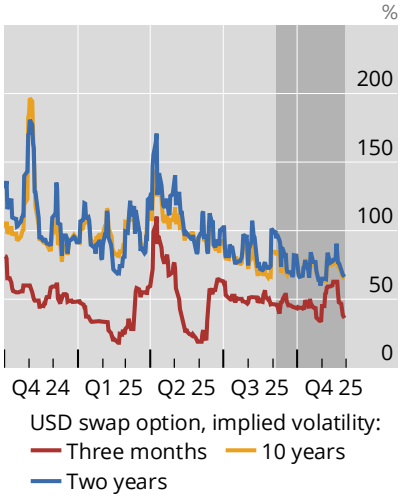
A. US money markets experienced bouts of volatility



B. The open interest in hedge funds' short future positions grew steadily[1]



C. Volatility in money markets did not transmit to the yield curve



SOFR = secured overnight financing rate; UST = US Treasury securities.

The shaded area indicates 5 September–28 November 2025 (period under review).

[1] See endnotes for details.

Sources: Board of Governors of the Federal Reserve System; Commodity Futures Trading Commission; JPMorgan Chase; LSEG Datastream; national data; BIS.

Tremors in dollar money markets occurred amid heightened demand for leverage via repo by the hedge fund sector. One highly leveraged strategy reliant on repo is the cash-futures basis trade. It involves purchasing a government bond while simultaneously selling the corresponding futures contract to pocket the small difference between the two prices.[2] To fund the purchase of the security and lever up the trade, the hedge fund typically turns to borrowing via the repo market.[3] This strategy has grown particularly rapidly during the quantitative tightening of the past two years (Graph 5.B). Pressures on Treasuries at longer maturities and bond markets more generally could occur should these trades be suddenly unwound due to a spike in derivatives margins or difficulties in rolling over repo borrowing.

Against this backdrop of buoyant demand, shortfalls in funding supply appear to have further contributed to the repo pressures. Reserve balances held by the banking system were shrinking amid the Fed's quantitative tightening (Graph 5.A, blue line), with settlements of large issuances of shorter-term government paper being a further drain. Technical factors, such as the increases in the Treasury General Account due to the shutdown, as well as the end of the fiscal year for Canadian banks, further contributed to a relative shortage in liquidity versus collateral. In this context, the Fed decided to halt its balance sheet reduction operations as early as December.

So far, such money market pressures have not spilled over to other parts of the yield curve. Indeed, volatility in fixed income markets has remained subdued,

[2] T Ehlers and K Todorov, "Goodbye Libor, hello basis traders: unpacking the surge in global interest rate derivatives turnover", *BIS Quarterly Review*, in this issue.

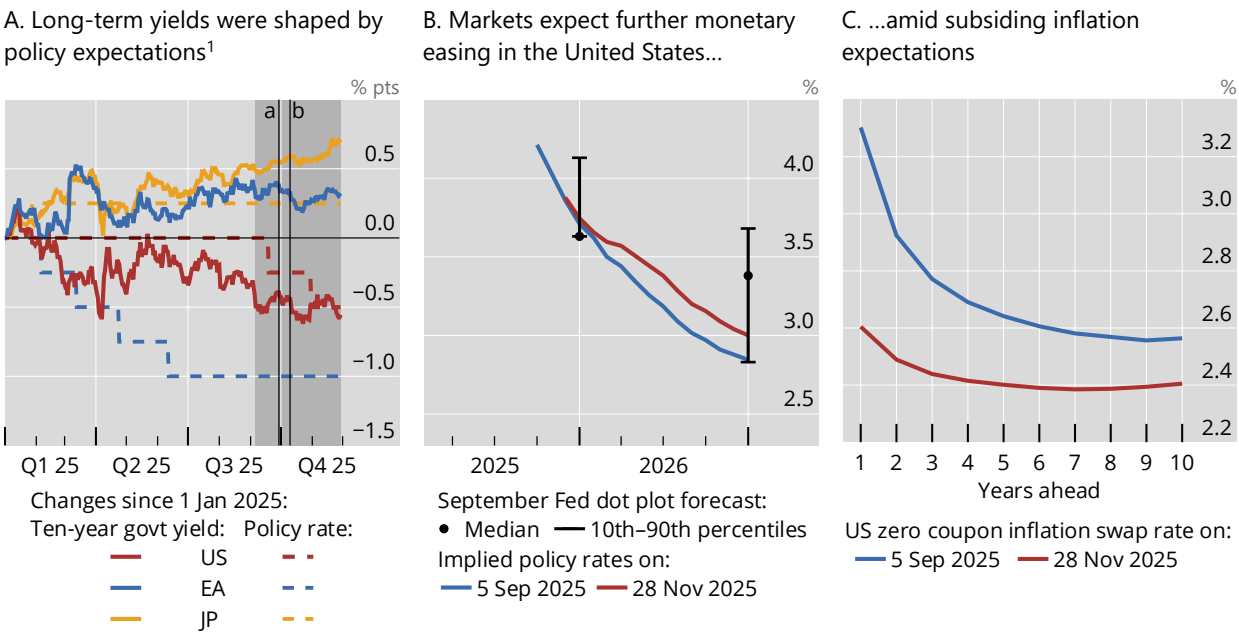
[3] F Hermes, M Schmeling and A Schrimpf, "Unpacking repo haircuts and its implications for leverage", *BIS Bulletin*, No 117.

underscoring investors' confidence in a benign outlook. Only the volatility at the very short end of the US Treasury yield curve appears to have increased visibly as money market volatility surged (Graph 5.C, red line), while that at longer maturities remained subdued by historical standards (blue and yellow lines).

US and euro area government bond yields moved sideways in the review period (Graph 6.A, red and blue solid lines) as market participants weighed the monetary policy outlook in the short run. In the United States, the uncertainty was compounded by the lack of hard data releases due to the government shutdown. Expectations of further policy rate cuts waxed and waned amid a perceived hawkish tone in the October FOMC press conference and signs of a weakening labour market from alternative indicators. As a consequence, market expectations for policy rates in the year ahead rose and then partially subsided, but still lay well below the median of FOMC participants' forecasts made in September (Graph 6.B). Markets' optimism about the prospects for further policy easing was also underpinned by their implicit inflation outlook. The term structure of market-based inflation expectations for the United States substantially shifted downwards since September, especially in the short to medium run (Graph 6.C). Other major central banks kept policy on hold after many had eased their stance in the previous review period, but stood ready to deliver further easing should economic conditions deteriorate. One exception was Japan, where the central bank has adopted a cautious approach to policy tightening, and fiscal developments contributed to the rise in long-term yields (Graph 6.A, solid yellow line).

Markets still expect further easing

Graph 6



The shaded area indicates 5 September–28 November 2025 (period under review).

[a] First Brands bankruptcy (29 September 2025). [b] US-China tariff escalation (10 October 2025).

[1] See endnotes for details.

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

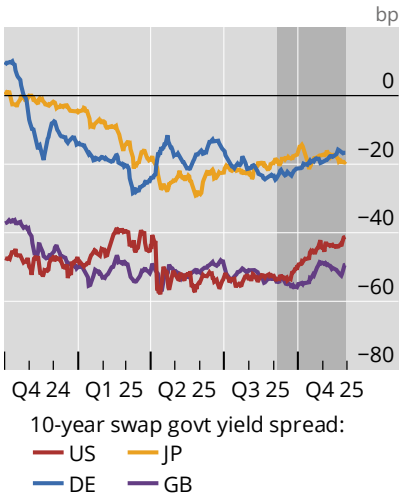
A relatively loose fiscal stance in several advanced economies was reflected in hefty issuance of public debt, particularly at short tenors. This, coupled with major central banks' unwinding of their balance sheets, led to a large supply of government bonds for markets to absorb. Reflecting such pressure, swap spreads remained persistently negative (Graph 7.A), indicating a negative convenience yield of holding government bonds (Box B). The resulting spread encourages hedge funds to engage in relative value trades using government bonds and interest rate swaps; the recent contraction in the US dollar swap spread hints indeed at greater hedge fund activity.[4]

Nevertheless, markets largely tuned out lingering concerns over the longer-term fiscal outlook. Ten-year average yields in 10 years, a gauge of longer-dated risk compensation, had been trending upwards for at least the last four years, reflecting growing investor concerns about fiscal sustainability (Graph 7.B). However, with the exception of Japan and Germany, this upward trend paused in the review period, possibly due more to limited issuance of long-term bonds than a waning of the underlying fiscal strains. Sovereign spreads in the euro area continued to narrow, partly because of the rise in German market-expected long-term rates (Graph 7.C). This includes France's sovereign spread against German bunds, which marginally declined over the review period, partly eroding the previous increases.

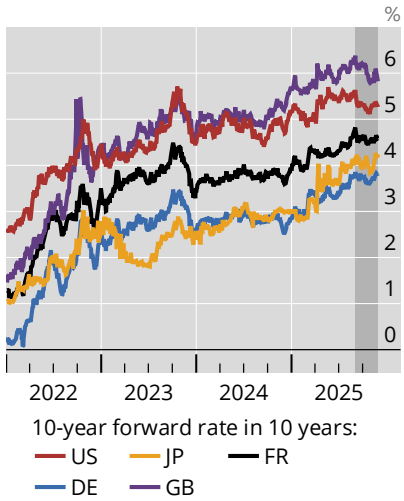
Risk appetite offset concerns about fiscal sustainability

Graph 7

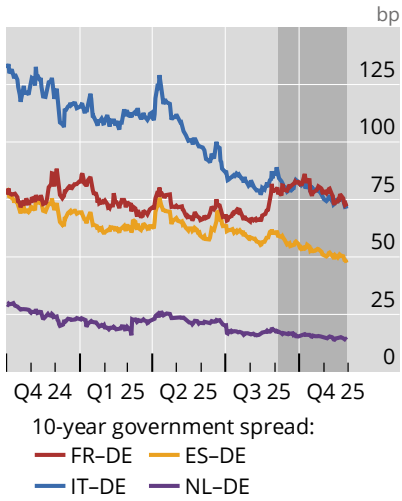
A. Negative swap spreads reflect an abundant supply of government bonds[1]



B. Longer-dated forward rates remained elevated



C. Euro area sovereign spreads narrowed further



The shaded area indicates 5 September–28 November 2025 (period under review).

[1] See endnotes for details.

Sources: Bloomberg; BIS.

[4] See V Sushko and K Todorov, "Sizing up hedge funds' relative value trades in US Treasuries and interest rate swaps", *BIS Quarterly Review*, in this issue.

Box B

Compressed credit spreads and the quest for a risk-free rate

*Giulio Cornelli and Marco Lombardi*①

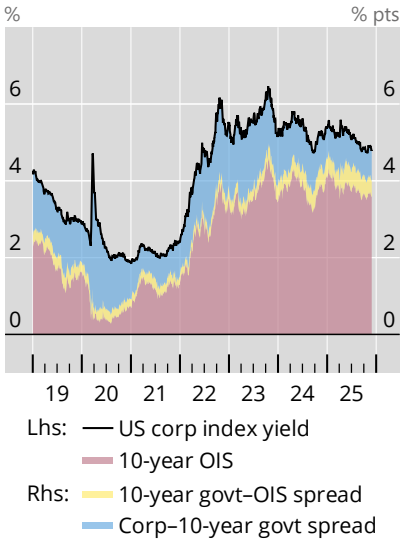
Corporate spreads compressed considerably over the past months, hovering well below historical norms. In this environment, the share of corporate issuers with a security trading at yields below their sovereign counterparts picked up, with the French case being especially noteworthy. This raises the broader question of whether the compression in corporate spreads reflects a genuine reduction in the pricing of corporate credit risk or an increase in sovereign yields that serve as a benchmark.

Conceptually, corporate credit risk can be thought of as the premium demanded by investors to hold corporate bonds over an equivalent "safe" bond. One common way in which corporate credit risk is measured is through spreads calculated relative to sovereign yields, which serve as benchmarks for a "safe" equivalent rate. However, this practice rests on an embedded assumption that movements in sovereign yields only reflect factors that also affect corporate bonds: pure interest rate risk, or a default risk component that is also shared with corporate bonds (eg fiscal or country risk). Moreover, sovereign bonds also embed a convenience yield – reflecting their high liquidity and their pledgeability as collateral – that may also fluctuate with the scarcity or abundance of sovereign bonds on the market. An alternative way to compute corporate spreads relies on using overnight index swaps (OIS) as benchmarks, which should in principle be exempt from these features.

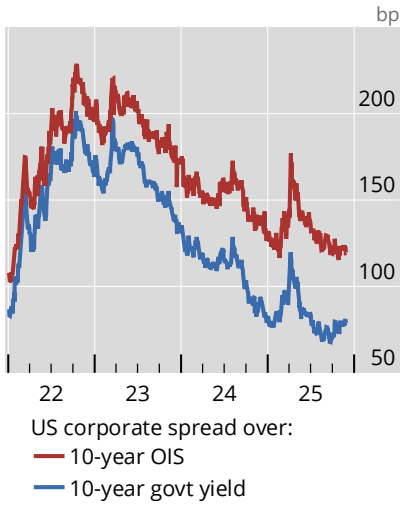
Corporate spread measures diverged, driven by the convenience yield[1]

Graph B1

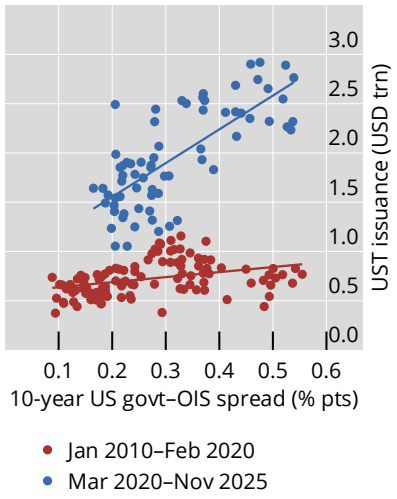
A. The growing erosion of the convenience yield…[2]



B. …led to divergences in corporate spreads[2]



C. The convenience yield became more correlated with issuance as supply became more abundant



OIS = overnight indexed swap; UST = US Treasury securities.

[1] USD OIS rate is based on the SOFR starting on 11 December 2018. [2] US corp index is the ICE BofAML US Corporate Index.

Sources: US Treasury Fiscal Data; Bloomberg; ICE Data Indices; authors' calculations.

The choice of the benchmark is crucial when interpreting the dynamics of corporate spreads. To show this, let us decompose corporate yields according to the following simple equation:

$$Corporate\ yield_t = OIS_t + (sovereign\ yield_t - OIS_t) + (corporate\ yield_t - sovereign\ yield_t)$$

where the OIS captures pure interest rate risk, the spread between sovereign yield and OIS reflects country-specific credit risk and the spread between corporate and sovereign yield accounts for corporate credit risk. The opposite of the second element in the equation above – the difference between OIS rates and sovereign yields –

is typically known as the swap spread and constitutes a measure of the convenience yield. Amid ongoing fiscal expansion and the unwinding of central banks' balance sheets, a growing amount of government bonds need to be digested by private investors, which explains the downward trend in swap spreads.

Since early 2020, the downward trend in convenience yields opened a wedge between sovereign yield and OIS in the decomposition above (Graph B1.A, yellow area). This, in turn, explains the substantial difference in the level of corporate spreads measured relative to sovereign and OIS rates for both the United States (Graph B1.B) and the euro area.

The period during which corporate spreads based on sovereign yields diverged from those using OIS rates coincided with a growing issuance of Treasury securities and the unwinding of the Fed's balance sheet. As the amount of Treasury securities available on the market became more abundant, the correlation between new issuances and the convenience yield doubled (Graph B1.C). This underscores how fiscal factors played a role in keeping measured corporate spreads compressed.

① The views expressed in this publication are those of the authors and do not necessarily reflect the views of the BIS or its member central banks. ② From about 2.5% in June to nearly 5% in September.

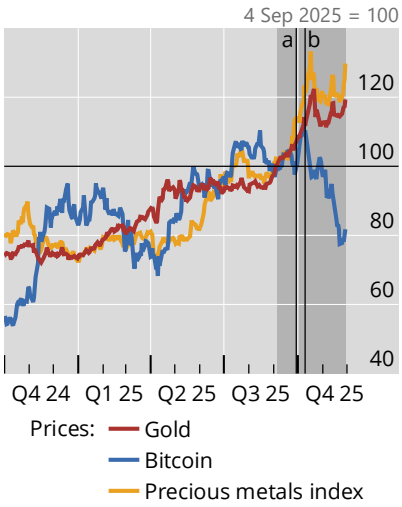
Precious metals and the US dollar appreciated

Precious metals saw an impressive rally in the early part of the review period, followed by a correction amid high volatility. Gold resumed its upward trajectory (Graph 8.A, red line), while other precious metals, such as silver, palladium and platinum, were also buoyant (yellow line).

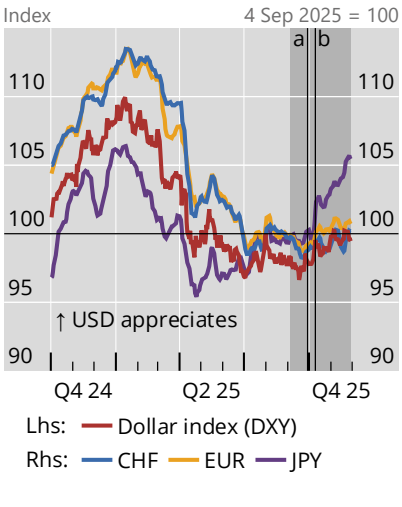
Such strong performance sits oddly with precious metals' traditional role as safe haven assets. This should make them unattractive in a risk-on environment, in which

Gold and the dollar appreciated[1] Graph 8

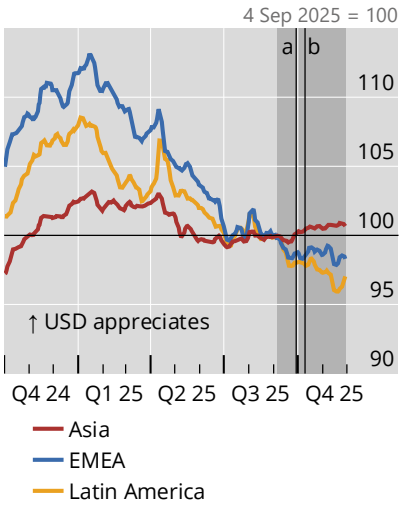
A. Gold and precious metals rallied while cryptocurrencies slumped



B. The dollar generally appreciated against major currencies



C. Asian EME currencies depreciated vs the dollar



EMEA = Europe, the Middle East and Africa.

The shaded area indicates 5 September–28 November 2025 (period under review).

[a] First Brands bankruptcy (29 September 2025). [b] US-China tariff escalation (10 October 2025).

[1] See endnotes for details.

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

other assets promise much higher returns. The appetite for precious metals may well reflect market participants seeking some safe asset exposure amid persistent fiscal strains and long-run inflation concerns. Another (non-mutually exclusive) explanation is that trend-chasing investors – notably retail – might have sought to capitalise on gold's momentum by engaging in speculative behaviour. Indeed, portfolio flow data show that inflows into retail ETFs and mutual funds tracking gold strongly rebounded in June and further accelerated in September, with some evidence for price pressure effects (Box C). Cryptocurrencies slumped towards the end of the review period: bitcoin, for example, shed about 20% (Graph 8.A, blue line). This might also be a sign of the growing fragility of the risk-on environment, and increased investor wariness over speculative assets.

The US dollar halted the depreciation path it had entered in April and posted gains against other major currencies (Graph 8.B, red line). It appreciated markedly against the Japanese yen (purple line) due to Japan's fiscal woes weighing on the currency and the Bank of Japan proceeding cautiously with rate hikes. Other Asian currencies also lost some ground against the dollar (Graph 8.C, red line), while EMEA and Latin American currencies continued to appreciate (blue and yellow lines, respectively). Overall, the dollar appreciation follows the trend observed in the previous review period. At first glance, this seems somewhat at odds with the typical pattern observed in a heightened risk-taking environment. Yet it could also reflect the relative outperformance of the US economy and the greater optimism on the profit prospects of its tech sector. In the jargon of currency traders, this would signify that we are on the right side of the US dollar "smile", as opposed to its bottom, where risk appetite prompts investors to seek heftier yields abroad, leading to a dollar depreciation.

Box C

Bubble conditions in US equities and gold?

*Giulio Cornelli, Marco Lombardi and Andreas Schrimpf*①

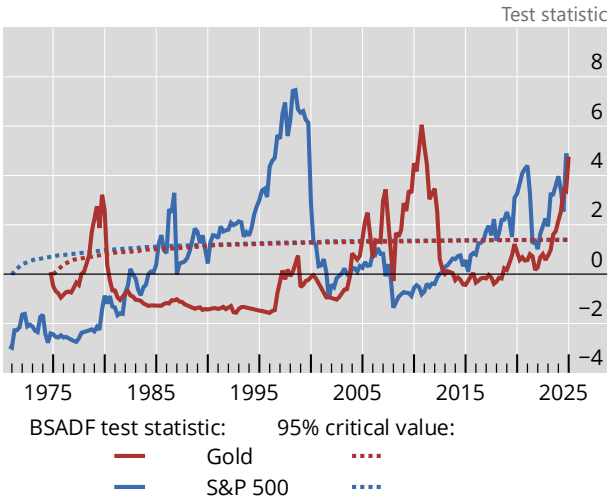
Throughout the recent market rally, US equities and gold surged in lockstep. The sharp price increases of both assets and their growing presence on the radar screens of non-specialised media have attracted substantial investment flows from retail investors and sparked a debate over the possibility of asset price bubbles.

Bubbles are characterised by rapid and accelerating price surges – reminiscent of an explosive behaviour – followed by sharp corrections. However, the identification of a bubble remains an open question in the academic discourse: there is no reliable evidence that price declines following strong increases are predictable, making it difficult to disentangle irrational price movements from rational market responses to the underlying (and potentially unobserved) fundamentals.② Statistical approaches, instead, abstract from fundamentals and focus squarely on the time series properties of the price process. More specifically, they leverage on the notion that bubbles typically feature "explosive behaviour" – the property that the underlying data-generating process exhibits non-stationarity and drifts upwards, hence giving rise to accelerating, or explosive, price surges.③ To establish this, researchers can rely on so-called unit root tests while postulating that if a bubble exists the process exhibits roots above unity, which implies explosiveness.

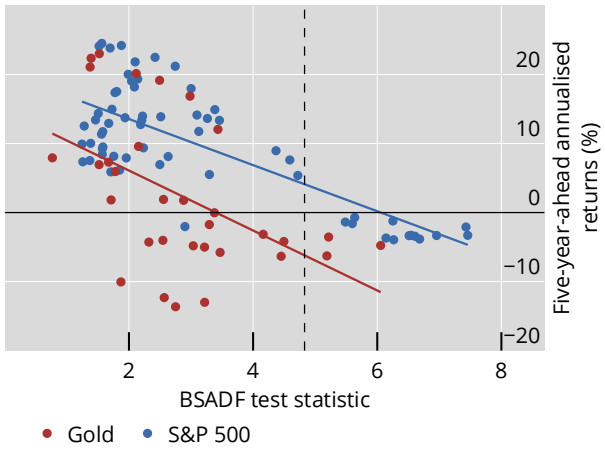
S&P 500 and gold at risk of being in a bubble

Graph C1

A. Gold and S&P 500 exhibited explosive behaviour jointly for the first time in the last 50 years



B. Explosive prices are associated with low future returns[1]



BSADF = Backward Supremum Augmented Dickey-Fuller.

[1] Based on observations exceeding the 95% critical value over the sample period of panel A. The vertical dashed line represents the maximum of the latest values of the BSADF test statistic for gold and the S&P 500.

Sources: Bloomberg; LSEG Datastream; authors' calculations.

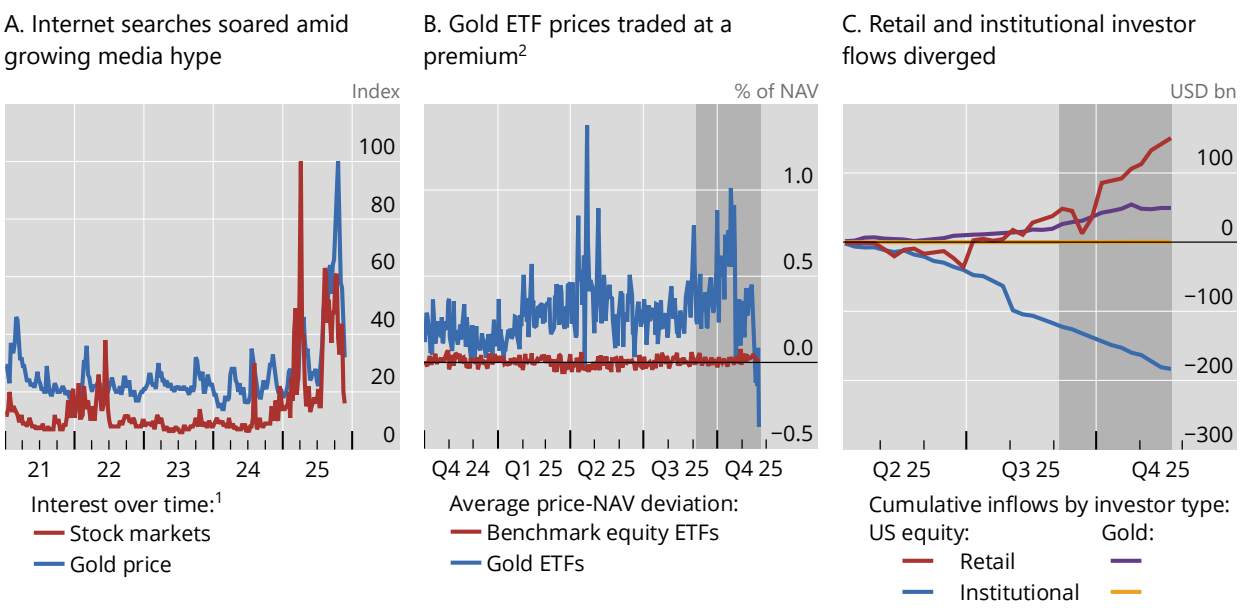
A widely used statistical test④ to detect the explosiveness of a price process suggests that both the S&P 500 and the price of gold have entered explosive territory in recent months. Historically, the prices of US equities and gold have breached the explosive behaviour threshold at different times (Graph C1.A). This was often followed by a significant correction, such as in 1980 for gold (after having surged during the Great Inflation) and the burst of the dotcom bubble for US equities. Note, however, that these corrections took place over a variable and potentially long time frame: while the test has reliably detected past bubbles, it provides no information on when bubbles may burst. Hence, during the development phase of the bubble, investors jumping on the trend could still benefit from further price increases. Also note that the past few quarters represent the only time in at least the last 50 years in which gold and equities have entered this territory simultaneously. Following its explosive phase, a bubble typically bursts with a sharp and swift correction. Graph C1.B suggests that high values of the test statistics – hinting at an ongoing bubble – are typically followed by periods of negative or subdued returns.

Beyond statistical properties, it is also instructive to monitor other common characteristics of bubbles. A typical symptom of a developing bubble is the growing influence of retail investors trying to chase price trends. At times of media hype and surging prices, retail investors can be lured to riskier assets that they would normally shun, compounded by herd-like behaviour, social interactions and fear of missing out.⑤ Indeed, measures of retail investors' interest in markets, such as internet searches, tend to surge at times of frothiness (Graph C2.A).

This time around, there is also evidence that retail investor exuberance and appetite for seemingly easy capital gains have spilled over to a traditional safe haven such as gold. Since the beginning of 2025, gold exchange-traded fund (ETF) prices have been consistently trading at a premium relative to their net asset value (NAV) amid growing retail investor interest (Graph C2.B, blue line). ETF prices exceeding their NAV signal strong buying pressure coupled with impediments to arbitrage.

Retail investors are attracted to financial markets at times of frothiness

Graph C2



ETF = exchange-traded fund.

The shaded area indicates 5 September–28 November 2025 (period under review).

[1] Data (accessed on 1 December 2025) resulting from worldwide Google search queries for selected terms in the period 2021–28 November 2025, indexed to 100 by peak search interest. [2] Data winsorised at the 0.5th and 99.5th percentiles. For benchmark equity ETFs, simple average of iShares Core S&P 500 ETF, SPDR S&P 500 ETF Trust and Vanguard 500 Index Fund ETF. For Gold ETFs, simple average of 194 ETFs.

Sources: LSEG Lipper; trends.google.com; authors' calculations.

Fund flow data reveal it was mostly retail investors who recently poured money into US equities and gold funds. Furthermore, retail investors have increasingly taken trading positions that run counter to those of their institutional counterparts: the latter were taking money out of US equities or maintaining flat positions in gold, while retail investors recorded inflows (Graph C2.C). Although the influx of retail investors has mitigated the impact of institutional investor outflows, their growing prominence could threaten market stability down the road, given their propensity to engage in herd-like behaviour, amplifying price gyrations should fire sales occur.

① The views expressed in this publication are those of the authors and do not necessarily reflect the views of the BIS or its member central banks. ② E Fama, "Two pillars of asset pricing", *American Economic Review*, vol 104, no 6, 2014, pp 1467–85. ③ Most statistical tests for asset price bubbles rely on unit root tests; see R Gürkaynak, "Econometric tests of asset price bubbles: taking stock", *Journal of Economic Surveys*, vol 22, no 1, 2008, pp 166–86. ④ The BSADF test for explosive behaviour performs a sequence of right-tailed unit root tests, keeping the endpoint of the sample fixed while recursively expanding the starting point; values of the test statistic above the critical ones indicate explosive behaviour; see P Phillips and S Shi, "Real time monitoring of asset markets: bubbles and crises", in H Vinod and C Rao (eds), *Handbook of Statistics: Financial, Macro and Micro Econometrics Using R*, vol 42, 2020, pp 61–80. ⑤ B Barber and T Odean, "All that glitters: The effect of attention and news on the buying behavior of individual and institutional investors", *The Review of Financial Studies*, vol 21, no 2, 2008, pp 785–818.

Endnotes

Graph 1.A: EA = STOXX Europe 600; EMEs = MSCI EM; GB = FTSE 100; JP = Nikkei 225; US = S&P 500.

Graph 1.B: Magnificent 7 =Alphabet, Amazon, Apple, Meta, Microsoft, Nvidia and Tesla. For the Magnificent 7 and the rest of the S&P 500, market capitalisation-weighted average. The composition of the S&P 500 is fixed on 28 November 2025.

Graph 1.C: For November 2025, data as of 28 November. EA = EURO STOXX 50; EA banks = EURO STOXX Banks; GB = FTSE 100; Magnificent 7 =Alphabet, Amazon, Apple, Meta, Microsoft, Nvidia and Tesla; US = S&P 500. For the Magnificent 7 and the rest of the S&P 500, simple average. The composition of the S&P 500 is fixed on 28 November 2025.

Graphs 2.A and 2.B: Magnificent 7= Alphabet, Amazon, Apple, Meta, Microsoft, Nvidia and Tesla. Other tech firms include companies classified as belonging to the "information technology" sector. The composition of the S&P 500 is fixed on 28 November 2025.

Graph 2.B: Market capitalisation-weighted average. For November 2025, data as of 28 November.

Graph 2.C: VIX = Cboe Volatility Index; VVIX = Cboe VIX Volatility Index.

Graph 3.A: Spreads of ICE BofAML index yields to OIS rates with matched maturities. Ten-year OIS for US investment grade, five-year for the rest. The USD OIS rate is based on SOFR starting on 11 December 2018. The EUR OIS rate is based on ESTR starting on 11 October 2019. For US investment grade, the box plot shows data between 31 July 2008 and 28 November 2025, due to data availability of USD 10-year OIS.

Graph 3.B: For non-financial firms. Weighted average by assets. Europe = AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IS, IT, LU, MC, NL, NO, PT and SE.

Graph 3.C: Simple average of sub-indices. Asia = CN, HK, ID, IN, KR, MY, SG and TH; EMEA = CZ, HU, IL and ZA; Latin America = BR, CL, CO, MX and PE.

Graph 4.B: Market capitalisation-weighted average of four BDC ETFs, the top 10 junk bond ETFs by asset under management and seven bank loan ETFs as of 28 November 2025.

Graph 4.C: Twelve-month moving sum.

Graph 5.B: Share of free-floating UST is the share of marketable US Treasury debt not held by the Fed. Data on marketable US Treasury debt available until 30 September 2025, and until 13 October 2025 for short positions of leveraged funds due to US government shutdown.

Graph 6.A: EA 10-year government bond yield refers to the German 10-year government bond yield.

Graph 7.A: Five-day moving average.

Graph 8.A: Precious metals index = simple average across the spot prices of palladium, platinum and silver.

Graph 8.B: For CHF, EUR and JPY, five-day moving average.

Graph 8.C: Simple average. Asia = CN, HK, ID, IN, KR, MY, SG and TH; EMEA = CZ, HU, IL, PL and ZA; Latin America = BR, CL, CO, MX and PE. Five-day moving average.

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Shifting currents in FX and interest rate derivatives: highlights from the 2025 Triennial Survey[1]

The articles in this special edition of the BIS Quarterly Review *leverage new data from the 2025 BIS Triennial Survey to examine how structural shifts and policy changes have shaped trading activity in FX and interest rate derivatives markets. Hedging activity, driven by US dollar depreciation and heightened interest rate volatility, boosted FX trading in April 2025. Structural changes, including the transition to risk-free reference rates and the advance of electronic trading, shaped market structure. The dramatic rise in positions in government bond futures, spurred by hedge funds exploiting the cash-futures basis trade, has bolstered trading of interest rate derivatives on exchanges rather than over-the-counter markets. Despite the market strains of April 2025, the overall market structure demonstrated resilience, supported by dealers' use of internal markets and advanced trading infrastructures. BIS statistics remain a vital tool for monitoring these developments and their implications for financial stability.*

JEL classification: F31, G15, G23.

Foreign exchange (FX) and interest rate (IR) derivatives markets are a linchpin of the global financial system. They offer market participants the ability to efficiently manage exposures to assets worldwide, share risks and pursue speculative strategies. However, derivatives markets also bring vulnerabilities, such as increased opacity in market positioning and the potential for amplified credit and liquidity risks.

This special edition of the *BIS Quarterly Review* explores the evolution of trading activity in FX and IR derivatives markets, drawing on data from the 2025 BIS Triennial Central Bank Survey of Foreign Exchange and Over-the-counter (OTC) Derivatives Markets – the most comprehensive source on the size and structure of OTC markets.[2] Two articles and boxes in this edition provide new insights on how policy changes and longer-term structural forces have reshaped FX and IR derivatives markets over the past few years. They also touch on issues of market development

[1] The views expressed in this publication are those of the authors and not necessarily those of the BIS or its member central banks. We thank Mathias Drehmann, Torsten Ehlers, Gaston Gelos, Krista Hughes, Daniel Rees, Hyun Song Shin, Frank Smets, Vladyslav Sushko and Philip Wooldridge for helpful comments.

[2] The BIS coordinates the Triennial Survey, conducted every three years since 1986, in cooperation with central banks worldwide under the auspices of the Markets Committee and the Committee on the Global Financial System. More than 1,100 dealers (mainly banks) located in 52 jurisdictions participated in the 2025 survey. Data were collected in two stages: OTC trading of FX spot, FX derivatives and interest rate derivatives was surveyed in April 2025, and the outstanding notional amounts and gross market values of all OTC derivatives were surveyed at end-June.

Key takeaways

- *Hedging activity took centre stage amid policy uncertainty in April 2025 that unsettled financial markets and precipitated a surge in FX trading as investors adjusted their hedging and portfolio strategies.*
- *Trading of interest rate derivatives on exchanges grew, fuelled by greater volatility in the interest rate environment and the cash-futures basis trade.*
- *Despite the market strains of April 2025, the overall market structure demonstrated resilience, supported by dealers' enhanced use of internal capital markets and internal matching of customer flows.*

and resilience specific to EMEs. A third article is a primer on derivatives markets; it explains underlying concepts and shows how the full range of BIS derivatives statistics helps monitor structural shifts and vulnerabilities in the global financial system. The following pages provide a brief synthesis of the key insights in this special edition.

Global FX markets when hedging takes centre stage

FX turnover – ie the value of transactions – in OTC markets averaged $9.5 trillion per day in April 2025, up 27% from 2022. This rise in trading occurred against a backdrop of heightened volatility triggered by US tariff announcements on 2 April and an unexpected depreciation of the US dollar. The resulting rush to hedge exposures by banks and institutional investors amplified trading in spot, forwards and options.

In this Quarterly, Huang, Krohn and Sushko (2025) analyse these dynamics, focusing on the role of FX hedging and how investors had positioned themselves going into April 2025. FX hedging costs rose substantially during the post-pandemic global monetary tightening cycle. Many investors' hedge ratios drifted down as a result, leaving them underhedged in early April 2025. This positioning helps explain the scale of trading activity during the month. Compared with a counterfactual based on higher-frequency but less comprehensive data, roughly $1.5 trillion of April's FX turnover can be attributed to the extraordinary effects of the tariff announcements.

Turnover patterns across instruments point to re-hedging as a key driver of market activity. Outright forwards, which offer a simple way to lock in exchange rates, are well suited for adjusting hedges on existing exposures.[3] Dealer banks that provide forwards to investors can turn to the spot market for hedging. Consistent with this narrative, outright forwards and spot transactions registered very large gains in trading. While the Triennial lacks information on the direction of trade, data from CLS Group suggest that non-US asset managers were persistent net dollar sellers via FX swaps and outright forwards. Such forward selling arguably reinforced the dollar's depreciation during April.

[3] FX swaps, by contrast, would be the preferred instrument if the transaction needs to be funded by borrowing of US dollars. That said, some institutional investors reportedly also sought to re-hedge their positions by combining FX swaps with spot positions, which can be beneficial given the liquidity of FX swaps. In line with this, spot and FX swap trading by institutional investors thus registered material gains.

Markets in April 2025 were volatile but resilient, with no clear signs of liquidity impairment or market dysfunction.[4] Largely invisible to the broader market, major FX dealer banks continued to match well over 80% of client spot volumes on their own books, minimising the overall market impact of heightened trading. Indeed, the FX trading landscape proved resilient, enabling participants to adapt strategies and access liquidity. The FX market is fragmented across different venues, as outlined by Krohn, Schrimpf and Sushko (2025a). Although its decentralised structure had earlier raised concerns about a potential "liquidity mirage", it appears that this very characteristic facilitated smooth functioning during the market strains in April.

Despite years of structural innovations to trading, settlement and clearing infrastructures, OTC derivatives markets remain opaque, especially in the uncleared FX segment. As highlighted by Avdjiev, McGuire and von Peter (2025), this constrains efforts to monitor the build-up of exposures and vulnerabilities. Financial stability monitoring requires data beyond measures of market size, to reveal the direction of currency flows and the geography of exposures – including the location and sector of counterparties. The BIS is working in cooperation with reporting central banks to close these data gaps.

The cash-futures basis trade and trading of interest rate derivatives on exchanges

Global turnover in IR derivatives surged by 87% between April 2022 and April 2025, reaching $25 trillion per day. Turnover in the OTC segment grew by 59% to reach $7.9 trillion per day. Even more substantial, turnover of exchange-traded derivatives reached $17.4 trillion per day. Ehlers and Todorov (2025) attribute the growth in OTC and exchange-traded derivatives markets to two conjunctural drivers and discuss how structural forces have reshaped IR derivatives markets over the past few years.

The first driver was the sharp turns in monetary policy since 2022. The global tightening cycle, marked by rapid interest rate hikes, spurred trading, particularly in contracts used to hedge movements in short rates. Exchange-traded money market futures, notably those linked to the benchmark interest rates in the United States (SOFR) and the Euro area (Euribor), saw significant growth.

The second driver – the cash-futures basis trade – boosted trading in government bond futures on exchanges. Rising government bond issuance amid quantitative tightening by central banks has expanded the float of government bonds to be absorbed by private market participants. Given dealers' balance sheet constraints, hedge funds have increasingly stepped into the market as marginal buyers of government bonds as part of a "basis" trade where they simultaneously enter into a short futures position[5] with asset managers taking the other side.

Structural forces have also played a role in reshaping OTC IR derivatives markets. The transition from Libor to near risk-free rates (RFRs) since 2021 has fundamentally altered the market landscape, with major jurisdictions adopting RFRs as primary

[4] See the box by Krohn, Schrimpf and Sushko (2025b), which provides an analysis of liquidity conditions and dealer intermediation during the April 2025 turbulence.

[5] Hedge funds use the repo market to fund the purchase of the cash government bond and to lever up returns, when earning the difference between the yield on government bonds and the implied yield on the futures contract.

benchmarks. This has cemented the dominance of overnight index swaps, which now account for 65% of global OTC IR derivatives turnover. However, the coexistence of RFRs and reformed interbank offered rates (IBORs) in some currency areas has meant continued demand for swaps referencing IBOR benchmarks.[6]

Uneven progress in EME FX and derivatives trading

Emerging market economies (EMEs) have become more integrated into global financial markets. Yet making derivatives markets in these economies deeper and more resilient remains a challenge.

Turnover in EME currencies saw substantial growth between 2022 and 2025, but remained low relative to underlying economic activity. In FX markets, EME currencies' combined share rose to a new high of 29% of global turnover. The Chinese renminbi led the way, boosted by its growing use in trade and investment. In a box, Wooldridge (2025) explores how the internationalisation of EME currencies has slowed, reflecting FX and capital controls that limit deliverability contributing to market fragmentation.

Trading of IR derivatives in EME currencies remains lower, at around 5% of global turnover (Ehlers and Todorov (2025)). The absence of exchange-traded government bond futures and the concentration of central clearing in a few key locations continue to hinder market development and deepening in EMEs. These challenges underscore the need for policy initiatives to foster deeper and more resilient markets.

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[6] This has led to signs of a bifurcation: jurisdictions adopting an RFR-only approach (eg the United States, the United Kingdom, Switzerland) have seen a surge in overnight index swap contracts, while in those that simultaneously reformed existing IBOR benchmarks (eg the euro area, Australia), overnight index swap contracts coexist with swaps linked to IBOR rates.

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Global FX markets when hedging takes centre stage[1]

Turnover in global foreign exchange (FX) markets averaged $9.5 trillion per day in April 2025, a 27% increase from April 2022. Developments specific to April, namely heightened volatility and the dollar's depreciation following US tariff announcements, were linked to a surge in spot and forward trading as market participants managed currency risk. The preconditions set by global monetary policy tightening since 2022, which had raised hedging costs and left many investors underhedged, amplified these developments. In addition, interbank trading in FX swaps stagnated because of reduced liquidity management needs and fewer cross-currency arbitrage opportunities. Dealers largely relied on internal capital markets to manage risk and demonstrated greater capacity to internalise client trades than in previous years, supporting orderly market functioning in April.

JEL classification: C42, C82, F31, G12, G15.

The average daily turnover in over-the-counter (OTC) foreign exchange (FX) spot and derivatives transactions reached $9.5 trillion in April 2025, more than a quarter higher than in April 2022. This surge occurred amid heightened volatility following the US tariff announcements early in the month and against the backdrop of global monetary tightening that shaped market preconditions. Drawing on the 2025 BIS Triennial Central Bank Survey results, this article examines recent trends in FX trading volumes and market structure and how they set the stage for the April developments.[2]

Over the past three decades, average daily FX trading volumes have not only dwarfed daily global GDP and international trade but also expanded at a much faster pace. While global FX trading volumes were 12 times global GDP in 1992, they were 30 times that in 2025 (see Annex Table A.1). They were about 70 times the volume of global trade in 2025, roughly double the ratio in 1992. This rise in FX volumes reflects financial deepening and greater involvement of non-bank financial institutions

[1] The views expressed in this publication are those of the authors and not necessarily those of the BIS or its member central banks. We thank Alain Chaboud, Mikael Charoze, Mathias Drehmann, Gaston Gelos, Hinako Kijima, Patrick McGuire, Daniel Rees, Dagfinn Rime, Andreas Schrimpf, Hyun Song Shin, Frank Smets and Goetz von Peter for helpful comments. We are also grateful to Kana Sasamoto and Jhuvesh Sobrun for invaluable research assistance.

[2] Central banks and other authorities in 52 jurisdictions participated in the 2025 survey, collecting data from more than 1,100 banks and other dealers. See BIS (2025) for details on the preliminary survey results (www.bis.org/statistics/rpfx25_fx.htm), Chaboud et al (2023) for a primer on FX spot market structure, Ranaldo (2023) for information on FX swaps and currency swaps, and Avdjiev et al (2025), in this issue, for the concepts underlying the BIS derivatives statistics.

Key takeaways

- *Global FX turnover reached $9.5 trillion per day in April 2025, up 27% from April 2022, partly reflecting trading around the US tariff news and hedging of US dollar exposures.*
- *Financial customers turned to forwards and options, in addition to FX swaps, to hedge their US dollar exposures; by contrast, interbank FX swap trading stagnated while interbank forwards gained traction.*
- *Dealers relied more on intragroup trading to manage risk and matched a larger share of client trades internally than in previous years, thereby reducing the market impact of heightened client activity.*

(NBFIs) in FX markets (International Monetary Fund (2025)), as trading for financial motives has come to dominate trading for the purpose of goods and services exchange (Caballero et al (2022)).

Since the 2022 Triennial Survey, growth in FX volumes was primarily driven by reporting dealers' trading with financial customers. Both spot transactions and trading of forwards and options with these counterparties rose noticeably. These instruments can be used to adjust exposures to currency risk on existing positions or to speculate on future currency moves. The growth of FX swap turnover was mainly due to trading with institutional investors, reflecting their funding and hedging needs across currencies. Overall, however, FX swap trading has grown only modestly since 2022, reflecting a stagnation in interbank activity.[3]

Several forces shaped FX volumes in April 2025. Announcements of major shifts in US trade policy early in the month and an unexpected depreciation of the US dollar, including a sudden flip in the dollar's correlations with major asset classes, roiled markets. Market participants rushed to hedge existing dollar exposures against further dollar depreciation (Shin et al (2025); Shin (2025)). This boosted turnover of forwards and options. There were no signs of dollar funding strains. If anything, investors reduced their dollar exposures in April. Thus, banks had little need for funding via FX swaps, which is consistent with their subdued growth.

Medium-term forces set the preconditions that amplified the role of hedging in FX trading in April 2025. The need to adjust hedges of US dollar positions was especially acute since many investors entered the month with relatively low hedge ratios. This was in response to higher hedging costs, which rose with global monetary policy tightening from 2022 to 2023. These costs were underpinned by a rapid increase in short-term interest rates in the United States and a widening of interest rate differentials across regions.

In addition to hedging, some market participants reduced their US dollar asset holdings while others used the opportunity to speculate. Thus, portfolio rebalancing by some drove spot turnover higher. In turn, knock-on volatility and movements in exchange rates spurred speculative trading by hedge funds and momentum traders.

Despite volatile market conditions, dealers demonstrated a greater capacity to internalise trades than in previous years. By matching offsetting client trades on their own books, they reduced the need to hedge externally with other dealers, thereby minimising the market impact of customer flows. Furthermore, the growth rate of

[3] Interbank transactions disproportionately contribute to total turnover because of regular rollovers of short-term contracts in which their trading is concentrated.

intragroup turnover was higher than total inter-dealer turnover across all instruments, indicating the rising role of internal capital markets for managing currency risk.

A surge in FX volumes in April 2025

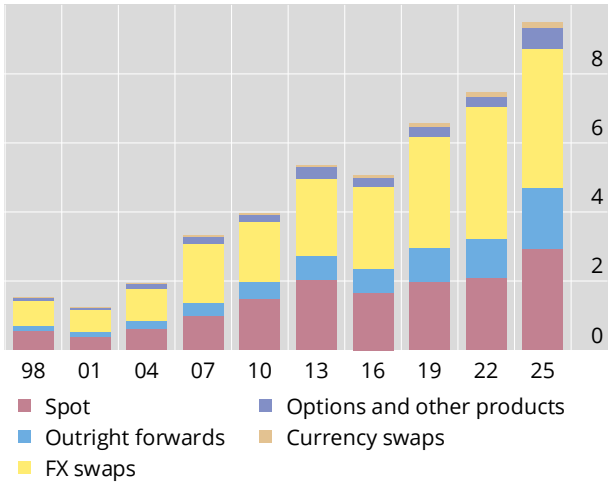
Global FX trading in April 2025 was at an all-time high, with average daily turnover of $9.5 trillion (Graph 1.A). Turnover exceeded trend growth in response to extraordinary events, namely elevated volatility and dollar depreciation following the US tariff announcements early in the month.

The tariff announcements' impact on trading activity in April appears to have been substantial, contributing an estimated $1.5 trillion to overall turnover (Graph 1.B). An imputed global FX turnover series (red line), derived from semiannual FX committee surveys, is used to gauge expected April activity without April-specific shocks: the prevailing trend from the October 2024 survey is extrapolated to April 2025 (red cross).[4] Actual turnover in April 2025 exceeded this benchmark and reached an all-time high, surpassing the previous imputed (unobserved) peak during the Covid-19 turbulence in March 2020 (vertical line).

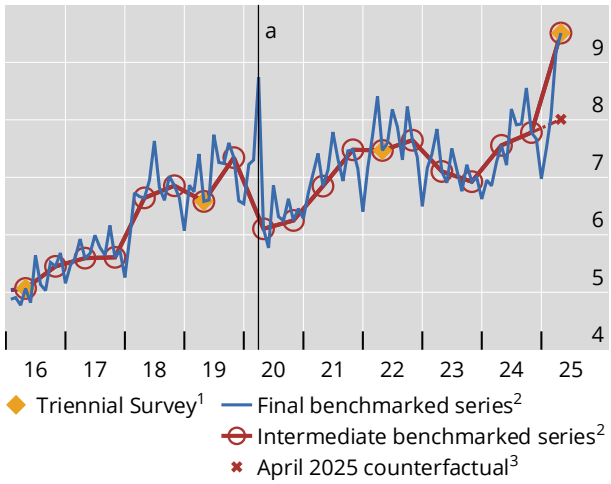
Global foreign exchange trading volumes hit new record

In trillions of US dollars — Graph 1

A. By instrument[1]



B. Imputed FX trading volumes



[a] Peak of Covid-19 turbulence (March 2020).

[1] Adjusted for local and cross-border inter-dealer double-counting, ie "net-net" basis; daily averages in April. [2] Benchmarking using the proportional Denton technique allows us to assess the evolution of FX trading volumes between Triennial Surveys. For a description, see Bech and Sobrun (2013). [3] Calculated by extrapolating the prevailing trend between the last two interim benchmarks, which are based on semiannual FX committee surveys between April and October 2024.

Sources: Bech and Sobrun (2013); CLS Group; semiannual FX committee surveys; BIS Triennial Central Bank Survey; authors' calculations.

[4] The imputed measure is constructed from semiannual FX turnover surveys of major local FX committees and monthly trading volumes computed by the Continuous Linked Settlement Group (CLS Group) – a specialised financial market infrastructure that settles FX transactions in major currency pairs. The methodology seeks to make the growth rates in the imputed series match those of the higher-frequency series as closely as possible, while ensuring that the imputed series matches the low-frequency series. See Bech (2012) and Bech and Sobrun (2013).

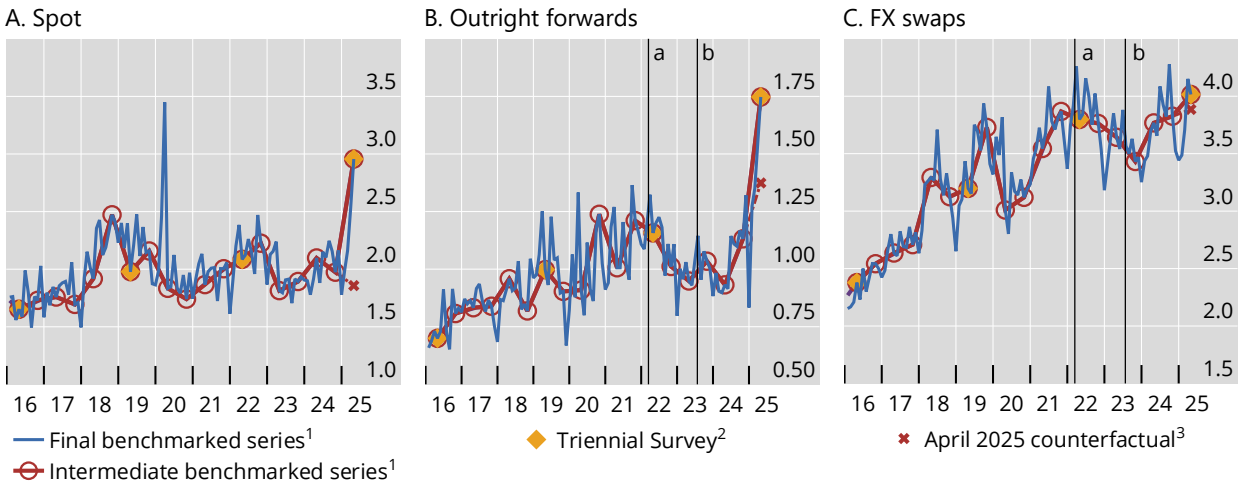
Heightened financial market volatility in April 2025 was associated with an uneven rise in FX trading activity across instruments. Compared with April 2022, spot and forward trading rose by 42% and 51%, respectively. Trading in options was up 108%. By contrast, trading growth in FX swaps, the most traded instrument, stagnated compared with the overall market, rising by only 6% (see Annex Table A.2).

The higher-frequency imputed series underscores the exceptional nature of April 2025. The rise in daily turnover in April was primarily due to an estimated $1.1 trillion spike in spot trading during that month (Graph 2.A). An extrapolation based on the prevailing trend suggests that, without the tariff effects, spot turnover would have been flat, or even lower, compared with April 2022. Similarly, roughly $400 billion of the $1.75 trillion daily turnover in forwards can be attributed to trading around the tariff announcements (Graph 2.B). By contrast, FX swap volumes were only slightly higher, by $130 billion, compared with the estimated trend (Graph 2.C).

The increase in FX trading was primarily driven by dealers' trading with financial customers, particularly institutional investors and non-reporting banks. Spot turnover with institutional investors has nearly doubled since 2022 (Graph 3), surpassing $440 billion in 2025. Meanwhile, non-reporting banks, which trade both on their own account and on behalf of institutional and corporate clients, saw spot and forward trading grow by 57% and 132%, respectively, each contributing an additional $200 billion to total turnover. Although growth in FX swap trading was more subdued overall, trading with institutional investors increased by 18%, to $349 billion. In addition, options turnover with these counterparties surged by more than 150%.

Imputed FX trading volumes by instrument show significant differences

In trillions of US dollars — Graph 2

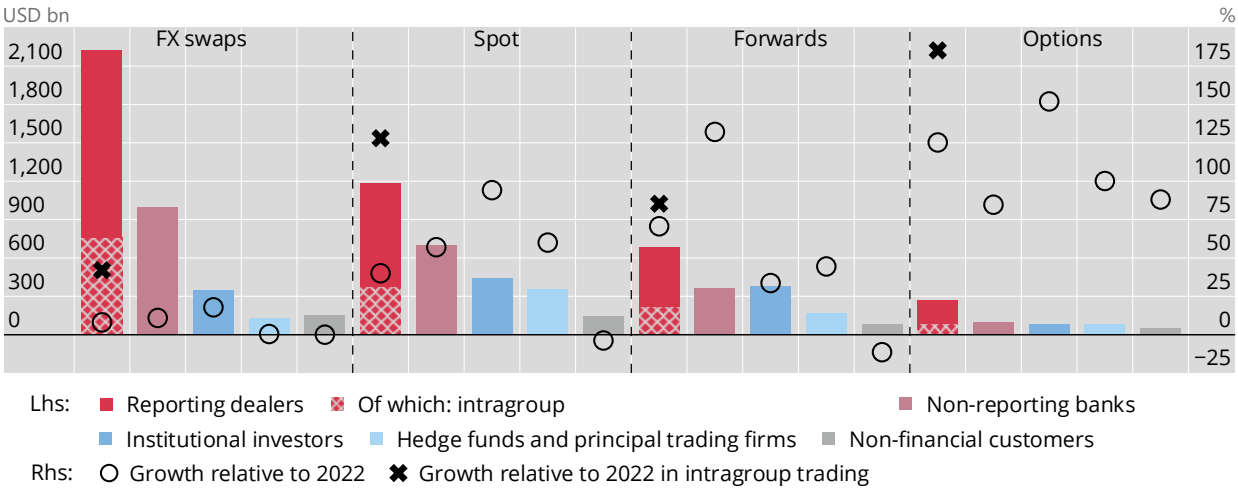


[a] First Fed funds rate hike (16 March 2022). [b] Latest Fed funds rate hike (26 July 2023).

[1] Benchmarking using the proportional Denton technique allows us to assess the evolution of FX trading volumes between Triennial Surveys. For a description, see Bech and Sobrun (2013). [2] Adjusted for local and cross-border inter-dealer double-counting, ie "net-net" basis; daily averages in April. [3] Calculated by extrapolating the prevailing trend between the last two interim benchmarks, which are based on semiannual FX committee surveys, between April and October 2024.

Sources: Bech and Sobrun (2013); CLS Group; semiannual FX committee surveys; BIS Triennial Central Bank Survey; authors' calculations.

FX volumes and turnover growth in April 2025, by instrument and counterparty[1] Graph 3



[1] Adjusted for local and cross-border inter-dealer double-counting, ie "net-net" basis. Intragroup trading is captured via related-party turnover in the survey; where related-party turnover was not reported, back-to-back trades (a subset of various related-party trades) were used.

Sources: BIS Triennial Central Bank Survey; authors' calculations.

Dealers largely managed risk arising from customer trades internally, without turning to external markets for hedging. Intragroup trading, whereby dealers shift risk across affiliates and trading desks within the same banking groups, increased much more than the overall inter-dealer trading (Graph 3, crosses vs circles). For example, intragroup trades in FX swaps rose 42% (cross), while external trading with other dealers contracted by 4% (not shown), resulting in the overall muted growth of 8% (circle). In spot and forwards, intragroup trades increased 128% and 85%, respectively, while overall trading with reporting dealers (dragged down by slower growth of external trades) rose by 40% and 71%. Such intragroup management of risk probably facilitated high internalisation ratios (Box A). Dealers continued to match a large amount of client trading volume internally instead of trading externally with other dealers (see Box B for a discussion of the FX execution landscape), thus minimising the overall market impact.[5]

Drivers of FX trading around the tariff news

Factors specific to April 2025 materially shaped the changes in FX trading between the 2022 and 2025 surveys. Although a shift in US trade policy was expected, the scale of the tariff news caught investors by surprise, prompting a broad reassessment of global portfolios and FX exposures. Responses diverged across countries: investors in some countries reduced their US dollar holdings, whereas others maintained exposures (International Monetary Fund (2025)). The historical relationship between the US dollar and risky assets reversed (Boissay and Huang (2025)), leading many to

[5] For example, banks also use ultra short-term (overnight) forward and FX swap positions for intragroup management of liquidity and currency mismatches (Drehmann and Sushko (2022)). More broadly, this speaks to the rising importance of internal capital markets in banking operations (Hardy et al (2024)) and in their OTC market transactions, such as repurchase agreements (Hermes et al (2025)).

hedge their dollar exposures for currency risk. These developments were amplified by relatively low hedge ratios going into April, reflecting high hedging costs that came with the rise in interest rates in 2022 and 2023.

Despite these dynamics, there were no signs of dollar funding stress in April. If anything, following the tariff announcements some global investors pared back their US exposure through sales of US assets,[6] driving up FX spot turnover. More importantly, though, investors rushed to hedge their existing positions against US dollar depreciation, mainly using forwards and options. Intuitively, forwards offered a simple way to lock in exchange rates for future transactions, making them well suited for adjusting hedge ratios on existing exposures. Options trading also increased significantly across counterparty segments, as some options strategies can substitute for forwards to hedge future FX risk. Meanwhile, hedge fund trading in options doubled, also suggesting heightened speculative activity (see Graph 3).

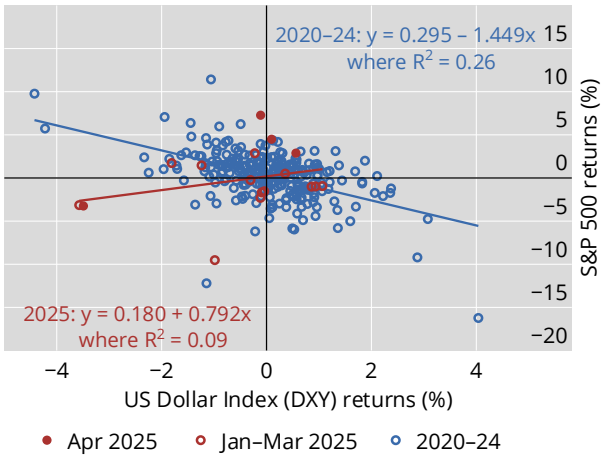
Some sophisticated investors could establish a forward position with a combination of more liquid instruments. For example, a spot dollar sale combined with a rolling FX swap can maintain a short dollar forward exposure. This approach was reportedly favoured by typical users of swaps, eg institutional investors, as seen in the 18% increase in FX swap turnover with these counterparties.

A breakdown in the dollar's correlation with risky assets also contributed to the rush to hedge dollar exposures. Historically, in times of market stress the dollar tended to appreciate when US equity markets fell – a response often referred to as "the dollar smile". This provided a natural hedge for dollar assets, leading many investors to leave large portions of dollar portfolios (especially equities) unhedged. In April 2025, however, this long-standing correlation broke down as the dollar depreciated sharply during the equity market selloff (Graph 4.A). This unexpected

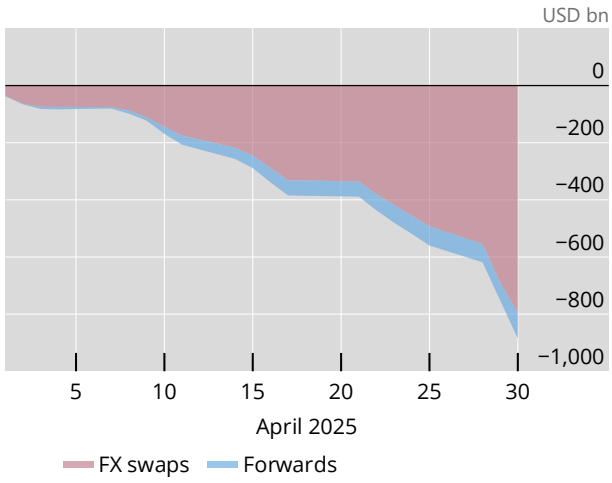
The flip in dollar-equities correlation and ex post hedging in April 2025

Graph 4

A. Correlation of the dollar with US equity returns



B. Cumulative net dollar purchases by non-US non-banks[1]



[1] Based on the difference between total daily dollar forward sales versus dollar purchases by non-US non-banks (mainly investment funds), cumulated through the month of April. CLS Group data.

Sources: Bloomberg; CLS Group; LSEG Datastream; BIS Triennial Central Bank Survey; authors' calculations.

[6] Boissay and Huang (2025) show that while some non-US investors sold significant volumes of US assets in April 2025, most of these flows reversed in May and June.

reversal caught equity investors off guard, prompting them to reduce or hedge their dollar exposures by selling dollars forward. This is clearly seen in third-party data, which show that non-US non-banks (mostly sophisticated investment funds) were persistent net dollar sellers via FX swaps and, to a lesser extent, outright forwards (Graph 4.B).[7]

Shifts in FX trading amid global monetary policy tightening

Despite the outsize impact of the April tariff announcements, other longer-term cyclical factors also contributed to turnover in the 2025 Triennial. Global monetary policy tightening in 2022–23, particularly in the United States, raised the costs of FX hedging, thus motivating investors to reduce hedging and shaping market conditions leading up to April 2025. In addition, over the same period, interbank FX swap trading stagnated while interbank forwards gained traction. The withdrawal of excess liquidity via quantitative tightening (QT) in major currencies and fewer cross-currency arbitrage opportunities probably contributed to subdued interbank FX swap turnover.

Reduced FX hedging amid higher hedging costs since 2022

The sharp rise in short-term interest rates since 2022 pushed up the costs of hedging dollar exposures. For non-US investors, these costs rise as the difference between short-term dollar interest rates and the equivalent rate in local currency widens.[8] Between January and December 2022, the annualised implied interest rate for a dollar borrower (ie hedger) via three-month FX swaps rose markedly for major currencies (Graph 5.A). For example, the forward premium increased from 0.7% to 3.5% for EURUSD, and from 0.3% to 5.5% for USDJPY. Furthermore, the dollar yield curve inverted with the rapid rise in short-term dollar rates. This reduced the expected returns on long-term dollar bonds on a hedged basis, making hedged investments even less attractive for fixed income investors.[9]

In response, many institutions with currency hedging mandates (eg life insurers and pension funds) significantly lowered their hedge ratios between 2022 and 2024.[10] For example, the Japanese life insurance sector reduced hedging rates from roughly 60% to 40% (Bank of Japan (2025)). Similarly, the ratios for Dutch pension funds fell from 30% to 25% and those of Danish insurers and pension funds fell from about 55% to 50% (De Nederlandsche Bank (2025); Danmarks Nationalbank (2025)),

[7] Based on outstanding data, less than half of outstanding outright forward and FX swaps globally settled through CLS Group. Most interbank trades but only a fraction of trades with non-bank counterparties, which use forwards more intensively, settle via CLS Group. Thus, while a reliable indicator for FX swaps, the figure understates US dollar forward sales by non-banks by a significant multiple (see Kloks et al (2023)).

[8] When hedging via FX swaps, investors exchange local currency for US dollars. The forward leg locks the future exchange rate and embeds the interest rate differential, which sets the hedging cost. In practice, hedging costs can differ from the interest rate differential by a small cross-currency basis (Du et al (2018)).

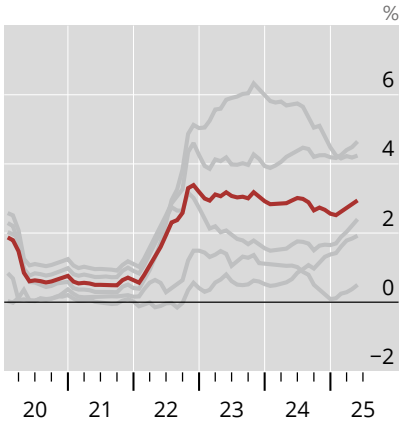
[9] Kubitza et al (2025) discuss how rollover risk affects investors' portfolio rebalancing activity; Nenova et al (2025) document the close relationship between FX derivatives and bond market conditions.

[10] FX hedge ratios among insurers are higher than those for pension funds or mutual funds (although pension fund hedging policies can differ markedly across jurisdictions) (Du and Huber (2024)).

Higher hedging costs are reflected in both quantities and prices

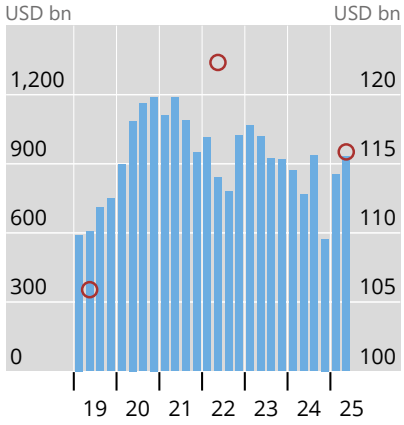
Graph 5

A. Hedging costs as measured by the USD forward premium[1]



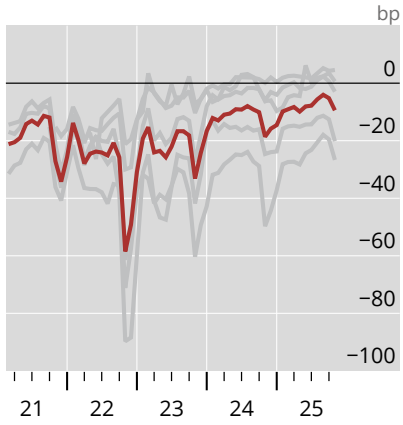
US dollar forward premium:
Turnover-weighted average
Individual currency pairs

B. Off-balance sheet net USD lending and longer-term FX swap turnover



Off-balance sheet net dollar lending to non-banks (lhs)[2]
USD longer-term FX swap turnover (rhs)[3]

C. USD premium in FX swaps, measured on a cross-currency basis[4]



Cross-currency basis:
Turnover-weighted average
Individual currency pairs

[1] Interest rate paid by USD borrowers in a three-month FX swap due to the difference between the spot and forward exchange rates (annualised); USD vs EUR, JPY, CHF, AUD and CAD. [2] Computed by combining US and euro area banking systems' on-balance sheet currency mismatches in BIS banking statistics with the banking systems' net FX swap and forward positions versus bank and versus non-bank counterparties in CLS Group data (under the assumption that banks' on-balance sheet currency mismatches are offset by off-balance sheet derivative positions; for methodology, see the online statistical annex, combining international banking statistics and CLS Group data in Kloks et al (2023)). [3] Net-net turnover; three-month tenors or higher, typically used for portfolio hedging, USD vs same currency pairs shown in panel A. [4] Deviations of three-month FX swap-implied US dollar rates from the actual interest rates; a negative value implies a dollar premium in FX swaps (ie the deviation of the forward premium from the interest rate differential in the two currencies); USD vs EUR, JPY, GBP, CHF and CAD.

Sources: Bloomberg; CLS Group; BIS international banking statistics; BIS Triennial Central Bank Survey; authors' calculations.

while the equity hedge ratio of the Australian superannuation sector declined from close to 30% to 20% (Hauser (2025)).

This global contraction in FX hedging activity between 2022 and 2025 is evident in the evolution of dealer banks' FX derivatives positions and in pricing data. US and European banks' net outstanding off-balance sheet dollar lending to non-banks fell from about $1 trillion in 2021 to as low as $600 billion in late 2024 (Graph 5.B, bars), consistent with weaker demand for dollar hedging from non-bank customers. Data on turnover of FX swaps tell a similar story: turnover in tenors most often used for hedging (eg three-month or higher) and in currencies with high hedging costs contracted between 2022 and 2025 (Graph 5.B, circles). The monthly imputed series (see Graph 2) points to an overall decline in FX swap and forward trading volumes during the Federal Reserve's rate hiking phase (2022–23). Consistent with less demand for hedging dollar positions with FX swaps (see eg Borio et al (2016)), the cross-currency basis narrowed during this period (Graph 5.C).

Box A

Non-visible trading and FX liquidity conditions in April 2025

Ingomar Krohn, Andreas Schrimpf and Vladyslav Sushko ①

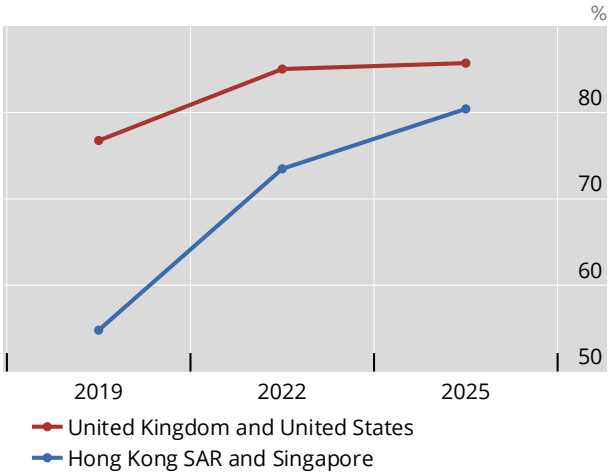
Despite the market turbulence in April 2025, there were no clear signs of liquidity impairment or market dysfunction. Large foreign exchange (FX) dealer banks were able to continue to match a large amount of client trading on their own books (a process known as internalisation), minimising the overall market impact. The fragmented FX trading landscape (detailed further in Box B) proved resilient overall, enabling participants to adapt strategies and access liquidity. While the decentralised nature of the FX market had raised concerns in the past about a potential "liquidity mirage", the market's very characteristics – such as private and bespoke trading – facilitated smooth functioning even during periods of market strain.

The non-visible part of the FX markets has shown greater growth in recent years, which may partly explain the fairly muted impact of the shock on market quality.② Despite heightened market volatility in April, dealers demonstrated greater capacity to internalise trades than in previous years, particularly in Asian financial centres (Graph A1.A). Internalisation ratios reached levels upwards of 80% across all currencies in major FX trading hubs (those for G10 currencies were even higher). High internalisation dampens the immediate price pressure from client trades, supporting steadier quotes and reducing information revelation to the market and thus reducing the aggregate price impact. It means less need for dealers to turn to external trading venues to hedge the imbalances in customer demand, a process sometimes referred to as inter-dealer "hot potato trading".③

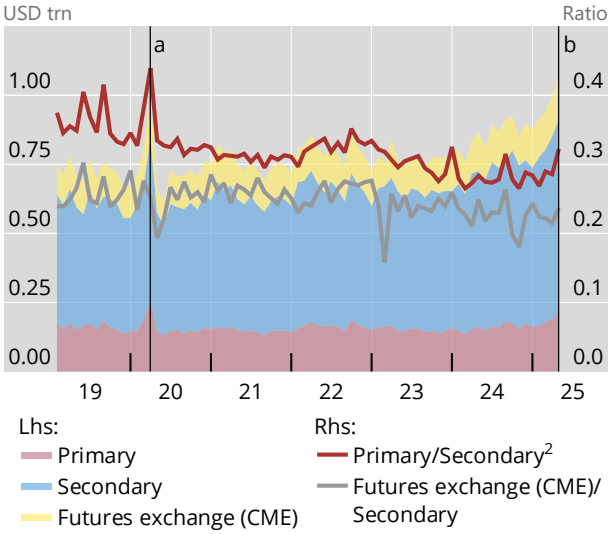
FX dealers' internal matching of client flows dominated external hedging

Graph A1

A. Internalisation ratios for spot trading in top centres[1]



B. Primary, select secondary venues and futures volumes[2]



[a] Covid-19 pandemic (March 2020). [b] US tariff announcements (April 2025).

[1] Percentage of customer trades matched across dealer's own book and not hedged externally; see BIS Triennial Survey 2025 reporting guidelines for details, at www.bis.org/statistics/triennialrep/2025survey_guidelinesturnover.pdf. [2] Primary venues: EBS and LSEG spot trades (as a proxy for respective central limit order book volumes); select secondary venues include 360T, Cboe FX (Hotspot), Euronext FX (Fastmatch), FXAll and FXSpotStream; futures refers to turnover in currency figures on the Chicago Mercantile Exchange (CME).

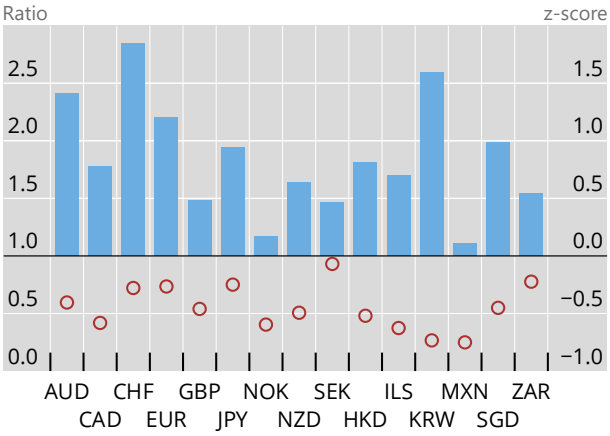
Sources: Cboe; CME; Deutsche Börse; Euronext; FXSpotStream; LSEG Workspace; authors' calculations.

While there was a pickup in such hedging via inter-dealer markets, it was relatively small, indicating that the market may have been strained but not stressed. In line with robust dealer internalisation, there was only a modest pickup in trading via inter-dealer electronic brokers, known as the "primary venues", where dealers turn to manage inventory imbalances in volatile markets (Graph A1.B).④

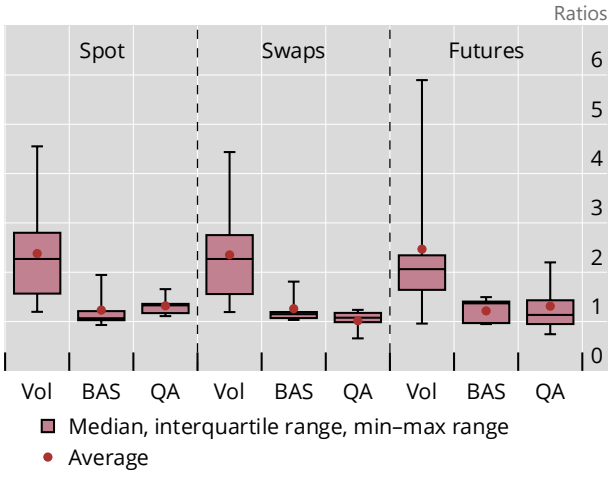
FX liquidity in April 2025 was robust across market segments

Graph A2

A. Price impact relative to previous volatile episode and abnormal trading volumes



B. Volatility and liquidity in OTC spot and derivatives trades compared with exchange traded futures[3]



BAS = bid-ask spread; OTC = over-the-counter; QA = quote activity; Vol = volatility.

[1] Z-score is based on a comparison of average aggregate CLS Group volumes in April 2025 with those in the preceding year, April 2024 to March 2025. The Amihud measure is computed as the ratio of the absolute value of daily returns to the corresponding trading volume. The figure compares the Amihud measure in April 2025 with the corresponding measure during the onset of the Covid-19 outbreak in March 2020. [2] Normalised trading volumes (z-scores) in April 2025 compared with the January–March 2025 period. [3] Volatility, bid-ask spreads and quote activity for spot and swaps are calculated using data from LSEG Tick History, while market metrics for FX futures are derived from CME data. Ratios refer to the median market metrics in April 2025 relative to the median during January to March 2025.

Sources: CME; CLS Group Data; LSEG DataScope; authors' calculations.

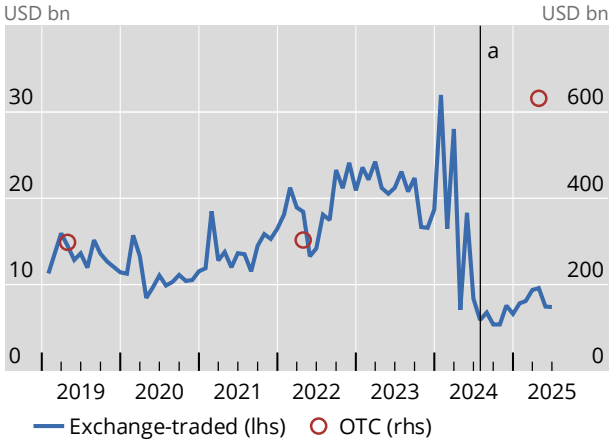
Despite the surge in overall trading demand, liquidity conditions remained resilient. Spot trading volumes across currencies rose notably in April compared with the preceding three months (Graph A2.A). Yet, unlike previous periods of turbulence, there were no signs of market distress. A comparison of price impact measures in April 2025 with the onset of the Covid-19 pandemic in March 2020 indicates that liquidity conditions remained resilient, with notably lower estimates of the price impact.

Liquidity conditions held up across different segments of the FX market. Based on intraday data, Graph A2.B shows the cross-currency distribution of the ratios of volatility, bid-ask spreads and quote activity during April 2025 compared with the preceding quarter (a reading of 1 means no change). While volatility increased notably in dealer-customer segments for both OTC spot and FX swaps and for exchange-traded FX futures, liquidity, as measured by bid-ask spreads, remained rather resilient in these segments. This suggests that concerns about "phantom liquidity" – where liquidity appears available but vanishes when market participants rush to execute trades – did not materialise.

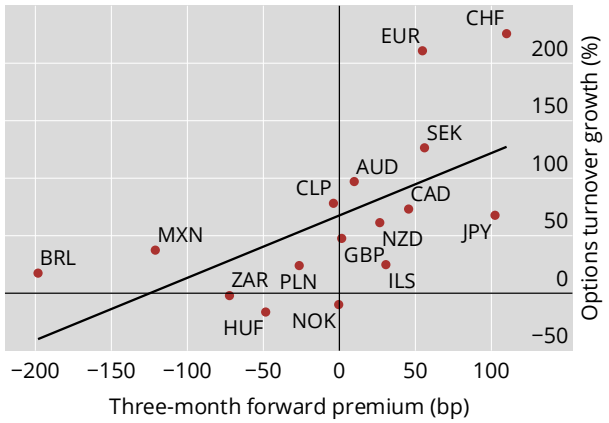
① The views expressed in this publication are those of the authors and not necessarily those of the BIS or its member central banks. ② M Butz and R Oomen, "Internalisation by electronic FX spot dealers", *Quantitative Finance*, vol 19, no 1, 2019, pp 35–56. ③ R Lyons, "A simultaneous trade model of the foreign exchange hot potato", *Journal of International Economics*, vol 42, no 3–4, 1997, pp 275–98. ④ A Chaboud, D Rime and V Sushko, "The foreign exchange market", in R Gürkaynak and J Wright, (eds), *Research Handbook of Financial Markets*, 2023, pp 253–75.

Higher hedging costs with FX forward transactions boosted hedging with options Graph 6

A. Exchange-traded and OTC options turnover



B. A shift towards options with higher hedging costs[1]



OTC = BIS over-the-counter options; "net-net" basis.

[a] Carry trade unwinding (August 2024).

[1] Options turnover is measured by the growth rate between 2022 and 2025, while hedging costs are approximated using the three-month forward premium.

Sources: Bloomberg; BIS exchange-traded derivatives statistics; BIS Triennial Central Bank Survey; authors' calculations.

With higher hedging costs for FX swaps and forwards, some market participants turned to options as a hedging tool.[11] Turnover in exchange-traded currency options increased in 2022–23, from less than $15 billion to almost $25 billion per day (Graph 6.A). Moreover, turnover in OTC currency options more than doubled between 2022 and 2025, from $303 billion to $634 billion (after remaining virtually unchanged between 2019 and 2022). Options turnover increased the most for the currencies where the costs of hedging via forwards rose (Graph 6.B), suggesting that investors substituted options for forwards.[12] While options trading in emerging market economy (EME) currencies followed this general pattern, they fell on the opposite end of the spectrum, as a number of EMEs, particularly in Latin America, raised interest rates higher and ahead of the United States (see Box C for a discussion on the evolution of EME currency trading).

Interbank FX swaps stagnated while forwards rose

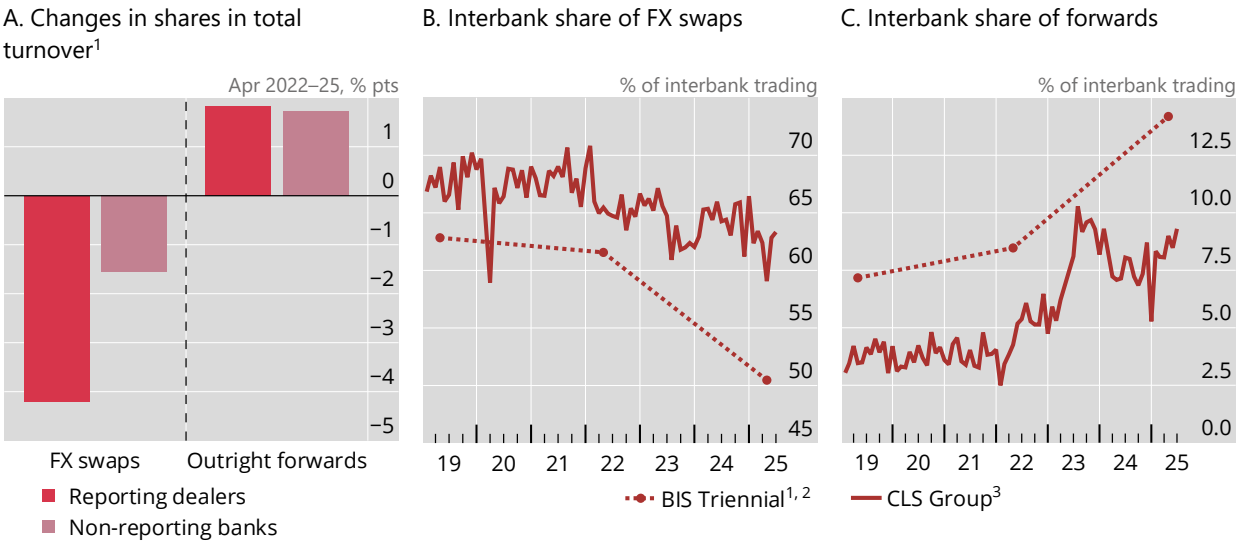
In the interbank segment, turnover of FX swaps grew little relative to 2022, whereas that of forwards gained importance (Graph 7.A). Monthly data from CLS Group reveal that these shifts started in 2022, coinciding with the onset of monetary policy tightening by major central banks (Graphs 7.B and 7.C). The shifts may have reflected factors related to liquidity management, arbitrage and hedging of customer trades.

[11] Options are more attractive than forwards when interest rate differentials are wide and FX volatility low. In these periods, participants may use option spread strategies, which economise on hedging costs. A basic example is a collar – buying an out-of-money put and selling an out-of-money call.

[12] While options hedge future cash flows and returns, investors still need swaps to fund initial investments. When purchasing foreign assets such as bonds, they often use FX swaps or currency swaps to exchange their domestic currency for foreign currency in order to fund the investment.

Shifts in interbank FX derivatives trading

Graph 7



[1] Adjusted for local and cross-border inter-dealer double-counting, ie "net-net" basis; daily averages. [2] For currency pairs that settle via CLS Group. [3] Monthly average of daily data.

Sources: CLS Group; BIS Triennial Central Bank Survey; authors' calculations.

First, the different pace of QT, which accompanied monetary policy tightening,[13] altered liquidity conditions across currency areas, in many cases, reducing banks' incentives to shift liquidity across currencies. This dampened turnover in short-maturity swaps used for liquidity management – ie tenors of one week or less (Graph 8.A). Because these swaps are rolled over frequently and account for the bulk of FX swap turnover, their stagnation weighed disproportionately on overall FX swap growth.

Second, and related, the narrower cross-currency basis, in large part due to the aforementioned weaker funding demand via FX swaps (see Graph 5), probably reduced banks' activity in cross-currency basis trades. This includes both less funding and less arbitrage activity on their own books and a reduced need to offload client positions via interbank FX swaps.

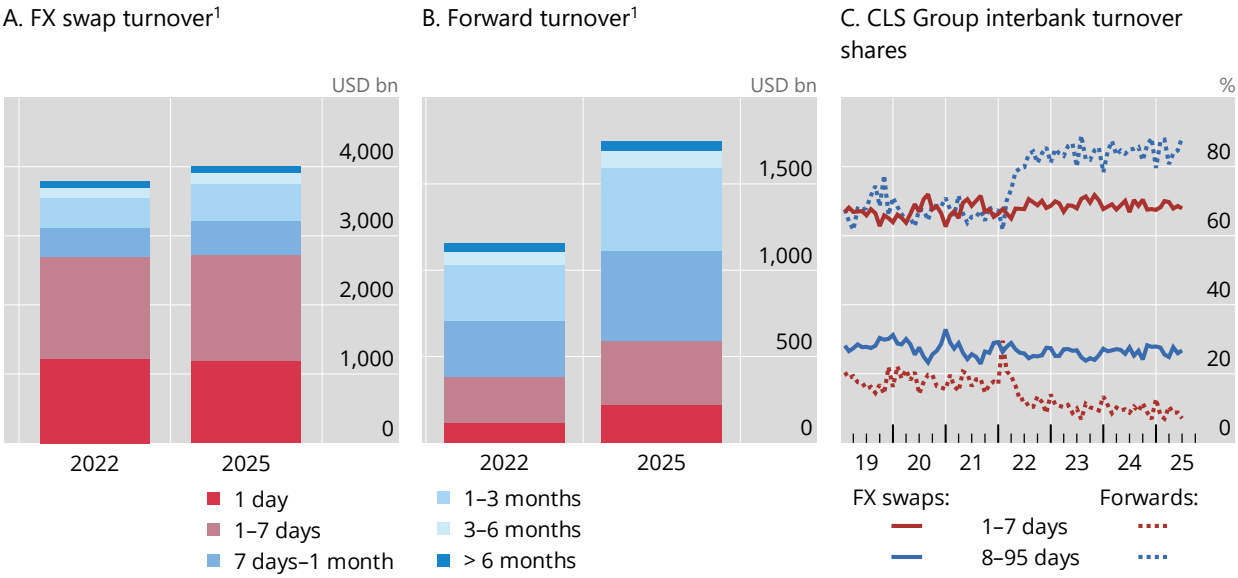
Third, banks may have turned to forwards in the inter-dealer segment to hedge some positions with clients. Instead of rolling over short-maturity swaps to hedge longer-dated client exposures, banks could enter longer-dated forward positions directly. This substitution helps explain both the stagnation in very short-dated swap turnover and the expansion of forward turnover in longer-term buckets (eg one week to three months) (Graph 8.B). CLS Group data confirm this expansion since 2022 (Graph 8.C).[14] [15]

[13] The Federal Reserve reintroduced QT in June 2022, while the ECB and the Bank of Japan began QT in March 2023 and March 2024, respectively.

[14] Trading of forwards has also been facilitated by inter-dealer electronic brokers beginning to onboard this instrument. For example, the share of forwards traded via electronic brokers in London doubled, from 14% to 28%, between 2022 and 2025, according to the London FX committee survey.

[15] The shifts in monetary policy also affected the composition of interest rate derivatives turnover, with greater trading of interest rate futures in one-month and similar tenors (Ehlers and Todorov (2025), in this issue).

Short-dated swaps stagnated due to shifts in interbank trading Graph 8



[1] Adjusted for local and cross-border inter-dealer double-counting, ie "net-net" basis; daily averages in April.

Sources: CLS Group; BIS Triennial Central Bank Survey; authors' calculations.

Conclusion

Global FX trading volumes reached a new high in April 2025, with average daily turnover of $9.5 trillion. Estimates based on higher-frequency benchmarks suggest that more than $1.5 trillion of this turnover resulted from a trading surge following US tariff announcements and sudden dollar depreciation. Investors' relatively low hedge ratios going into April, reflecting higher hedging costs since 2022, amplified this surge.

The FX market appeared to act as a shock absorber during the turbulence in April 2025. Many market participants adjusted to higher perceived risks in their dollar investments via FX derivatives rather than resorting to sales of underlying assets. They increased their currency hedge ratios and sold dollars forward using FX derivatives to counteract the risk of any further depreciation.

Despite volatile market conditions, dealers demonstrated an even greater capacity to internalise client trades than in previous years. High internalisation was probably supported by the internal capital markets of banking groups, with intragroup trading increasing significantly across all instruments. Such non-visible intermediation reduced the impact of client trades on the market and probably contributed to resilient market functioning during the volatile conditions in April 2025.[16]

[16] See International Monetary Fund (2025) for a dedicated analysis of the risk and resilience of the global FX market, as well as an analysis of trading around the April 2025 events.

Box B

The FX trade execution landscape through the prism of the 2025 BIS Triennial Survey

Ingomar Krohn, Andreas Schrimpf and Vladyslav Sushko ①

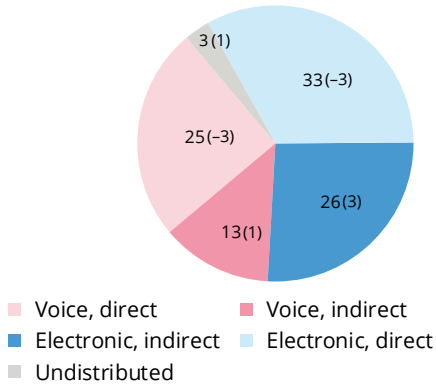
The foreign exchange (FX) market has a unique structure, distinct from other major asset classes.② It has by and large evolved organically based on market participants' needs and technological advancements, with less regulatory oversight than other key markets. Unlike equities or futures contracts, which are traded on centralised exchanges, spot and most FX derivatives transact over the counter (OTC), with dealers acting as intermediaries. Compared with other OTC markets, such as bond markets, the FX market is more liquid and diverse and features more electronic trading and a broader range of trading venues. It is thus decentralised and fragmented. Moreover, much of the trading is "invisible" to the market, since it takes place directly between customers and dealers, with dealers matching more than 80% of customer trades within their own internal liquidity pools via so-called "internalisation" (see Box A).

FX trades can be executed directly with dealers or indirectly through a range of venues. These include anonymous central limit order books (CLOBs) and disclosed, quote-driven platforms where participants submit and respond to requests for quotes (RFQs). Venues serve different counterparty segments, from inter-dealer-only markets to platforms open to both dealers and customers. In addition, many dealer-owned (often single-dealer) platforms facilitate customer flow. Execution may be by voice or fully electronic.

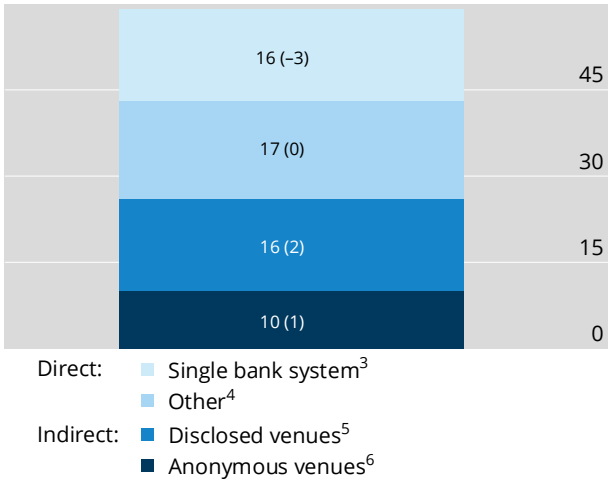
Trade execution methods in April 2025[1]

As a percentage of global turnover — Graph B1

A. Execution methods[2]



B. Electronic execution methods[2]



[1] In brackets: change in percentage points since the 2022 Triennial Survey. [2] Direct: trades not intermediated by a third party. Indirect: trades intermediated by a third party – either a voice broker or a third-party electronic platform. [3] Single bank trading systems (eg Barclays BARX, Citi Velocity, Deutsche Bank Autobahn and UBS Neo). [4] Other direct electronic trading systems (eg direct electronic price streams). [5] Multibank dealing systems that facilitate trading on a disclosed basis or that allow for liquidity partitioning using customised tags (eg 360T, EBS Direct, Currenex FXTrades, Fastmatch, FXall OrderBook and Hotspot Link). [6] Electronic trading platforms geared to non-disclosed trading; these include the primary central limit order books (CLOBs), namely LSEG Matching and EBS, as well as limit order books from LMAX and Currenex.

Sources: BIS Triennial Central Bank Survey; authors' calculations.

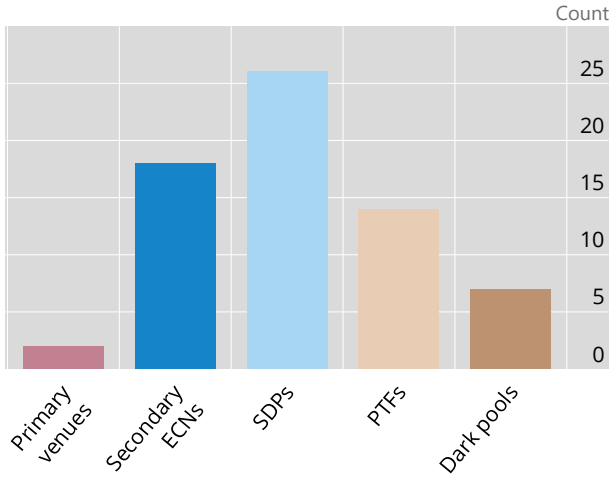
The latest snapshot of the microstructure of trading was taken during April 2025, a month marked by a spike in volatility and trading activity around the US tariff announcements. The data show that market participants continued use all modes of trading, with electronic trading accounting for 59% (Graph B1.A), a share virtually unchanged since the previous Triennial Survey. Within the electronic segment, there was some shift

towards indirect (ie brokered) forms of trading, as more participants sought access to multiple providers at once, both via platforms where the identities are disclosed and where they remain anonymous (Graph B1.B). At the same time, voice methods remained vital, allowing participants to execute larger spot trades while minimising market impact or to transact in FX derivatives at bespoke contract terms.

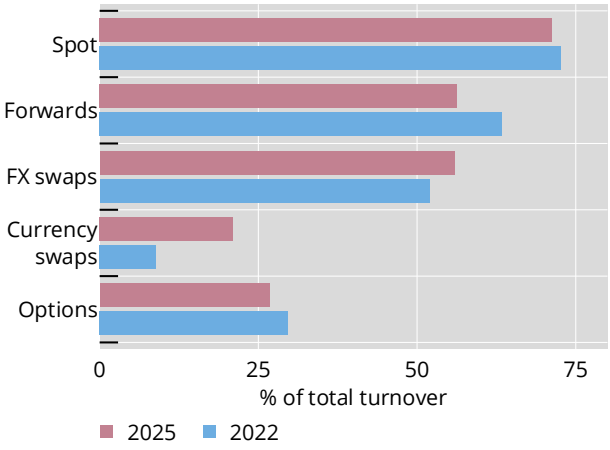
Electronic trade execution landscape across liquidity sources and instruments

Graph B2

A. Liquidity sources by type[1]



B. Share of electronic trade execution by instrument



[1] As of October 2025. Primary venues: CME EBS Market and LSEG Matching. Secondary electronic communication networks (ECNs): a variety of anonymous and disclosed multi-dealer platforms; SDP: proprietary single-dealer platforms of FX dealer banks; PTFs: principal trading firms; dark pools: electronic venues where information about traders' orders is not revealed to other participants.

Sources: ION Group MarketFactory; authors' calculations.

Different execution methods cater to the trading needs of various market participants, and trading is characterised by a large degree of fragmentation. Customers who turn to indirect disclosed electronic trading could, in theory, transact on over 15 multi-dealer platforms (Graph B2.A). On such venues, customers send dealers RFQs or connect to executable streaming prices from multiple liquidity providers. This enables them to effectively "shop" for liquidity or best execution while spreading trades across venues to minimise market impact. Customers also continue to rely on direct electronic trade execution methods and single-dealer platforms (SDPs). In addition to dealers, customers can connect to over a dozen non-bank liquidity providers, so-called principal trading firms (PTFs).③ While this variety of options might suggest market fragmentation, liquidity aggregators – tools that consolidate access to multiple trading venues and providers – help to overcome this issue, enhance transparency and enable smoother market functioning.④

Electronic trading, entrenched for a long time in spot and non-deliverable forwards, has been recently making inroads in lagging segments, notably outright forwards and swaps (Graph B2.B). In fact, inter-dealer electronic brokers are beginning to onboard more forwards, allowing for anonymous inter-dealer trading via CLOBs. Similarly, as customers trade more FX swaps via electronic RFQs or even streaming platforms, demand from an electronic inter-dealer environment yields market reference prices. The challenge for trading forwards and FX swaps in an anonymous electronic environment is that, unlike with spot trading, these trades leave counterparties with future exposures to each other. Currently, platform providers are developing various solutions to address counterparty credit risk in a (pre-trade) anonymous trading environment. Hence, over the next three years, one may anticipate notable shifts in the electronic trading landscape of FX swaps and forwards, amid progress in inter-dealer electronic risk-sharing in these instruments.

① The views expressed in this publication are those of the authors and not necessarily those of the BIS or its member central banks. ② See also A Schrimpf and V Sushko, "FX trade execution: complex and highly fragmented", *BIS Quarterly Review*, December 2019, pp 39–51. ③ High-frequency trading by PTFs also plays a crucial role in price discovery inter-dealer electronic brokers; see W Huang, P O'Neill, A Ranaldo and S Yu, "HFT and dealer banks: liquidity and price discovery in FX trading", *Swiss Finance Institute Research Paper*, no 23-48, June 2023. ④ R Oomen), "Execution in an aggregator", *Quantitative Finance*, vol 17, no 3, 2017, pp 383–404.

Renminbi propels the growth of EME currency trading

Philip Wooldridge ①

Emerging market currencies' collective share of global foreign exchange (FX) turnover rose to a new high of 29% in April 2025. This compares with 26% in April 2022 and less than 10% in the 2000s (Graph C1.A). Trading in the currencies of emerging market economies (EMEs) averaged $2.8 trillion per day in April 2025 – $2.7 trillion in over-the-counter markets covered by the BIS Triennial Central Bank Survey plus $0.1 trillion on exchanges.

The rise in EME currencies' global share was propelled largely by trading in the Chinese renminbi (CNY) and Hong Kong dollar (HKD). CNY was by far the most traded EME currency, accounting for 8.8% of global turnover in April 2025 (Graph C1.A). This was up from 7.0% in April 2022 and cemented the CNY's status as the fifth most traded currency overall. Indeed, in April 2025 USD/CNY surpassed USD/GBP as the third most traded currency pair, behind only USD/EUR and USD/JPY. HKD was the next most traded EME currency at 3.8% of global turnover, up from 2.5% in April 2022, followed by the Singapore dollar (SGD) at 2.4% and the Indian rupee (INR) at 1.9%.

Exchange rate volatility made an important contribution to the increase in CNY and HKD turnover in April 2025. Like for other major currencies, high volatility boosted inter-dealer activity as well as intermediation by principal trading firms (PTFs) and positioning by hedge funds. PTFs' and hedge funds' share of overall activity in CNY rose to 8%, in line with the global average, and in HKD their share climbed to 11%.

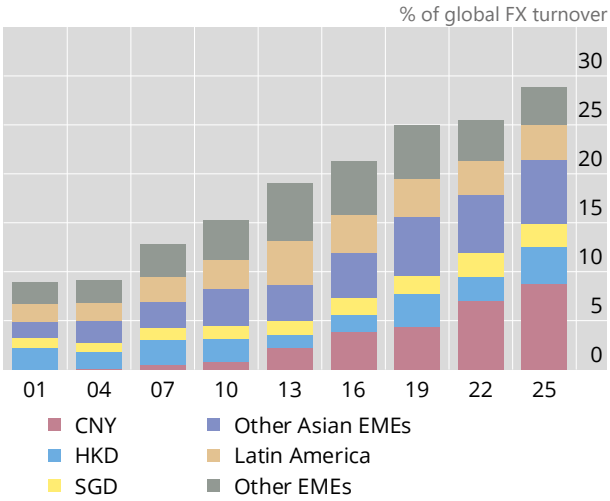
Alongside such cyclical factors, the trend increase in CNY activity was supported by the currency's growing use for trade and investment. For example, CNY-denominated cross-border bank credit to borrowers in Asian EMEs has been rising steadily since 2021. That said, USD continues to be the dominant vehicle currency for FX transactions involving CNY: as much as 96% of all CNY transactions were against USD in April 2025. Also, relative to economic activity, FX trading in CNY remains much lower than that in other major currencies, though it is rising quickly (Graph C1.B).

Aside from CNY and HKD, most other EME currencies saw relatively modest increases in trading volumes. Indeed, the upward trend in FX turnover as a share of GDP plateaued, with turnover relative to economic activity in the median EME unchanged between April 2022 and April 2025 (Graph C1.B).

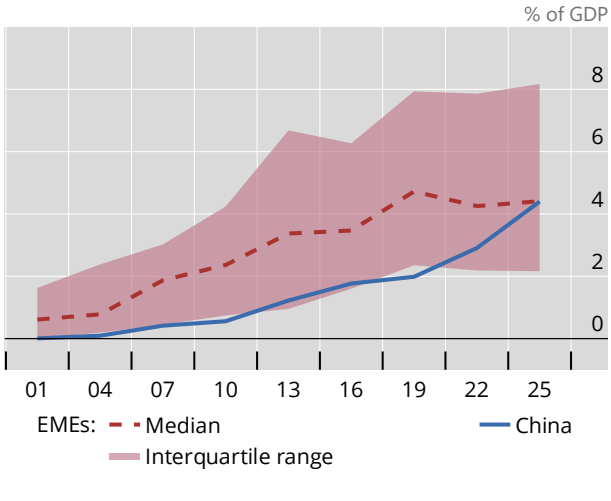
Growth of EME currency trading[1]

Graph C1

A. CNY and HKD drove the increase in EME currencies' share of global FX turnover



B. The trend increase in FX turnover as a share of EMEs' GDP has recently plateaued



[1] Global average daily spot and derivatives trading in over-the-counter markets ("net-net" basis) as well as on exchanges, in the month of April.

Sources: IMF, *World Economic Outlook*; Futures & Options World; Futures Industry Association; Options Clearing Corporation; BIS derivatives statistics; BIS Triennial Central Bank Survey; author's calculations.

This moderation in growth went hand in hand with a stabilisation in the share of international trading. Trading with non-residents had increased rapidly in the 2000s and 2010s, propelling the overall growth of FX activity in EME currencies (Graph C2.A). In recent years, however, the international share of trading has not changed much for the majority of EME currencies.

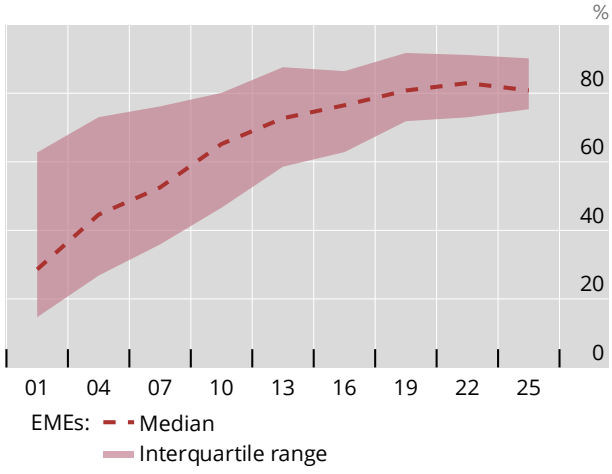
This steadying in the pace of internationalisation was explained in part by the faster growth of spot trading compared with derivatives trading. Among EME currencies, a larger share of spot trading than of derivatives trading takes place onshore – with residents of the currency area. For many years the growth of derivatives trading had outpaced spot trading, but between April 2022 and April 2025 spot trading grew faster. Exchange rate movements in April 2025 prompted EME and other non-US investors to hedge a larger proportion of their USD assets, which boosted activity in spot markets.

For all but a handful of currencies, FX derivatives trade mainly in offshore markets, beyond the reach of FX and capital controls that apply to transactions onshore (y-axis in Graph C2.B). Notable exceptions include the currencies of global financial centres, like HKD, SGD and the United Arab Emirates dirham (AED).

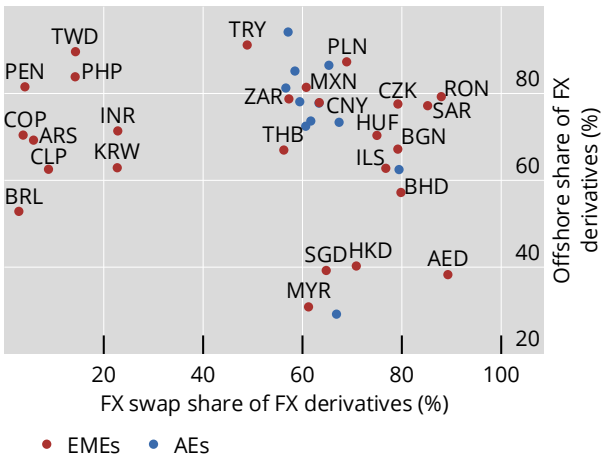
Geography of EME currency trading

Graph C2

A. International trading (with non-residents of the currency area) has stabilised as a share of overall trading in EME currencies[1]



B. FX derivatives trade mainly offshore and, for deliverable currencies, mainly in the form of FX swaps[2]



[1] Spot and derivatives trading in OTC markets ("net-net" basis) in the month of April. [2] Average daily turnover in April 2025, including FX futures and options traded on exchanges. Trading on exchanges located within the currency area is categorised as onshore trading.

Sources: Futures & Options World; Futures Industry Association; Options Clearing Corporation; BIS derivatives statistics; BIS Triennial Central Bank Survey; author's calculations.

Where controls restrict a currency's deliverability abroad, trading fragments between onshore and offshore markets, thereby depressing market liquidity. Fragmentation is most noticeable in the instruments traded. For deliverable currencies, FX swaps are used by residents and non-residents alike to fund and hedge foreign investments; accordingly, FX swaps account for the largest share of derivatives trading (x-axis in Graph C2.B). In contrast, for non-deliverable currencies, such as the Colombian peso (COP), INR and Korean won (KRW), trading concentrates in non-deliverable forward contracts (NDFs). While authorities in some economies permit such contracts to trade onshore, NDFs overwhelmingly trade offshore between non-residents.

Even though the Brazilian real (BRL) and Malaysian ringgit (MYR) are non-deliverable currencies, a relatively low share of FX derivatives denominated in these currencies trade offshore (y-axis in Graph C2.B). BRL is unusual because futures traded on the Sao Paulo exchange account for a sizeable proportion of FX derivatives trading, in contrast to other currencies where futures trading is negligible. Importantly, there are few restrictions on non-resident participation in BRL futures, which helps to concentrate liquidity onshore. Similarly in Malaysia, FX controls are relatively liberal for non-residents, which reduces the cost of transacting MYR onshore.

① The views expressed in this publication are those of the author and not necessarily those of the BIS or its member central banks.

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Annex A

Global FX market turnover, 1989–2025

Net-net basis,[1] daily averages — Table A.1

	1989	1992	1995	1998	2001	2004	2007	2010	2013	2016	2019	2022	2025
	(a) Volumes (in USD billion)												
All instruments	539	817	1,182	1,527	1,239	1,934	3,324	3,973	5,357	5,066	6,581	7,468	9,510
Spot total	305	394	494	568	386	631	1,005	1,489	2,047	1,652	1,979	2,085	2,952
Growth, all		52%	45%	29%	–19%	56%	72%	20%	35%	–5%	30%	13%	27%
	(b) Ratios												
All instruments/GDP[2]	10	12	14	17	13	16	21	22	25	24	27	27	30
All instruments/Trade[3]	32	39	42	51	36	38	43	47	52	58	63	54	72
Spot/GDP[2]	6	6	6	6	4	5	6	8	10	8	8	7	9
Spot/Trade[3]	18	19	18	19	11	12	13	18	20	19	19	15	22

[1] Adjusted for local and cross-border double-counting. Turnover and absolute change rounded. Undistributed volumes omitted from the table. [2] GDP refers to world GDP expressed in 2024 current prices. [3] Trade represents the aggregate value of global exports and imports.

Sources: IMF, *World Economic Outlook*; IMF International Trade in Goods (IMTS); BIS Triennial Central Bank Survey; authors' calculations.

Global FX market turnover in April 2025, by counterparty and instruments

Net-net basis,[1] daily averages in April 2025 Table A.2

	Turnover in 2025	2022–25 change	2022–25 change	Contribution to 2022–25 change	Share in 2025 turnover	Change in share
	USD billion		In per cent			
Global FX market	9,510	2,043	27%	100%	100%	
By counterparty						
Reporting dealers	4,443	948	27%	46%	47%	0%
Other financial institutions	4,627	1,081	30%	53%	49%	1%
Of which:						
Non-reporting banks	2,195	599	38%	29%	23%	2%
Institutional investors	1,261	416	49%	20%	13%	2%
Hedge funds and PTFs	760	246	48%	12%	8%	1%
Official sector institutions	138	41	42%	2%	1%	0%
Other non-bank financials[2]	273	–221	-45%	–11%	3%	–4%
Non-financial customers	441	14	3%	1%	5%	–1%
By instrument						
Spot	2,952	866	42%	42%	31%	3%
Outright forwards	1,747	590	51%	29%	18%	3%
FX swaps	4015	218	6%	11%	42%	–9%
Currency swaps	164	40	33%	2%	2%	0%
Options	632	328	108%	16%	7%	3%

[1] Adjusted for local and cross-border double-counting. Turnover and absolute change rounded. Undistributed volumes omitted from the table. [2] This category can include various other financial counterparties, such as securities firms, financial arms of corporates, and retail aggregators. See glossary for abbreviations.

Sources: BIS Triennial Central Bank Survey; authors' calculations.

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Goodbye Libor, hello basis traders: unpacking the surge in global interest rate derivatives turnover[1]

Structural and cyclical factors have driven a surge in turnover of interest rate derivatives (IRDs) since 2022 – both in over-the-counter (OTC) and exchange-traded (XTD) markets. The reform of benchmark rates and the shift away from Libor has fundamentally reshaped OTC markets, with overnight index swaps becoming the dominant instrument. In XTD markets, positions in government bond futures have risen dramatically, fuelled by hedge funds exploiting arbitrage opportunities through the cash-futures basis trade. Meanwhile, the sharp shifts in monetary policy since 2022 boosted turnover, especially for exchange-traded money market futures for major currencies. By contrast, growth in turnover for emerging market currencies was driven primarily by OTC contracts. Further market deepening may be held back by the complex geography of central clearing and the lack of markets for XTD government bond futures.

JEL classification: E43, G12, G21, G23.

Global turnover in over-the-counter (OTC) and exchange-traded (XTD) interest rate derivatives (IRDs) surged by 87% between April 2022 and April 2025, reaching $25 trillion per day (Graph 1.A).[2] Turnover rose particularly strongly in XTD markets, to $17.4 trillion per day, driven mainly by futures referencing short-term rates as well as government bond futures. In OTC markets, turnover reached $7.9 trillion per day in April 2025, as overnight index swaps (OIS) emerged as the dominant OTC instrument with the shift to "nearly risk-free" rates.

These developments reflect both cyclical and structural factors that have reshaped the IRD market. Key factors include the finalisation of the benchmark rate reform in major markets, the rise of arbitrage trades by hedge funds in government bond futures and shifts in monetary policy expectations that have boosted trading in contracts referencing short-term rates.

IRD markets have undergone fundamental structural changes since the Great Financial Crisis. The G20 OTC derivatives markets reform increased transparency and

[1] The views expressed here are those of the authors and not necessarily those of the BIS or its member central banks. The authors thank Gaston Gelos, Branimir Gruic, Bryan Hardy, Patrick McGuire, Benoît Mojon, Daniel Rees, Andreas Schrimpf, Hyun Song Shin, Frank Smets, Vladyslav Sushko, Christian Upper and Philip Woodridge for helpful comments and discussions, as well as Tongshuo Li for excellent research assistance. See the full list of abbreviations and brief descriptions of interest rate derivative instruments in the glossary of this issue.

[2] This article uses comprehensive data on OTC IRD markets from the BIS Triennial Central Bank Survey in 2025, as well as monthly data on exchange-traded IRDs collected by the BIS. See www.bis.org/statistics/dataportal/derivatives.htm?m=196.

Key takeaways

- *Average daily turnover in markets for interest rate derivatives grew by 87% between April 2022 and 2025, driven by both over-the-counter and exchange-traded markets.*
- *The benchmark rate reform with its shift away from Libor, the rise of the cash-futures basis trade and fundamental shifts in monetary policy have spurred growth and structural changes.*
- *Emerging market economy interest rate derivatives also expanded rapidly, but challenges like the absence of government bond futures and the complex geography of clearing remain.*

led to centralised clearing and electronic trading (Ehlers and Hardy (2019)). In addition, the reform of benchmark interest rates replaced London interbank offered rates (Libor) for unsecured lending in the interbank market with "nearly risk-free" rates, which are mostly overnight rates for either secured or unsecured lending (Huang and Todorov (2022)).

This benchmark reform solidified the dominance in OTC markets of overnight index swaps (OIS) – contracts that swap a fixed rate for an overnight rate – in major currencies. The reform's effects were particularly pronounced in US dollar and sterling markets, where risk-free rates (RFRs) are now the primary benchmarks. By contrast, markets for euro contracts are somewhat distinct, as the euro interbank offered rate (Euribor) – the reformed interbank offered rate (IBOR) – coexists with RFRs like the euro short-term rate (ESTR) (EMMI (2019)). A similar duality of reformed IBORs and RFRs also exists for other currencies like the Australian, New Zealand and Singapore dollars.

By construction, XTD markets always featured centralised trading and clearing of standardised contracts. Yet XTD markets have also seen significant changes that spurred turnover growth. One such change has been the rise of the cash-futures basis trade, which exploits spreads between government bonds and the corresponding futures prices. Hedge funds have taken large short positions in government bond futures in recent years to exploit this spread, with asset managers taking the other side of the trade. This has happened amid growing government debt supply and ample availability of repurchase agreement (repo) funding (Hermes et al (2025)). In combination, the basis trade has raised activity in long-term XTD contracts, particularly in US Treasury futures.

Additionally, the sharp shifts in monetary policy since 2022 have acted as a cyclical driver of turnover growth. As the Federal Reserve and European Central Bank began signalling and implementing rate hikes after years of near zero interest rates, volatility in short-term rates picked up. This spurred hedging and speculative activity, particularly in XTD futures that reference short-term rates ("money market futures") and contributed to the rapid growth in IRD contracts linked to short-term rates after 2022.

Finally, turnover in IRD contracts in emerging market economy (EME) currencies has also grown significantly, albeit from a low base. In contrast to advanced economy currencies, where both OTC and XTD markets are developed, turnover in EME IRDs has been overwhelmingly driven by OTC markets. However, some notable exceptions, eg turnover in Chinese renminbi, Brazilian real and Korean won contracts, demonstrate how policy initiatives can foster the development of XTD markets. In most other EME jurisdictions, the market for government bond futures is dormant. In

addition, EMEs face unique challenges in the OTC market due to the complex geography of clearing and trading activity. This highlights the remaining barriers to a deepening of these markets.

Benchmark reform and structural shifts in OTC IRD markets

The shift to new benchmark rates, finalised in major markets by mid-2023, has transformed OTC IRD markets. The reform transitioned most currencies from Libor to "nearly risk-free" rates, which are based on the more active market for overnight transactions. Libor was based on interbank transactions, which raised concerns over the viability of the rate due to shrinking interbank deposit volumes as well as over-manipulation (CFTC (2012); FSA (2012); FSB (2014)).

However, the benchmark reform was implemented differently across jurisdictions. Libor was fully phased out for the US dollar, sterling, the Swiss franc and the Japanese yen by mid-2023. Other currencies adopted a dual approach of creating new RFRs which coexist with reformed versions of IBORs. This is the case for the euro and several other currencies including the Australian, New Zealand and Singapore dollars.

This coexistence of IBORs with RFRs reflects the ongoing demand for credit-sensitive term rates, which can capture credit and term liquidity risks better. These risks are inherent in IBORs like Libor, which was originally designed to reflect banks' unsecured term funding costs. Additionally, credit-sensitive IBORs are forward-looking and provide certainty about interest payments at the start of a contract period. This is important for instruments like loans or bonds with fixed payment schedules, for which the borrower needs certainty about the interest payments in advance. By contrast, RFRs such as SOFR (the secured overnight funding rate) in the United States and SONIA (the sterling overnight index average) in the United Kingdom are much less sensitive to credit risk as they are overnight rates. In the case of SOFR, the benchmark rate is based on collateralised transactions to further minimise credit risks.

The divergence in approaches across currencies and the demand for credit-sensitive term rates have shaped how IRDs are used and, in turn, the structure of the OTC market. Turnover of OTC IRDs in currencies that use RFRs based on unsecured rates has surged. Most notably, this applies to the euro and sterling (Graph 1.B). In contrast, OTC turnover in currencies with RFRs based on secured lending has remained relatively stagnant. This includes US dollar IRDs, where SOFR has become the primary benchmark. The different pace of growth in turnover across segments has altered the currency composition of OTC IRD markets.

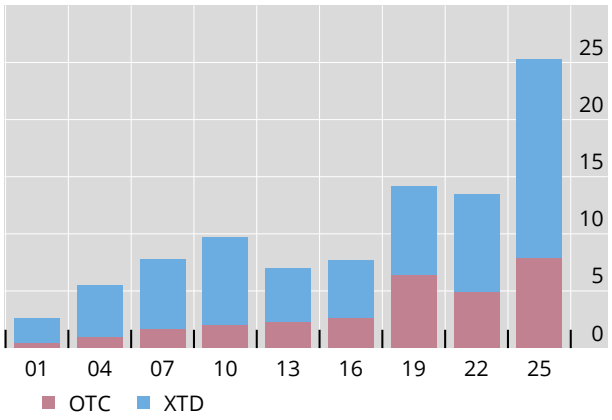
The reform's impact is also evident in the composition of instruments, which reflects the mechanics of hedging interest rate risks. As a forward-looking rate known at the beginning of the coupon period, Libor closely reflects banks' expected borrowing costs over a future period (Schrimpf and Sushko (2019)). By contrast, most RFRs are backward-looking and track the evolution of actual overnight rates over a given period. The coupon in RFR-based instruments is hence known only at the end of the relevant period and is calculated by compounding overnight rates during that period. As the coupons in RFR-based swaps capture the daily realisation of overnight rates, they are "fixed" every day. This is structurally different from Libor-based swaps, in which the coupons are fixed for much longer periods of three or six months. The

Trading volumes in OTC and XTD interest rate derivatives markets[1]

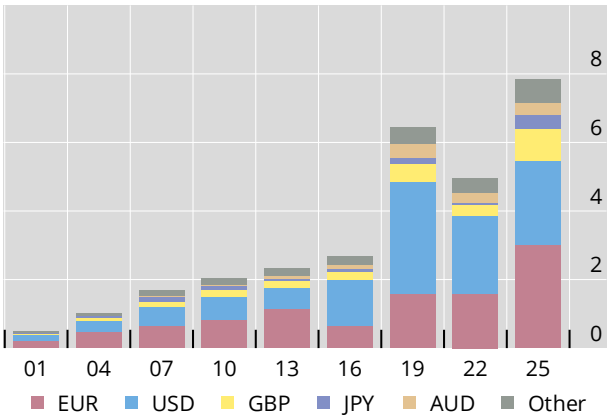
In trillions of US dollars

Graph 1

A. Global turnover



B. OTC turnover by currency



OTC = over-the-counter; XTD = exchange-traded.

[1] Adjusted for local and cross-border inter-dealer double-counting, ie "net-net" basis; daily averages in April.

Sources: Futures & Options World; Futures Industry Association; Options Clearing Corporation; BIS Triennial Central Bank Survey; authors' calculations.

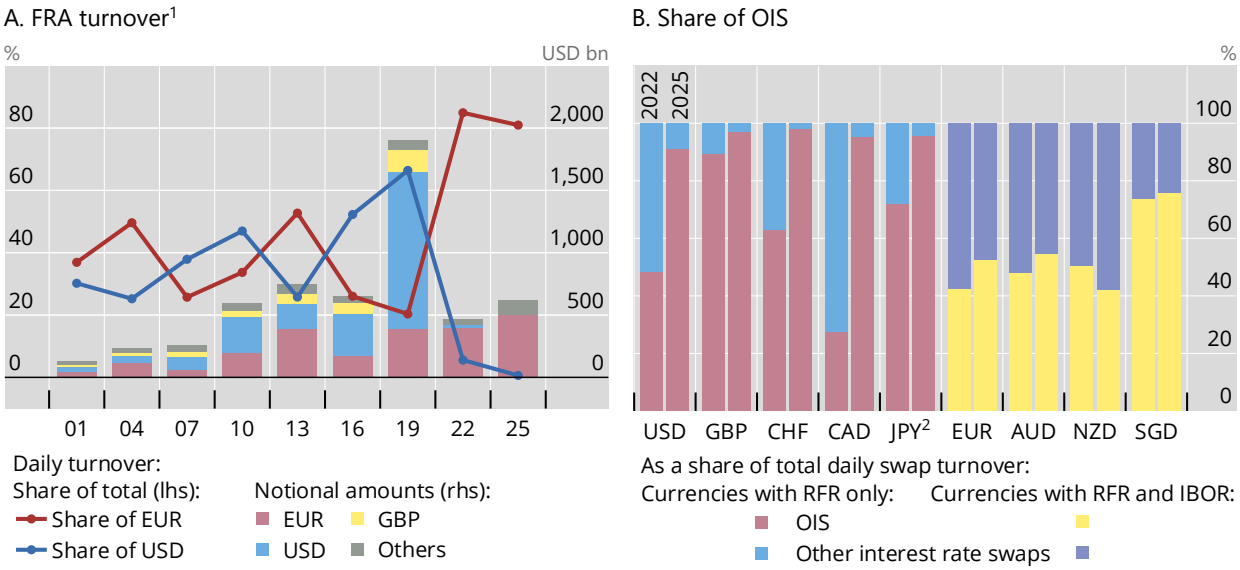
longer fixed periods for Libor created so-called fixing risk, which arises from the mismatches in coupon fixings on different dates. This fixing risk is significantly smaller in RFR-based swaps due to the overnight fixings of RFRs (see Box A in Huang and Todorov (2022) for more details).

With greater adoption of RFRs that have lower fixing risks, the use of forward rate agreements (FRAs), which were employed to hedge fixing risks in Libor-based markets, has declined significantly (Graph 2.A). On top of this, FRAs are, by construction, based on forward-looking rates, making them incompatible with backward-looking RFRs (Huang and Todorov (2022)). As a result, turnover of US dollar-, sterling- and yen-denominated FRAs has virtually disappeared in the post-Libor world. However, euro-denominated FRAs, which accounted for roughly 80% of global FRA turnover in 2025, are an exception owing to the continued demand for Euribor-based contracts. These give rise to fixing risks and thus necessitate FRA hedging. Still, the share of FRAs in euro-denominated IRD turnover declined from 25% in 2022 to 17% in 2025.

OIS, which align naturally with the backward-looking nature of RFRs, have become the dominant instrument in OTC IRD markets. Their rise has been particularly pronounced in currencies that adopted an RFR-only approach, including the US dollar, sterling, the Swiss franc and the Canadian dollar. In these markets, OIS now account for over 90% of all swap turnover, reflecting the widespread adoption of RFRs as benchmarks for interest rate swaps (Graph 2.B). Globally, the share of OIS in OTC IRD turnover reached 65% in 2025, up from 42% in 2022.

OIS are the dominant type of IRDs

Graph 2



FRA = forward rate agreement; IBOR = interbank offered rate; IRDs = interest rate derivatives; OIS = overnight index swaps; RFR = risk-free rate.

[1] Adjusted for local and cross-border inter-dealer double-counting, ie "net-net" basis; daily averages in April. [2] JPY has also an IBOR (Tibor), but it is rarely used (see main text).

Sources: BIS Triennial Central Bank Survey; authors' calculations.

In the euro area and other jurisdictions like Australia and New Zealand, however, the coexistence of the reformed IBORs and new RFRs has resulted in a more gradual transition. While OIS have gained traction, accounting for 53% of euro interest rate swap turnover, Euribor-based contracts remain prominent, suggesting a persistent demand for credit-sensitive term rates (Graph 2.B). Similar duality, where IBORs coexist with RFRs, is also observed in other currencies like the Australian and New Zealand dollars, where OIS account for about half of swap turnover, and in the Singapore dollar.

In principle, the coexistence of two different reference rates should give rise to the use of so-called basis swaps. These instruments allow the exchange of interest rate payments in one reference rate versus another. Surprisingly, however, their scale remains very limited – including for euro-denominated IRDs (less than 1% of total turnover).

The euro area's dual approach contributed to the rising share of euro-denominated contracts in global turnover (Box A). Euro-denominated OTC IRD turnover nearly doubled between 2022 and 2025, reaching $3 trillion in daily averages and surpassing US dollar turnover, which stagnated at $2.3–2.4 trillion (Graph 1.B).

In Japan, the benchmark reform has also been accompanied by unique dynamics. While the Tokyo overnight average rate (TONA) has become the dominant RFR, the Tokyo interbank offered rate (Tibor), a reformed IBOR, is maintained for domestic contracts since some market participants still require a credit-sensitive term rate to hedge longer-term funding costs or manage credit risk. The publication of Tibor for offshore euro-yen contracts, however, ceased at the end of 2024. As a result, the bulk of yen IRD turnover is now concentrated in OIS (Graph 2.B).

Geographical shifts in turnover and the migration of euro contracts to Germany

Torsten Ehlers and Karamfil Todorov ①

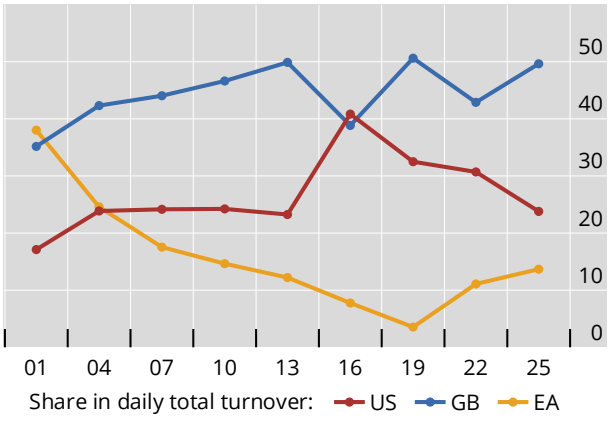
Structural changes and the benchmark reform have given euro area countries a greater share of global interest rate derivatives turnover.② Turnover reported by sales desks in euro area countries reached $1.2 trillion per day in April 2025, up from $610 billion in 2022. Euro area countries' share of global turnover also rose, to 14%, up from 11% in 2022 (Graph A1.A, yellow line). By contrast, the share of turnover at sales desks in the United States has declined, reflecting the near elimination of US dollar forward rate agreement (FRA) trading and the shift of US dollar interest rate swap activity to other jurisdictions. The surge is consistent with the migration of trading demand for credit-sensitive interbank offered rates towards Euribor-based contracts and the expansion of the euro overnight index swap markets. For its part, turnover at sales desks in the United Kingdom rebounded somewhat, rising to 50% of the global total in 2025, similar to its share in 2019 and 2013.

This overall shift in turnover towards euro area countries has largely reflected a migration of euro-denominated contracts from London to the continent (Graph A1.B). While London remained the top trading location for euro-denominated interest rate derivatives (IRDs), its share in turnover fell from 69% in 2022 to 67% in 2025, continuing its downward trend after 2016. In contrast, the share of euro area countries rose marginally, from 31% in 2022 to 33% in 2025. The rise was supported by a more than twofold increase in turnover in Germany, which now accounts for 58% of euro-denominated IRD trading in euro area countries (red bars). This increase probably reflects the efforts to shift the clearing of euro interest rate swaps to the euro area.③ In the near term, a dual-centre structure seems likely, with execution still concentrated in the United Kingdom and a growing share of euro clearing and trading moving to euro area venues.

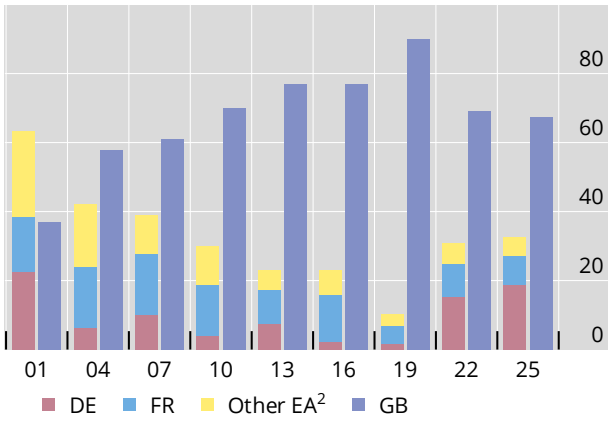
Euro area turnover increased as trading in euro contracts moved away from the United Kingdom after 2019[1]

In per cent — Graph A1

A. Share of total OTC turnover (all currencies)



B. Shares in euro-denominated turnover



OTC = over-the-counter.

[1] Adjusted for local inter-dealer double-counting, ie "net-gross" basis; daily averages in April. [2] AT, BE, ES, FI, GR, IE, IT, LT, LU, NL, PT and SK.

Sources: BIS Triennial Central Bank Survey; authors' calculations.

① The views expressed are those of the authors and do not necessarily reflect those of the BIS or its member central banks. ② Fourteen euro area countries participated in the 2025 IRD segment. ③ J Demski, R McCauley and P McGuire, "London as a financial centre since Brexit: evidence from the 2022 BIS Triennial Survey", *BIS Quarterly Review*, December 2022.

The cash-futures basis trade and XTD positioning

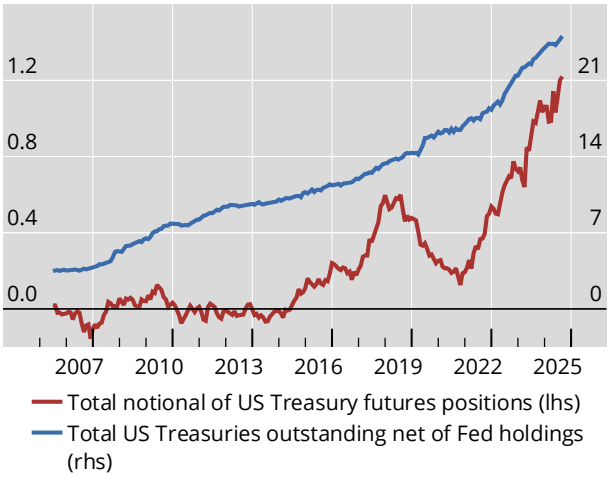
The cash-futures basis trade has emerged as an important factor behind the growth in XTD markets, particularly in longer-term government bond futures. The basis trade exploits the price difference between cash government bonds and their futures contracts. Typically, hedge funds take long positions in cash government bonds such as US Treasuries, financed through repos, while simultaneously shorting government bond futures contracts. This arbitrage captures the so-called basis spread, which arises from factors like balance sheet costs for dealers, liquidity premia and delivery options in futures (cheapest-to-deliver dynamics). The trade profits when the basis converges, often at the futures' expiry. But it exposes participants to funding risks if margins spike, as has happened in stress events (Schrimpf et al (2020); Barth and Kahn (2020)). The rise of the basis trade could heighten systemic risks if the trade unwinds during a funding squeeze, as the closing of hedge funds' leveraged positions could amplify volatility (Aramonte et al (2021)).

A confluence of factors has underpinned the basis trade's prominence in recent years.[3] Most importantly, rising government debt to fund fiscal deficits and quantitative tightening have led to an increase in the supply of outstanding US Treasuries that must be absorbed by the market (Graph 3.A). Given dealers' balance sheet constraints, hedge funds have increasingly stepped into the market as marginal buyers of government bonds as part of a "basis" trade where they simultaneously

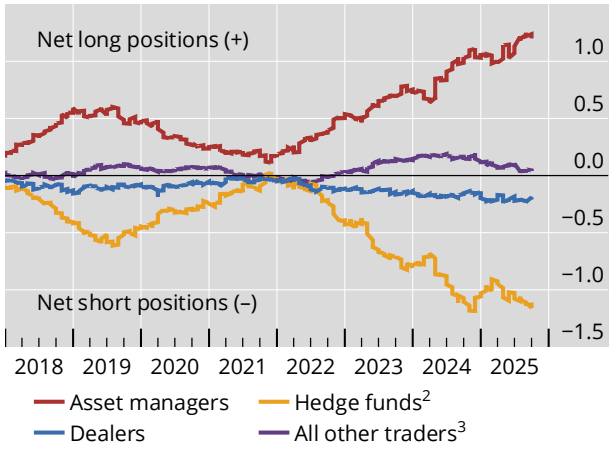
Hedge funds' short futures positions rose with US Treasury issuance

In trillions of US dollars — Graph 3

A. Amounts of US Treasuries outstanding and futures positions rose



B. Net positions of all trader types[1]



[1] Net positions are calculated as the difference between long and short positions. A negative net position indicates that traders have a higher open interest in short than in long contracts. Long and short positions are positions for which traders do not hold exactly offsetting positions. [2] For hedge fund positions, we use those of "leveraged funds" from the Commodity Futures Trading Commission (CFTC). [3] "All other traders" comprises all traders not in the previous three categories, including those not reporting to the CFTC.

Sources: Federal Reserve Bank of New York; Federal Reserve Bank of St Louis; CFTC; US Department of the Treasury; authors' calculations.

[3] See, inter alia, Schrimpf et al (2020); Avalos and Sushko (2023); Glicoes et al (2024); US Treasury (2024); FSB (2025); Brookings (2025); IMF (2025).

enter into a short futures position[4] with asset managers taking the other side. As a result, hedge funds now hold record positions in US Treasuries. Data from the Commodity Futures Trading Commission indicate that net positions of asset managers in Treasury futures have more than quadrupled since 2022, while hedge funds' net short positions have expanded commensurately (Graph 3.B).

While the basis trade has been particularly impactful in US dollar markets, similar trades are present in other major government bond markets, such as for German bunds and Canadian and Japanese government bonds. That said, they are probably smaller in scale and a more recent phenomenon. However, another hedge fund trade, the swap spread trade, has gained size in the past year (see box B).

Turnover driven by shifts in monetary policy expectations

The sharp shifts in monetary policy since 2022 have been a key cyclical driver of IRD turnover growth, particularly in short-term contracts. For years, policy rates in the United States and the euro area had remained near zero, reducing volatility in short-term rates and limiting the need for hedging or speculative trading. This changed when major central banks began signalling rate hikes in early 2022, followed by actual tightening in March (United States) and July (euro area). Interest rate volatility surged as a result.

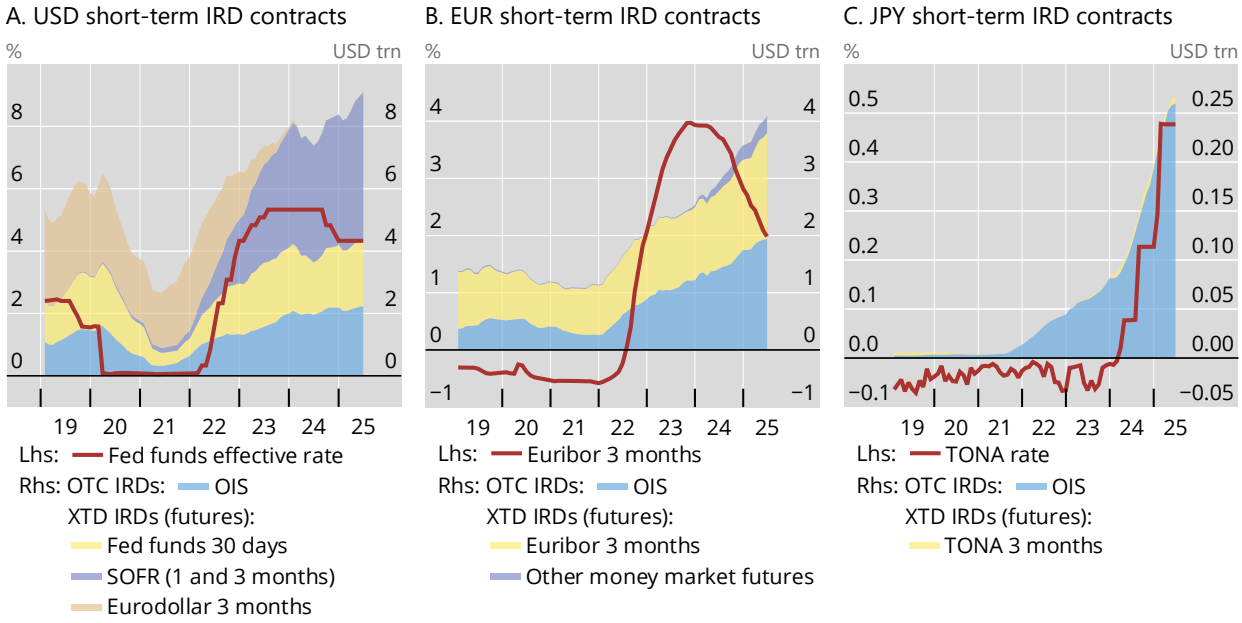
This created new demand for hedging and opportunities for speculation, and turnover for short-term IRD contracts picked up strongly. For the two major currencies, the US dollar and the euro, a key driver of the increase in turnover was XTD futures referencing short-term rates – often dubbed "money market futures" (Graphs 4.A and 4.B). In the United States, futures referencing one- and three-month SOFR alone generated an average daily turnover of $4.5 trillion (12-month average for April 2025) – more than a third of the global turnover of XTD contracts. Fed funds futures contributed another $2.1 trillion in turnover on the average day over the same period. For euro-denominated contracts, the reformed interbank rate Euribor still serves as an important benchmark rate, as explained above, and Euribor futures have contributed significantly to the growth in turnover (Graph 2.B). However, OIS contracts were also important, matching the turnover of Euribor futures. Shifts in monetary policy also affected the composition of FX derivatives trading, with the rise in turnover of short rate forwards (Huang et al (2025), in this issue).

Monetary policy changes also had ripple effects on hedging activity in other currencies, particularly the yen. The Bank of Japan's decision in 2024 to end yield curve control and resume using short-term rates as its primary policy tool introduced volatility into a previously calm market for short-term rates. In contrast to US dollar- and euro-denominated IRDs, the market for XTD money market futures denominated in yen has traditionally been very small. The increase in hedging demand and speculation therefore boosted mainly OTC-traded instruments like OIS, which could also explain the dominance of OIS over other swaps, including those linked to TIBOR (Graph 2.B). As a result of the increase in OIS trading, total yen OTC turnover surged more than sixfold in 2025 compared with 2022.

[4] Hedge funds use the repo market to fund the purchase of the cash government bond and to lever up returns, when earning the difference between the yield on government bonds and the implied yield on the futures contract.

Turnover in OIS and short-term rate futures rose ahead of rate increases post-2022[1]

Graph 4



IRDs = interest rate derivatives; OIS = overnight index swap; OTC = over-the-counter; XTD = exchange-traded.

[1] Interest rates are monthly. OTC and XTD turnover are monthly, 12-month moving average. OIS data in this graph are from ClarusFT.

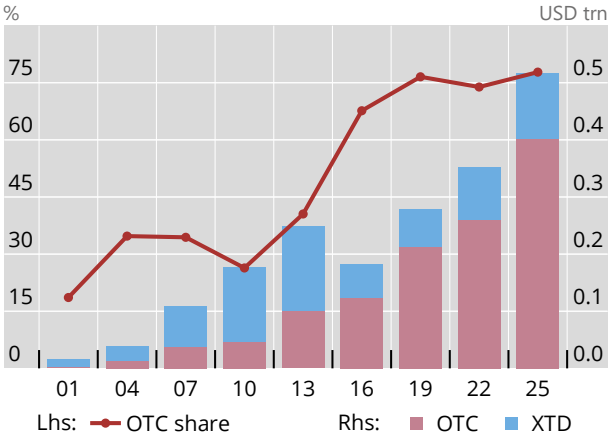
Sources: National central banks; ClarusFT; Futures & Options World; Futures Industry Association; Options Clearing Corporation; authors' calculations.

The growth in OTC IRD markets for EME currencies and remaining challenges

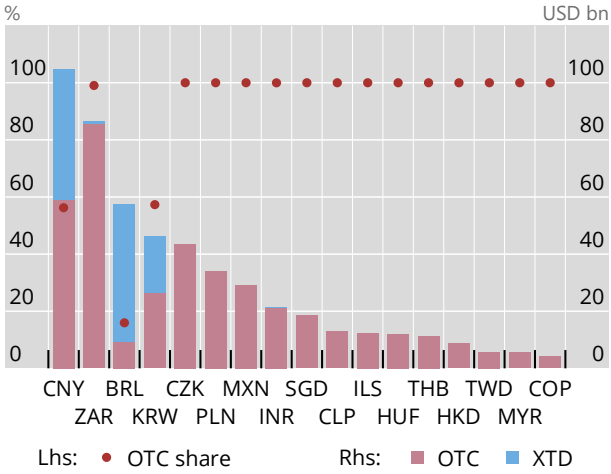
Like IRDs in the major currencies, turnover in IRD contracts in EME currencies also grew rapidly, reaching $0.5 trillion in April 2025 (Graph 5.A). Yet market depth is still lacking. For example, while EME currencies accounted for 29% of global foreign exchange (FX) market turnover in April 2025 (Wooldridge (2025), in this issue), their share in OTC IRD markets remained lower at just 5.1%. When examining daily IRD turnover relative to the size of the outstanding government bonds market, EME currencies lag even further behind advanced economy currencies, at a ratio of just 0.07% compared with 35%.

The rapid increase in IRD turnover in EME currencies was mostly driven by OTC[1, 2] Graph 5

A. OTC and XTD turnover in EME currencies



B. Turnover and OTC shares of major EME currencies in 2025



IRD = interest rate derivative; OTC = over-the-counter; XTD = exchange-traded.

[1] EME currencies: AED, ARS, BGN, BHD, BRL, CLP, CNY, COP, CZK, EEK, HKD, HUF, IDR, ILS, INR, KRW, LTL, LVL, MXN, MYR, PEN, PHP, PLN, RON, SAR, SGD, THB, TRY, TWD and ZAR. [2] Adjusted for local and cross-border inter-dealer double-counting, ie "net-net" basis; daily averages in April.

Sources: Futures & Options World; Futures Industry Association; Options Clearing Corporation; BIS Triennial Central Bank Survey; authors' calculations.

One striking difference to IRDs in advanced economy currencies is that EME IRD turnover has been concentrated in OTC rather than XTD markets. There are some notable exceptions, however, where XTD markets are well developed (Graph 5.B). The major EME currencies for which XTD markets hold a non-negligible turnover share are the Chinese renminbi, Brazilian real and Korean won. XTD market development for these currencies, however, has followed different paths. In Brazil and Korea, XTD markets have been well established for over 25 years.[5] In China, by contrast, regulators and industry groups began promoting XTD markets in the mid-2010s. The share of XTD turnover in the Chinese renminbi rose from 0% in 2013 to 44% in April 2025, spurred by the 2015 introduction of the 10-year Chinese government bond futures contract on the China Financial Futures Exchange.

Despite these successes, activity in XTD markets in other EME currencies remains muted or non-existent. This may be due to a lack of demand for interest rate hedging by EME banks more generally, which tend to match the interest rate sensitivity of their assets and liabilities instead (Caballero et al (2023); Ehlers and Packer (2013)). As the volume of outstanding local currency government bonds has risen and is expected to rise further, XTD futures could play a more prominent role in the management of interest rate risk – not only for banks but also for a wider range of financial institutions that will absorb these bonds.[6]

[5] XTD contracts in the Korean won are predominantly futures on three- and 10-year government bonds. In contrast, XTD turnover in the Brazilian real is almost entirely driven by futures on the overnight monetary policy rate, which are used primarily for speculation or hedging against changes in monetary policy.

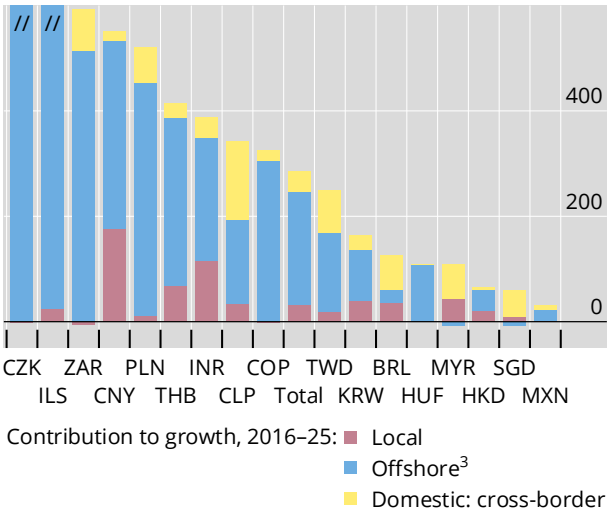
[6] Another option to manage the interest rate risks of government bond holdings could be the use of OTC instruments, such as government bond forwards. This, however, would also require further market development across many EME jurisdictions. Overall, forwards (including government bond

International trading is key for OTC IRD markets in most EME currencies[1]

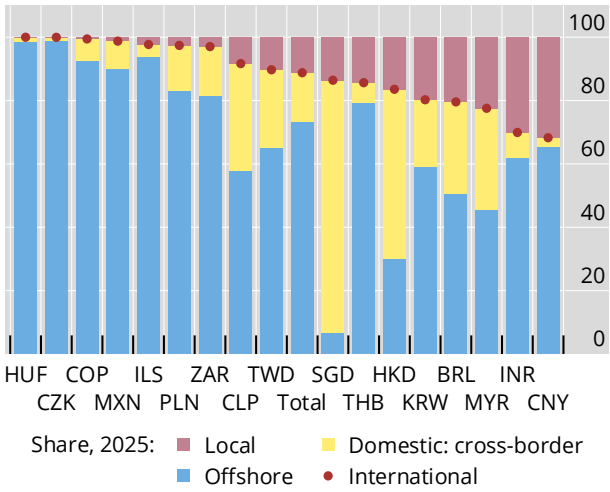
In per cent

Graph 6

A. OTC local and international turnover[2]



B. OTC local versus international trading shares



IRD = interest rate derivative; OTC = over-the-counter.

[1] Adjusted for local and cross-border inter-dealer double-counting, ie "net-net" basis; national aggregates adjusted for local inter-dealer double-counting, ie "net-gross" basis; daily averages in April. Total denotes the total across all currencies. [2] At constant April 2025 exchange rates. [3] CZK: 2,903%; ILS: 1,300%.

Sources: BIS Triennial Central Bank Survey; authors' calculations.

Much of the increase in turnover of OTC IRD for EME currencies over the last decade has been driven by trades in foreign locations (Graph 6.A) rather than domestic markets. For example, IRDs denominated in central and eastern European currencies and the South African rand are predominantly recorded at sales desks in the United Kingdom (Graph 6.B). Similarly, OTC IRDs in Asian currencies are mostly recorded in Hong Kong SAR and Singapore, while Latin American currencies see a disproportionate share of turnover recorded at sales desks in the United States.

On the one hand, these patterns suggest that IRDs in EME currencies exhibit a high degree of internationalisation, consistent with the trend in FX derivatives (Caballero et al (2022)). On the other hand, the share of non-local trading is indicative of the complex geography of central clearing for OTC IRD derivatives, which in turn is influenced by the concentration of clearing in a few global central counterparties (CCPs).[7] Clearing of OTC IRDs for EME currencies is essentially concentrated in two key CCPs: the London Clearing House in the United Kingdom and the Chicago Mercantile Exchange in the United States. This presents challenges for deepening IRD markets in EMEs, where local institutions often lack clearing membership at the major CCPs (Box C). Only a few currencies, such as the Malaysian ringgit, Indian rupee and Chinese renminbi, exhibit local trading shares comparable with those of advanced economy currencies (Graph 6.B).

and other forwards) account for only about 16% of the turnover in EME currencies, amid a very low ratio of IRD turnover to outstanding government bonds compared with advanced economies.

[7] While for EME currencies, the share of cleared derivatives is lower than for advanced economies (67% compared with 87% of outstanding derivatives positions), it is still substantial.

Conclusion

The rapid growth in global IRD turnover from 2022 to 2025 reflects the combined influence of structural and cyclical forces. The benchmark rate reform has reshaped OTC markets, with the transition to nearly risk-free rates making OIS the dominant trading instrument. In XTD markets, the cash-futures basis trade has driven a significant rise in positioning, particularly in US Treasury futures by hedge funds and asset managers. Continued US Treasury issuance alongside quantitative tightening is likely to keep the basis trade active. However, a sudden tightening in funding or margin conditions could trigger leveraged unwinds and amplify volatility across XTD and OTC markets. Shifting monetary policy expectations have also contributed to greater turnover, especially in short rate contracts, as rises in the short rate boosted hedging and speculative demand. In contrast with that for advanced economies, growth in IRD turnover for EME currencies has occurred primarily in OTC markets rather than in XTD markets. The complex geography of clearing and the underdevelopment of XTD markets remain constraints for further market deepening. Regulatory initiatives to improve clearing access and foster local XTD markets could support market development.

Box B

Sizing up hedge funds' relative value trades in US Treasuries and interest rate swaps

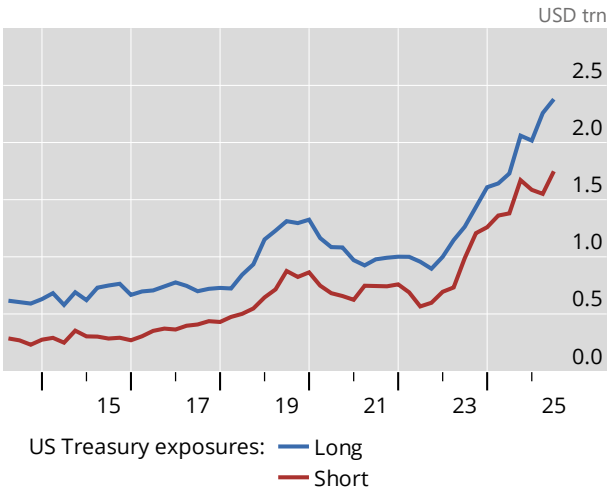
Vladyslav Sushko and Karamfil Todorov ①

The start of quantitative tightening in 2022 and continued rapid government debt issuance has been a fertile environment for hedge funds to expand their footprint in the market for US Treasury securities (USTs) and other government bonds. Hedge funds have employed various relative value trading strategies that exploit small price differences between closely related financial instruments.② To make these trades sufficiently profitable, hedge funds employ leverage, mainly relying on repo borrowing to finance their bond holdings. While the best known and well documented strategy has been the cash-futures basis trade,③ another strategy, the interest rate swap (IRS) spread trade ("the swap trade" for short), has grown rapidly over the past year. This trade combines a long position in USTs together with a "pay fixed" position in an IRS, mimicking a short position in a fixed rate bond, to earn a higher yield on the UST than the fixed rate paid in the swap. The swap trade drove most of the growth in hedge fund repo leverage in the United States over the past year, whereas the cash-futures basis trade, while still the largest, has not expanded further since early 2024. The swap trade was fuelled further by beliefs about regulatory relief in the United States since January 2025, and was also the source of hedge fund deleveraging pressures in Treasury markets during the April 2025 turbulence.

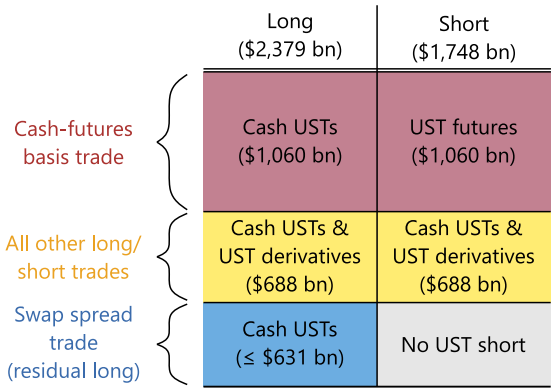
Leveraged relative value trades in the US Treasury market

Graph B1

A. Hedge funds' UST exposures have more than doubled since 2022[1, 2]



B. Deriving the upper bound on hedge funds' swap spread trade from long and short UST exposures[1, 2, 3]



USTs = US Treasury securities.

[1] Long UST positions consist of cash UST holdings, often financed via repo agreements, as well as long positions in UST futures, forwards and options. Short UST positions include primarily short positions primarily in UST futures, followed by forwards and options, and can also include USTs borrowed via reverse repos and sold, along with short positions in UST futures, as well as forwards and options. [2] Data as of June 2025. [3] Note that the implied size of the swap trade based on the residual UST long exposure represents an upper bound, as hedge funds can also hold cash USTs for other purposes, such as collateral and liquidity management to fund margin calls.

Sources: Commodity Futures Trading Commission; Office of Financial Research; authors' calculations.

Data on hedge funds' long and short UST exposures are published by the US Office of Financial Research (OFR), which aggregates information from confidential SEC Form PF quarterly filings. The long UST exposures consist of cash bond holdings (often financed via repos), as well as long positions in UST futures, forwards and options. In turn, short UST exposures include bonds borrowed via reverse repos and sold, along with short positions in UST futures, as well as forwards and options. It is crucial to note that unlike Treasury futures, an IRS contract does not reference USTs as an underlying in the reporting. Instead, in an IRS counterparties exchange

a series of interest rate payments, where a floating rate benchmark and the dollar notional amount are specified in the contract. For example, a short IRS position refers to making (pre-determined) fixed rate payments and receiving floating rate payments based on the contract's notional amount. Hence, the OFR does not classify IRS as UST exposures. This feature of the data allows us to estimate the size of the swap trade from information on hedge funds' long and short UST exposures.

In the swap trade, hedge funds hold cash USTs (long UST exposure) and enter IRS as fixed rate payers (short IRS exposures).④ Like the cash-futures basis trade, the swap trade exploits pricing discrepancies – specifically, the discount at which cash USTs trade relative to comparable derivatives (in this case an IRS) due to the "inconvenience" yield on USTs.

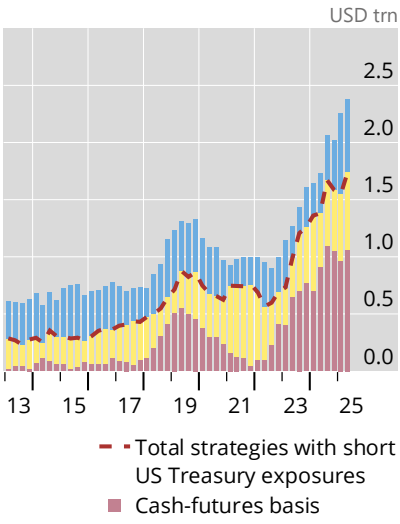
Since 2022, hedge funds' total UST exposures have more than doubled. As of Q2 2025, long UST exposures totalled $2,379 billion (Graph B1.A, blue line), or approximately 10% of USTs held by the private sector, while short UST exposures totalled $1,748 billion (red line). Most of the short UST exposures, $1,060 billion, were in short UST futures associated with the cash-futures basis trade (see main text).⑤ In that trade, as mentioned above, the short futures positions are matched with an equal sized $1,060 billion in cash UST holdings. The remaining $688 billion in short UST exposures can be linked to various other relative value trades with offsetting short and long UST exposures (eg on-the-run vs off-the-run arbitrage or yield curve arbitrage).

The upper bound on the size of the swap trade can be approximated from aggregate data because the UST holdings (long US positions) in this trade are not matched by short UST positions reported in the OFR data. Unlike the cash-futures basis trade, where a long cash UST position is paired one for one with a short UST futures position, the swap trade pairs a long cash UST position with a short (ie fixed rate payer) position in an IRS, which is not classified as a short UST position by the OFR, as explained above. Hence, one can infer the upper bound on the size of the swap trade as the residual of long UST exposures of hedge funds after all their short UST exposures have been accounted for. This residual represents an upper bound, since hedge funds may also hold USTs for collateral and liquidity management, eg to make payments on margin and collateral calls on their outstanding derivatives positions. Applying this approximation, a T-account-type diagram illustrates that the residual long UST exposures, not matched by short exposures, amounted to $631 billion in Q2 2025 (Graph B1.B, blue block). This residual is the implied upper bound on the size of the swap trade.

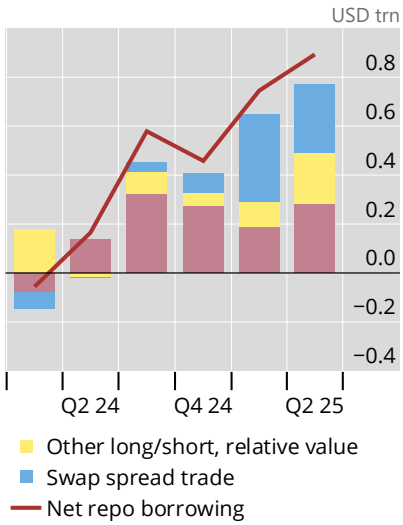
Swap trades drove the recent growth of hedge funds' repo leverage

Graph B2

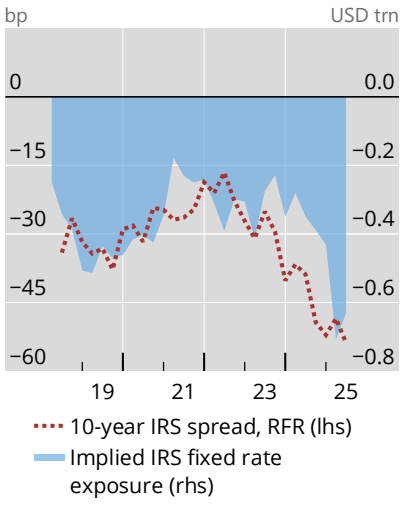
A. Relative value trades in the US Treasury market by type



B. Cumulative repo borrowing and UST relative value trades



C. Implied size of the swap spread trade co-moved with the swap spread



IRS = interest rate swap; RFR = risk-free rate.

Sources: Commodity Futures Trading Commission; Bloomberg; Office of Financial Research; authors' calculations.

The swap trade has expanded rapidly since early 2022. Since Q1 2022, the size of the swap trade has more than doubled, from $281 billion in Q1 2024 to $631 billion in Q2 2025 (Graph B2.A, blue bars). In fact, since Q2 2024, the growth of hedge funds' UST exposures has been primarily driven by the swap trade, whereas the cash-futures basis trade, while remaining the largest, has largely stagnated (red bars). Hence, the increase in hedge funds' repo leverage appears to be primarily driven by the swap trade, and to a lesser extent by other long/short relative value trades (Graph B2.B).

The inferred size of the swap trade exhibits the expected co-movement with the IRS spread. For expositional purposes, we plot the estimate of the swap trade as a negative value, which can be interpreted as the resulting short IRS exposure, where hedge funds position themselves as payers of the swap rate (the fixed rate in an IRS). The size of the implied short IRS exposures tends to expand and contract with the IRS spread (the 10-year swap rate minus the 10-year UST yield) (Graph B2.C), where the spread approximates the incentives to enter the swap trade. This suggests that, despite being an upper bound, the inferred size of the swap trade may be a fairly good estimate of the size of the actual trade, at least over the past few years.

The swap trade has become the source of the growth of hedge funds' Treasury exposure over the past year, largely driven by bets on regulatory easing, but was also vulnerable to rate shocks. Specifically, hedge funds have bet on the possible easing of the supplementary leverage ratio for banks, which is expected to free up balance sheet space to hold more USTs, thus allowing for the trades to be unwound with a profit from higher UST prices. However, during the April 2025 market turbulence, traders were caught wrong-footed, as UST yields spiked and bond prices fell. The partial unwinding of the swap trade was reflected in an 11% contraction of the implied size of the trade, from $707 billion in March 2025 to $631 billion in June (Graph B2.A, blue bars), underscoring its sensitivity to periods of strains in fixed income markets. Most recently, the swap spread has compressed somewhat,⑥ suggesting that hedge funds may have renewed their bets on potential supplementary leverage ratio relief. Moreover, the continued erosion of the UST convenience yield due to expansive fiscal policy could give further impetus to the growth of the swap trade. There is also an international dimension, as incentives for the IRS trade have been rising in other jurisdictions, such as the euro area and Japan.⑦ The associated cross-border interconnections and potential international spillovers from the swap trade could be just as significant as those of the cash-futures basis trade, if not more so.

① The views expressed in this publication are those of the authors and do not necessarily reflect the views of the BIS or its member central banks. ② Main types of trades are cash-futures basis trades, IRS spread trades, on-the-run versus off-the-run arbitrage, auction cycle arbitrage and yield curve arbitrage. ③ D Barth and J Kahn, "Hedge funds and the Treasury cash-futures basis trade", *Journal of Monetary Economics*, volume 155, 103823, 2025. ④ Traditionally, bank dealers have been the main sellers of IRS (see eg N Boyarchenko, P Gupta, N Steele and J Yen, "Negative swap spreads", *Federal Reserve Bank of New York Economic Policy Review*, October 2018) but hedge funds have been growing their footprint. Fixed rate receivers in IRS often include institutional duration hedgers, corporates seeking to swap floating for fixed rates and other market participants managing interest rate risk. ⑤ For the most recent discussion of the basis trade, see T Ehlers and K Todorov, "Goodbye Libor, hello basis traders: unpacking the surge in global interest rate derivatives turnover", *BIS Quarterly Review*, December 2025, in this issue. Also note that not all short UST positions are basis trades. For example, futures, instead of cash bonds, can also be used in yield curve arbitrage, and for hedging other cash bond exposures, such as those associated with auction cycle arbitrage. ⑥ See "Volatility challenges the risk-on mood", *BIS Quarterly Review*, December 2025, in this issue. ⑦ M Aquilina M, A Schrimpf, V Sushko and D Xia, "Negative interest rate swap spreads signal pressure in government debt absorption", *BIS Quarterly Review*, December 2024.

Box C

The concentration of clearing as a challenge for emerging market economy OTC interest rate derivatives markets

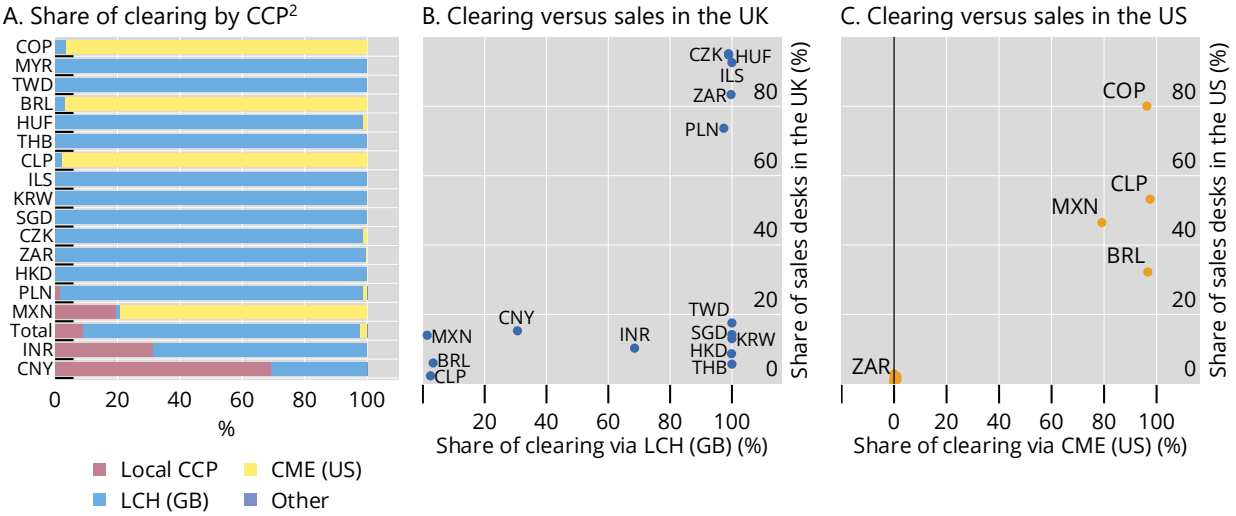
Torsten Ehlers and Karamfil Todorov ①

The dominance of two global central counterparties (CCPs) in clearing over-the-counter (OTC) interest rate derivatives (IRDs) affects the location of sales for contracts in emerging market economy (EME) currencies. The London Clearing House (LCH) in the United Kingdom and the Chicago Mercantile Exchange (CME) in the United States are the two dominant CCPs for OTC interest rate derivatives (IRDs) in EME currencies (Graph C1.A). Only China, India and Mexico have local CCPs that attract meaningful OTC clearing activity. The locations of the two main CCPs, in turn, are often closely related to where an IRD contract is being sold. IRDs for currencies like the Hungarian forint, Czech koruna, Israeli new shekel, South African rand and Polish zloty are almost entirely cleared through LCH, which also aligns with the majority of IRD sales in these currencies being recorded in the United Kingdom (Graph C1.B). In contrast, IRDs for major Latin American currencies are primarily cleared through CME, with a corresponding concentration of sales recorded in the United States (Graph C1.C). Emerging Asian currencies are an exception, as they are predominantly cleared through LCH but traded mainly in Hong Kong SAR and Singapore, where several large banks that are also clearing members of LCH are located.

The clearing through foreign CCPs can create challenges for domestic counterparties in EMEs. As in advanced economies, the hurdles for IRD trading may be relatively low in cases where an EME is home to financial institutions that are clearing members of the global CCPs or have affiliates in the country where the key CCP is located. This is not the case, however, for all EMEs. The reliance on foreign CCPs is bound to result in cross-border legal complexities as well as higher settlement costs and risks, given the involvement of correspondent banking services. In some jurisdictions, capital controls pose an additional hurdle. The alternative, setting up local CCPs in EMEs, faces significant competitive disadvantages due to the scale and network effects of global CCPs (see Ehlers and Hardy (2019)).

The key CCPs LCH and CME affect the geography of sales for EME currencies[1]

Graph C1



CCP = central counterparty.

[1] Data as of April 2025. Average daily turnover adjusted for local and cross-border inter-dealer double-counting, ie "net-net" basis. National aggregates used to calculate the local and offshore shares are adjusted for local inter-dealer double-counting, ie "net-gross" basis. [2] "Total" is the global total across all currencies for comparison. The local CCP share is the share of turnover cleared through CCPs located in the jurisdiction where the respective currency is issued. Local CCPs include Shanghai Clearing (China) for CNY, CCIL (India) for INR, Asigna (Mexico) for MXN, KDPW (Poland) for PLN, HKEX (Hong Kong SAR) for HKD, KRX (Korea) for KRW and SGX (Singapore) for SGD.

Sources: ClarusFT; BIS Triennial Central Bank Survey; authors' calculations.

① The views expressed are those of the authors and do not necessarily reflect those of the BIS or its member central banks.

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International finance through the lens of BIS statistics: derivatives markets[1]

Financial derivatives are a linchpin of the global financial system, enabling market participants to hedge exposures, engage in speculative strategies and arbitrage across markets. This article reviews how the BIS derivatives statistics can be used to examine the size and structure of derivatives markets for different risk categories. Through the lens of these statistics, the article sheds light on key transformations in derivatives markets, including the transition to risk-free rates in interest rate derivatives and the growing use of foreign exchange derivatives to facilitate global portfolio flows. These developments underscore the evolving data needs of policymakers and analysts to track emerging vulnerabilities.

JEL classification: F31, G13, G15, G21.

Financial derivatives have become a linchpin in the modern financial system. In its most basic form, a derivative contract allows an investor to unbundle or combine separate components of risk inherent in a financial exposure. While derivatives cannot eliminate risks overall, they facilitate their redistribution across agents and sectors. This important aspect of derivatives enables a broad range of financial activity: investors can use derivatives to hedge or insure (eg against market risk, currency risk, credit risk, weather events, etc); to speculate (eg on interest rates, exchange rates, equity markets and many other prices); and to arbitrage prices across markets. Miraculously, they can do these things with zero or minimal upfront payment.

Derivative contracts date to antiquity, but their pre-eminent role in financial markets is a more recent phenomenon. Assyrian farmers and ancient Greeks used derivative-like contracts to insure against failed harvests. In the 17th and 18th centuries, contracts for the future delivery of securities took off in Europe, and "rice bills", for the future delivery of rice, were traded in Japan. The futures contract on agricultural commodities listed by the Chicago Board of Trade in 1865 marked a shift from private, non-transferable forward contracts to standardised, exchange-traded instruments, laying the groundwork for modern derivatives markets.

[1] The views expressed in this publication are those of the authors and not necessarily those of the BIS or its member central banks. This is the seventh article in a series showcasing the BIS international banking and financial statistics. We are grateful to Jeemin Son for excellent research assistance. We also thank Iñaki Aldasoro, Benjamin Cohen, Gaston Gelos, Branimir Gruic, Bryan Hardy, Benoît Mojon, Daniel Rees, Andreas Schrimpf, Hyun Song Shin, Frank Smets, Christian Upper and Philip Wooldridge for helpful comments and suggestions.

Key takeaways

- *Financial derivatives have become a linchpin of the global financial system, allowing investors to unbundle and separately trade market risk, credit risk and currency risk.*
- *The BIS derivatives statistics were introduced in the 1980s to keep pace with the growth in markets for foreign exchange, interest rate and credit derivatives.*
- *BIS statistics help in monitoring market developments including the transition to risk-free rates in interest rate derivatives and the growing use of foreign exchange derivatives to facilitate global portfolio flows.*

Innovations in derivatives markets in the 1980s reshaped international finance. Investors at the time hedged risks or took positions primarily by transacting in cash markets across maturities and currencies (BIS (1986)). The development of interest rate (IR), foreign exchange (FX) and credit derivatives enabled investors to shift the management of these risks off their balance sheets, driving growth in over-the-the counter (OTC) markets for these products. For banks, derivatives helped decouple the risk profile of their portfolios from credit origination. Yet despite their rapid growth in the 1980s and 1990s, OTC derivatives markets remained opaque and policymakers lacked information to monitor the build-up of exposures and vulnerabilities.

The BIS derivatives statistics were collected to address the lack of transparency in these burgeoning markets. The statistics capture both flows (turnover of contracts) and stocks (outstanding positions) across risk categories (FX, IR, equity, etc), with breakdowns by country, currency, instrument and maturity. The flagship collection, the BIS Triennial Survey of turnover in FX and IR derivatives, shows *where* trading activity takes place, with breakdowns by counterparty sector, instrument, currency and maturity. The BIS OTC derivatives (OTCD) statistics provide a complementary semi-annual view of notional amounts outstanding for five risk categories, with breakdowns by counterparty sector, currency and instrument. The BIS exchange-traded derivatives (XTD) supplement the OTCD statistics to provide a comprehensive overview of derivatives markets.

These statistics help track structural shifts in derivatives markets and changes in the use of derivatives for hedging and speculation. For example, the statistics for IR derivatives shed light on the transformation of markets in the 1990s and 2000s, as benchmark reference rates shifted from public to private rates and back with the recent transition from the London interbank offered rate (Libor) to risk-free rates. The statistics for FX derivatives have helped in monitoring financial flows that arise from hedging and speculation related to exchange rate movements (eg cross-currency basis trades, carry trades).

This article is structured as follows. The first and second sections explain the concepts underlying the BIS derivatives statistics and provide a market overview (additional details about their scope and dimensions are provided in the Online annex). The third section presents some practical applications of how the BIS derivatives statistics shed light on the evolution of IR derivatives markets and on currency use patterns that arise from FX hedging and speculative activity.

Concepts, history and structure of BIS derivatives statistics

Derivatives concepts

Derivatives have traditionally been classified into three basic types of *instruments* – forwards, swaps and options. *Forwards* are agreements to deliver financial instruments or commodities at a future date and price, settled through physical delivery or cash. Futures similarly commit two parties but are more standardised and traded on exchanges. *Swaps* involve the exchange of payment streams based on an agreed amount over a set period. *Options* grant the purchaser the right (but not the obligation) to buy or sell an asset at a specified price on (or by) a future date. Derivatives can also be combined to form more complex instruments. Unlike investments in the ownership of assets (eg stocks, bonds or commodities), derivatives are in zero net supply: one party's long position offsets another's short position.

Derivatives reference underlying assets or events, which define their *risk category*. FX derivatives reference a currency pair (eg EUR/USD). IR derivatives reference a bond price or rate, eg a government bond yield or benchmark rate. Credit derivatives, notably credit default swaps (CDS), link their payout to the performance or default of a specific debt obligation. Commodity derivatives have returns linked to the price of a commodity, such as oil or precious metals. Similarly, equity derivatives have returns linked to the price of a specific equity or equity index.

There are various metrics to gauge the scale of derivatives markets. The *notional amount* measures the "size" of a derivative contract. It represents the principal (ie payment value) or a reference value from which payments are derived, depending on the derivative type. In most FX derivatives, the notional amount is the principal amount of currency exchanged for another, and thus an actual payment obligation. In a CDS, the notional amount is the potential payout, eg the face value of referenced debt in the event of default.[2] For the CDS issuer, the potential payout is a contingent liability. By contrast, in IR derivatives, the notional amount merely serves as a reference for calculating interest payments to be exchanged.

For its part, the *market value* of a derivative is the amount that would have to be paid to replace a contract. It tracks gains and losses over the contract's duration. For forwards and swaps, it is zero at inception and requires no upfront payment; the value then fluctuates with the price of the underlying asset, moving "into the money" for one party.[3] Options have a positive market value at inception for the option buyer and a negative value for the seller (or "writer"). The option maintains a positive value if the price of the underlying asset moves in the buyer's favour, so the option can be exercised at a gain, or zero value otherwise. Hence, the *gross market value* of open contracts at current market prices (also called the replacement value) provides a sense of the scale of risk transfer provided by those contracts.[4] Taking into account legally enforceable netting between counterparties yields another measure – *gross exposure*.

[2] For options, the notional value is tied to the underlying asset. In cash-settled contracts (eg non-deliverable forwards), it is used to calculate settlement based on rate differences at maturity.

[3] While gains and losses to derivative contracts constitute zero-sum redistributions, the heterogeneity of end users implies that aggregate economic effects follow from the use of these instruments.

[4] Gross market values are often taken as an indicator of counterparty credit risk. However, the actual counterparty risk is overstated: contracts with positive and negative replacement values between a given pair of counterparties are often netted against one another. Accounting for legally enforceable

Derivatives do not eliminate risks but facilitate risk-sharing between agents. They enable investors to unbundle or combine risks and trade them, which facilitates hedging, speculation or arbitrage.

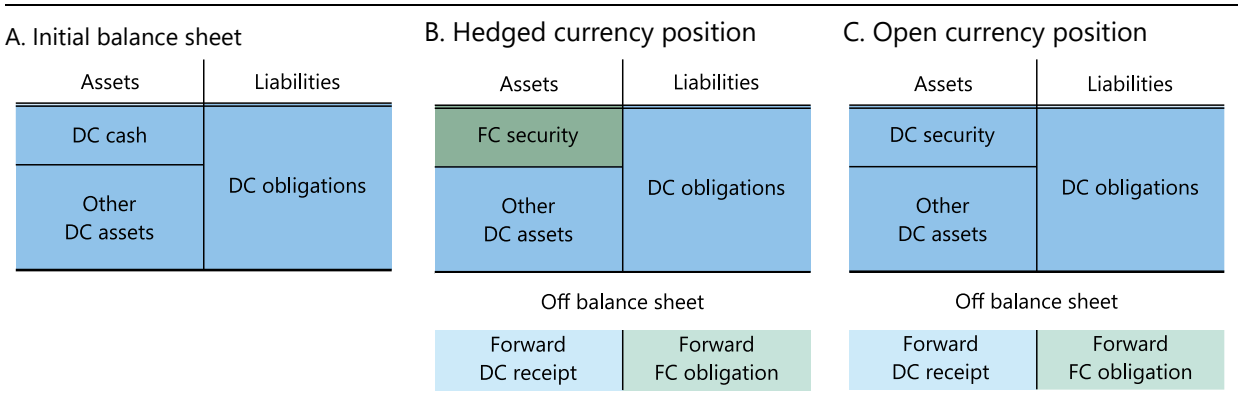
Hedging entails adopting a position in derivatives so that a potential loss on the balance sheet will be offset by an equal gain on the derivatives position. As an example of hedging interest rate risk, suppose a company borrows $10 million at a low floating rate but faces the risk that the rate jumps, eg as in the post-Covid-19 tightening cycle. The company can hedge this risk with an IR swap in which it agrees to pay a fixed rate in exchange for receiving the floating rate. If the floating rate rises, the higher payments on the original loan are offset by payments received under the swap. The swap effectively allows the company to convert the floating rate loan into a fixed rate loan, eliminating uncertainty about future interest payments.[5]

Similarly, FX derivatives allow investors to gain international exposure on a hedged basis. An investor wishing to diversify a domestic currency portfolio (Graph 1.A) by acquiring foreign currency assets can do so without taking on currency risk. Using an FX swap, the investor exchanges domestic cash for foreign currency (spot leg) and agrees to reverse the trade at a future date (forward leg).[6] The investor uses the currency to purchase foreign currency assets and incurs an off-balance sheet obligation to repay the foreign currency at the pre-agreed forward rate (Graph 1.B).

Derivatives can also be used for speculation. To implement a carry trade, the investor can sell the foreign currency received in the spot leg instead of purchasing foreign currency bonds: this leaves an outright forward position that commits the investor to delivering foreign currency at a later date (Graph 1.C).[7] Similarly, a hedge fund can bet on falling rates by entering into an IR swap, agreeing to pay a floating rate to a counterparty in exchange for receiving the fixed rate. Many other derivatives

Illustration: hedging and speculation using FX swaps

Graph 1



DC = Domestic currency, FC = foreign currency.

Source: Authors' elaboration.

netting arrangements yields *gross credit exposure*. Counterparty credit risk is further reduced by collateral and margining arrangements.

[5] As another example, CDS are used to hedge credit risk. An investor can finance a bond without concern over the potential default of the issuer by transferring the credit risk to the seller of a CDS.

[6] A currency swap is a longer-term swap in which coupons linked to the underlying interest rates are exchanged in addition to the principal.

[7] This is profitable if the investor picks up the yield differential and/or the foreign currency depreciates during the contract (and can be acquired cheaply in the spot market before delivery).

help to establish speculative positions to bet on market prices or credit events. Speculators used to bet on a Greek default using naked CDS (buying protection without owning the underlying bond), to the point that the European Union imposed a ban on naked sovereign CDS in late 2012.

Derivative contracts often offer greater liquidity and lower costs than spot transactions in traditional cash markets. This can make hedging and speculation via derivatives more cost-effective. Electronification has also reduced transaction costs through narrower bid-ask spreads and improved pricing. Derivatives like FX swaps support cost-effective funding and liquidity management by enabling secured foreign currency borrowing or lending, both off the balance sheet.[8]

For all their benefits, derivatives can also give rise to a range of risks (IMF (2025)). *Market risk* arises when prices in the underlying assets move against the (speculative) derivative position.[9] *Liquidity risk* comes in many forms, eg when agents use short-term swaps to hedge or finance long-term positions that may have to be liquidated when swaps fail to roll over. *Counterparty credit risk* is the risk that one party to a contract goes into default, leaving an open but unpaid out-of-the-money position. This risk is heightened in uncleared OTC derivatives due to their bilateral nature. *FX settlement risk* is the risk that one party to an FX transaction fails to deliver the currency owed at the point of settlement. Finally, derivatives markets can be disrupted by *operational risks*, such as an outage in trading or clearing systems.

Financial stability risks give impetus to the BIS derivatives statistics

The rapid expansion of derivatives markets during the 1980s and 1990s gave rise to concerns about the potential impact of these risks on prudential soundness and financial stability. Unlike traditional financial instruments, the payment obligations involved in some types of derivatives (eg FX swaps, CDS) do not appear on the balance sheets of regulated entities (only market values do), leaving them largely outside the view of bank supervisory authorities and statistical agencies (Borio et al (2017; 2022)). The off-balance sheet payment obligations can be much larger than the on-balance sheet market values, effectively embedding leverage that can amplify the standard risks discussed above.

The BIS derivatives statistics were collected to keep pace with market developments and to help monitor vulnerabilities. The first BIS Triennial Survey was launched in 1986 with data collection on turnover by Canada, Japan, the United Kingdom and the United States. The surveys since have covered FX forwards, swaps, currency swaps and options in more countries. Their scope was expanded in 1995 to cover forward, swap and option transactions in IR derivatives markets.[10] The Triennial Survey has evolved to become the most comprehensive source of information on the

[8] Accounting convention does not count FX swaps as debt but rather as an off-balance sheet entry, despite their debt-like characteristics (Borio et al (2017; 2022)).

[9] Market risk can often be hedged, but an imperfect hedge gives rise to *basis risk*, eg when the payments due on a derivative contract do not exactly match the payments expected to be received on the asset to which the derivative acts as a hedge.

[10] See the working group reports in BIS (1992), BIS (1995) and BIS (1996).

size and structure of global OTC markets in FX and IR derivatives, with more than 1,100 dealer banks from over 50 jurisdictions participating.[11]

While turnover statistics measure activity on the basis of where trading takes place, separate statistics on outstanding amounts provide a complementary view of the size of derivatives markets and associated positions. The BIS OTCD statistics capture notional amounts and gross market values of FX, IR, credit, commodity and equity derivatives. In addition, they capture gross credit exposures and liabilities for all OTCD contracts combined. These statistics have been reported semi-annually since 1998 for a set of consolidated dealer banking groups headquartered in 12 jurisdictions (on a nationality basis).[12]

To complement the OTCD collections, the BIS publishes statistics on XTD compiled from commercial sources, as detailed in the Online annex.

The growth of derivatives markets

Derivatives markets have expanded rapidly since the 1980s, becoming central to global finance (Graph 2). For IR derivatives, notional amounts grew tenfold between 1998 and 2007, followed by more moderate growth since 2013. FX derivatives also grew rapidly, a trend dented only by the 2007–09 Global Financial Crisis (GFC).

Not all derivatives markets keep expanding, however. In particular, the market for credit derivatives, mainly CDS, went through a cycle of expansion and consolidation centred on the GFC (Graphs 2.C and 2.F, yellow lines). Notional amounts (Graph 2.C) and gross market values (Graph 2.F) surged in the boom phase amid low perceived counterparty risk. Both collapsed amid rising defaults and extensive revaluation of the underlying risks. By 2016, amounts were less than a sixth of their peak, in part reflecting efforts to reduce counterparty risk through the introduction of central clearing counterparties (CCPs, discussed below).

Many standardised contracts, such as futures and many types of options, have long been traded on centralised exchanges, which run an order book to match buy and sell orders. A clearing house associated with the exchange becomes the counterparty to both sides, records the long and short positions and manages credit risk through margining and daily mark-to-market settlement. Positions exist as bookkeeping entries at the clearing house and are closed by entering an equal and opposite trade that nets the exposure to zero. For XTD, turnover statistics thus capture the volume of opening and closing trades, while *open interest* reflects the net number of outstanding positions.

Institutional differences make the size of XTD and OTCD markets difficult to compare. Notional amounts in OTC derivatives exceed the open interest recorded on exchanges (Graphs 2.A, 2.B and 2.C).[13] At the same time, turnover in XTD can be large,

[11] The Triennial survey is coordinated by the BIS under the auspices of the Markets Committee (for the FX part) and the Committee on the Global Financial System (for the IR derivatives part).

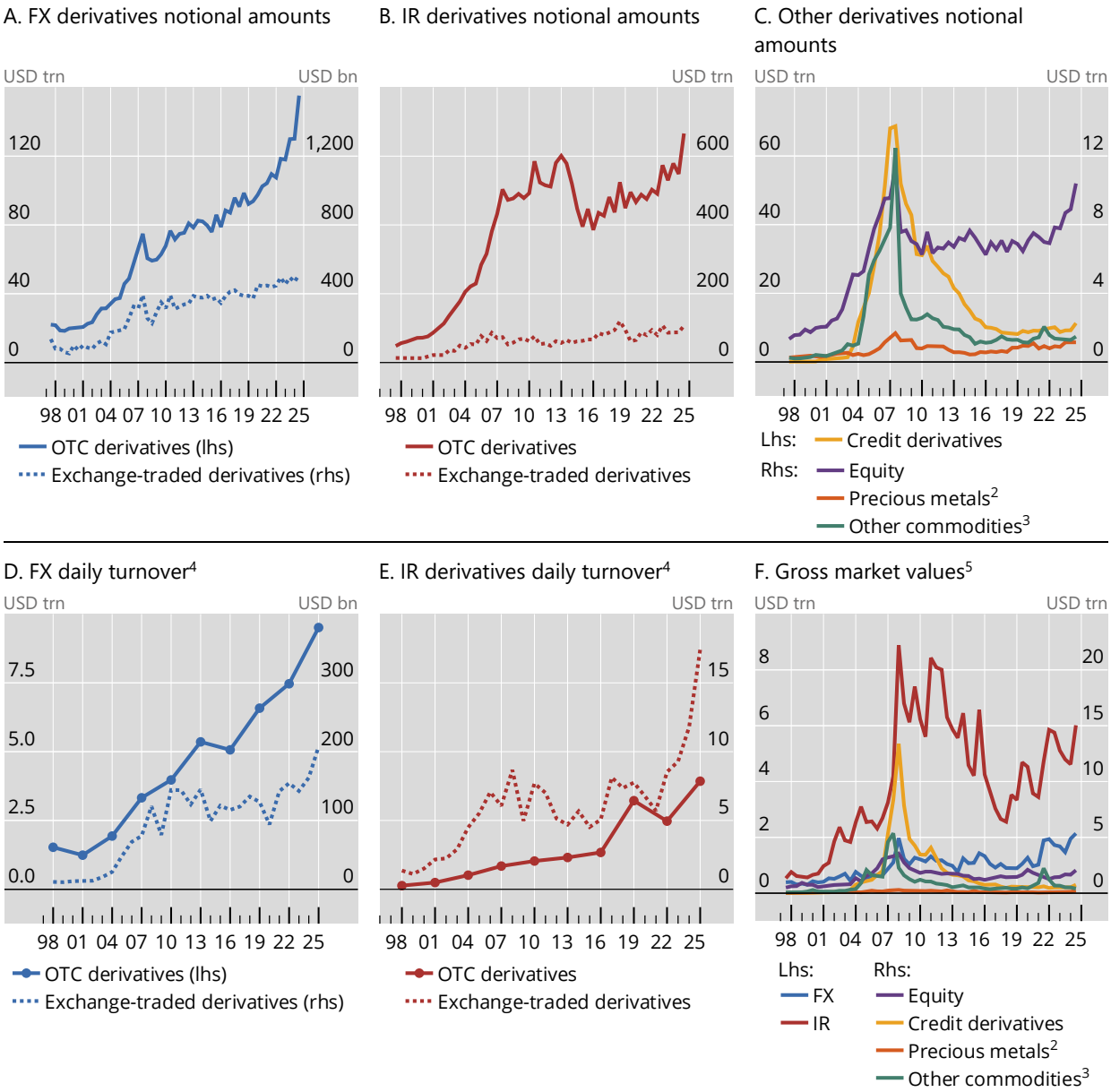
[12] The data reported by 12 major jurisdictions in the semi-annual statistics capture the bulk of global market activity. More than 30 additional jurisdictions provide data every three years as part of the Triennial Survey; these amounts are combined with the semi-annual data to derive global aggregates.

[13] The comparison is loose, since in XTD offsetting long and short positions reduce open interest, while in OTC markets positions are often offset by entering new contracts, which boosts notional amounts.

since positions are opened and closed with ease and the short-term contracts traded on exchanges turn over frequently. Hence, turnover in exchange-traded IR derivatives outpaced that in OTCD markets (Graph 2.E). FX derivatives, by contrast, remain predominantly OTC (Graph 2.D), as forwards and swaps are often customised to meet the needs of market participants in terms of timing, currency pairs or maturities.

The growing universe of derivatives markets[1]

Graph 2



OTC = over-the-counter.

[1] OTC derivatives adjusted for local and cross-border inter-dealer double-counting, ie "net-net" basis. [2] Gold and other precious metals combined. [3] Commodities excluding precious metals. [4] Daily averages in April. [5] See endnotes for details.

Sources: Futures & Options World; Futures Industry Association; Options Clearing Corporation; BIS OTC derivatives statistics; authors' calculations.

Post-GFC reforms have promoted trading of standardised contracts. This facilitates trading on exchanges and central clearing of OTC derivatives, which reduces counterparty risk and enhances transparency.[14] However, the extent to which this is possible depends on the risk category and instrument. IR futures and options are standardised and heavily traded on exchanges. Exchange-traded turnover accounted for nearly 70% of total IR derivatives turnover in April 2025 (Graph 3.A). The share fell before 2019 due to relatively rapid growth of OTC turnover (Graph 2.E), much of which is centrally cleared (Graph 3.B). Indeed, more than half of both outstanding OTC IR derivatives and credit derivatives are centrally cleared.

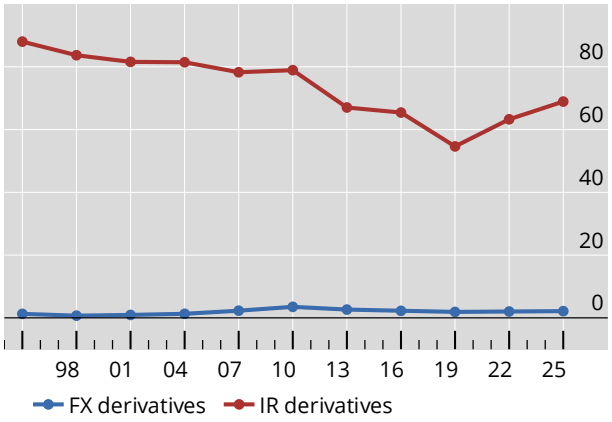
This shift towards central clearing has not occurred for most FX derivatives. Challenges with clearing are that much of it involves the exchange of principal (notional) amounts and that mechanisms to ensure payment versus payment at the settlement stage already exist for large segments of the market. However, clearing differs from settlement in that clearing effectively guarantees the performance of the transacting parties during the life of the contract through payments of initial and

Trading and central clearing of derivatives[1]

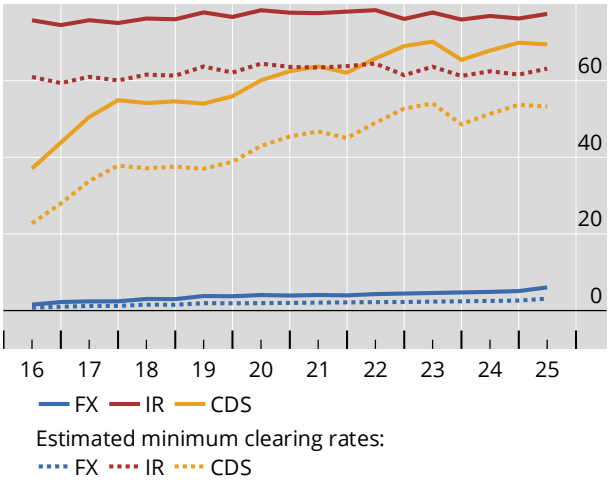
In per cent

Graph 3

A. Exchange-traded derivatives, in total turnover[2]



B. Clearing rates of OTC derivatives, in amounts outstanding[3]



CCP = central clearing counterparty; CDS = credit default swaps; FX = foreign exchange; IR = interest rate; OTC = over-the-counter; XTD = exchange-traded derivatives.

[1] OTC derivatives (OTCD) adjusted for local and cross-border inter-dealer double-counting, ie "net-net" basis. [2] The share of exchange-traded derivatives to total derivatives (OTCD excluding spots and XTD combined), separately for each risk category. See endnotes for details. [3] The solid lines show for each risk category the percentage of total OTCD notional amounts outstanding that has a CCP as counterparty. The dotted lines show the proportion of trades that are cleared. See endnotes for details.

Sources: Futures & Options World; Futures Industry Association; Options Clearing Corporation; BIS OTC derivatives statistics; authors' calculations.

[14] CCPs interpose themselves between the contractual parties, which enables netting and reduces counterparty risk. Trade compression allows contracting parties to "tear up" offsetting positions and replace them by fewer contracts – the scope for compression was much enhanced by efforts to standardise and move to central clearing.

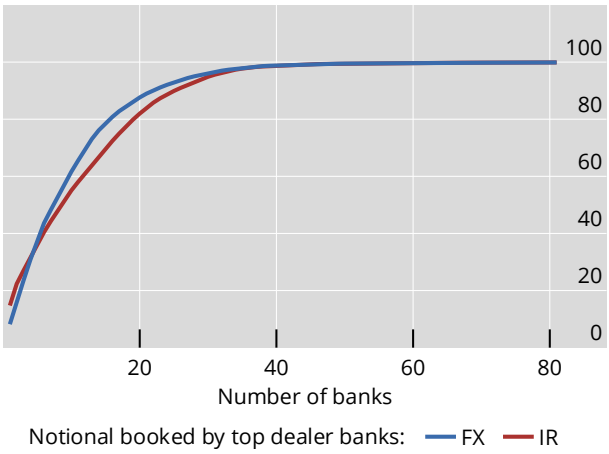
variation margin based on market values.[15] Currently, only a fraction of outstanding FX derivatives is centrally cleared (Graph 3.B), mainly non-deliverable forwards which do not involve the exchange of principal.

Trading in FX and IR derivatives is concentrated in a handful of dealer banks. Estimates derived from banks' financial disclosures at end-2024 suggest that the top 10 banks reported almost 60% of global outstanding FX derivatives, and the top 20 more than 85% (Graph 4.A). Concentration is only slightly lower in IR derivatives. Among the large dealers, US banks play an outsize role in FX derivatives (Graph 4.B), being on one side of more than 30% of notional outstanding amounts. Indeed, Kloks et al (2023) demonstrate their "pivotal" role in the inter-dealer market: in EUR/USD FX swaps between 2012 and 2022, US banks borrowed euros from euro area banks and channelled them to Japanese banks in greater volumes than the direct net positions between Japanese and euro area banks. In IR derivatives, euro area banks are by far the largest group of dealers, followed by US and UK banks. The dominance of euro area banks in part reflects the large volume of IR notional amounts in euro.

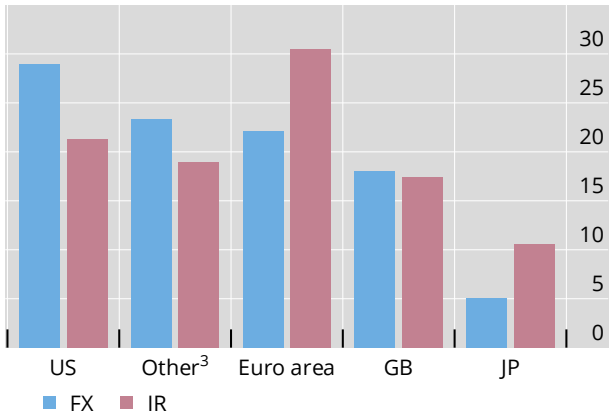
Dealer concentration in OTC derivatives markets

In per cent — Graph 4

A. Positions are concentrated in a few dealer banks[1]



B. Shares of notional amounts outstanding, by bank nationality[2]



FX = foreign exchange; IR = interest rate; OTC = over-the-counter.

[1] Lines show the cumulative shares of notional amounts outstanding at end-2024 (all instruments including options). See endnotes for details. [2] Share of OTC derivatives outstanding at end-H1 2025 with dealers of the nationality indicated on one side, not adjusted for inter-dealer double-counting. [3] Residual reporting countries.

Sources: Bank of Japan; US Office of the Comptroller of the Currency; Fitch Connect; S&P Global Market Intelligence; BIS OTC derivatives statistics; authors' calculations.

[15] Payment-vs-payment settlement eliminates settlement risk, ie the risk that one party to an FX transaction delivers the required currency at maturity but does not receive the other currency in return. It eliminates counterparty credit risk during the life of the contract. Duffie (2011) argues that a CCP could exist alongside existing settlement infrastructures and, by collecting initial and variation margin based on market values, could protect market participants against counterparty credit risk.

Market monitoring with IR and FX derivatives statistics

Financial innovation, regulation and changes in investor allocations and hedging practices have shaped markets for derivatives over the decades. The BIS derivatives statistics have become a go-to data source to monitor the impact of these drivers. This section presents three examples viewed through the lens of BIS statistics. In the first, shifts in market practices and regulation of IR derivatives markets led to the emergence of new products and new benchmark interest rates. The second and third examples examine how global investors' hedging of dollar portfolios gave rise to currency flows both on and off balance sheet, with knock-on effects on prices.

Benchmark tipping in fixed income and derivatives markets

Since the 1980s, IR derivatives markets have experienced a series of "tipping points" in benchmark rates, ie shifts in the reference rates used in IR derivatives. BIS statistics have helped to monitor these transitions and the changes in market structure.

The first example is an episode from the 1980s, when "eurodollar" (Libor) futures overtook Treasury bill futures as the hedging instrument of choice at the short end of the US dollar yield curve (McCauley (2001); Wooldridge (2001)). This reflected concerns about "basis risk", ie the risk that the value of an asset and its hedge move against each other, compounding rather than mitigating losses. At the time, short positions in US Treasury bills had been used to hedge long positions in private short-term bonds. Episodes of distress in money markets (eg the run on Continental Illinois bank in 1984), however, provoked periodic flights to quality that drove up Treasury bill prices. This resulted in losses on both sides of the trade, as the value of the long position in bonds fell along with the effectiveness of the hedge.

To reduce basis risk, investors in short-term markets turned to futures tied to *private* rates, ie rates faced by private borrowers rather than government issuers. Since private rates capture credit risk, they better approximate investors' borrowing costs and investment returns than do Treasury bill rates. Futures tied to eurodollar rates, ie rates paid on offshore US dollar bank deposits, rapidly gained ground.

Another transition started in the 1990s at the longer end of the curve. Kreicher et al (2017) document the steady decline in the share of government bond futures and options in the turnover of interest rate derivatives (Graph 5.A). In their place rose interest rate swaps (IRS) referencing Libor, a set of rates based on a panel of commercial banks' unsecured borrowing costs.

Spurred by post-GFC regulatory reforms, innovations such as central clearing and swap execution facilities made OTC markets more competitive with government bond-linked derivatives (Ehlers and Eren (2016); McCauley and Wooldridge (2016)). IRS expanded the most in the largest markets for USD, EUR and JPY contracts.[16]

The transition from Libor that started in 2021 again transformed markets.[17] Libor was based on bank surveys and prone to manipulation (Gyntelberg and Wooldridge (2008); CFTC (2012)), a problem common to other interbank offered rates (IOSCO (2013)). In addition, after the GFC, trading in unsecured interbank markets gave way

[16] Libor helped solve problems with basis risk vis-à-vis government rates, but introduced other types of risk, such as fixing risk. See Huang and Todorov (2022) and Ehlers and Todorov (2025) in this issue.

[17] Libor for GBP, EUR, CHF and JPY ceased as of end-2021 and for USD as of June 2023.

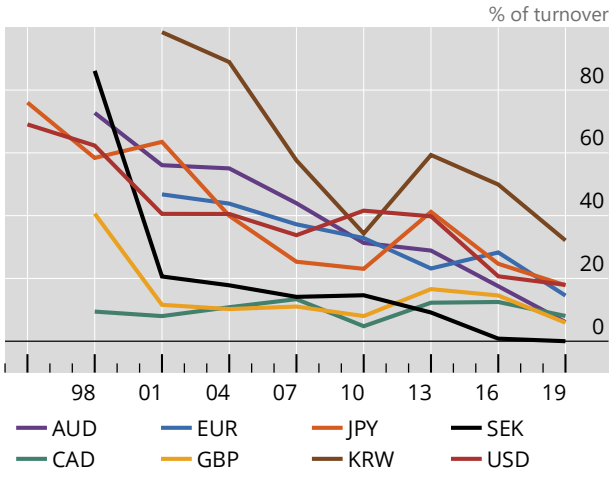
to secured interbank repurchase agreements, diminishing Libor's representativeness as a benchmark for funding rates. To address these issues, authorities, together with the private sector, developed new benchmark rates based on transactions in liquid overnight lending markets (FSB (2014); Schrimpf and Sushko (2019)). These nearly risk-free rates (RFRs) are less sensitive to credit risk, being overnight and tightly linked to policy rates (and, for USD and CHF, reflect *secured* lending).

With the shift to RFRs, trading of overnight index swaps (OIS) gained market share for currencies most affected by the reform (Huang and Todorov (2022)). An OIS is a type of IRS that is distinguished by its floating leg, which is tied to a compounded overnight rate (eg Secured Overnight Financing Rate (SOFR) or Euro short-term rate (ESTR)). By April 2022, nearly all new GBP contracts and more than 60% of CHF and JPY contracts referenced RFRs, up from 24%, 55% and 7%, respectively, in April 2019 (Graph 5.B). In the case of USD and EUR contracts, the share of OIS in IRS turnover remained relatively stable, since, for these currencies, RFRs mainly replaced existing overnight rates (blue bars).[18] Yet, by April 2025, OIS had emerged as the dominant contract in USD as well. The impact of this transition is still being felt, as described in Ehlers and Todorov (2025) in this issue.

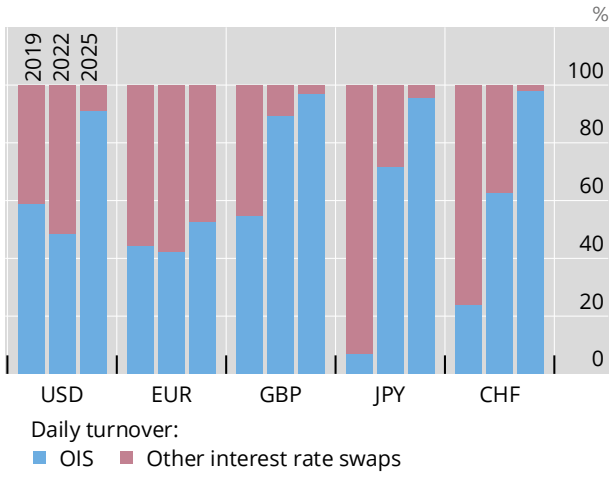
Benchmark tipping in interest rate derivatives markets

Graph 5

A. Tipping from government bond futures[1]



B. Share of overnight index swaps (OIS) in total swaps



[1] Turnover in government bond futures and options as a share of turnover in bond derivatives (over-the-counter plus long-term exchange-traded derivatives); calculated for currencies with active bond futures markets.

Sources: Futures & Options World; Futures Industry Association; Options Clearing Corporation; BIS Central Bank Triennial Survey; authors' calculations.

NBFI FX hedges and global portfolio flows

The BIS derivatives statistics can shed light on how FX swaps and forwards[19] make money fungible across currencies. Non-bank financial institutions (NBFIs) have

[18] ESTR took over the euro overnight index average (EONIA) for EUR contracts and SOFR partially replaced the effective federal funds rate (EFFR) for USD contracts.

[19] For convenience, we use "FX swaps and forwards" to refer to the sum of FX swaps, outright forwards and currency swaps.

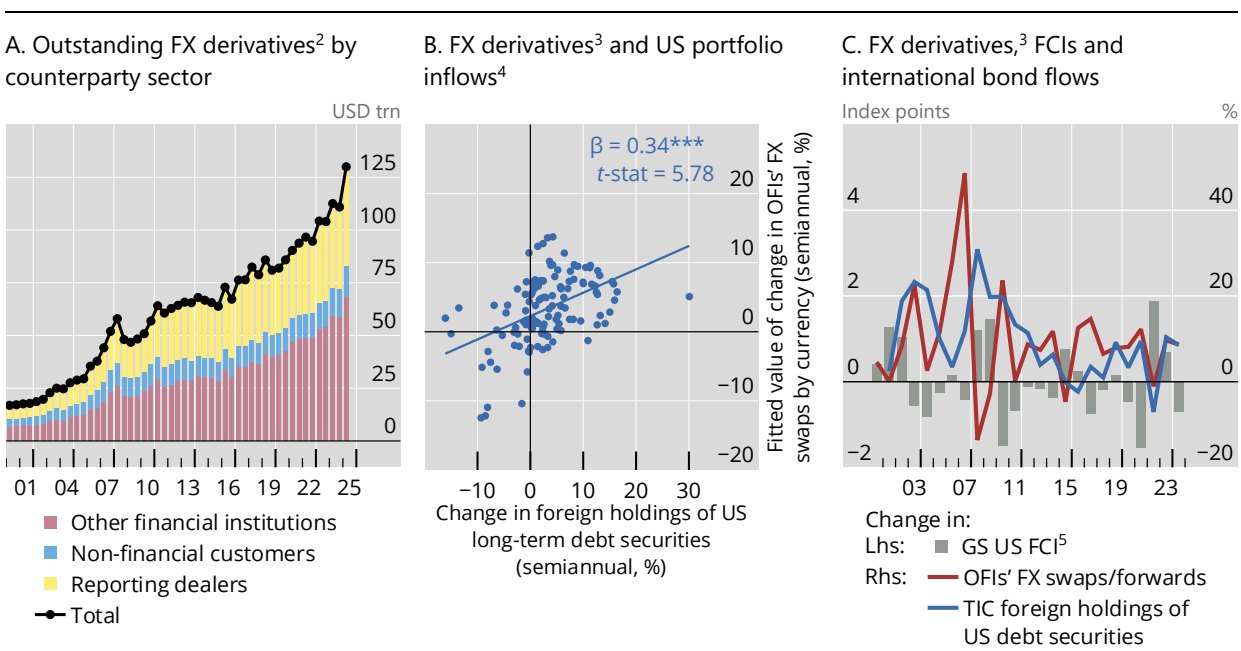
globally diversified portfolios denominated in multiple currencies but tend to have mainly domestic currency liabilities. This inherent currency mismatch makes FX hedging an integral part of their investment decisions (BIS (2025)). An NBFI can use FX derivatives to invest in a foreign currency asset while hedging currency risk.

FX swaps and forwards facilitate NBFIs' cross-border investments by allowing them to adjust the amount of currency risk associated with those investments (as illustrated in Graph 1.B). As a consequence, the largest and fastest-growing segment of the FX swap market has been contracts with "other financial institutions", which include mainly NBFIs but also non-reporting banks (Graph 6.A). This segment has more than tripled since 2009.

Other financial institutions' outstanding positions in FX swaps and forwards largely track their international portfolio allocation and are therefore useful as a barometer of risk-taking and global financial conditions (Nenova et al (2025)). Notably, portfolio flows into US debt securities are closely related to fluctuations in the volume of FX swaps and forwards used by NBFIs (Graph 6.B).

Linkages between FX derivatives, portfolio flows and financial conditions[1]

Graph 6



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

[1] See endnotes for details. [2] Including FX swaps, outright forwards and currency swaps; notional amounts outstanding. [3] Including FX swaps and outright forwards; notional amounts outstanding. [4] The sample spans H1 2012–H1 2024. *** denotes statistical significance at the 1% level. See endnotes for details. [5] An increase (decrease) indicates a tightening (loosening) of financial conditions.

Sources: Nenova et al (2025); Goldman Sachs Global Investment Research; US Treasury International Capital (TIC) data; BIS OTC derivatives statistics; authors' calculations.

There is also a strong empirical link between financial conditions and activity in FX swaps and forwards. This relationship arises since FX swaps and forwards are tightly linked to international portfolio flows, which in turn affect asset prices and financial conditions. For example, financial conditions in the United States tend to ease when portfolio flows into US debt securities increase and the global volume of FX swaps and forwards grows (Graph 6.C).

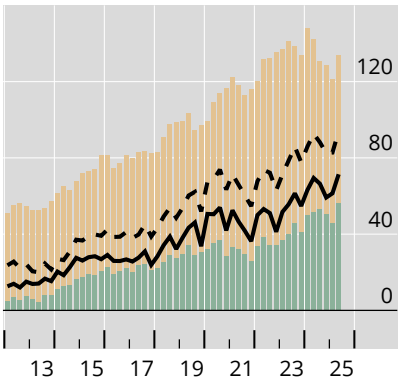
Cross-currency basis trades and carry trades

Hedging demand by banks and NBFIs gives rise to two of the most popular trades in global finance: the cross-currency basis trade and the carry trade. In the former, financial institutions use derivatives to arbitrage between markets. In the latter, they use them to speculate. These trades are notoriously difficult to quantify, but their footprints are discernible in BIS statistics.

Footprints of JPY/USD cross-currency basis trades and yen-funded carry trades

In trillions of yen — Graph 7

A. Holdings of yen official assets



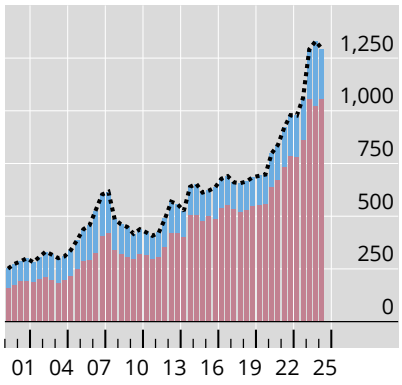
Foreign bank deposits, BoJ
T-bills held by foreign investors

Banks' foreign claims on the Japanese official sector:[1]
BIS reporting banks
US and euro area banks

B. Yen loans outside Japan

Yen-denominated loans:
To banks[2] outside Japan (cross-border)
To non-banks[3] outside Japan

C. FX swaps and forwards with yen on one side[4]



Total excluding dealers
Other financial institutions
Non-financial customers

[1] Includes claims on the government and central bank in Japan. [2] Includes interoffice claims. [3] Cross-border and local bank loans denominated in yen of BIS-reporting banks to non-banks resident outside Japan. [4] Including FX swaps, outright forwards and currency swaps, notional amounts outstanding.

Sources: Bank of Japan; Bloomberg; BIS consolidated banking statistics; BIS global liquidity indicators; BIS locational banking statistics; BIS OTC derivatives statistics; authors' calculations.

A dealer bank providing FX hedging services seeks to avoid taking on currency risk by maintaining balanced positions across currencies. A dealer bank that swaps dollars for yen at the spot leg of an FX swap faces a choice: (i) park the yen received on its balance sheet by buying safe yen assets; or (ii) enter into another derivatives position to offset the FX swap. For much of the post-GFC period, deviations from covered interest parity made it profitable for dollar-rich dealer banks to hold yen assets (Graph 7.A). The loss from holding (at times) negative-yielding yen assets was more than offset by the cross-currency basis, ie the premium received (relative to dollar cash rates) for lending dollars against yen via FX swaps. Between 2012 and 2025, US and euro area banks in particular racked up nearly ¥60 trillion in claims on the official sector in Japan (black solid line).

Since 2022, widening interest rate differentials between the United States and Japan have given rise to a similar but distinct trade – the yen-funded carry trade. Such trades have waxed and waned over the decades, being especially prominent in the run-up to the GFC (Galati et al (2007)). The most recent build-up of such trades

culminated in a rapid unwinding in August 2024, disrupting markets and generating losses on investors' equity portfolios.

There are several ways to implement a carry trade, each leaving footprints in international statistics (McGuire and von Peter (2024)). The textbook case involves borrowing the funding currency, selling it on the spot market and investing the proceeds in an asset denominated in the target currency. The borrowing leg is captured in the BIS international banking statistics as a loan owed in the funding currency (Aquilina et al (2024)). For example, carry trades leave traces in yen-denominated loans to non-banks outside Japan, which can use these transactions as the first step in a yen-funded carry trade. Indeed, the BIS global liquidity indicators reveal that yen loans to non-banks outside Japan grew by nearly 75% between early 2022 and 2024 (Graph 7.B, blue line). Yen funding for carry trades could also be provided via interbank lending. Cross-border yen loans to banks outside Japan expanded by over 55% during the same period (red line).

Yet, on-balance sheet positions tell only a small part of the story. The more common carry trade strategy, used by hedge funds and other speculators, relies on derivatives to establish an open outright forward payment obligation in the funding currency, combined with a long forward position in a target currency (as illustrated in Graph 1.C). [20] Since the use of derivatives does not require on-balance sheet borrowing of the funding currency, it is difficult to detect the trade in official statistics. Nevertheless, the dynamics of FX swaps in yen provide a useful, albeit rough, indication of the relative size of those yen-funded trades. They rose sharply during the 2022–24 period (Graph 7.C), in line with indicators of carry trade profitability.

Conclusions

Derivatives markets have transformed international finance by facilitating hedging, risk transfer and speculation. They have also been flash points, contributing to market swings and financial instability during periods of stress. The role of FX swaps and credit derivatives during the GFC is a case in point.

While BIS statistics have evolved along with the rise of derivatives markets, data gaps remain. The statistics were designed to capture market totals and distinguish between risk categories. Increasingly, however, analysts need data tailored to financial stability analysis. More concretely, they need data with directional positions by currency and with country and sector breakdowns to locate financial vulnerabilities.

Nowhere is this more important than in FX derivatives. Higher clearing rates for interest rate derivatives has meant greater visibility, since CCPs publish a wealth of information. By contrast, less information is available about OTC FX derivatives, which are generally not cleared. As noted, FX derivatives typically involve the exchange of principal, which means large payments that need to be managed, giving rise to potential liquidity and counterparty credit risks. However, BIS statistics provide little information about the geography of these payment obligations (ie the country and sector of the obligors). The BIS, in cooperation with reporting central banks, has been reviewing the BIS OTC derivatives statistics with an eye on closing some of these data gaps.

[20] Borrowing yen in an FX swap to sell it in the spot market is an attractive alternative to an outright forward contract, given the depth of FX swap markets.

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Endnotes

The names of jurisdictions with ISO codes are provided under the abbreviations on pages iv–vii.

Graph 2.F: Amounts outstanding. The sum of positive and (the absolute value of) negative market values, without taking into account legally enforceable netting sets (or collateral).

Graph 3.A: Note that OTCD and XTD statistics are not exact counterparts in the way participation and measures are defined (see Online annex).

Graph 3.B: The dotted lines are estimated as (CCP / 2) / (1 – (CCP / 2)), where CCP represents the share of notional amounts outstanding that dealers report against CCPs. The CCP share is halved to adjust for the potential double-counting of inter-dealer trades novated to CCPs.

Graph 4.A: The cumulative shares are based on banks' financial statements; banks are ranked in descending order by size of their positions at end-2024.

Graph 6: 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 BIS estimates the outstanding positions of dealers in these additional jurisdictions. 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).

Graph 6.B: Foreign holdings based on data from the US Treasury International Capital (TIC) System from monthly SLT reports. The sample covers CA, CH, EA, GB and JP and their respective currencies. The fitted values on the y-axis are obtained from a panel regression of semi-annual changes in the notional amounts outstanding of other financial institutions' FX swaps and outright forwards (with five advanced economy currencies (CAD, CHF, EUR, GBP, JPY). For details, see the additional notes for Graph 6.B in Chapter II of the BIS *Annual Economic Report 2025*.

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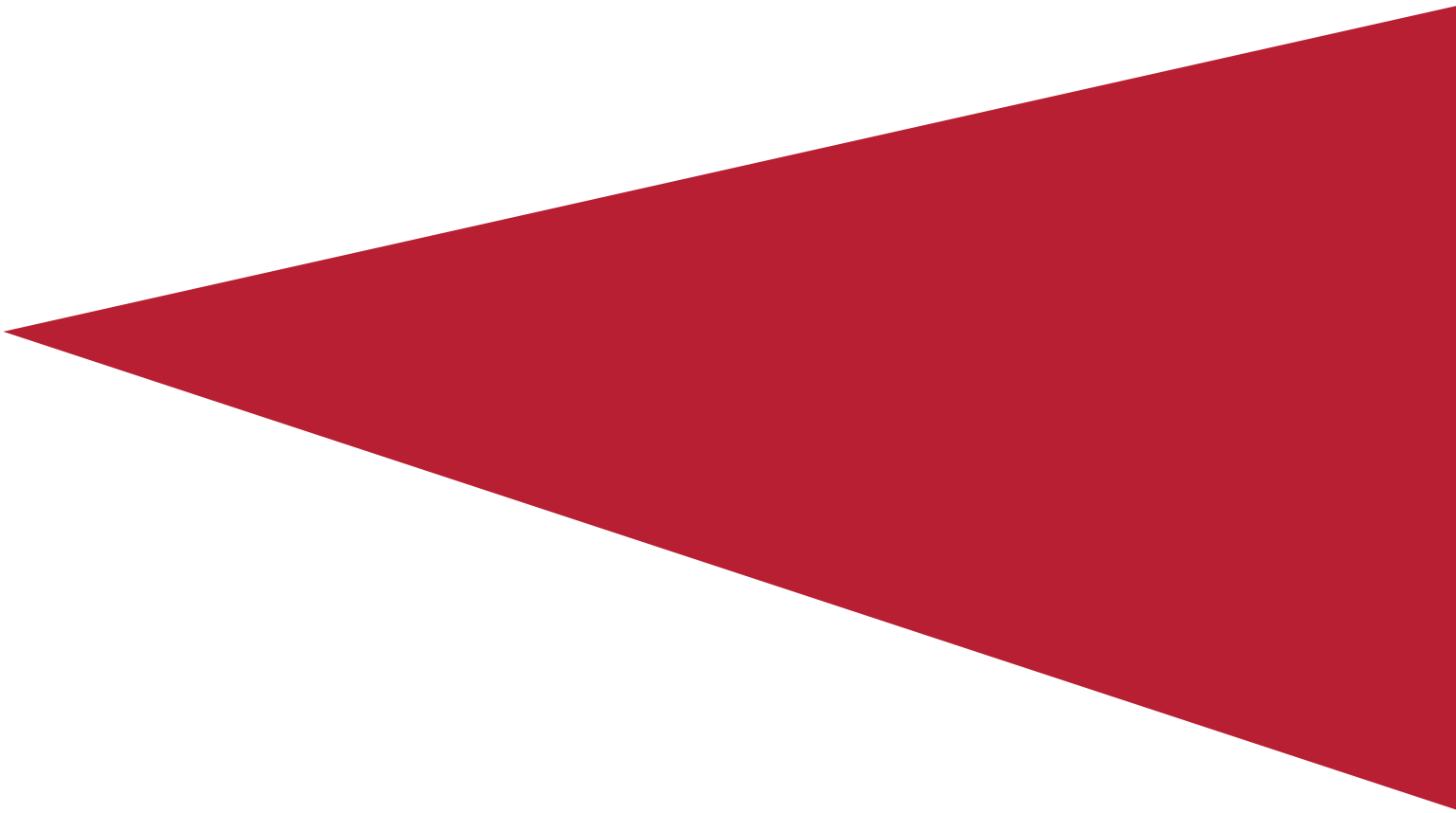

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