Stefan Avdjiev
stefan.avdjiev@bis.org

Patrick McGuire
patrick.mcguire@bis.org

Goetz von Peter
goetz.vonpeter@bis.org

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.

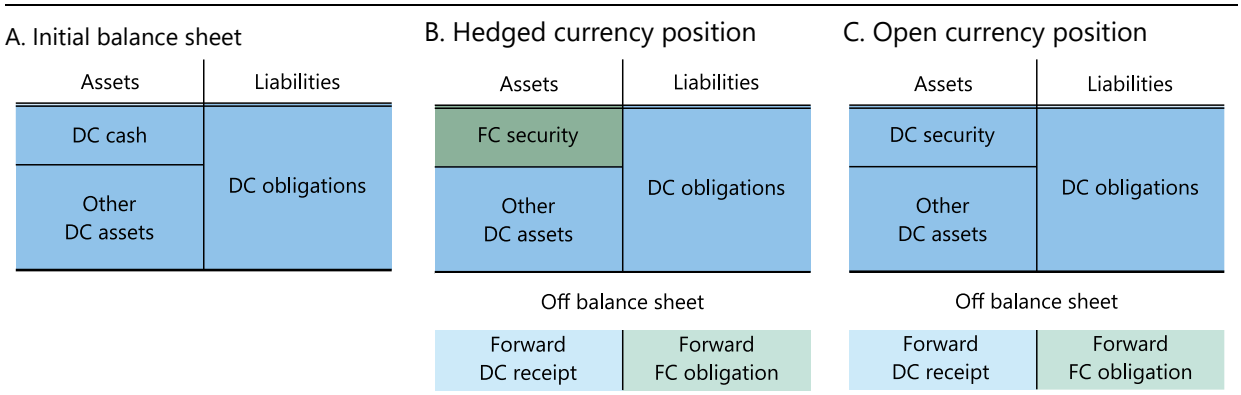
Hedging entails adopting a position in derivatives so that a potential loss on the balance sheet will be offset by an equal gain on the derivatives position. As an example of hedging interest rate risk, suppose a company borrows $10 million at a low floating rate but faces the risk that the rate jumps, 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).

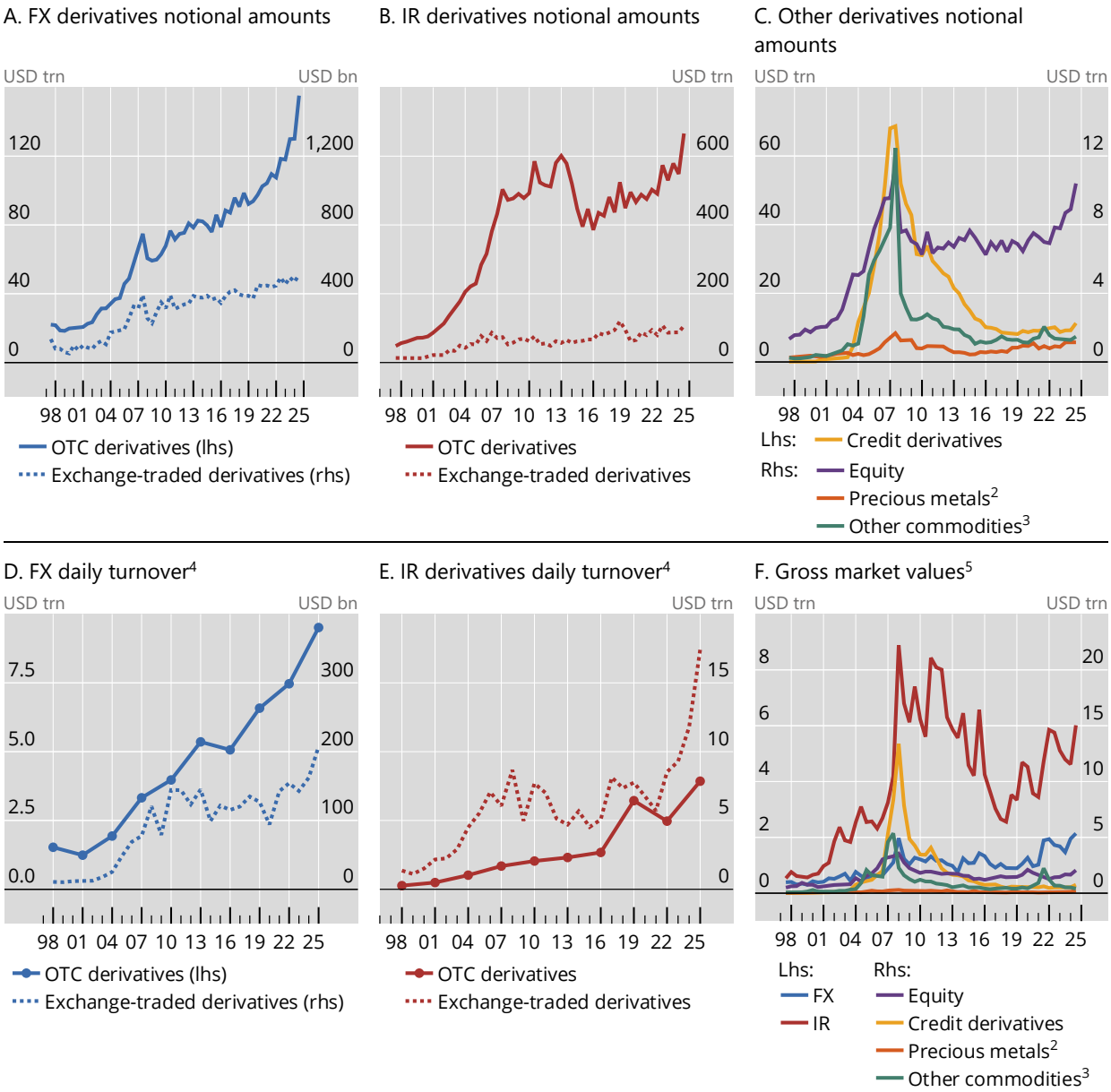
[12] The data reported by 12 major jurisdictions in the semi-annual statistics capture the bulk of global market activity. More than 30 additional jurisdictions provide data every three years as part of the Triennial Survey; these amounts are combined with the semi-annual data to derive global aggregates.

[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.

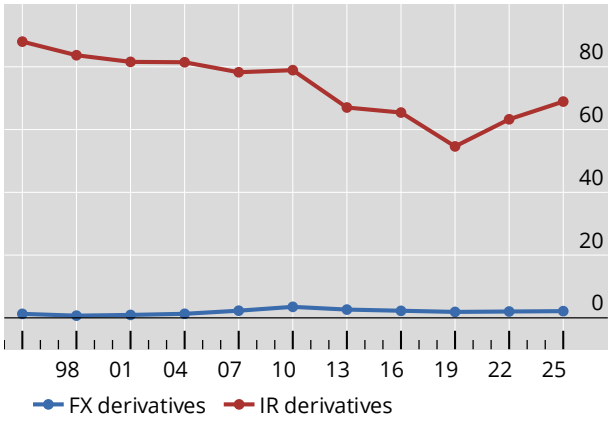
This shift towards central clearing has not occurred for most FX derivatives. Challenges with clearing are that much of it involves the exchange of principal (notional) amounts and that mechanisms to ensure payment versus payment at the settlement stage already exist for large segments of the market. 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]

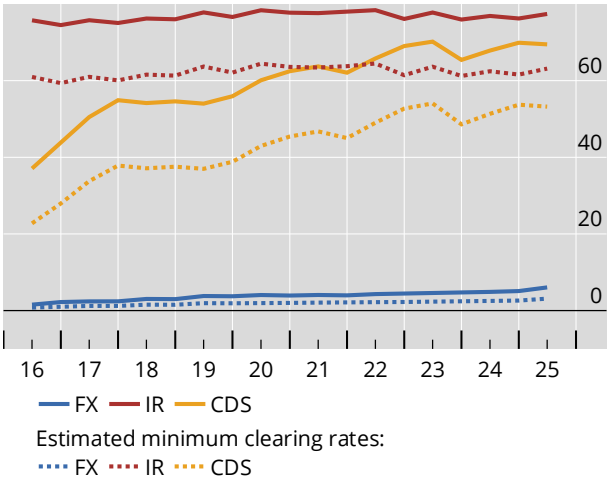
In per cent

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.

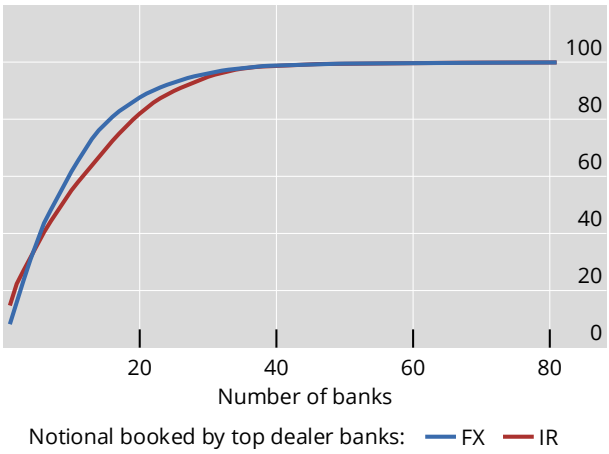
variation margin based on market values.[15] Currently, only a fraction of outstanding FX derivatives is centrally cleared (Graph 3.B), mainly non-deliverable forwards which do not involve the exchange of principal.

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.

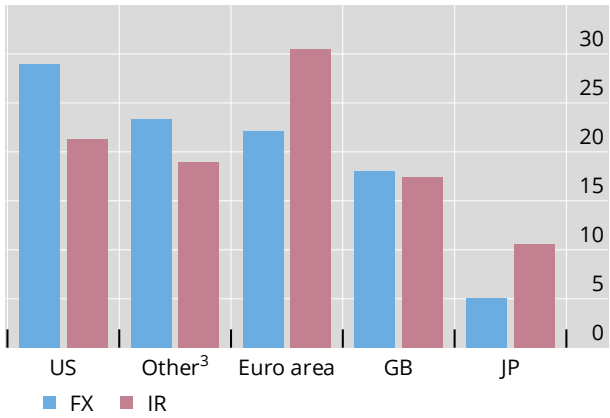
Dealer concentration in OTC derivatives markets

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.

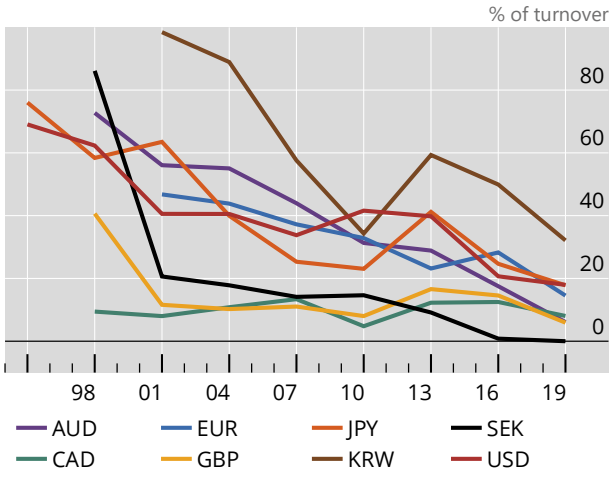
to secured interbank repurchase agreements, diminishing Libor's representativeness as a benchmark for funding rates. To address these issues, authorities, together with the private sector, developed new benchmark rates based on transactions in liquid overnight lending markets (FSB (2014); Schrimpf and 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.

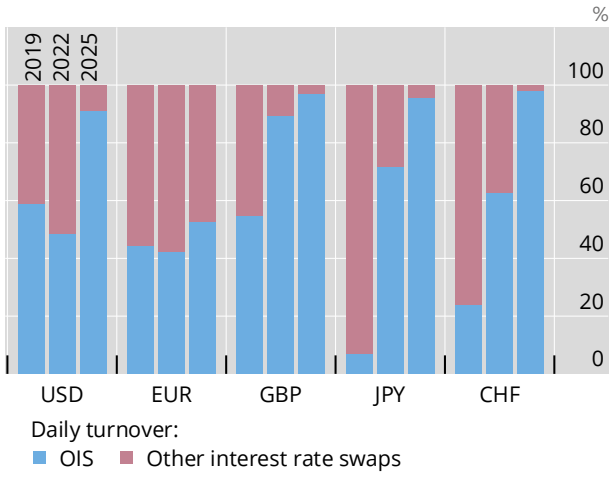
Benchmark tipping in interest rate derivatives markets

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.

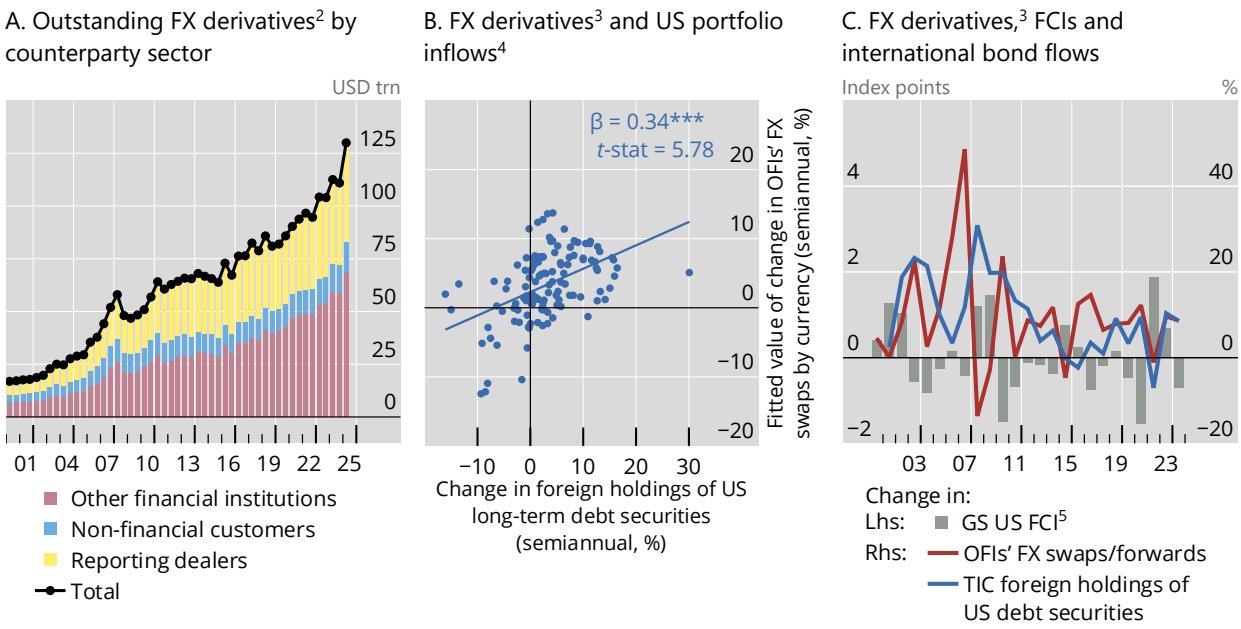
globally diversified portfolios denominated in multiple currencies but tend to have mainly domestic currency liabilities. This inherent currency mismatch makes FX hedging an integral part of their investment decisions (BIS (2025)). An NBFI can use FX derivatives to invest in a foreign currency asset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

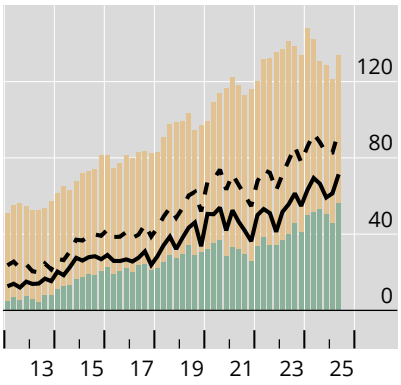
Cross-currency basis trades and carry trades

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

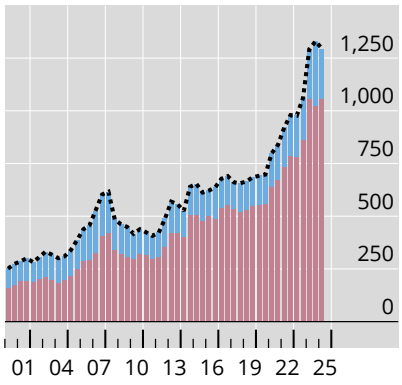


Foreign bank deposits, BoJ
T-bills held by foreign investors
Banks' foreign claims on the Japanese official sector:[1]
BIS reporting banks
US and euro area banks

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*.