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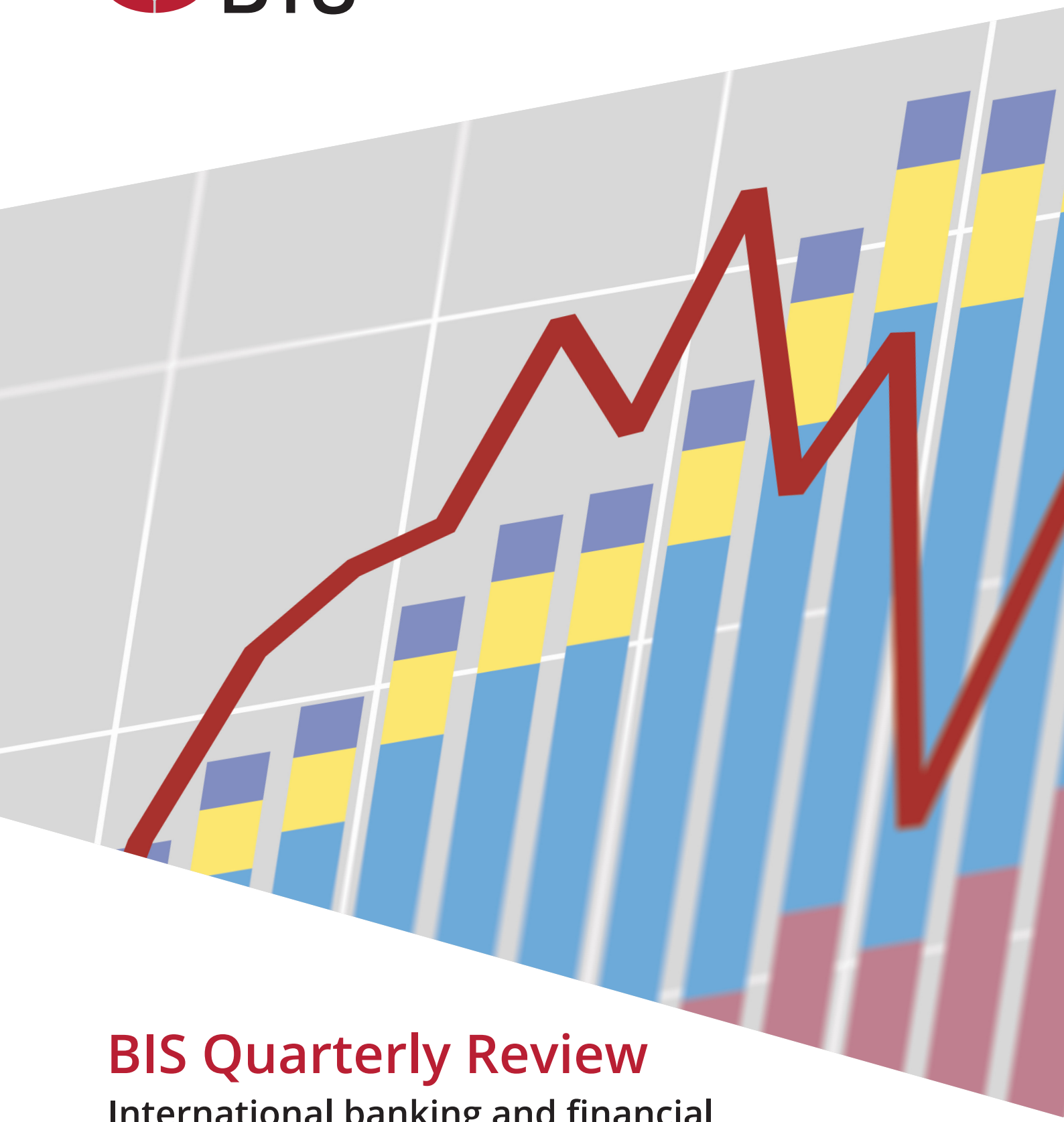

BIS Quarterly Review

International banking and financial market developments

June 2026

BIS Quarterly Review
Monetary and Economic Department

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This publication is available on the BIS website (https://www.bis.org/publ/qtrpdf/r_qt2606.htm).

ISBN 978-92-9259-959-1 (online)
ISSN 1683-0121 (online)

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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.

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The evolution of central banks' lending operations: insights from the Markets Committee Compendium[1]

Central banks' monetary policy operational frameworks have evolved in response to pandemic-era interventions, the resurgence of inflation and changes in market structure. The transition to smaller balance sheets, coupled with the growing footprint of non-bank financial institutions, is having a material impact on liquidity demand. Against this backdrop, central banks have begun recalibrating their lending operations, which comprise lending facilities and open market operations that extend funds to private sector borrowers on a collateralised basis. Drawing insights from the updated Markets Committee Compendium, this article examines the key design features and trade-offs related to the counterparty access policies, the collateral framework, pricing and disclosure practices of lending operations.

JEL classification: E41, E42, E52, E58.

Central bank operational frameworks are mechanisms and tools designed to align the operational target with the desired policy stance. At their core, these frameworks manage the supply of reserves to meet demand at the desired policy rate. As some major central banks reduce their balance sheet size, effective liquidity tools have become even more crucial in meeting demand for reserves and curbing excessive volatility in money markets. In addition, the growing footprint of non-bank financial institutions (NBFIs) has placed new demands on central banks' frameworks. Central banks have thus begun to re-examine the design of their liquidity toolkit.

Against this backdrop, the Markets Committee[2] has updated the *Compendium of monetary policy frameworks and central bank market operations*. With data as of end-2025, the Compendium provides new insights about the design of central banks' lending operations (Box A), including counterparty access, collateral frameworks, pricing methods and disclosure practices.[3] A key Compendium feature is a

[1] The views expressed in this publication are those of the authors and not necessarily those of the Bank for International Settlements or its member central banks. We thank Elena Munteanu and Yui Ching Li for excellent research support; and Paolo Cavallino, Mathias Drehmann, Gaston Gelos, Daniel Rees, Andreas Schrimpf, Frank Smets, Nikola Tarashev, Philip Wooldridge and representatives from Markets Committee member central banks for helpful comments. All remaining errors are our own.

[2] The Markets Committee is a central bank forum comprising senior officials with expertise in central bank operations and their interactions with financial markets. For further information on the Markets Committee, its current membership and work, see https://www.bis.org/about/factmktc.htm.

[3] Cap et al (2020) discuss the 2020 update of the Markets Committee Compendium, which captures changes in operational frameworks after the Great Financial Crisis.

Key takeaways

- *The updated Markets Committee Compendium, with new information about counterparty access and collateral frameworks, provides valuable insights about the "nuts and bolts" of operational frameworks.*
- *The transition to regimes with less abundant reserves involved a recalibration of central banks' liquidity toolkit to encourage use whenever economically sensible.*
- *Central banks have taken different approaches to expanding liquidity access to non-bank financial institutions (NBFIs) and in collateral frameworks. Central banks balance the ability to provide liquidity with risk and cost considerations.*

classification of lending operations by *function*, which refers to the policy objective: *monetary policy implementation and transmission*, *financial stability* or *payments system support*. This classification helps to compare lending operations rigorously across central banks.

This article explores central banks' *lending operations*, which involve tools to extend funds to private sector entities for a fixed period and on a collateralised basis. These include *lending facilities* and certain *open market operations* (OMOs),[4] differing in terms of *availability* and *who initiates use*. *Standing lending facilities* are available on any business day, with usage initiated by the counterparty, while *discretionary lending facilities* are available in periods set by the central bank, typically in response to market stress; once activated, drawings are initiated by the counterparty. Repurchase agreements, a type of OMO in which the central bank provides reserves against collateral, are initiated by the central bank on a recurring or ad hoc basis.

The Compendium highlights that central banks share common objectives for lending operations, but the number and type of operations employed vary significantly.[5] In terms of their design features, banks are almost universally eligible as counterparties, while access for NBFIs is more limited and varies by jurisdiction and type. Most jurisdictions accept domestic government bonds as collateral, but acceptance of private sector or foreign issued collateral is jurisdiction-specific and depends on the operation's function.

The Compendium also highlights how central banks balance trade-offs in designing lending operations. For counterparty access policies, they aim to provide sufficient liquidity to the financial system without taking on excessive credit risk with NBFIs. Similarly, accepting a broad range of collateral types eases liquidity provision, but with potentially greater operational costs and risks to central bank balance sheets. In setting prices, central banks want to ensure liquidity is drawn when needed without encouraging excessive reliance on the central bank (eg the central bank becoming a substitute for market funding).

The next section examines the recent evolution in central bank operational frameworks and the recalibration of lending operations. The following section highlights new elements in the updated Markets Committee Compendium, covering

[4] Other types of OMOs that are not covered here are outright transactions that involve the buying and selling of securities in the open market, for example as part of asset purchase programmes. In addition, foreign exchange (FX) swaps are not included in the analysis.

[5] This aligns with the discussion in Borio (2001), which compares the monetary policy operating procedures in the United States, Japan and the euro area.

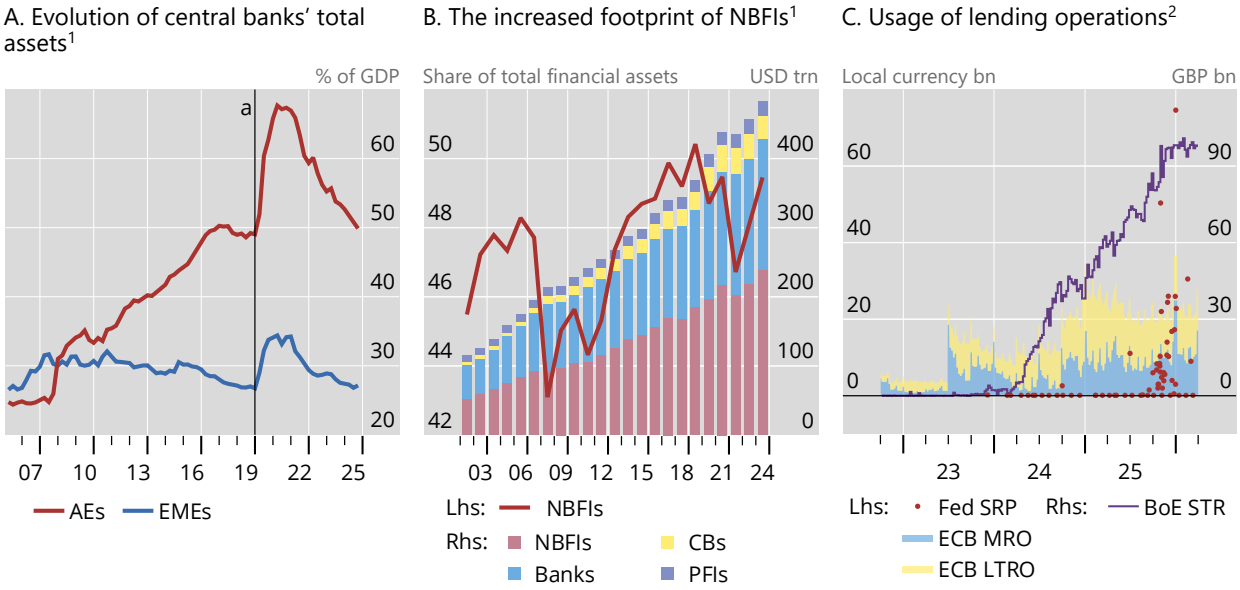
specific design features of lending operations and the key policy considerations that underpin those choices. The final section concludes. A box provides a primer on the Compendium database.

Operational frameworks amidst cyclical and structural shifts

Central banks' operational frameworks have evolved significantly over the past two decades. Those in major advanced economies (AEs) that engaged in asset purchase programmes and long-term lending programmes following the Great Financial Crisis (GFC) and the Covid-19 pandemic (Graph 1.A) saw balance sheet expansions and a significant increase in the level of central bank reserves.[6] Those in some emerging market economies (EMEs) grew their balance sheets by accumulating foreign exchange reserves, although asset purchases also contributed. Overall, however, EME central bank balance sheets grew by far less than those of their AE counterparts, with the majority continuing to operate with scarce reserves.[7]

After peaking during the Covid-19 pandemic, many AE central banks have been shrinking their balance sheets by unwinding unconventional policy measures. When

Changing landscape of central bank operational frameworks — Graph 1



CBs = central banks; LTRO = long-term refinancing operations; MRO = main refinancing operations; NBFIs = non-bank financial institutions; PFIs = public financial institutions; SRP = standing repo operations; STR = short-term repo.

[a] Beginning of the Covid-19 pandemic (Q4 2019).

[1] See endnotes for details. [2] For the Federal Reserve, SRP total amounts accepted, with values below $100 million not shown to enhance readability; for the ECB, daily outstanding amount of MRO with a one-week maturity and LTRO with a three-month maturity; and for the Bank of England, total amount allocated of weekly STR operations. Data as of 31 March 2026.

Sources: ECB; Bank of England; Federal Reserve Bank of New York; FSB (2025); BIS; authors' calculations.

[6] See Cantú et al (2021) on central banks' monetary response to the Covid-19 pandemic; Cavallino et al (2025) on the taxonomy of operational frameworks; and Borio (2023) on trade-offs between different operational frameworks.

[7] EME central banks often use FX swaps and issue central bank bills to sterilise reserves.

a central bank seeks to maintain a low opportunity cost for banks to hold reserves while simultaneously shrinking its balance sheet, it must be prepared to buffer variations in reserve demand to avoid volatility in money market rates (Cavallino et al (2025)). This in turn requires lending operations that enable the level of reserves to adjust in response to fluctuations in demand.

In addition to these cyclical changes, macro-financial structural changes – most notably the growing footprint of NBFIs (Graph 1.B) – have implications for the effectiveness of liquidity provision tools. While NBFIs may improve market resilience by diversifying the pool of market participants, the inherent flightiness of certain NBFIs may exacerbate volatility in particular money market segments and undermine market liquidity during periods of stress, as observed during the March 2020 market turmoil.

Box A

The Markets Committee Compendium database on the BIS website

To enhance transparency and understanding, the Markets Committee has published a *Compendium of monetary policy frameworks and central bank market operations*, with updates every few years. The Compendium provides a comprehensive cross-country overview of key aspects of monetary policy implementation across 27 jurisdictions. It includes information on the institutional features of monetary policy frameworks, policy communication and the "nuts and bolts" of reserve requirements, lending facilities and open market operations.① The Compendium has two key features:

- **Currency area overviews**: offers a text summary of the institutional frameworks and key features of monetary policy operations for each currency area.
- **Elements**: summarises the core 12 "elements" or components of operational frameworks, including the institutional setup of monetary policy decisions, monetary policy communication, reserve requirements, standing facilities, deposit facilities, open market operations (OMOs) and disclosure practices.

The "comparison" tab enables customised queries for cross-country and/or cross-table perspectives. For example, users can select a currency area and then specify the framework elements of interest (eg types of standing facilities) and drill down into subcomponents (eg list of eligible counterparties or pricing methods). The query will then generate customised tables with data exportable in XLS or CSV formats.

The most recent update of the Compendium, with data as of end-2025, provides new information about the design of lending facilities, OMOs and outright transactions. Users can access detailed information on specific design features (eg counterparty access, collateral framework, pricing method and tenor, disclosure practice) of each of the lending facilities and OMOs for each jurisdiction.

① The descriptions of monetary policy frameworks in the Markets Committee Compendium either reproduce or summarise information already publicly available in central bank publications or websites. The original central bank source remains the ultimate point of reference.

Against this backdrop, many central banks have been recalibrating their liquidity tools to encourage use by eligible counterparties – when economically sensible for liquidity management, and to adapt to structural shifts in the financial system. For instance, the Federal Reserve removed the aggregate operational limit for its standing repo operations in 2025, and the European Central Bank (ECB) reduced the spread between the interest rate on the main refinancing operations (MRO) and its deposit facility. In 2022, the Bank of England introduced the short-term repo (STR) facility to keep short-term market interest rates aligned with the policy rate as reserves declined. Subsequently, in 2025, it increased the reserves available at indexed long-term repo (ILTR) operation auctions at fixed minimum spreads (Bank of England (2025)). Importantly, to promote use, the UK Prudential Regulatory Authority (PRA)

affirmed that it would view use of both the STR and ILTR tools as routine sterling liquidity management. The Bank of England also recalibrated their bilateral facilities – the usage of which the PRA also supports. Additionally, the Bank of England introduced the contingent NBFI repo facility (CNRF),[8] enabling eligible pension funds, insurers and investment funds to borrow cash during periods of market-wide disruption that temporarily increase NBFIs' demand for liquidity, and where that demand is outside the reach of the Bank's routine liquidity facilities. Uptake patterns have started to reflect these developments, with usage increasing since late 2023 (Saporta (2024); Perli (2025); Iskaki et al (2026)) (Graph 1.C).

Lending facilities and open market operations

The updated Compendium characterises OMOs and lending facilities by their function for the first time, along with details about its pricing methodology, collateral framework and the range of market participants that have access.

A bird's eye view across jurisdictions

OMOs and lending facilities have three broad functions: *to implement monetary policy*, *to promote financial stability* and *to support payment systems* (Graph 2). In the context of monetary policy implementation, these tools serve to control short-term interest rates, manage reserves and transmit policy decisions by influencing market conditions and signalling the central bank's policy stance. For financial stability objectives, they contribute to stabilising market conditions and addressing liquidity pressures, thereby limiting systemic risks. And for payments systems, they underpin smooth functioning by providing participants with access to central bank liquidity, addressing timing mismatches in payments and avoiding disruptions.

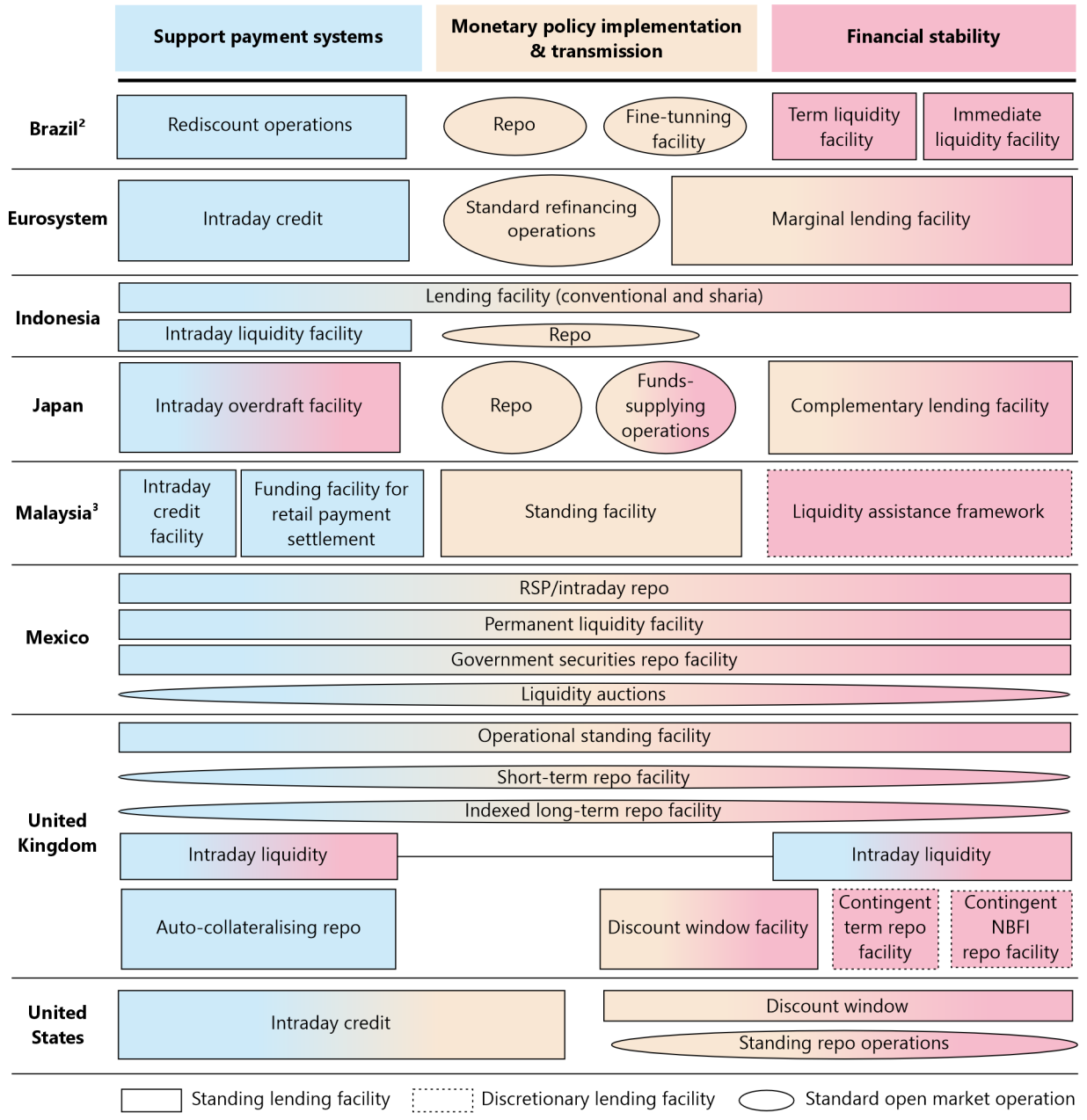
Although central banks share common objectives (Graph 2), they use a different mix of OMOs (ovals) and facilities (rectangles) to achieve these objectives. The most visible difference across central banks is in the *number* of tools, which varies from one to nine (average of four) (Graphs 2 and 3.B). Some central banks – eg the Bank of England and the Central Bank of Brazil – use a relatively large number of instruments, many with a specific purpose. Others – eg the Federal Reserve, ECB, Bank of Mexico and Bank Indonesia – have a streamlined framework with fewer tools that serve multiple objectives.

For a given policy objective, the choice of the tool, or combination of tools, reflects domestic legal and market structural factors, experience with past episodes of market stress and/or the central bank's assessment of the effectiveness and costs of the toolkit (Arseneau et al (2025)). Most central banks allocate at least one tool for monetary policy implementation (Graph 3.A); most combine OMOs and lending facilities (see Graph 3.C). By contrast, some do not have an explicit tool to support payment systems functioning or to promote financial stability.[9] For the former,

[8] The Bank of England introduced the CNRF in response to events such as the 2020 "dash for cash" and the 2022 liability-driven investment (LDI) funds episode, during which the gilt market faced severe dysfunction arising from a temporary increase in NBFIs' demand for liquidity.

[9] See CPMI (2022) for an overview of payment system participants' settlement accounts.

Lending facilities and open market operations (OMOs) for selected jurisdictions[1] Graph 2



NBFI = non-bank financial institution; RSP = repos for liquidity provision to the payment system.

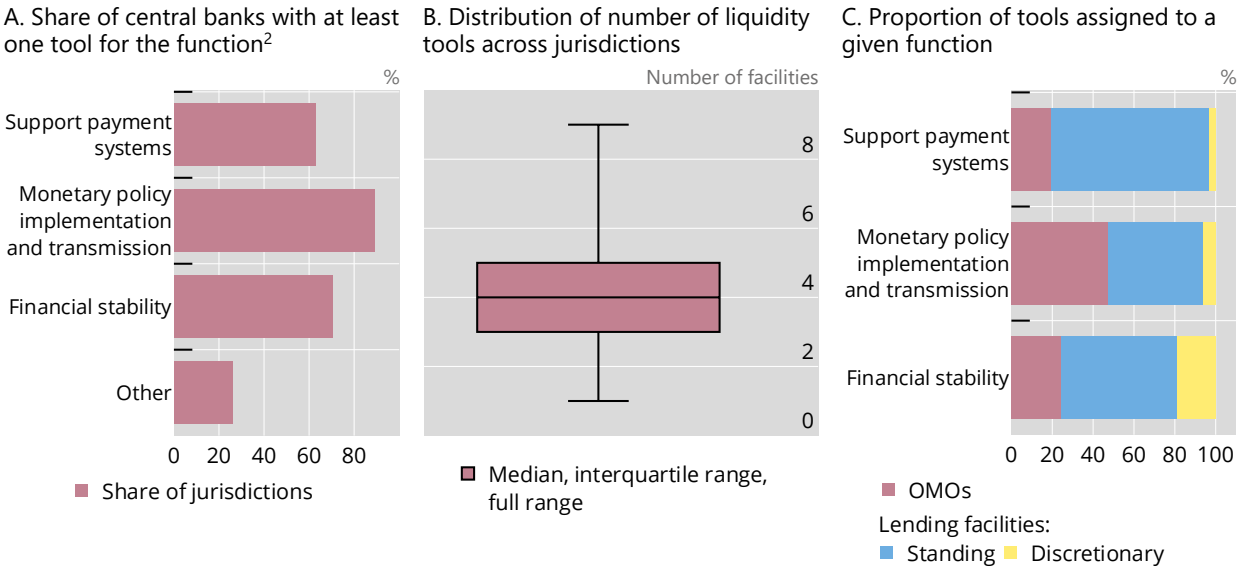
[1] As of December 2025. Emergency lending assistance (ELA) facilities, FX swaps and outright transactions are not included. [2] Central Bank of Brazil's term liquidity facility is both standing and discretionary. [3] Central Bank of Malaysia also provides a repo facility to support bond market liquidity by lending government bonds to banks for market-making purposes.

Source: Markets Committee Compendium.

standing lending facilities dominate, while for the latter both standing and discretionary facilities are important.

Central banks face trade-offs in choosing the number and function of the OMOs and lending facilities in their toolkit. A greater number may enable a central bank to differentiate eligible counterparties and collateral, and tailor pricing and tenor, for

Overview of lending facilities and open markets operations[1] Graph 3



OMOs = open market operations.

[1] As of December 2025 except NZ (March 2026), PH (February 2026) and TH (March 2026). [2] Single tool can have multiple functions.

Sources: Markets Committee Compendium; authors' calculations.

each policy objective.[10] At the same time, it requires more resources to operationalise, both for the central bank and its counterparties. A complex framework can also be opaque and disproportionately benefit the more sophisticated market participants (Bindseil (2016)). *Discretionary* facilities help manage the trade-off between flexibility and complexity as the central bank can respond to specific types of stress by activating the facility on a temporary basis.[11] Alternatively, central banks can maintain a small number of facilities, but adjust the modalities (lower pricing, broader collateral) depending on the circumstances.

Counterparty access

The structure of the financial sector, the breadth of financial intermediaries' business models and their regulatory treatment, and the type of liquidity tool all determine how central banks determine the mix of eligible counterparty types.

Banks, which play a pivotal role in financial intermediation, monetary policy transmission and maturity transformation, are eligible counterparties in virtually all jurisdictions (Table 1). Moreover, they are eligible not only for standing lending facilities but also for discretionary facilities and OMOs.

For NBFIs, eligibility across central banks depends on the entity type and the liquidity tool. For example, securities brokers/dealers are eligible at a majority of AE central banks, again with relatively broad access to the different liquidity tools. This

[10] Arseneau et al (2025) find that when moving from business as usual to stress-related facilities, collateral schemes become broader, tenors become longer and pricing becomes more expensive.

[11] Cantú et al (2021) report that about two thirds of the lending operations policies in place during the Covid-19 pandemic were newly established.

Eligibility of counterparties[1]

Share of jurisdictions in which counterparty type has access to at least one central bank liquidity tool Table 1

Type of liquidity tool	Region	Number of jurisdictions	Banks/ Depository inst.	Non-bank financial institutions (NBFIs)					
				Securities brokers/ dealers	FMIs[2]	Money market funds	Insurance companies	Pension funds	Other
Standing lending facility	AEs	12	100	58	67	17	17	8	33
	EMEs	13	100	31	15	15	8	8	31
Discretionary lending facility	AEs	3	100	67	33	0	33	33	33
	EMEs	5	100	0	0	0	20	20	20
OMOs	AEs	9	78	78	22	22	22	0	44
	EMEs	14	100	21	14	7	7	7	36

FMIs = financial market infrastructures; OMOs = open market operations.

[1] As of December 2025 except NZ (March 2026), PH (February 2026) and TH (March 2026). See endnotes for details.

Source: Markets Committee Compendium.

reflects their outsized role as intermediaries in money markets. Financial market infrastructures (FMIs), such as central clearing counterparties and payments platforms, are also eligible in a majority of AEs, predominantly at standing facilities, given their central role for the functioning of the financial system. For both types of counterparties, eligibility is much more restricted at EME central banks.[12] In both AEs and EMEs, other NBFIs (eg insurance companies, money market funds (MMFs) or investment funds) are far less commonly eligible for lending operations.

This heterogeneity of NBFI eligibility in part reflects jurisdiction- and market-specific factors. At a few central banks (eg Swiss National Bank), insurance companies, MMFs and investment/pension funds have access to OMOs and standing facilities *if* they meet regulatory criteria and are deemed important for liquidity in the money market. Conversely, some central banks (eg Bank of England, drawing lessons from the March 2020 and September 2022 gilt turmoil episodes; Bank of Canada, during the Covid-19 pandemic) have granted those regulated NBFIs with a prominent role in core markets access to *discretionary* facilities during periods of financial stress.[13] Finally, NBFI access can also be *indirect*. The Federal Reserve's money market mutual fund liquidity facility was activated during the subprime crisis and the Covid-19 pandemic to alleviate redemption pressures. Eligible banks and dealers received non-recourse loans from the Federal Reserve to purchase high-quality assets from MMFs, which they pledged as collateral.

More generally, access policies for NBFIs to the central banks' liquidity tools can reflect how much a central bank is willing to incur market or credit risk in their operations. Central banks with a broad access policy can allocate liquidity directly to counterparties experiencing liquidity strains, reducing the risk of fire sales. However, doing so exposes the central bank to the credit risk of counterparties that are often more lightly regulated than banks. Asset purchases by the central bank can be

[12] The share of NBFIs in the domestic financial sector's total assets is smaller in EMEs than in AEs, which can be an explanation for lower access.

[13] While the Bank of Canada uses the generic term "NBFIs" in its access guidelines, the Bank of England explicitly mentions insurance companies, pension funds and liability-driven funds.

targeted to specific market segments, but they expose the central bank to market risk.[14]

The trade-offs around access may become more acute as NBFIs' role in financial intermediation continues to expand. While central banks' liquidity support can be stabilising, it can also incentivise NBFIs to take on funding and leverage risk. A potential remedy is to condition NBFIs' access on proportionate regulation of maturity mismatches and leverage (Aramonte et al (2022); Garcia Pascual et al (2025)).

Collateral frameworks

The breadth of the central bank's collateral framework – ie the range of assets a central bank is willing to accept in exchange for liquidity – has a direct bearing on the potential amount of liquidity support it can provide. The framework can also influence market functioning by affecting the availability or scarcity of certain types of collateral. Finally, it shapes both the risks that the central bank faces and the costs associated with valuing, transferring and legally securing collateral.

All central banks accept domestic government bonds as collateral in at least one tool, but they differ greatly in their acceptance of privately or foreign issued assets (Graph 4.A). AE central banks tend to have broader collateral frameworks; most accept investment grade corporate bonds, mortgage-backed securities, covered bonds and other loans, and about half accept mortgage loans, with loans typically being eligible at financial stability-related facilities (see below). By contrast, EME central banks accept a much narrower range of private sector assets and are also less inclined to accept collateral where the debtor is a non-resident entity.

A closer look at loan collateral reveals other significant differences. Mortgage loans are less often eligible than non-mortgage loans, despite the former typically being safer and more standardised. This is because it is challenging in some jurisdictions to secure legal rights over real estate. To address this, the Swiss National Bank, for instance, accepts mortgages with legal and operational safeguards, transferring them to a fiduciary account at an independent FMI. By contrast, the ECB accepts mortgage loans in its permanent collateral framework if they are securitised as covered bonds or as mortgage-backed securities.

For some collateral types, the cross-border dimension increases the complexity and risk involved. Most AE central banks accept bonds issued by foreign entities, but loans to foreign borrowers are typically not eligible for several reasons. First, cross-border enforcement of claims can be cumbersome. Second, ring-fencing can be a barrier as loans, unlike bonds, often remain on a bank's balance sheet when pledged as collateral. Third, if a bank lends to a foreign borrower via a branch or subsidiary, the home central bank may view the loan as primarily eligible at the host central bank.

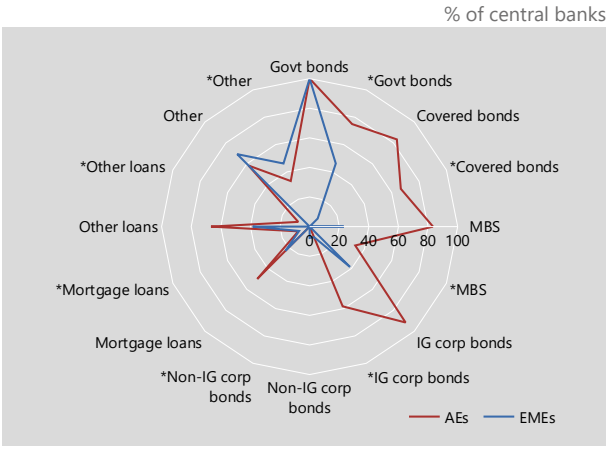
The breadth of eligible collateral in part depends on the function of the lending facility/OMOs (Graph 4.B). For tools that support monetary policy implementation, collateral is often restricted to core, liquid instruments (notably government bonds), which reduces operational costs. By contrast, tools that promote financial stability typically allow a broader collateral range, with the most notable difference being the

[14] See Markets Committee (2022) for an in-depth discussion.

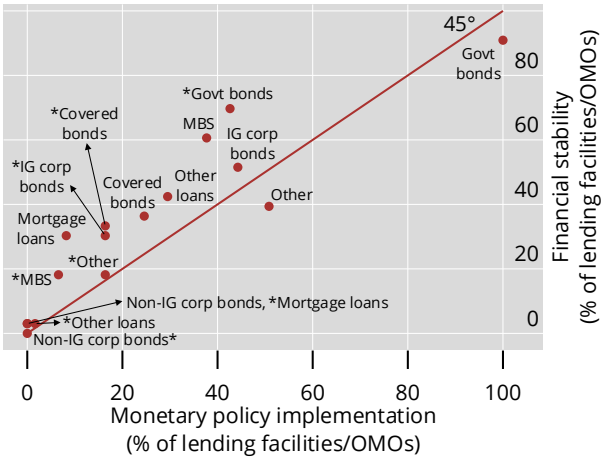
Collateral eligibility and breadth, by lending facility/OMO function[1]

Graph 4

A. Eligibility of collateral[2]



B. Collateral types by lending facility/OMO function[3]



IG = investment grade; MBS = mortgage-backed securities; OMO = open market operation.

[1] As of December 2025 except NZ (March 2026), PH (February 2026) and TH (March 2026). A * denotes foreign collateral. Other loans are non-mortgage loans. [2] Percentage of central banks with at least one tool accepting each type of collateral. See endnotes for details. [3] Percentage of lending facilities/OMOs at which a given type of collateral is eligible.

Source: Markets Committee Compendium.

eligibility of loans.[15] This broader set of eligible assets allows the central bank to rapidly scale up its liquidity provision in stress periods. Still, some central banks (eg ECB) have a broad collateral range (including non-mortgage loans) for both functions. One motivation is to accommodate the liquidity needs of banks with different business models.

Choosing an appropriate breadth for collateral involves trade-offs.[16] A broad framework may be more market neutral, as it does not privilege specific asset types or business models. Moreover, broader eligibility increases a central bank's capacity to meet counterparties' liquidity needs (Choi et al (2021)). Finally, it can provide stronger support for market functioning: when a central bank accepts less liquid or non-marketable collateral, *marketable* collateral remains available for market-based secured funding and derivative transactions.

At the same time, a broad collateral framework may have drawbacks. For one, it may be more burdensome to operate, because the central bank and its counterparties must establish processes for valuing the collateral and ensuring its operational and legal transferability (Chailloux et al (2008); Buessing-Loercks et al (2020)). For another, a broad framework that eases access to liquidity support may incentivise market participants to take on more liquidity risk. Similarly, looser requirements on collateral credit quality may prompt banks to weaken their lending standards (Nyborg (2017)). Finally, the central bank may be exposed to adverse selection, ie market participants post riskier collateral at its facilities, saving the safer collateral for use in the market (Chailloux et al (2008)). Haircuts can mitigate these risks.

[15] The Central Bank of Brazil accepts government bonds only for liquidity tools for monetary policy implementation. Banks rely on other collateral types when accessing tools for financial stability.

[16] Bindseil et al (2017) identify both *primary* objectives (eg support monetary policy, protect against losses) and *secondary* objectives or constraints (eg market neutrality and cost efficiency).

Over time, central banks have expanded collateral eligibility to reflect developments in financial markets, with the most notable changes occurring during stress episodes (CGFS and Markets Committee (2015); Buessing-Loercks et al (2020)). New types of instruments have become eligible, particularly during the GFC (eg asset-backed securities, commercial paper, credit claims). In addition, credit quality requirements have been lowered. As a specific example, the ECB expanded its temporary collateral framework during the euro area sovereign debt crisis and the Covid-19 pandemic (but later transitioned back to its permanent framework). Some temporary measures that proved effective, such as the eligibility of bonds in the main foreign currencies, were permanently integrated in 2024 (Gomes et al (2025)).

Apart from eligibility, operational readiness – ie the ability of the central bank and its counterparties to mobilise eligible collateral – has gained attention in recent years. Insufficient preparation at Credit Suisse, as well as at several US regional banks, exacerbated the 2023 banking turmoil (Coelho et al (2024)). Readiness is essential for ensuring that liquidity support can be executed in a timely manner and that the full breadth of the collateral framework can be utilised. Some central banks encourage banks (eg Bank of England) or even require them (eg Swiss National Bank for its liquidity-shortage financing facility) to preposition collateral. Regular testing of the collateral process also helps ensure preparedness (Coelho et al (2024)). For internationally active banks, operational readiness is also important for obtaining *foreign currency* liquidity support from the central banks in their host jurisdictions (CGFS (2026)).

Pricing

When setting prices, central banks balance market discipline considerations against the need to ensure that liquidity is actually drawn when needed.[17] Pricing above policy or market rates helps maintain market discipline and prudent liquidity management. However, excessively high rates can deter usage even in periods of stress, potentially undermining the effectiveness of liquidity provision. For financial stability facilities, central banks can address this trade-off by setting the lending spread above the policy rate but below market rates during periods of stress.

Central banks price facilities according to their function. Those for monetary policy implementation are typically priced at the policy rate or with a fixed spread to it (Graph 5).[18] For those that support financial stability, the spread is usually higher. Facilities that support payments systems are more usually free of charge, in line with the typically very short maturity (mostly intraday).

Recent pricing adjustments by a number of central banks illustrate the trade-off. In 2020, during the Covid-19 pandemic, the Federal Reserve reduced the discount window primary credit rate and set it at the top of the federal funds target range to encourage borrowing and support liquidity. The Federal Reserve has maintained this pricing policy since then, emphasising that it views the use of the discount window as appropriate under both normal and stressed market conditions. In 2026, the Bank of England also lowered the discount window spreads to enhance its accessibility as

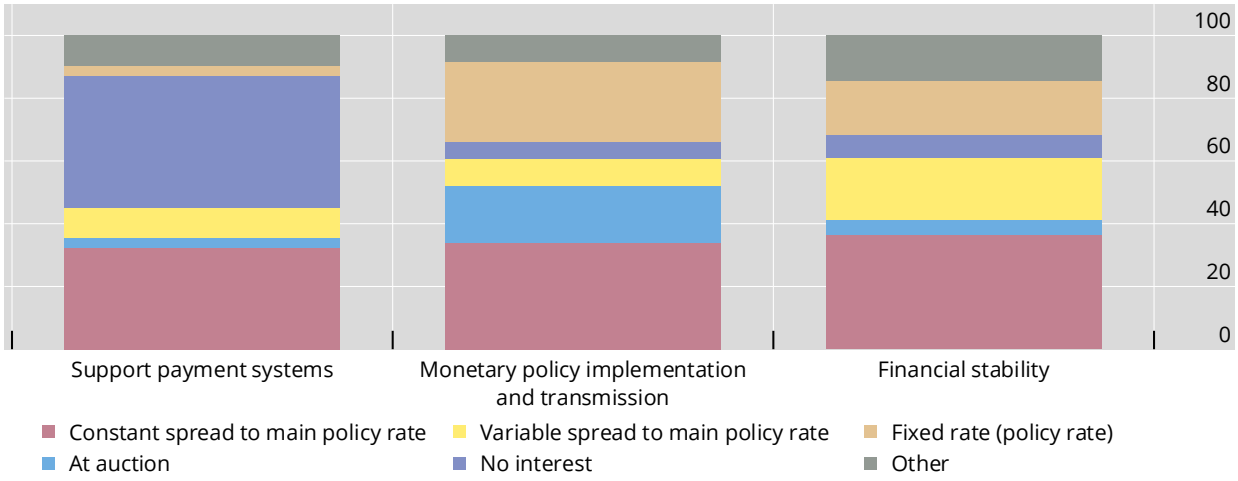
[17] For a survey of the literature analysing these trade-offs, see for example Ennis (2016).

[18] For a few facilities for monetary policy implementation, no price is charged. This reflects the fact that at some central banks, the intraday facility can also serve monetary policy implementation.

Pricing method, by lending facility/OMO function[1]

Share of responses, in per cent

Graph 5



OMO = open market operation.

[1] As of December 2025 except NZ (March 2026), PH (February 2026) and TH (March 2026).

Source: Markets Committee Compendium.

a liquidity tool. At the same time, it maintained tiered pricing based on collateral quality to preserve incentives for sound liquidity management.

Disclosure practices

In disclosing information about the frequency and scale of usage of lending facilities and OMOs, central banks must balance transparency and accountability with operational effectiveness and market stability. While transparency is essential for public accountability, disclosures that directly or indirectly reveal liquidity support to individual entities can create stigma and discourage usage in episodes of stress and may thus undermine the effectiveness of the liquidity provision framework.

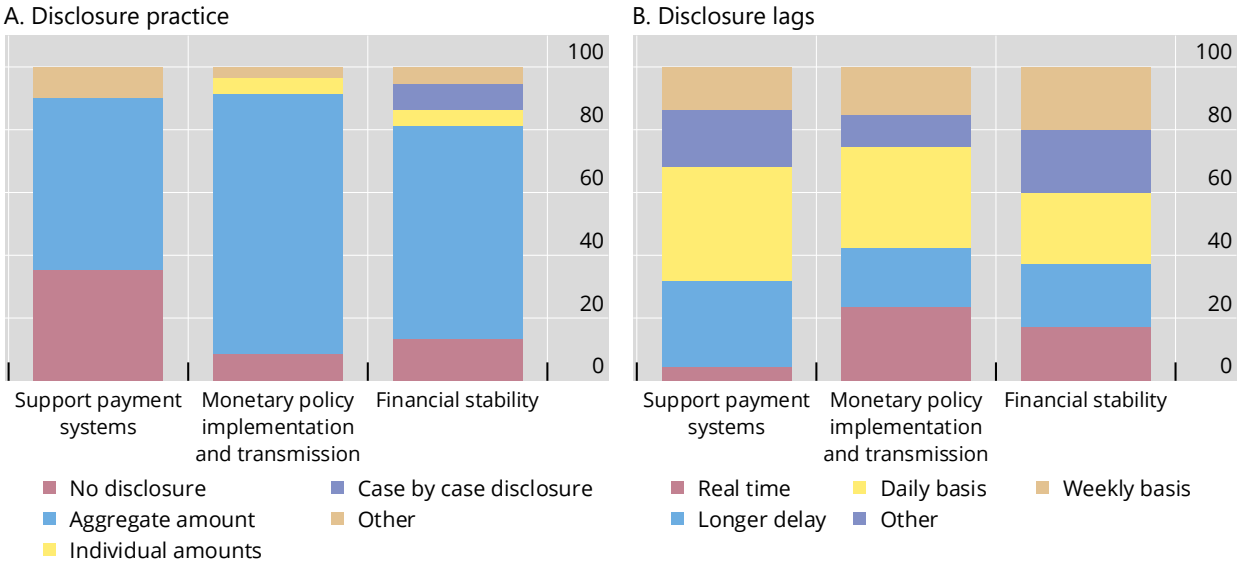
Overall, central banks' preferred disclosure practice is to report aggregate usage (Graph 6). Only a few disclose the names of counterparties. While aggregate disclosure can mitigate stigma concerns, large-scale use by a single counterparty may be visible in published data or could reasonably be inferred (Lee and Sarkar (2018)). During the Covid-19 pandemic, the Federal Reserve reduced the granularity of weekly disclosures for each of the Federal Reserve banks to balance reporting transparency requirements with protecting borrower confidentiality. Discount window lending is now included with a broader balance sheet item, which reduces but does not eliminate the possibility of inferring borrowing by a larger bank.[19] Another possibility is to disclose aggregate figures for financial stability facilities with a longer lag. For example, the Bank of England reports aggregated data for its discount window facility with a five-quarter lag.

[19] Inference depends on the volatility/volume of other assets in the balance sheet item (Kelly (2024)).

Disclosure practice, by lending facility/OMO function[1]

Share of responses, in per cent

Graph 6



OMO = open market operation.

[1] As of December 2025 except NZ (March 2026), PH (February 2026) and TH (March 2026). Multiple answers are possible.

Source: Markets Committee Compendium.

Conclusion

The updated Markets Committee Compendium provides valuable insights into the design and functioning of central banks' lending operations across jurisdictions. By categorising operations by type and function, the Compendium enables a nuanced understanding of how central banks navigate trade-offs in areas such as counterparty access, collateral frameworks, pricing and disclosure practices.

As central banks reduce their balance sheet sizes, lending operations play a bigger role again in ensuring desired monetary conditions. Accordingly, central banks are recalibrating their lending operations to encourage use when economically sensible. With NBFIs' growing footprint, some central banks are also reviewing their access policies and the breadth of their collateral frameworks, to enhance their liquidity provision capacity in times of stress.

While these adjustments contribute to financial market resilience, there are trade-offs. Central banks must ensure that broader collateral policies and more attractive pricing do not undermine market discipline or encourage excessive reliance on the central bank. Moreover, they must balance the benefits of broader counterparty and collateral eligibility against the increased operational complexity and risks to their own balance sheets. Adequate regulatory safeguards are essential to promote prudent liquidity risk management among banks and NBFIs. Regular testing or collateral prepositioning are effective means to ensure operational readiness, enabling operations involving a broad range of collateral and counterparties to be conducted safely and efficiently.

Looking ahead, the effectiveness of central bank lending operations will depend on their ability to adapt flexibly to both cyclical and structural changes. The insights from the Compendium serve as a valuable resource for policymakers and market participants alike, fostering a deeper understanding of the mechanisms that underpin monetary policy implementation and global financial stability.

References

Aramonte, S, A Schrimpf and H S Shin (2022): "Non-bank financial intermediaries and financial stability", *BIS Working Papers*, no 972.

Arseneau, D, M Carlson, K Chen, M Darst, D Kirkeeng, E Klee, M Malloy, B Malin, E O'Malley, F Niepmann, M-F Styczynski, M Vanouse, and A Vardoulakis (2025): "Central bank liquidity facilities around the world", *FEDS Notes*, Board of Governors of the Federal Reserve System.

Bank of England (2025): *Transitioning to a repo-led operating framework – discussion paper feedback statement*.

Bindseil, U (2016): "Evaluating monetary policy operational frameworks," paper presented at the Federal Reserve Bank of Kansas City Jackson Hole symposium.

Bindseil, U, M Corsi, B Sahel and A Visser (2017): "The Eurosystem collateral framework explained", European Central Bank *Occasional Paper Series*, no 189.

Borio, C (2001): "A hundred ways to skin a cat: comparing monetary policy operating procedures in the United States, Japan and the euro area", *BIS Papers*, no 9.

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

Buessing-Loercks, M, D King, I Mak, and R Veyrune (2020): "Expanding the central bank's collateral framework in times of stress", *Special Series on Covid-19*, International Monetary Fund.

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

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

Cavallino, P, M Drehmann, R Finlay and J Remache (2025): "Monetary policy operational frameworks – a new taxonomy", *BIS Quarterly Review*, September.

Chailloux, A, S Gray, and R McCaughrin (2008): "Central bank collateral frameworks: principles and policies", *IMF Working Papers,* no 222.

Choi, D, J Santos and T Yorulmazer (2021): "A theory of collateral for the lender of last resort", *Review of Finance,* vol 25, no 4.

Committee on the Global Financial System (CGFS) (2026): "Foreign currency funding risk and cross-border liquidity", *CGFS Papers* no 71.

Committee on the Global Financial System (CGFS) and Markets Committee (2015): "Central bank operating frameworks and collateral markets", *CGFS Papers*, no 53.

Committee on Payments and Market Infrastructures (CPMI) (2022): *Improving access to payment systems for cross-border payments: best practices for self-assessments*.

Ennis, H (2016): "Models of discount window lending: a review", Federal Reserve Bank of Richmond *Economic Quarterly*, vol 102, no 1.

Financial Stability Board (FSB) (2025): *Global monitoring report on non-bank financial intermediation*.

Garcia Pascual, A, T Piontek, R Veyrune, and J Wu (2025): "Addressing market dysfunction and liquidity stresses in nonbank financial intermediaries", *International Monetary Fund Global Financial Stability Note*, no 4.

Gomes, D, S Sauer, I Alexopoulou, C Brancatelli, and D Gybas (2025): "Changes to the Eurosystem collateral framework to foster greater harmonisation", *European Central Bank Economic Bulletin*, no 1.

Iskaki, V, T Linzert, Y Schneider, M Skrzypińska and O Vergote (2026): "How banks are adjusting to declining reserves", *The ECB Blog*.

Kelly, S (2024): "Policy note: weekly Fed report still drives discount window stigma", *Journal of Financial Crises*, vol 6, no 3.

Lee, H and A Sarkar (2018): "Is stigma attached to the European Central Bank's marginal lending facility?", *Liberty Street Economics*.

Markets Committee (2022): *Market dysfunction and central bank tools*.

Nyborg, K (2017): "Central bank collateral frameworks", *Journal of Banking and Finance,* vol 83.

Perli, R (2025): "Money market conditions and the Federal Reserve's balance sheet", remarks at the US Treasury Market Conference, New York.

Saporta, V (2024): "Let's get ready to repo!", speech at the Association for Financial Markets in Europe, London.

Endnotes

Graph 1.A: Simple average. Retrieved from the BIS central bank total assets data set. Quarterly data. Last observation is Q3 2025. AEs include AU, CA, CH, EA, GB, HK, JP, KR, NZ, SE, SG and US. EMEs include BR, CL, CN, ID, IN, MX, MY, PE, PH, TH, TR and ZA.

Graph 1.B: The sample covers AU, BR, CA, CH, CL, CN, EA, GB, HK, ID, IN, JP, KR, MX, SG, TR, US and ZA. Banks are all deposit-taking corporations.

Graph 4.A: AEs include AU, CA, CH, EA, GB, HK, JP, KR, NZ, SE, SG and US. EMEs include BR, CN, CO, ID, IN, KH, MX, MY, PH, TH, TR, VN and ZA.

Table 1: AEs include AU, CA, CH, EA, GB, HK, JP, KR, NZ, SE, SG and US. EMEs include BR, CL, CN, CO, ID, IN, KH, MX, MY, PH, TH, TR, VN and ZA.

Table A.1: AEs include AU, CA, CH, EA, GB, HK, JP, KR, NZ, SE, SG and US. EMEs include BR, CN, CO, ID, IN, KH, MX, MY, PH, TH, TR, VN and ZA.

Appendix

Eligibility of collateral[1]

Table A.1

Percentage of jurisdictions in which a given type of collateral is eligible for at least one facility/OMO

Domestic/**foreign** issuer/borrower

Type of liquidity tool	Region	Number of jurisdictions	Government bonds	Covered bonds	MBS	IG corporate bonds	Non-IG corporate bonds	Mortgage loans	Other loans[2]	Other
Standing lending facility	AEs	12	100/75	83/67	83/33	92/58	0/0	42/8	58/8	50/33
	EMEs	12	100/42	8/0	25/0	33/8	8/0	8/0	33/0	50/25
Discretionary lending facility	AEs	3	100/67	67/67	100/33	33/33	0/0	67/0	67/0	33/33
	EMEs	6	83/33	0/0	0/0	50/17	17/0	33/17	33/0	33/17
OMOs	AEs	8	100/50	38/38	75/25	63/38	0/0	13/0	50/0	38/13
	EMEs	13	100/23	0/0	0/0	8/0	0/0	8/0	8/0	38/23

IG = investment grade; MBS = mortgage-backed securities; OMOs = open market operations.

[1] See endnotes for details. [2] Other loans include non-mortgage loans.

Source: Markets Committee Compendium.

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Uncovering FX settlement risk: new measures from the 2025 BIS Triennial Survey[1]

Foreign exchange settlement risk is the risk that one party to a currency trade fails to deliver the currency owed. It can result in significant losses and undermine financial stability. To shed light on the scale of trades most at risk, the April 2025 Triennial Survey categorised settlement amounts by settlement method. Just over $5 trillion, or 36% of the average daily settlement during the month, settled via payment versus payment (PvP), which eliminates FX settlement risk. A further $7.6 trillion (54%) involved settlement methods such as pre-settlement netting that mitigate but do not eliminate settlement risk. More than $1.4 trillion (10%) were settled on a gross bilateral basis, which is fully exposed to settlement risk.

JEL classification: E42, F31, G15

On the afternoon of 26 June 1974, the German authorities ordered Bankhaus Herstatt into liquidation. The bank was closed at 3.30 pm Frankfurt time, after which its New York correspondent bank suspended all outgoing US dollar payments from Herstatt's account. This action left Herstatt's counterparties exposed for the full value of the Deutsche marks they had already paid in Frankfurt earlier in the day to settle US dollar-Deutsche mark foreign exchange (FX) trades. The collapse of Herstatt was a watershed moment in the history of financial markets, exposing the systemic risk associated with FX settlement. This type of risk, also referred to as "Herstatt risk", occurs when one party to an FX trade fulfils its obligation to deliver currency but does not receive the corresponding currency in return.

The failure triggered a loss of trust in financial markets. Market participants began to delay payments until they had received confirmation of their counterparties' payments. This brought cross-border payments and, with them, FX trades to a halt, threatening a spiral into a global financial crisis (see Schenk (2014); Norman (2015)). The turmoil subsided only after major central banks signalled their readiness to provide sufficient liquidity. In its aftermath, what is now the Basel Committee on Banking Supervision (BCBS) was established at the end of 1974. This was followed by the creation in 1990 of the Committee on Payment and Settlement Systems (CPSS), the precursor to the BIS Committee on Payments and Market Infrastructures (CPMI),

[1] The views expressed in this publication are those of the authors and not necessarily those of the Bank for International Settlements or its member central banks. We thank Iñaki Aldasoro, Gaston Gelos, Branimir Gruić, Matthew Hartley, Henry Holden, Philippe Lintern, James O'Connor, Josh Perers Cook, Daniel Rees, Tara Rice, Hyun Song Shin, Andreas Schrimpf, Costas Stephanou and Goetz von Peter for helpful comments and inputs, and Fanni Leppanen for excellent research assistance.

Key takeaways

- *The BIS 2025 Triennial Survey of FX markets classifies the use of FX settlement methods to help assess FX settlement risk, ie the risk that one party to a currency trade fails to deliver the currency owed.*
- *In April 2025, 90% of the average daily settlement was via methods which eliminate or minimise FX settlement risk. But 10%, or $1.4 trillion, remained exposed to these risks.*
- *Public and private sector stakeholders should continue their efforts to reduce FX settlement risk for a broader range of currencies and market participants.*

to address policy issues related to payment systems used for the settlement of domestic and cross-border transactions.

The CPSS's first task resulted in the G10 Central Bank Governors' strategy to reduce FX settlement risk (CPSS (1996)). The strategy consisted of three elements: (i) action by individual banks to control their FX settlement exposures; (ii) action by industry groups to provide risk-reducing multicurrency services for settling FX trades; and (iii) action by central banks to induce private sector progress. A key milestone of this process was the launch of CLS Bank (CLS) in 2002. CLS provides a payment-versus-payment (PvP) service called CLSSettlement that eliminates FX settlement risk.

Half a century after the Herstatt failure, the 2025 BIS Triennial Survey of FX markets provides a fresh stocktake on FX settlement risk. The 2025 survey is based on a methodology that was jointly developed on behalf of the Markets Committee by the Global Foreign Exchange Committee (GFXC),[2] in cooperation with experts from the CPMI, central banks, local FX committees and the BIS. The methodology also underpins the GFXC semiannual FX settlement survey.

The new survey methodology classifies FX settlement according to the method used. Just over one third of the average daily settlement volume in April 2025, or $5.2 trillion, was settled via PvP, which eliminates settlement risk. Three other methods – intragroup settlement, pre-settlement netting, which reduces gross payment amounts to a smaller net payment, and settlement over bank accounts with settlement timing controls – all mitigate but do not eliminate FX settlement risk. Roughly $7.6 trillion, or 54% of the total, was settled via these methods. Finally, gross bilateral settlement, which exposes the counterparties to FX settlement risk to the full trade value, made up the remaining $1.4 trillion, or 10% of total settlement, in April. The more granular survey data reveal that the main reasons for relying on this settlement method were that the counterparty did not have PvP access or that the currency pairs or trade type were not eligible for PvP settlement.

The 2025 survey results, compared with those from a similar survey in 2006, show that efforts by the private and public sectors to reduce FX settlement risks have borne fruit.[3] The overall share of settlement on a gross bilateral basis has decreased substantially. But the survey also underscores the need for further collaboration to address potential vulnerabilities.

[2] The GFXC brings together central banks and private sector participants with the aim of promoting a robust, liquid, open and appropriately transparent FX market, supported by resilient infrastructure.

[3] Due to methodological changes, the 2025 survey results cannot be compared with those from the 2019 and 2022 BIS Triennial Surveys on FX settlement risk.

The remainder of the article is structured as follows. The next two sections detail the new survey methodology and the key insights from the 2025 survey on FX settlement risk. The final section concludes with an overview of the ongoing public and private sector efforts to further reduce FX settlement risk. A statistical annex provides the full breakdown of the surveyed data.

The 2025 methodology for assessing FX settlement risk

The Herstatt episode exemplified the nature of FX settlement risk and its implications for financial stability. This risk materialises when one party to an FX transaction has delivered the required currency with finality while the other counterparty fails to deliver the corresponding currency, for instance because that counterparty is in default. A failure constitutes an extreme event, but the potential exposures can be very large given the sizeable trades in FX markets and the fact that the full value of a trade is subject to loss (principal risk). Moreover, a single payment failure can erode market confidence, giving rise to a payment gridlock and severe market disruptions, as witnessed in the aftermath of the Herstatt failure.

To manage this risk, a variety of settlement methods have been developed, which are surveyed in the April 2025 Triennial Survey. The survey classifies settlement based on a hierarchy of five settlement methods (Table 1): (i) PvP systems; (ii) pre-settlement netting; (iii) intragroup settlement; (iv) settlement over bank accounts with settlement timing controls; and (v) gross bilateral settlement. This methodology is aligned with the approach for managing FX settlement risk in the GFXC's revised January 2025 FX Global Code, in particular the revised Principle 35, which recommends FX market participants consider the hierarchy to reduce FX settlement risk (GFXC (2025)).

Trades settled via a PvP system are not subject to FX settlement risk. A PvP system ensures that the final payment of one currency occurs if and only if the final payment of the other currency occurs. The PvP function is distinct from the function of a central counterparty (CCP), which interposes itself as a counterparty to all its participants and assumes their obligations.[4] Hence, the PvP function alone does not eliminate replacement cost risk (ie the risk of incurring extra costs when replacing the original transaction at current market prices) or the liquidity risks of not receiving a currency when expected.

Beyond eliminating FX settlement risk, PvP systems generate other benefits. For one, a PvP mechanism can function as a coordinating and stabilising device in decentralised FX markets during times of market stress. Since obligors know for sure that their payments will never be processed unless the same is true for incoming payments, a PvP mechanism can help to prevent a payment gridlock.[5] An additional benefit is that PvP systems can often enable netting of payments, offering advantages for liquidity management.

The largest and best known PvP system is CLSSettlement, which settles payments involving 18 major currencies.[6] Given its systemic importance, CLS is subject to

[4] Some PvP systems also act as a CCP. See CPMI (2023).

[5] See Shirakawa (2009) on the role of PvP mechanisms in sustaining market liquidity in US dollar swap markets during the Great Financial Crisis.

[6] As of June 2026, CLS-eligible currencies are: AUD, GBP, CAD, DKK, EUR, HKD, HUF, ILS, JPY, KRW, MXN, NZD, NOK, SGD, ZAR, SEK, CHF and USD.

The hierarchy of FX settlement methods

Methodology in the 2025 BIS Triennial Survey of FX markets Table 1

Risk	Settlement method	Description
1.	**Payment versus payment (PvP)**	**Mechanism**: Payment in one currency occurs if and only if the payment in the other currency occurs. **Risk**: Eliminates FX settlement risk.
2.	**Intragroup settlement**	**Mechanism**: Trades that are settled intragroup, ie between two entities that are part of the same banking group. **Risk**: Internal coordination across the banking group can mitigate the risk of settlement failures. But internal settlement, particularly across borders, can be at risk of liquidity ring-fencing if the banking group is in distress.
	Pre-settlement netting	**Mechanism**: Multiple FX trades between counterparties are netted, resulting in a single net payment per currency. **Risk**: Netting reduces gross FX settlement risk, but net amounts need to be settled. Netting effectiveness requires its legal enforceability.
	Settlement over bank accounts with timing controls	**Mechanism**: Trades that are settled over an account where the reporting dealer has control over the timing of settlement. **Risk**: Timing controls can mitigate FX settlement risk but require coordination between counterparties to be effective. Could result in delayed payment instructions or liquidity hoarding.
3.	**Gross bilateral settlement**	**Mechanism**: Payment of the full amount is made without any FX settlement risk mitigation. **Risk**: Trades settled on a gross bilateral basis are fully exposed to FX settlement risk.

Source: Authors' elaboration.

stringent risk management requirements and cross-border cooperative oversight by the Federal Reserve Bank of New York and other central banks that issue CLS-eligible currencies. The 2025 survey asked reporting dealers to separately report settlement volumes for CLS-eligible and CLS-ineligible currency pairs.

Several other PvP systems have emerged, some of which settle currency pairs that are not CLS-eligible (CPMI (2023)). These include: B3 Foreign Exchange Clearinghouse (B3) in Brazil since 2002 (settling in the Brazilian real and US dollar); CCIL in India since 2015 (settling in the Indian rupee and US dollar); CHATS in Hong Kong SAR since 2000 (settling in the Hong Kong dollar, offshore renminbi (CNH), euro, Indonesian rupiah, Malaysian ringgit, Thai baht and US dollar); and Buna in the United Arab Emirates since 2023 (settling in the UAE dirham, euro, Egyptian pound, Jordanian dinar, Saudi riyal and US dollar).

Beyond PvP, other settlement methods can reduce but not eliminate FX settlement risk.

First, dealer banks may settle their internal transactions (ie transactions between two entities that are part of the same banking group) on an intragroup basis. This could include settlement of transactions between desks and branches within the same

legal entity, between the headquarters and its subsidiaries, and between two subsidiaries or affiliated entities within the banking group. The probability of FX settlement risk materialising from intragroup trades is relatively low as there are strong incentives at the group level to coordinate trades and ensure timely settlement. However, intragroup settlement is not risk-free: in severe stress scenarios, liquidity can get trapped in a particular entity, for example if a national authority imposes ring-fencing measures or payment moratoriums. Trapped liquidity can disrupt the sequence of internal payments in the entire group, in turn crystallising liquidity or credit risk that spills over to the rest of the group or even outside it.

Second, pre-settlement netting of outstanding trades can reduce FX settlement risk. It nets out multiple trades between two parties that have matching characteristics (eg currency, value date) to reduce gross settlement amounts into a single, smaller net amount to be settled for each currency. This reduces settlement risk to the extent that the final net amounts to be settled are smaller than the original gross settlement amounts. However, pre-settlement netting's effectiveness at mitigating risk requires the legal enforceability of netting agreements in the event of a default, which may not be fully ensured for all counterparties, currencies or jurisdictions. Moreover, the net amounts still need to be settled by another method such as traditional correspondent banking relationships and are subject to counterparty credit risk. In the survey, the netted transactions were not distributed to other buckets of settlement methods to avoid double-counting, and therefore their method of settlement is not known.

Third, reporting dealers may also settle across bank accounts with settlement timing controls. Such trades are typically with other (non-reporting) financial institutions or with non-financial customers that have an account with the reporting dealer. To manage settlement risk in this case, the reporting dealer in effect settles its obligation only when the other party has paid with finality or has posted sufficient collateral.[7] This approach, however, may create asymmetries, as client counterparties may lack equivalent controls. In addition, timing controls could result in or amplify delayed settlements, liquidity hoarding and reduced FX trading activity in times of stress.

Trades that do not settle via one of the methods above must settle on a gross bilateral basis through traditional correspondent banking relationships, exposing the counterparties to FX settlement risk for the full amount. To understand why some trades settle without any risk mitigation, the 2025 Triennial Survey asked reporting dealers to classify trades settled on a gross bilateral basis by whether the transactions were eligible for applicable PvP systems and, if not, whether this was because: (i) the counterparty is not a direct or indirect member of the applicable PvP system; (ii) the currency pair is ineligible; or (iii) the trade type is ineligible. This information gives policymakers more information about how to target market participants' efforts to further mitigate FX settlement risk.

For the April 2025 survey, reporting dealers in 49 jurisdictions provided data on the use of different settlement methods during the month. The survey covers

[7] In some cases, the reporting dealer and its external counterparty may both hold accounts with the same (third-party) bank used for FX settlement, and both legs of their trade may be settled across the books of that bank, which uses an internal risk mitigation mechanism to control the timing of settlement of both legs.

settlement of all FX trades that involve two-way payments.[8] Volumes are based on actual settlement during the month of April rather than settlement volumes derived from turnover figures for that month.[9] To align the survey with how FX settlement risk is managed in practice, the reporting basis is the global banking group determined by the location of the corporate headquarters rather than the sales desk, which is the basis in the turnover part of the Triennial Survey.

FX settlement risk in April 2025

More than $14 trillion worth of gross financial obligations were settled on an average day in April 2025 (Table 2). Just over one third (36%) of these were settled via PvP systems, eliminating FX settlement risk. More than $2 trillion (15%) were subject to pre-settlement netting, leaving a post-netting amount of $337 billion. This amount needed to be settled by other means (eg traditional correspondent banking relationships), and thus was subject to some counterparty credit risk. More than one third of the average daily amount (35%) settled intragroup, highlighting the size and complexity of reporting dealers' internal funding structures and operations. By contrast, only a small fraction (3%) settled over bank accounts where reporting dealers have control over the timing of settlement. Finally, 10% were settled on a gross bilateral basis. These transactions settle without any mitigation method for FX settlement risk and hence are the most concerning from a systemic risk perspective.

Settlement via PvP systems was especially prevalent for trades in CLS-eligible currencies. More than four fifths of the average daily settlement – or $12.2 trillion – involved CLS-eligible currency pairs (Graph 1.A), reflecting the importance of these major currencies in global FX markets (see Huang et al (2025) Of these, 40% were

Settlement of FX obligations by settlement method[1] Table 2

	USD bn	%
Total gross financial obligations settled	14,186	100
PvP	5,157	36
Intragroup settlement	4,950	35
Pre-settlement netting	2,167	15
Net amount[2]	(337)	(2)
Settlement over bank accounts with timing controls	496	3
Gross bilateral settlement	1,416	10

PvP = payment versus payment.

[1] Net-net basis, daily averages in April 2025. [2] Figures in brackets denote post-netting amounts that settle by other means (eg traditional correspondent banking relationships).

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

[8] Instruments that involve a single payment only are not included (eg non-deliverable forwards, option premia).

[9] For example, trades that took place in April but settled in May were included in the FX settlement measures derived from turnover data in the 2019 and 2022 surveys, but not in the 2025 survey.

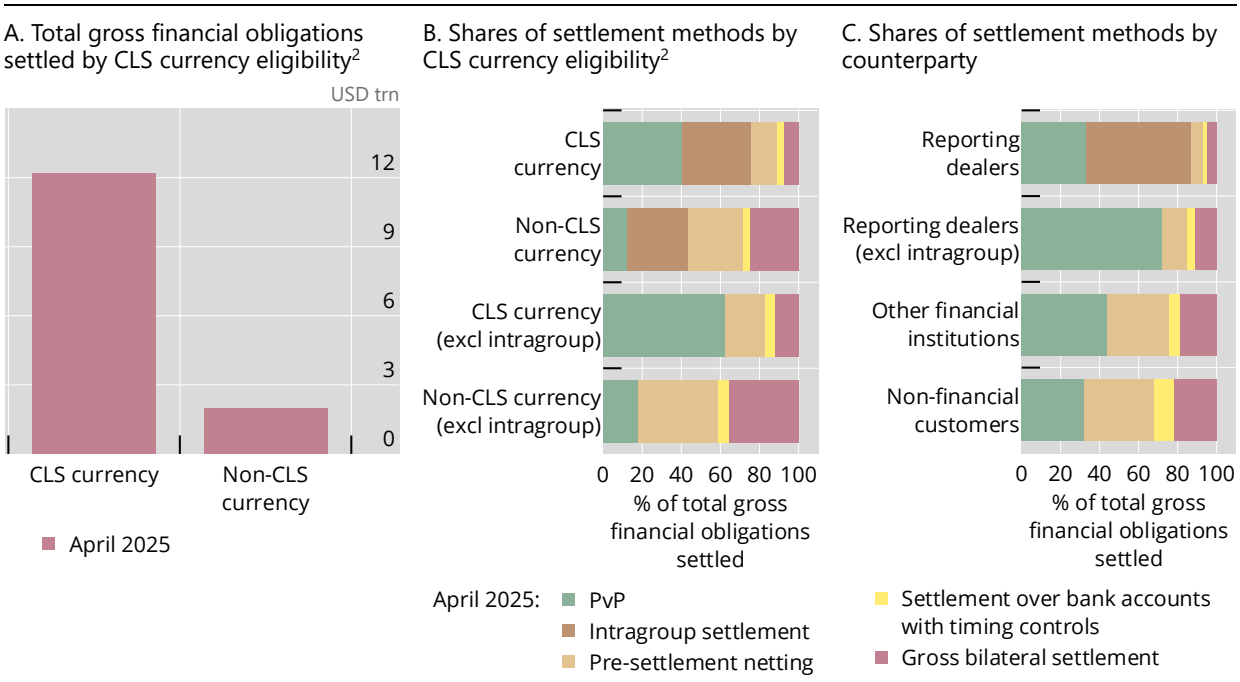
settled via PvP systems. By contrast, only 12% of trades that involved non-CLS-eligible currency pairs settled via (non-CLS) PvP systems (Graph 1.B).

The use of PvP systems to mitigate risk is most common for transactions between reporting dealers (Graph 1.C). This is not surprising given that many dealer banks are CLS members. PvP settlement was used to settle $3.1 trillion of inter-dealer trades per day, or 33% of the average of inter-dealer trades settled ($9.3 trillion). At the same time, more than $4.9 trillion (or more than 53%) of all inter-dealer trades settled intragroup. Excluding these intragroup settlements leaves $4.3 trillion of inter-dealer trades with external counterparties that settled via other methods, of which a full 72% were settled via PvP systems – much more than the PvP share of trades with other (non-reporting) financial institutions (44%) or with non-financial counterparties (32%) (Table A.2 in the statistical annex).

There was also significant use of pre-settlement netting to manage FX settlement risk. Only 2% of all settled inter-dealer trades were settled over bank accounts with timing controls, rising to 10% of settled trades with non-financial customers. Pre-settlement netting was more important: 15% of total settlement and a third of the settlement of trades with other financial institutions and with non-financial customers were subject to netting (Table A.1). In volume terms, pre-settlement netting reduced around $2.2 trillion on average per day to $337 billion to be settled by other means. The survey did not collect data regarding how this net amount was distributed across counterparty types. Anecdotally, however, compression from netting tends to be higher for inter-dealer obligations than for those with customers, since customers tend to have directional FX positions.

The remaining obligations of more than $1.4 trillion on average per day were settled on a gross bilateral basis, exposing the counterparties to FX settlement risk

Gross financial obligations settled, by CLS currency eligibility or counterparty[1] Graph 1



PvP = payment versus payment.

[1] Net-net basis, daily averages. [2] "CLS currency" and "non-CLS currency" indicate whether the currency pair is eligible for CLS.

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

for the full amount. External inter-dealer transactions that settled this way amounted to $474 billion, or 11% of all external inter-dealer settlement (5% of total inter-dealer settlement, if intragroup settlement is included). This share of risky external inter-dealer obligations is roughly half of those observed for obligations with other financial institutions (19%) and with non-financial customers (22%) (Graph 1.C). The next section explores why risk mitigation techniques were not applied in these transactions.

Reasons for gross bilateral settlement

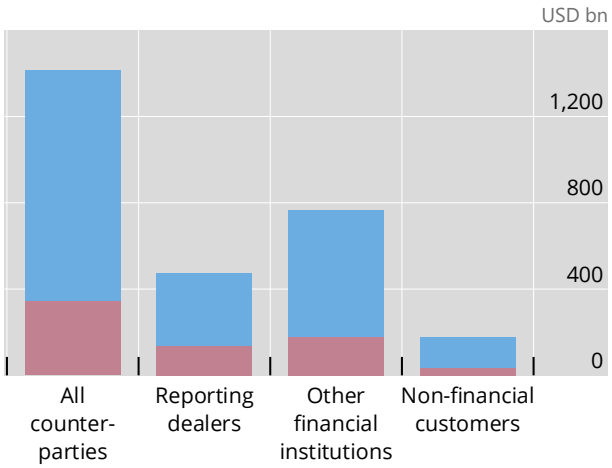
While only 10% of the average daily FX settlement in April 2025 settled on a gross bilateral basis, the average absolute amount was still large, surpassing $1.4 trillion per day. The 2025 survey methodology introduced questions that help to understand why risk mitigation techniques were not applied to these FX obligations. This information can help policymakers target efforts that incentivise further risk mitigation.

Of the total amount settled on a gross bilateral basis per day, 25% or $347 billion was eligible for settlement in a PvP system (Graph 2.A). More than half of this amount involved transactions with other financial institutions ($178 billion), with trades between reporting dealers making up much of the remainder ($136 billion). These trades involved PvP-eligible currency pairs and products, and were with counterparties that were direct or indirect members of an applicable PvP system. As such, it should have been possible to eliminate settlement risk in these transactions.

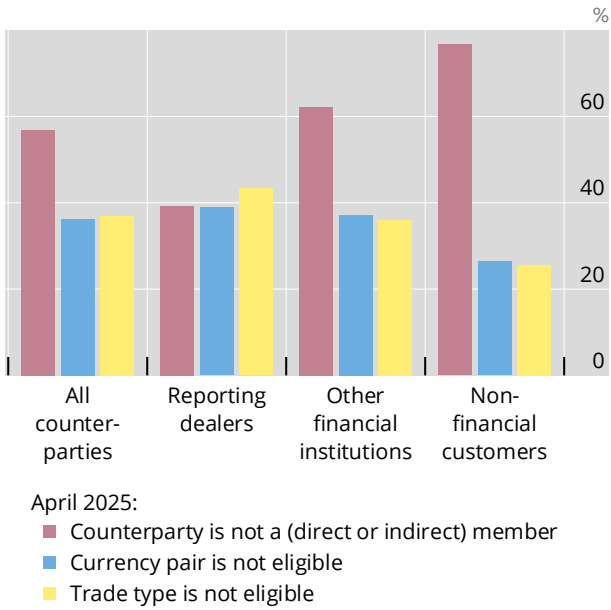
There are several anecdotal reasons why trades settled on a gross bilateral basis even though they were eligible for PvP settlement. For one, operational issues might

Reasons for settling on a gross bilateral basis[1] Graph 2

A. Trades settled on a gross bilateral basis, by PvP eligibility and counterparty



B. Trades *not eligible* for applicable PvP systems and settled on a gross bilateral basis, by counterparty[2]



PvP = payment versus payment.

[1] Net-net basis, daily averages. [2] Subcomponents in this section are not mutually exclusive. One single trade can be reported under more than one component, where applicable.

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

result in trades missing the cutoff times for PvP settlement. Other reasons include challenges in managing credit risk exposures to correspondent banks that some banks use for payments to or from a PvP system, or meeting tight payment schedules of a PvP system.[10] Continued industry-wide efforts to foster clear understanding of FX settlement risk and further implementation of relevant supervisory and industry guidance can help to onboard these types of trades, notably the supervisory guidance developed by the BCBS (2013) and the GFXC Global FX Code.

Three quarters of the trades that settled on a gross bilateral basis were not eligible for PvP systems. Three (sometimes overlapping) reasons help to explain this (Graph 2.B, Table A.3, Statistical Annex).

The most common reason was that the counterparty did not have direct or indirect access to PvP systems (57%). This issue is more acute in settlement of transactions with other (non-reporting) financial institutions and with non-financial customers than in inter-dealer transactions, where both sides to the trade tend to have direct PvP access. Continuing efforts to broaden direct and indirect access to more market participants therefore remains important, in particular as the role of non-bank financial institutions (NBFIs) in FX intermediation continues to expand.

The second reason for gross bilateral settlement was that currency pairs were not eligible for PvP settlement. This was the case for 36% of the trades that settled on a gross bilateral basis because of any of the three ineligibility issues. It is therefore not surprising that reporting dealers that transacted more in CLS-eligible currencies reported a lower share of overall transactions settled on a gross bilateral basis (Graph 3.A).

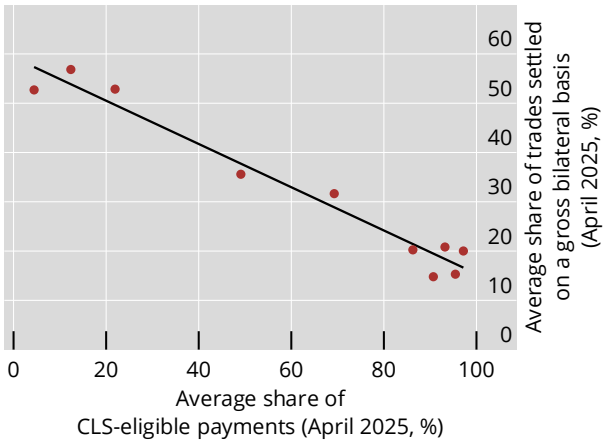
Enlarging the set of eligible currencies for PvP systems will probably become more important as the role of non-eligible currencies increases in global financial markets. However, this often comes with several structural challenges. These include establishing robust legal frameworks (eg to ensure settlement finality), improving FX convertibility by removing or loosening capital or FX controls, increasing operational reliability of wholesale payment systems and internal systems of participating banks, and securing liquidity providers in local currencies. Thus, increasing PvP adoption in this way may be pursued as part of broader efforts to modernise a nation's payment ecosystem and capital market. Where PvP settlement is not practical or too costly, pre-settlement netting solutions with robust legal and operational arrangements could be explored as a shorter-term solution.

The third reason trades were settled on a gross bilateral basis was that the trade type was ineligible for PvP settlement (37%). PvP systems are generally designed for T+1 or T+2 settlement and they operate on specific cutoff times for settlement instruction submission (eg 12 am CET for next-day settlement). With such cutoff times, same-day (T+0) trades currently cannot be settled via PvP. As more jurisdictions move to T+1 for securities settlement cycles, market participants' needs for same-day FX swaps may increase to fund cross-border securities transactions, which may, in turn, lead to an increase in trades settled on a gross bilateral basis.

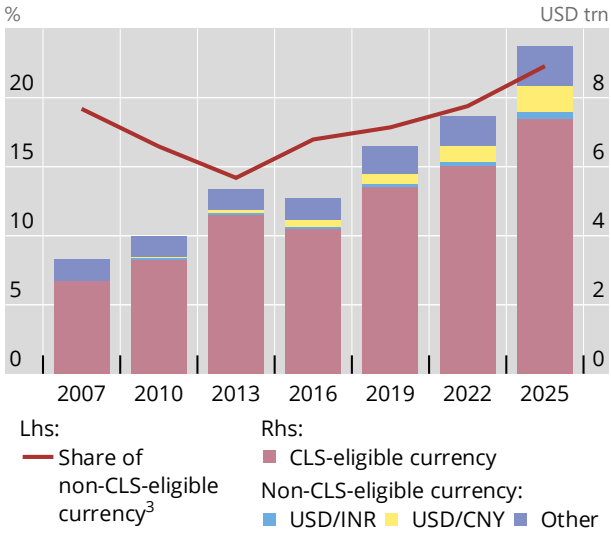
[10] Tight payment schedules of a PvP system may be a challenge for certain currencies whose local funding markets are less liquid. In this case, a dealer who sold a currency to a counterparty without having the offsetting position already locked in may prefer not to settle via PvP.

Gross bilateral settlement is higher with a lower share of CLS-eligible payments[1] Graph 3

A. CLS-eligible payments vs gross bilateral settlement[2]



B. FX turnover by currency pair and CLS currency eligibility



[1] Net-net basis, daily averages. [2] Each point represents a group of four to five jurisdictions, which have been grouped based on the share of CLS-eligible currency pairs (out of total gross financial obligations settled), grouped in descending order of their shares. [3] As a percentage of total gross financial obligations settled.

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

The evolution of FX settlement risk over the past 20 years

Over the last 20 years, there has been a substantial reduction in the share of transactions subject to FX settlement risk. This is evident from a comparison of the 2025 Triennial Survey with the 2006 CPSS survey of FX settlement risk.[11] This comparison highlights that trades settled on a gross bilateral basis have more than halved, from 32% of the average daily settlement in 2006 to 15% in 2025 (Table 3). This reflects ongoing private and public sector efforts to reduce settlement risk.

Even so, PvP settlement increased only modestly in the last two decades, from 54% of average daily settlement to 56%. This rise reflects broader membership and currency coverage by CLSSettlement as well as a larger role of other PvP systems. However, these factors were somewhat offset by the rising share of non-CLS eligible currencies in global FX market turnover, from 19% in 2007 to 22% in 2025 (Graph 3.B). The growing footprint of NBFIs in FX markets was also a factor: in the 2025 survey, NBFIs are generally reported as other financial institutions, for which the use of PvP settlement is much lower than for inter-dealer trades (Graph 1.C).

The main driver that reduced FX settlement risk was greater use of pre-settlement netting. The fractions of trades subject to pre-settlement netting nearly doubled, from 12% of average daily settlement in 2006 to 23% in 2025. Pre-settlement netting gained ground with the rise of service providers that facilitate

[11] The 2006 CPSS survey used a methodology similar to the 2025 Triennial Survey, except that intragroup settlement was excluded. As noted in footnote 3, methodological changes preclude comparisons with the 2019 and 2022 survey results.

FX settlement methods in 2025 compared with 2006 Table 3

	2025 Triennial Survey		2006 CPSS survey	
	USD bn	%	USD bn	%
Total gross financial obligations settled (excluding intragroup)	9,236	100	3,977	100
PvP	5,157	56	2,129	54
Pre-settlement netting	2,167	23	459	12
Settlement over bank accounts with timing controls[1]	496	5	112	3
Gross bilateral settlement[2]	1,416	15	1,277	32

CPSS = Committee on Payment and Settlement Systems; PvP = payment versus payment.

[1] "On-us without settlement risk" in the 2006 CPSS survey. [2] Includes "on-us with settlement risk" and "gross non-PvP" in the 2006 CPSS survey.

Sources: BIS Triennial Central Bank Survey; CPSS 2006 survey; authors' calculations.

netting. For example, CLS istarted CLSNet in 2018, which is a bilateral payment netting calculation service for FX trades.[12] CLSNet can be used for various FX instruments (eg to/next and same-day trades) and it covers more than 120 currencies, including those not currently settling in CLSSettlement's PvP system.

Settlement fails

The 2025 survey collected, for the first time, data on settlement fails, defined as trades that had been due to settle during April 2025 but that remained unsettled at the end of the month. Settlement fails can incur a financial penalty and also cause market risk (replacement cost risk), liquidity risk and/or reputation risk for the involved parties.

The 2025 survey shows that settlement fails were limited, accounting for only 0.01% of total gross financial obligations settled. Settlement fails among reporting dealers ($121 million) were lower than those with other non-reporting financial institutions ($1.4 billion), potentially reflecting the different levels of operational sophistication and risk controls across counterparty types.

Continued monitoring of settlement fails will be important, especially as more jurisdictions move to shorter securities settlement cycles. Shorter cycles reduce the window to execute and settle FX trades used to fund cross-border securities transactions. As such, firms have less time to rectify confirmation- or settlement-related issues. Unless mitigated (eg via greater automation and straight through processing), this could lead to more failed FX (and associated securities) trades.

[12] The delivery of the net payment amounts is managed by CLSNet users outside the service through existing correspondent banking relationships.

Mitigating FX settlement risk: past achievements and the road ahead

For several decades, private and public sector stakeholders have collaborated to mitigate FX settlement risk and promote robust risk management by FX market participants. This has followed the three-pronged approach developed in 1996 by the CPSS, which called for actions by: (i) individual banks to control their FX settlement exposures; (ii) industry groups to provide risk-reducing multicurrency services for settling FX trades; and (iii) central banks to induce private sector progress (CPSS (1996)).

Comparing the results of the 2025 survey with those from 2006 shows that these ongoing efforts have borne fruit and that the overall share of settlement on a gross bilateral basis has decreased substantially. However, due to growth in global FX markets, a large sum of $1.4 trillion is still at risk every day. The 2025 survey highlights the need to further reduce risk, which is on the agendas of several global committees.

The GFXC, as a private-public partnership, has continuously promoted best practices to mitigate FX settlement risk. The 2024 update to the FX Global Code reaffirmed that all market participants have a role to play. The update also introduced the settlement hierarchy (ie the waterfall approach) for mitigating FX settlement risk, which served as the basis for the 2025 Triennial Survey methodology. Further, the updated Code urges market participants to regularly review settlement choices to further reduce risk. The GFXC has also been a strong proponent of enhancing transparency on the magnitude of FX settlement risk. Complementing the Triennial Survey, the GFXC will continue to gather data from some of its member jurisdictions on a semiannual basis.[13]

In the meantime, as part of the G20 roadmap to enhance cross-border payments, the CPMI, working closely with industry, has explored ways to increase PvP adoption. The March 2023 CPMI report "Facilitating increased adoption of PvP" outlined potential roles for both private and public sector stakeholders.[14] More recently, the CPMI has been engaging with the private sector to further address operational barriers to PvP adoption. Private sector experts under the CPMI's Cross-border Payments Interoperability and Extension (PIE) Taskforce conducted further surveys and analysis and suggested possible next steps.[15]

In addition to these efforts, private sector companies have recently begun offering, or are in the process of developing, new services to complement or expand existing PvP systems. Some of these initiatives leverage innovative technologies, such as distributed ledger technology, that allow for smart contracting to only execute settlement if both parties pay. The BIS Innovation Hub has been exploring longer-term innovative solutions through various projects, such as Projects Jura, Mariana, Rialto and Agorá.

[13] GFXC data for the reporting months of April and October will be published on a global aggregated basis. The GFXC's data collection uses the same methodology and reporting template as the Triennial Survey to ensure data consistency and comparability between the two surveys. Although fewer jurisdictions take part in the GFXC Survey, the majority of global FX trade settlement is captured.

[14] These include: (i) aligning correspondent banks' operating hours and processes; (ii) exploring potential changes to conventions for an international value date; and (iii) promoting integration and interoperability between legacy and emerging systems.

[15] See Cross-border Payments Interoperability and Extension Taskforce: Task Team 1 (2025).

These diverse efforts address several key areas that help to reduce FX settlement risk: increasing the use of PvP systems for already eligible trades; expanding membership and currency coverage within PvP systems; incorporating FX trades with shorter settlement cycles into PvP settlement; and promoting greater use of biliteral netting. The updated Survey methodology provides useful insights into the potential scale of further risk reduction benefits in these areas.

More than 50 years have passed since the failure of Bankhaus Herstatt, yet more remains to be done. Enhanced transparency through the BIS Triennial Survey, alongside the GFXC Survey, plays a valuable role by supporting collaborative efforts as global FX markets continue to evolve.

References

Basel Committee on Banking Supervision (BCBS) (2013): *Supervisory guidance for managing risks associated with the settlement of foreign exchange transactions*, February.

CLS (2026): "BIS Triennial Survey 2025: FX settlement risk – You can't fix what you can't measure", *Shaping FX series*, 3 February.

Committee on Payment and Settlement Systems (CPSS) (1996): *Settlement risk in foreign exchange transactions*, March.

——— (2008): *Progress in reducing foreign exchange settlement risk*, May.

Committee on Payments and Market Infrastructures (CPMI) (2023): *Facilitating increased adoption of PvP*, March.

Cross-border Payments Interoperability and Extension Taskforce: Task Team 1 (2025): *FX settlement risk mitigation in (wholesale) cross-border payments*, March.

Global Foreign Exchange Committee (GFXC) (2025): *Outcomes of the three-year review of the FX Global Code*, January.

Huang, W, I Krohn and V Sushko (2025): "Global FX markets when hedging takes centre stage", *BIS Quarterly Review*, December.

Norman, B (2015): "BoE archives reveal little known lesson from the 1974 failure of Herstatt Bank", *Bank Underground*, Bank of England, June.

Schenk, C (2014): "Summer in the City: banking failures of 1974 and the development of international banking supervision", *The English Historical Review*, vol 129, no 540.

Shirakawa, M (2009): "International policy response to financial crises", remarks at the Federal Reserve Bank of Kansas City Jackson Hole symposium, 21 August.

Statistical annex

Settlement of FX obligations, by CLS eligibility and counterparty[1]

Table A.1

	All counterparties		CLS-eligible currency pairs		Non-CLS-eligible currency pairs		Reporting dealers		Other financial institutions		Non-financial customers	
	USD bn	%	USD bn	%	USD bn	%	USD bn	%	USD bn	%	USD bn	%
Total gross financial obligations settled	14,186	100	12,198	100	1,988	100	9,254	100	4,127	100	805	100
PvP	5,157	36	4,911	40	246	12	3,093	33	1,807	44	257	32
Intra-group settlement	4,950	35	4,331	36	619	31	4,950	53	…		…	
Inter-branch	3,590	25	3,229	26	361	18	3,590	39	…		…	
Inter-affiliate	1,360	10	1,102	9	258	13	1,360	15	…		…	
Pre-settlement netting	2,167	15	1,604	13	563	28	571	6	1,304	32	292	36
Net amount[2]	(337)	(2)	…		…		…		…		…	
Settlement over bank accounts with timing controls	496	3	424	3	72	4	167	2	250	6	79	10
Gross bilateral settlement	1,416	10	928	8	488	25	474	5	766	19	176	22
Trades *eligible* for applicable PvP systems	347	2	279	2	68	3	136	1	178	4	33	4
Trades *not eligible* for applicable PvP systems	1,069	8	649	5	420	21	338	4	587	14	144	18

PvP = payment versus payment.

[1] Net-net basis, daily averages in April 2025. [2] Figures in brackets denote post-netting amounts that settle by other means (eg traditional correspondent banking relationships).

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

Settlement of FX obligations, by CLS eligibility and counterparty, excluding intragroup[1]

Table A.2

	All counterparties		CLS-eligible currency pairs		Non-CLS-eligible currency pairs		Reporting dealers		Other financial institutions		Non-financial customers	
	USD bn	%	USD bn	%	USD bn	%	USD bn	%	USD bn	%	USD bn	%
Total gross financial obligations settled (excluding intragroup)	9,236	100	7,867	100	1,369	100	4,304	100	4,127	100	805	100
PvP	5,157	56	4,911	62	246	18	3,093	72	1,807	44	257	32
Pre-settlement netting	2,167	23	1,604	20	563	41	571	13	1,304	32	292	36
Net amount[2]	(337)	(4)	…		…		…		…		…	
Settlement over bank accounts with timing controls	496	5	424	5	72	5	167	4	250	6	79	10
Gross bilateral settlement	1,416	15	928	12	488	36	474	11	766	19	176	22
Trades *eligible* for applicable PvP systems	347	4	279	4	68	5	136	3	178	4	33	4
Trades *not eligible* for applicable PvP systems	1,069	12	649	8	420	31	338	8	587	14	144	18

PvP = payment versus payment.

[1] Net-net basis, daily averages in April 2025. [2] Figures in brackets denote post-netting amounts that settle by other means (eg traditional correspondent banking relationships).

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

Trades *not eligible* for applicable PvP systems and settled on a gross bilateral basis[1]

Table A.3

	All counterparties		CLS-eligible currency pairs		Non-CLS-eligible currency pairs		Reporting dealers		Other financial institutions		Non-financial customers	
	USD bn	%	USD bn	%	USD bn	%	USD bn	%	USD bn	%	USD bn	%
Trades *not eligible* for PvP systems and settled on a gross bilateral basis	1,069	100	649	100	420	100	338	100	587	100	144	100
Counterparty is not a (direct or indirect) member[2]	608	57	393	61	216	51	133	39	366	62	110	77
Currency pair is not eligible[2]	388	36	14	2	374	89	131	39	218	37	38	26
Trade type is not eligible[2]	395	37	321	50	74	18	146	43	212	36	37	25

PvP = payment versus payment.

[1] Net-net basis, daily averages in April 2025. [2] Subcomponents in this section are not mutually exclusive. One single trade can be reported under more than one component, where applicable.

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

Abbreviations

Currencies

AED	United Arab Emirates dirham	MXN	Mexican peso
ALL	Albanian lek	MXV	Mexican unidad de inversión (UDI)
ARS	Argentine peso	MYR	Malaysian ringgit
AUD	Australian dollar	NAD	Namibian dollar
BHD	Bahraini dinar	NGN	Nigerian naira
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 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
EUR	euro	SAR	Saudi riyal
GBP	pound sterling	SEK	Swedish krona
HKD	Hong Kong dollar	SGD	Singapore dollar
HUF	Hungarian forint	THB	Thai baht
IDR	Indonesian rupiah	TRY	Turkish lira
ILS	Israeli new shekel	TWD	New Taiwan dollar
INR	Indian rupee	USD	US dollar
ISK	Icelandic króna	VES	Venezuelan bolívar soberano
JPY	Japanese yen	VND	Vietnamese dong
KRW	Korean won	XOF	CFA franc (BCEAO)
MAD	Moroccan dirham	ZAR	South African rand

Countries

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

Countries (cont)

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

Countries (cont)

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