

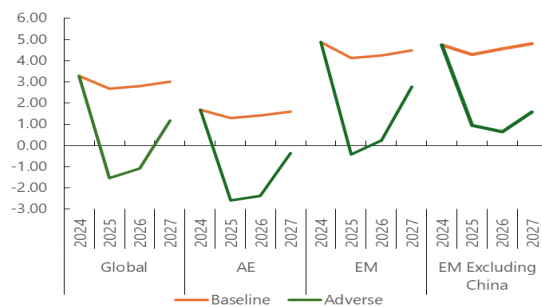
GLOBAL FINANCIAL STABILITY REPORT

Annex 1.1 IMF Global Stress Test (GST) Scenarios¹

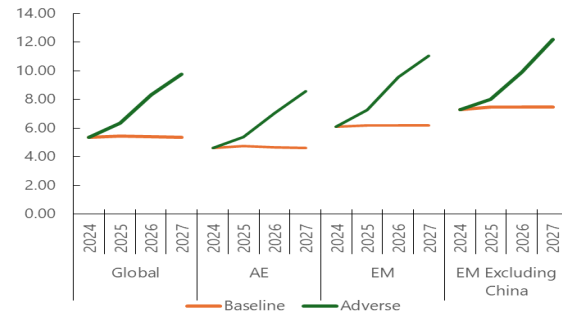
1. This annex details the macrofinancial scenario used in the October 2025 GFSR Global Stress Tests. See section “*Higher Capital Ratios Strengthen Global Banks but the Weak Tail of Banks Remains Substantial*”

Figure A1.1.1 GST 2025 Stagflation Scenario

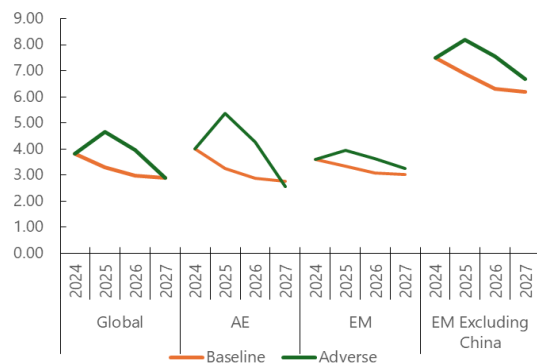
1. Real GDP Growth Percent



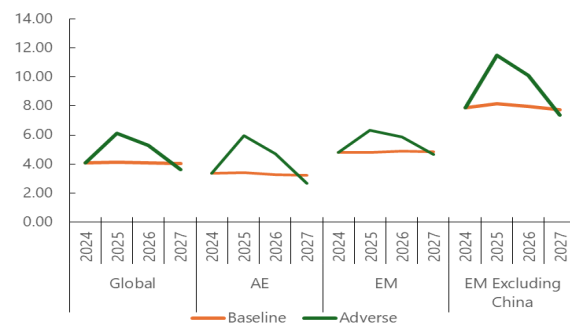
2. Unemployment Rate Percent



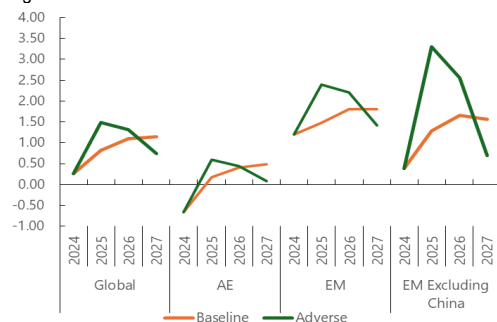
3. Short-term Rate Percent



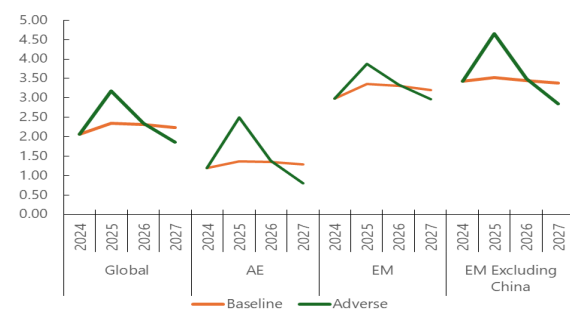
4. Long-term Rate Percent



5. Term Spread Percentage Point



6. Corporate Bond Spread Percentage point



¹ This section was prepared by Xiaodan Ding, Srobona Mitra, and Silvia Ramirez.

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Annex: 1.2 Definitions of Nonbank Financial Institutions (NBFIs)¹

1. This annex defines the different NBFIs discussed in the October 2025 GFSR, section “Stronger Bank-Nonbank Nexus Increases Contagion and Liquidity Risks”

Table A1.2.1 Definition of Nonbank Financial Intermediaries (United States)	
Mortgage Credit Intermediaries	All mortgage companies that specialize in residential or commercial mortgage loan origination or servicing activities (other than loans secured by real estate). Include loans to SPEs designed to facilitate residential or commercial mortgage-related securitizations activities (mortgage warehousing facilities, loans to direct lenders, REITs, CDOs, CLOs, private debt funds, ABCP conduits, or other financial intermediaries in which the underlying asset are comprised of residential or commercial mortgages (greater than 50% of assets or lending activities). Include CLO tranche holdings. Exclude outright purchases of mortgages or other loans secured by real estate.
Business Credit Intermediaries	SPEs, finance companies, direct lenders, CDOs, CLOs, private debt funds, leasing companies, ABCP conduits, BDCs, SBICs, or other financial intermediaries in which the underlying assets are mainly comprised of loans to businesses (greater than 50% of assets or lending activities). Includes CLO tranche holdings reported as loans.
Private Equity Funds	Private equity funds. Include capital call commitment and other subscription-based facilities to private equity and venture capital funds, or any other general partnership funds that raise capital through limited partnership arrangements in which the underlying investment assets are mainly comprised of equity investments in private, non-listed assets or companies (greater than 50% of assets).
Consumer Credit Intermediaries	SPEs, finance companies, direct lenders, private debt funds, leasing companies, ABCP conduits, or other financial intermediaries in which the underlying assets are mainly comprised of loans to consumers (greater than 50% of assets or lending activities). Includes CLO tranche holdings reported as loans. Includes loans designed to facilitate ABS activities for consumer credit products (ABS, credit card ABS, student loan ABS, etc.). Include loans to other non-bank consumer lenders, including internet-based lending platforms and other marketplace lenders.
Other Loan NonDepository Financial Institution	Loans to HCs of other depository institutions, insurance companies, federally-sponsored lending agencies, investment banks and broker dealers. Excludes loans secured by real estate, and loans for purchasing or carrying securities, including margin loans. Loans and advances made to the bank's own trust department. Publicly-listed investment funds such as money market funds, mutual funds (open and closed), index funds and exchange-traded funds. Loans to private capital funds, including private equity and private debt funds. Hedge funds. Pension funds, endowments, family offices and sovereign wealth funds. Securitization vehicles and other investment firms and financial vehicles.
Source: FFIEC Call Report instructions.	

¹ This section was prepared by Silvia Ramirez.

Table A1.2.2. Definition of Selected Financial Metrics

Equity to Assets	Total equity capital as a percentage of total assets.
Loan and Lease Allowance/Total Loans and Leases	Allowance for Loan and Lease Losses/ Total Loans and Leases. Beginning 3/31/2007, this ratio compares allowance for loans and leases losses with total loans and leases. Declining or adverse trends in these ratios can signal that a bank is not providing appropriate protection for the level of risk being booked. For periods prior to 3/31/2007, this ratio compared adjusted allowance for loan and lease losses with adjusted loans and leases, calculated as [Allowance for Loan and Lease Losses - Net Charge Offs on Credit Card Loans - (0.0025*1-4 Family Loans) - Noncurrent Loans]/ [Total Loans and Leases - Credit Card Loans - 1-4 Family Loans - Noncurrent Loans].
Investment Portfolio Depreciation	[(HTM Securities FV - HTM Securities Amortized Cost) + (AFS Securities FV - AFS Securities Amortized Cost)]/ Tier 1 capital. Beginning 2007Q1, this ratio measures the proportion of capital offset by estimated depreciation in available for sale and held to maturity investment portfolios. Depreciation in these asset classes usually is the result of yields that are below current market rates. For periods prior to 2007Q1, calculated as [(HTM Securities Amortized Cost - HTM Securities FV) + (AFS Securities Amortized Cost - AFS Securities FV) + Estimated Depreciation on 1-4 Family Loans]/ Tier 1 capital. Tier 1 capital, depending on institution attributes and period, is reported under either the General risk-based (GRB) regulatory capital rules or the U.S. Basel III (B3) revised regulatory capital rules. Preference between GRB and B3 values is given based on the nature of the filing and the attributes of the various Tier 1 capital ratios.
Net Loan Growth	Net loan growth over a 12-month period calculated as current period net loans less year-ago net loans and leases as a percent of year-ago loans and leases. This is determined as the current period account balance less the account balance as of the corresponding reporting period in the previous year as a percent of the previous year's balance.
Net Loans and Leases/Assets	Net loans and leases as a percent of total assets. This ratio measures the percentage of the reporting institution's total assets that are invested in loans.
Net Noncore Funding Dependence	Non-core liabilities less short-term investments as a percent of long-term assets. The net non-core funding dependence ratio indicates the degree of reliance on funds from the professional money markets. Non-core liabilities include time deposits of more than \$250,000 and brokered deposits less than or equal to \$250,000. For banks, prior to March 31, 2010, time deposits are defined as \$100,000 or more and brokered deposits are as defined as less than or equal to \$250,000. For bank holding companies, time deposits are \$100,000 or more and brokered deposits are less than \$100,000.
NIM	Net Interest Margin. Net interest income to average earning assets.
On-hand Liquidity Liabilities	[(Interest-bearing Balances) + (Total Securities) + (Fed Funds Sold and Reverse Repos) - (Fed Funds Purch and Repos) - (Pledged Securities)] / [Total Liabilities]. This ratio measures a bank's ability to meet liquidity needs from on-hand liquid assets.
Reliance on Wholesale Funding	[(Total borrowings) + (Brokered Deposits)] / [(Total borrowings) + (Total Deposits)]. This ratio depicts the portion of a bank's total funds that are from wholesale sources.
ROAE	Net income to average equity.
Source: S&P Capital IQ Pro.	

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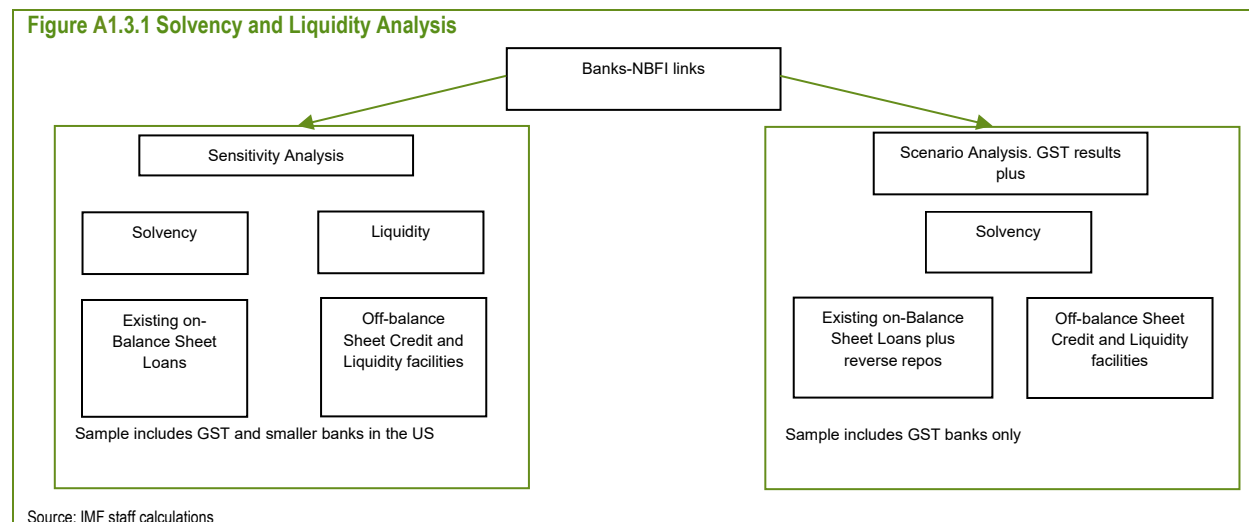
Annex 1.3 Stress Test of Banks Exposures to NBFIs¹

1. This section explains the analytical approach and methodology used to stress test banks' exposures to NBFIs. The objective is to estimate the impact of a hypothetical scenario in which multiple NBFIs face liquidity and solvency shocks (see October 2025 GFSR, section "Stronger Bank-Nonbank Nexus Increases Contagion and Liquidity Risks"). The analysis focuses on U.S. and European banks because of their global systemic importance and availability of (partial) data.

2. Banks have three types of exposures to NBFIs on the asset side—mostly direct loans and credit lines, derivatives but also repos. The analysis assumes that banks are forced to re-assess the risks from these exposures by changing their risk-weights, including on off-balance sheet credit lines (with a low pre-shock risk weight) that migrate to a loan as an on-balance sheet item with higher risk-weight, assuming credit lines are drawn down fully during an adverse shock. The impact of higher risk weighted assets reduces CET1 ratios. The analysis has two separate components: sensitivity one and scenario one (Figure A1.3.1). Sensitivity analysis does not assume further shocks, while for the scenario analysis this reduction is added to the GST results from the previous section in the main text.

3. On the liabilities side, banks face outflows due to draw-down of liquidity and credit lines by NBFIs. These outflows are compared to available liquid assets—using less-strict and more-strict definitions of these assets—to identify banks that would face a funding gap.

Figure A1.3.1 Solvency and Liquidity Analysis



Background, Data availability and Assumptions.

4. Banks are tightly interconnected with NBFIs through credit, funding, derivatives, ownership, and other channels. In the case of the US, most of the loans provided by banks to NBFIs at end-2023 were credit lines (81 percent), with an average utilization rate of 40 percent.² ECB and EBA assessments indicate that EU/EA

¹ This section was prepared by John Caparusso, Xiaodan Ding, Mindaugas Leika, and Srobona Mitra.

² <https://www.philadelphiafed.org/-/media/frbp/assets/economy/articles/economic-insights/2024/q3/bt-why-banks-finance-their-nonbank-competitors.pdf>

banks' exposure to NBFIs is close to 10 percent of total assets, with loans making up nearly half.³ These supervisory assessments underscore that banks are crucial providers of operational liquidity to NBFIs.

5. Both sensitivity and scenario analyses assume that stress leads to an inability of NBFIs to refinance their debt. This is followed by a significant drawdown—up to 100 percent—of existing credit and liquidity facilities provided by banks to NBFIs. The solvency analysis then assumes a reassessment of credit risk of the entire NBFI loan portfolio—including credit lines that are now drawn during stress.

6. The scenario analysis also links the impact of higher risk-weighted assets from NBFI stress to the results from the global stagflationary scenario to assess the additional number of banks (GST sample) that are weakened by NBFI stress.

7. Motivation for liquidity risk sensitivity analysis is based on 2023 crisis events. In a typical market distress scenario, investors could shift assets and deposits from NBFIs to banks, increasing banking system liquidity and enabling banks to provide temporary support to NBFIs. While this occurred in past crises the relationship may not hold for all banks. Some institutions could face deposit outflows if perceived as riskier due to business models or concentrated NBFI exposures.⁴ Moreover, a bank could simultaneously face higher NBFI drawdowns on credit commitments and deposit outflows, creating a positive correlation of stress. For example, a bank may need to provide full liquidity support to NBFIs while securing additional funding if deposit outflows reduce its liquid assets. The liquidity analysis thus links banks' outflows related to draw-down of NBFI liquidity lines and compares these outflows to available liquid assets. It then assesses the number of banks and their share in total assets that could face funding gaps due to NBFI stress.

8. The FRB 2025 stress test included an exploratory analysis of the impact of NBFI stress on banks in the FRB sample. The analysis focused on two dimensions: solvency (a rapid deterioration in the credit quality of exposures to NBFIs) and liquidity (borrowers drawing down 100 percent of undrawn credit lines). Our approach differs in two key ways: i) We do not estimate credit losses from banks' exposures because of insufficient information; instead, we assume that rating downgrades and/or a decline in NBFIs' financial performance lead to higher risk weights on these exposures; ii) We estimate the liquidity impact of NBFI drawdowns on banks' liquidity positions, taking into account immediately available liquidity (such as cash, balances at banks, and unencumbered securities).

9. Publicly available data on banks' exposures to NBFIs remains sparse and varies across jurisdictions. Therefore, the analysis uses multiple public data sources and applies several assumptions and sensitivity tests to address the uncertainties involved in such an estimation. We focus on two jurisdictions where some public data are available: the United States and the European Union (plus additional countries covered in EBA data: Norway, Liechtenstein, and Iceland). For the United States, we use solo (non-consolidated) data to include a broad range of banks, including smaller institutions not subject to FRB stress testing or additional solvency and liquidity requirements, also compare results of sensitivity analysis with their core funding and liquidity indicators. For the EU and the additional non-EU countries, only major banks (significant institutions) are included. Table 1 below lists the key data sources and assumptions.

³ https://www.ecb.europa.eu/press/financial-stability-publications/fsr/special/html/ecb.fsrart202305_02~1ff06bc324.en.html ; <https://www.eba.europa.eu/sites/default/files/2024-11/f03ee0c1-7258-4391-8bf1-578924956049/EBA%20Risk%20Assessment%20Report%20-%20Autumn%202024.pdf>

⁴ During the last crisis episode in 2023 which involved Credit Suisse as well as a set of smaller banks in the US, deposit outflows happened due to a contagion related to similarities in business models of banks as well as stress in the market for crypto assets. See, for example: <https://www.chicagofed.org/publications/working-papers/2025/2025-04>

Table A1.3.1 Data and Assumptions

	US	EU
Data sources	Scenario analysis for the US is done at the holding company level based on FRB Y-9C reports. Regulatory reporting FFIEC Call Report for the sensitivity analysis and liquidity stress.	EBA Transparency exercise EBA website (various reports as highlighted in the document).
Data availability	Loans to NBFIs by type of NBFIs; liquidity data (cash and reserves at banks; aggregate data on unencumbered securities); various funding ratios (core, wholesale etc.). Capital components, RWAs for credit risk. Data for irrevocable and cancellable off-balance sheet commitments is available at a consolidated level only (and used for scenario analysis).	Proxy for loans to NBFIs (loans and debt securities); proxy for off-balance sheet commitments; cash and reserves at banks; securities; capital components; RWAs for credit risk. EBA data on asset encumbrance: https://www.eba.europa.eu/publications-and-media/publications/liabilities-funding-and-liquidity-1#ipn-0-31755918653806814
Missing data	RWAs for NBFIs loans; exposures to NBFIs (as a regulatory parameter) and corresponding granularity (loans, derivatives, repos/reverse repos, securities, equity instruments). Credit conversion factors (CCFs). Off-balance sheet exposures to Government Sponsored Enterprises (GSEs).	RWAs for NBFIs loans; exposures to NBFIs (as a regulatory parameter) and corresponding granularity (loans, derivatives, repos/reverse repos, securities, equity instruments). Credit conversion factors (CCFs). Data for irrevocable and cancellable off-balance sheet commitments. Data for banks' exposures to NBFIs belonging to own group are not available. Bank-by-bank data on asset encumbrance.
Cut-off date	Q2 2025; Scenario analysis (GST sample): Q4 2024.	Q2 2024; with exposures to NBFIs increased to match aggregate Q4 2024 data
Sample size and level of consolidation	For the sensitivity analysis: all banks at the level of operating company with a sample further reduced to 362 entities for which data is available, and which have exposure to NBFIs. For the scenario analysis: consolidated data at the holding company level. The NBFIs stress impact does not materially differ between consolidated and non-consolidated data.	109 entities plus data for all other banks (aggregated) as reported by EBA. Consolidated (cross-border, banking group level only).
Assumptions	Starting point: Average Risk Weight density – 20 percent, Credit Conversion factor – 50 percent; all facilities treated as irrevocable for the purpose of liquidity analysis. Stress: Risk weights increase to 50 percent on all NBFIs exposures; the Credit Conversion factor increases to 100 percent.	Average starting Risk Weight density – 20 percent, Credit Conversion factor – 50 percent; all facilities treated as irrevocable for the purpose of liquidity analysis. Off-balance sheet exposures to NBFIs proportional to share of loans to NBFIs. Share of loans to NBFIs companies belonging to own banking group are not considered. Off-balance sheet exposures increased to match aggregate EBA number. Asset encumbrance ratios as reported by EBA per country.
Key sources of uncertainty	Risk weight densities across banks, credit conversion factors.	Risk weight densities across banks, credit conversion factors, off-balance sheet exposures to NBFIs, asset encumbrance by bank.

Sources: IMF staff

Analytical Approach and Calculations

10. Due to differences in available data and the number of assumptions required, we applied the same tests but used varying approaches to derive results for the United States and the European Union.

For the US:

11. Step 1. Outflow calculations. For each bank j in the sample we calculate:

$$1. \text{Outflows}_j = \text{Unused commitments}_i * \text{drawdown rate}_i$$

12. We used a shock to an aggregated unused commitment to NBFIs despite that more granular data (by type of NBFIs) are available in regulatory reports. This was also to expand the sample and include smaller banks which in some cases do not report granular data, opting to report aggregated exposure instead. The sensitivity test assumed two drawdown rates: 50 and 100 percent⁵.

13. Step 2. Treatment of irrevocable vs. cancelable credit lines. We do not know from the data which credit lines are irrevocable and which are cancelable. This distinction matters for both solvency and liquidity analysis because cancelable credit lines can be withdrawn by banks, reducing potential exposure and outflows. Indirectly, the share of cancelable versus irrevocable commitments can be inferred from Y-9C data; however, the consolidation level differs, and the data cover all commitments only, requiring us to assume the same ratio across all loans for each bank. Given this uncertainty, we assume that all credit lines—both irrevocable and cancelable—are gradually utilized and, in the worst-case scenario, reach 100 percent drawdown.

14. Step 3. Liquidity impact. We use data from FFIEC Call Reports to obtain the following variables:

$$2. \text{Liquid assets}_j = \text{Cash and balances at banks}_j + A * (1 - \text{share of encumbered securities}_j) * \text{Total securities}_j$$

15. Where A is scenario parameter, for the narrow (stricter) definition of liquidity we assume $A=0$, thus only cash and balances at banks are available for liquidity purposes; if $A=1$, banks are also using unencumbered securities to meet liquidity outflows.

$$3. (\text{NLP}) \text{Net liquidity position}_j = \text{Liquid assets}_j - \text{Outflows}_j$$

Bank is illiquid if NLP is <0 .

16. There is no assumption about the time horizon of outflows as well as there is no data on inflows etc. as majority of banks (apart from G-SIBs) do not report or are not subject to LCR requirements and reporting.

17. We then calculated and reported number of banks with 3. <0 and their share in terms of total assets and share of liquidity gap of banks with negative liquidity position in terms of TA.

18. The analysis does not assume deposit withdrawal from banks and is based on individual bank liquidity position, i.e., ignores systemwide redistribution of liquidity.

19. Step 4. Solvency impact. We use the same data sources to estimate the impact of higher credit line utilization on risk-weighted assets (RWAs) and, ultimately, CET1 ratios. The analysis focuses only on RWAs—not on potential credit losses, unlike the FRB analysis—making it partial. It also excludes the impact of derivatives, equity positions, and other exposures to NBFIs.

20. The solvency analysis faces three key uncertainties: i) credit conversion factors (CCFs) for existing NBFIs credit lines; ii) the extent of credit line utilization (how much off-balance-sheet exposure converts to on-balance-sheet); iii) RWAs for NBFIs loans and the degree to which RWAs for existing exposures increase under market stress.

⁵ Analysis does not include simulation of deposit outflows but implicitly assumes that NBFIs use of credit lines leads to 100 percent outflow to other financial institutions.

21. *4.1 CCFs for existing credit lines.* Given limited information and high degree of uncertainty related to CCFs, we assume that CCF is 50% in the existing unused credit facilities.
22. *4.2 Utilization of credit lines.* Given the uncertainty, we assumed 100 percent draw-down.
23. *4.3 RWAs for existing on-balance sheet loans.* To calculate impact on RWAs we assumed that shock to drawdown leads to an increase in RWAs for the simulated drawdown (due to exposure becoming an on-balance sheet one) plus a change in RWAs due to one notch downgrade of the NBFIs in case of securitization exposures or secured lines of credit. For the existing exposures, if average exposure is rated as A and is downgraded to BBB, the delta in RW requirement would be 30 percent. The later assumption is similar to the one made by FRB.⁶

$$4. \Delta RWAs_j = (1 - CCF_j) * RWD_j * Outflows_j + \partial_j * Existing\ NBFI\ loans_j$$

24. Where CCF_j – is average CCF assumed, RWD_j – risk weight density of new exposures, and ∂_j – assumed change in RWAs due to one notch credit rating downgrade of existing loan exposures. We set CCF as 50%, and final RWD of exposures as 50 and 100 percent (shocks as 30 and 80 percent respectively); and ∂_j – as 30 and 80 percent because NBFIs face liquidity issues, their credit rating is likely downgraded to by at least one notch.

For the EU:

25. *Step 1. Calculating NBFI exposures.* We used EBA transparency exercise data to obtain banks' loans to NBFIs (“Gross carrying amount on Loans and advances (including at amortized cost and fair value) - by exposure” “Financial corporations other than credit institutions”).⁷ Only performing loans are included when calculating additional risk weights for existing exposures, although data shows that the share of NPLs in this category is low at 0.6 percent of all loans to NBFIs (as of Q2 2024).

26. The second set of data is “Gross carrying amount on Debt securities (including at amortized cost and fair value) - by exposure” (“Financial corporations other than credit institutions”). Breakdown by status is considered, i.e., only performing securities were included in calculating additional risk weights for existing exposures. Data shows that as of Q2 2024 the share of NPLS in debt securities is 0.5 percent in terms of total exposure to NBFIs debt securities.

The final bank j performing exposure to NBFIs is obtained as follows:

$$5. \text{Performing NBFI exposure}_j = \text{NBFI loans}_j - \text{NPLs NBFI loans}_j$$

27. For this test we excluded debt securities, which constitute about 1 percent of total exposure to NBFIs in terms of assets. This is consistent with the approach used in case of US banks.

28. *Step 2. Calculating Unused Off balance sheet commitments.* Considering public data limitations, we used data from EBA transparency portal (Gross carrying amount on off-balance sheet exposures) and multiply it by the share of the respective bank's j share of loans to NBFIs with respect to total loan portfolio:

$$6. \text{Unused NBFI commitments}_j^* = \text{Off balance sheet exposure}_j * \frac{\text{NBFI loans}_j}{\text{Total loans}_j}$$

⁶ This is an approximation; FRB had granular exposure data, which allowed them to estimate precise impact of the downgrades.

⁷ The data source is <https://www.eba.europa.eu/risk-analysis-and-data/eu-wide-transparency-exercise>

29. In the second step we compared our obtained aggregate number (EUR Bn 632) with the data published by EBA (EUR Bn 950).⁸ EBA data for Q4 2024 shows that our off-balance sheet exposure is approximately 51 percent lower, and the time gap of 6 months would not be sufficient to explain this difference. To correct for the difference, we multiply each bank's off-balance sheet exposure by the difference ratio:

$$7. \text{Unused NBFI commitments}_j = \left(\text{Off balance sheet exposure}_j * \frac{\text{NBFI loans}_j}{\text{Total loans}_j} \right) * \left(\frac{\text{EBA total NBFI off balance sheet exposure}}{\sum_1^{109} \text{bank unused commitments}^*} \right)$$

30. *Step 3. Liquidity impact.* To obtain liquidity data for each bank in the sample, we used the following data:

$$8. \text{NLP}_j = \text{Cash, cash balances at central banks and other demand deposits}_j + A \\ * (\text{Financial assets held for trading}_j \\ + \text{Financial assets designated at fair value through profit or loss}_j \\ + \text{Financial assets at fair value through other comprehensive income}_j) * (1 - AE_{\text{country}}) \\ - \text{Outflows}_j$$

Only Level 1 assets (based on accounting classification) were included in calculations.

31. *Step 4. Assigning risk weights.* Since no additional data on RWDs for the sample of EU banks was publicly available, we used the same assumptions to assign shocks to RWDs as in the case of US.

Additional Assumptions for the Scenario Analysis

32. As a final step, the combined solvency impact on the U.S. and EU banks from the NBFI shock - with a focus on the RWA effect - was incorporated in the GST stress test results. Specifically, individual banks' ISIN codes were used to match the original sample with the GST sample, and country average impact was applied to banks with missing data. The additional capital impact on the bank level was imposed on capital of sample banks over the horizon under the GST adverse scenario. The resulting capital ratio path of individual banks was used to update the weak bank list based on previously established criteria (see Chapter 1 main section on GST for further details on the criteria used to determine weak banks).

Additional Observations & Discussion

33. Overall, the results show that, in the United States, banks that fail the liquidity test tend to have higher dependence on non-core funding, a lower share of short-term investments, a higher loan-to-deposit ratio, and a higher ratio of unused commitments to total assets. These are mostly smaller banks in the sample. The analysis highlights their liquidity risk, given the lack of granular public liquidity data and the fact that these banks are not subject to LCR requirements (Table A1.3.2).

Table A1.3.2 Liquidity Ratios									
	Short-Term Non-Core Funding/ Total Assets (%)	Net Non- Core Funding Dependen- ce (%)	Brokered Deposits/ Deposits (%)	Brokered Deposits Mat <= 1 Yr/ Brokered Deposits (%)	Short-Term Investment/ Short-Term Non-Core Funding (%)	Short-Term Assets/ Short-Term Liabilities (%)	Net Short- Term Liabilities/ Total Assets (%)	Net Loans & Leases/ Total Deposits (%)	Unused commitments as a % of TA

⁸ <https://www.eba.europa.eu/publications-and-media/publications/asset-side-1#ipn-0-19213176871740167> Eur Bn 950 includes undrawn loan commitments, financial guarantees and other commitments.

Sample of 14 banks (with NLP<0 under broad liquidity metrics)	19	30	17	60	62	222	-2.4	102	21
Sample of 362 banks	13	15	7	77	190	308	-3.2	80	3

Source: FFIEC Call Reports and IMF staff calculations

Table A1.3.3 Definition of Selected Financial Metrics	
Short-Term Non-Core Funding Total Assets	Short-term non-core funding as a percentage of total assets. Non-core funding
Net Non-Core Funding Dependence	Non-core liabilities less short-term investments as a percent of long-term assets. Non-core liabilities consist of the sum of time deposits of more than \$250,000, other borrowed money, foreign office deposits, securities sold under agreements to repurchase, federal funds purchased, insured brokered deposits of \$250,000 or less (234915).
Net NonCore Funding Dependence	Non-core liabilities less short-term investments as a percent of long-term assets. Non-core liabilities include time deposits of more than \$250,000 and brokered deposits less than or equal to \$250,000. For banks, prior to March 31, 2010, time deposits are defined as \$100,000 or more and brokered deposits are as defined as less than or equal to \$250,000. For bank holding companies, time deposits are \$100,000 or more and brokered deposits are less than \$100,000 (215674).
Brokered Deposits Mat <= 1 Yr/ Brokered Deposits	Brokered deposits with a remaining maturity of one year or less as a percentage of total brokered deposits
Short-Term Investment/ Short-Term Non-Core Funding	Short-term investments as a percentage of short-term non-core funding. Short-term investments (Interest Bearing Bank Balances + Fed Funds & Repos + Debt Securities with a Maturity less than 1 Year + Acceptances of Other Banks). Short-term non-core funding include From periods beginning with March 31, 2011 forward, this item is calculated as the sum of time deposits greater than \$250,000 with a remaining maturity of one year or less, brokered deposits of less than or equal \$250,000 with a remaining maturity of one year or less, time deposits in Non-U.S. offices with a remaining maturity of one year or less, Federal Home Loan Bank advances with a remaining maturity of one year or less, other borrowed money with a remaining maturity of one year or less and securities sold under agreements to repurchase and federal funds purchased. maturity of one year or less were included instead of time deposits greater than \$250,000 and brokered deposits of \$250,000 or less.
Short-Term Assets/ Short-Term Liabilities (%)	Short-term assets as a percentage of short term liabilities. Short-term assets include fixed and floating rate debt securities, loans and leases with remaining maturity of one year or less, federal funds sold, and securities purchased under agreements to resell and interest-bearing balances due from depository institutions, including time certificates of deposit not held for trading. Short-term liabilities include
Net Short-Term Liabilities/ Total Assets (%)	Net short-term liabilities as percent of total assets. Net short-term liabilities are calculated as short-term liabilities with less short-term assets.
Net Loans & Leases/ Total Deposits (%)	Loans and finance leases, net of reserves, as a percent of deposits. This ratio indicates the extent to which a bank's deposit structure funds the loan portfolio. The higher the ratio the more reliance that a bank has on non-deposit sources of funding to fund the loan portfolio. A high ratio suggests potential vulnerability to credit-sensitive funds providers at less favorable points in the credit and economic cycles.

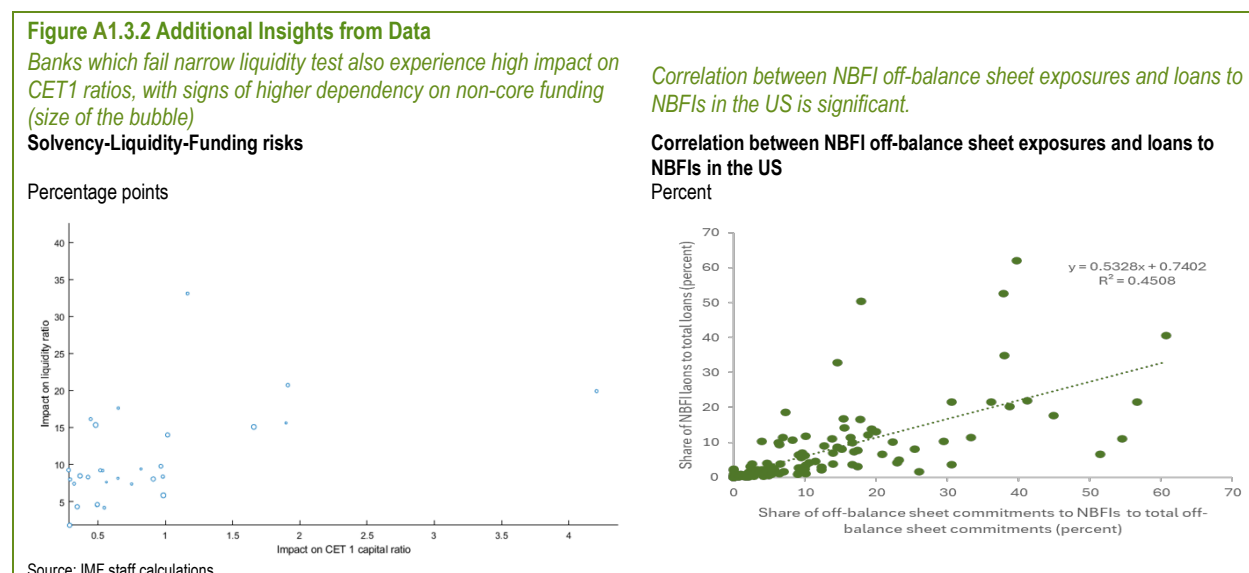
Source: S&P Capital IQ Pro and Uniform Bank Performance report.

34. In the United States, banks that exhibit negative net liquidity positions (NLP) in the narrow liquidity test also show a high impact on solvency. However, only a few of the weakest banks in the sample have a high

share of non-core funding relative to total funding, making them more vulnerable to hypothetical funding outflows (Figure 1.3.2, left panel).

35. In the European Union, banks do not face major liquidity challenges because market liquidity remains abundant under the ECB's monetary policy framework and banks can pledge credit claims as collateral to the ECB. Aggregate country-level AE ratios used in the exercise may mask significant differences across banks and may understate liquidity, as banks likely encumbered non-marketable assets (such as credit claims) with the ECB first. Even if bank-level aggregate liquidity ratios were available, they would not reveal the composition of asset encumbrance by bank.

36. EBA risk assessment report also highlights that banks' off-balance sheet exposure is uneven and concentrated among largest banks.⁹ To validate our assumption that the share of loan portfolios to NBFIs is a reasonable proxy for the share of off-balance-sheet exposures to NBFIs relative to total exposures, we used U.S. data. The results show a strong correlation (Figure 1.3.2, right panel).



37. The finding of scenario analysis suggests that the share of weak banks in the Advanced Economies (the U.S. and EU) increases from about 20 percent in the GST adverse scenario to 24 percent, with the additional weak banks coming from Europe. In the US, banks that are exposed to the additional NBFi risks are already considered weak in the GST adverse scenario.

References

⁹ EBA 2024 report which has a box on banks exposures to NBFi (<https://www.eba.europa.eu/sites/default/files/2024-11/f03ee0c1-7258-4391-8bf1-578924956049/EBA%20Risk%20Assessment%20Report%20-%20Autumn%202024.pdf>).

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Annex 1.4. Mutual Funds and Their Impact on Core Bond Markets¹

1. This annex explains the analytical approach and methodology used to study mutual fund outflows and their impact on core bond markets (October 2025 GFSR, section “Nonbanks are the Lynchpin for Bond Market Function”). The work focuses on the US Treasury market for three main reasons. First, the US Securities and Exchange Commission’s (SEC) N-PORT database offers detailed, security-level holdings data, enabling precise analysis of fund positions.² Second, the US mutual fund sector is one of the largest and most developed globally, providing substantial potential to influence underlying security markets. Third, the US Treasury market plays a central role in the global financial system, so shifts in fund flows can have significant market-wide implications.

Overview of Analytical Setup and Key Assumptions

2. The analysis consists of two steps, each requiring specific assumptions. First, liquidity pressures faced by mutual funds are calculated based on: i) outflow scenarios; and ii) variation margin calls on interest rate derivatives exposures. Second, the funds are assumed to absorb these liquidity pressures under a “waterfall approach,” whereby assets are liquidated in a preferred order. The key assumptions for these two steps are outlined in Table A1.4.1.

Table A1.4.1 Key Assumptions			
		Key Assumptions	Further assumptions/notes
Step I Modeling Liquidity Pressures	I.1 <i>Fund Outflows</i>	Scenarios: 1. March 2020 flow scenario 2. April 2025 flow scenario 3. 99 th percentile flow scenario (fund by fund)	- Based on monthly flow statistics from Lipper - Extrapolated to new funds based on US mutual fund objective³ - Historical flow patterns, expressed as percentage of AuM, are projected onto most recent AuM
	I.2 <i>Variation margin calls</i>	- Interest rate derivatives only - Curve shift scenarios - Linearized price impact (duration-based, see below)	- Initial margins not assessed - Treasury futures and US dollar interest rate swaps included; other derivatives exposures not assessed
Step II Modeling Liquidation		- Waterfall approach with liquidation preference from <i>Cash</i> first, to <i>Money Market Fund (MMF) Shares</i>, <i>T-bills</i>, <i>Commercial Paper (CP)</i>, and lastly <i>Other Assets</i> - No increase in repo-activity⁴ - Variation margin posted in cash⁵	

3. To evaluate the potential impact of the liquidity pressures faced by funds on the bond market, it is necessary to define *forced liquidations*. Forced liquidations are defined as gross asset sales by bond mutual funds; potential bond purchases are excluded (not netted). Under the scenarios considered, some funds receive inflows

¹ This section was prepared by Benjamin Mosk

² Background information about the Securities and Exchange Commission’s (SEC) Form N-PORT can be found on [SEC.gov | Form N-PORT Data Sets](https://www.sec.gov/foia/nport). Data is available as of 2019Q4, and the analysis presented in this GFSR is based on the 2025Q2 batch of data (by filing date).

³ See “[Lipper-U.S.-Mutual-Fund-Classifications-Definitions](#)” for a detailed explanation and definition of different fund types. Table 2 provides the sample’s top three fund types by count and by total assets under this classification.

⁴ Most US bond funds do not make significant use of repurchase agreements, and they have historically not significantly increased repo-funding under market stress, with the exception of the sub-category of leveraged funds (see “[Global Financial Stability Report](#)”, October 2024, Page 38). In addition, the Bank of England’s “[System-Wide Exploratory Scenario \(SWES\) exercise](#)” suggests that not all NBFIs might not receive all the repo financing they expect. The report states that: “During a market stress, banks are unlikely to provide all of the additional repo financing NBFIs ask for, despite their willingness to draw on central bank lending facilities.”

⁵ Securities collateral (e.g. Treasuries) is more common for initial margin (IM), which is not considered for this exercise. Variation margin (VM) reflects daily mark-to-market gains or losses on a derivative position and is meant to settle losses immediately to prevent accumulation of counterparty risk.

or variation-margin credits that could, in principle, be used to buy assets, softening the impact of forced sales by funds experiencing outflows. This study assumes that, under market stress, asset managers have a liquidity preference; that is, they prefer to maintain cash holdings or purchase MMF shares over US Treasuries.

Sample Description and Statistics

4. The analytical sample combines SEC Form N-PORT filings from the 2025Q2 submission cycle—which report portfolio holdings and exposures for 2025Q1—with historical Lipper fund-flow statistics. Funds enter the sample if Lipper classifies them as *Mutual Funds* in the *Bond* asset category. By construction, the sample is limited to the intersection of these sources and therefore consists of U.S.-domiciled bond mutual funds, regardless of investment objective (including funds that invest in foreign assets). Foreign funds that are not subject to N-PORT filing requirements are excluded by construction. Table A1.4.2 summarizes the main characteristics of the sample.

Table A2.4.2 Sample Descriptive Statistics				
General Sample Statistics				
<i>Sample size:</i>	1235 bond mutual funds			
<i>Top 3 bond fund types (US Mutual Fund Objective) by count:</i>	Core Bond Funds			12.6%
	High Yield Funds			6.4%
	Short Investment Grade Debt Funds			6.2%
<i>Top 3 bond fund types (US Mutual Fund Objective) by total assets:</i>	Core Bond Funds			41.2%
	Multi-Sector Income Funds			13.4%
	Short Investment Grade Debt Funds			5.2%
Assets, Liabilities, and Treasury Holdings				
	<i>Sum (bn)</i>	<i>Weighted Average (bn)</i>	<i>Weighted Median (bn)</i>	<i>Weighted (5th, 95th) percentile (bn)</i>
<i>Total assets</i>	4894.3	114.8	30.2	(1.1, 410.3)
<i>Total liabilities</i>	696.1	31.3	1.1	(0.0, 163.1)
<i>Treasury Holdings</i>	1126.7	31.6	5.8	(0.0, 166.7)
Note: Fund type reflects a fund's US Mutual Fund Objective as reported by Lipper. Weighting of average, median and 5 th and 95 th percentile is based on funds' total assets.				

Fund Flow Assumptions

5. Fund flow assumptions for the March 2020 and April 2025 scenarios are derived from actual fund-level flows using *monthly* data from LSEG Lipper. As the mutual fund sector continues to grow, the magnitude of flows, expressed as a percentage of a fund's assets under management, is applied to each fund's current size (2025Q1). If funds were not yet operating or data are missing during the historical episodes of March 2020 and April 2025, we imputed missing values using the median flow of peers within the same US mutual fund objective. Figure A1.4.1 shows that the March 2020 flow scenario has a much heavier left-tail than the April 2025 flow scenario; the latter was relatively mild—most funds saw outflows between 0-2% of assets under management.

6. A third scenario assigns to each fund its own 99th percentile of monthly outflows (between January 2013 and June 2025), expressed as share of assets under management. For many funds, this 99th percentile outflow corresponds to the March 2020 episode; however, even during this episode, some funds recorded inflows (e.g., short-term government bond funds). By taking the 99th percentile for each fund, we construct a more severe scenario. A limitation is the shorter history for relatively young funds—particularly those launched after March 2020—which can skew percentile estimates. The scenario's greater severity and more uniform outflows are evident in the near absence of funds with inflows (Figure A1.4.1).

7. In addition to the outflow channel, liquidity pressures emanating from variation margin calls on interest rate derivatives are also incorporated into the scenarios. The simplified interest rate shocks assume parallel

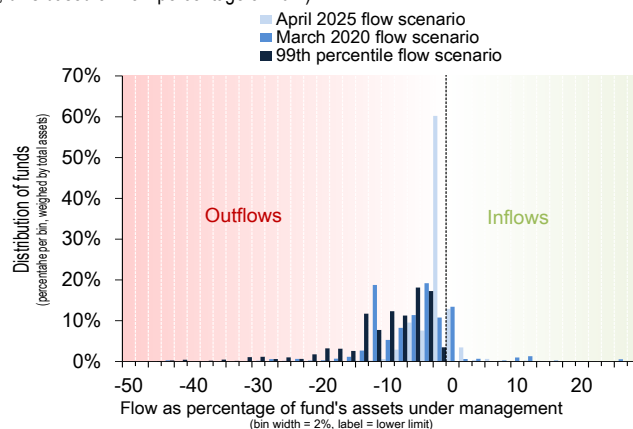
curve shifts of respectively +60, +80, and +100 basis points (see Table A1.4.3), calibrated to historical moves.⁶ Because interest rates, fund flows, and liquidations are jointly determined, realized rate changes reflect general-equilibrium effects rather than purely exogenous shocks as the ones assumed in this exercise; this caveat should guide the interpretation of the results. Table A1.4.3 summarizes the three scenarios that were considered for the exercise, including statistics on fund flows and the interest rate shocks that are part of each scenario.

Figure A1.4.1 Distribution of Bond Mutual Fund Flows - Scenarios

The April 2025 flow scenario is mild compared to the March 2020 scenario and the 99th percentile outflow scenario, which both show heavier left tails. The 99th percentile outflow scenarios stands out by not having funds with inflows (by construction).

1. Distribution of Fund Flows for Scenarios

(percent of total assets per bin, bins based on flow percentage of AuM)



Sources: Lipper, SEC N-PORT; and IMF staff calculations.

Table A1.4.3. Scenarios

Scenarios		
<i>April 2025 outflows + 60 bps rate shock</i>	<i>March 2020 outflows + 80 bps rate shock</i>	<i>99th pct outflows + 100 bps rate shock</i>
Flow assumptions		
April 2025 outflows projected to current fund size	March 2020 outflows projected to current fund size	Each individual fund's 99 th percentile outflow, projected to current fund size
Extended to funds with missing data on the basis of US mutual fund objective grouping (median of group assigned)		
Flow statistics: Median; (5 th , 95 th percentile)		
-0.8% (-7.1%, 5.6%)	-2.7% (-16.9%, 9.0%)	-9.4% (-40.0%, -2.2%)
Interest Rate Shock Assumptions (for derivatives)		
Level shift of curve by +60 basis points	Level shift of curve by +80 basis points	Level shift of curve by +100 basis points

Derivatives Pricing Assumptions

8. Only interest-rate derivatives are considered: US Treasury futures and (USD) fixed-float interest-rate swaps.⁷ Positions are repriced using the linear (DV01) response to the exogenous rate shock; higher-order effects such as convexity are excluded. The duration assumptions for the US Treasury Futures contract are

⁶ The March 2020 and April 2025 flow scenarios are combined with interest rate shocks of +80 and +60 bps curve shifts respectively. These numbers correspond approximately to the trough-to-peak change in the 10-year Treasury yield during those episodes.

⁷ Bond mutual funds use Treasury futures and interest rate swaps to take directional duration exposures of to hedge interest rate risk. They may use other derivatives as well, such as FX derivatives, particularly when they invest in non-US dollar denominated bonds, or credit default swaps. Choi Kim and Randall (2023) show, based on N-PORT data, that fixed income fund notional positions in interest rate derivatives is significantly larger than their positions in credit and FX derivatives.

shown in Table A1.4.4, left hand side; the exact duration of a futures contract depends on a number of factors, such as the conversion factor and cheapest-to-deliver bond. Swap durations (Table A1.4.4, right panel) depend on the fixed coupon, the current forward curve for the relevant benchmark rates, and other contract characteristics. Parameter values reflect IMF staff judgment, informed by recent market conditions and prevailing rate levels.

Table A1.4.3 Assumptions for the Duration of Interest Rate Derivatives						
US Treasury Futures			US Dollar Interest Rate Swaps (fixed-float, all benchmark rates)			
Contract	Duration assumption		Maturity	Duration	Maturity	Duration
2-Year	2.0		0.5	0.5	8	6.9
5-Year	4.7		1	1	10	8.3
10-Year	9.0		1.5	1.4	12	9.5
10-Year Ultra	9.8		2	1.9	15	11.2
Bond	18.0		3	2.8	20	13.7
Bond Ultra	20.0		4	3.7	25	15.7
			5	4.5	30	17.5
			6	5.4	40	20.5
		7	6.1	50	22.9	

Additional Observations & Discussion

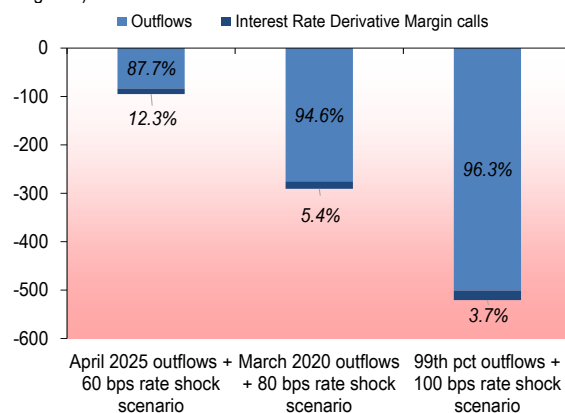
9. The exercise is limited in scope, so findings should be interpreted considering the underlying assumptions and simplifications. Two higher-level observations emerge. First, liquidity pressures arising from interest-rate derivatives are small relative to those generated by investor outflows (Figure A1.4.2). Second, fund-level heterogeneity means that aggregate statistics on flows or margin calls can understate the scale of forced liquidations: some funds experience inflows in a given scenario, while others must sell assets. Heterogeneity reflects both the sources of pressure and balance-sheet composition. Funds with larger buffers—cash, MMF shares, Treasury bills, and commercial paper—tap US Treasury bonds only in more severe scenarios, whereas funds with thinner liquidity cushions may be forced to sell Treasuries even under milder conditions (e.g., the April 2025 flow scenario).

Figure A1.4.2 Scenario Outcomes for Gross Liquidity Pressures for Bond Mutual Funds

Under the assumptions presented in this Annex, US bond mutual funds' gross liquidity pressures emanating from margin calls on interest rate derivatives are dwarfed by the impact of fund outflows.

1. Gross Liquidity Pressures

(US dollar billion, percent of total for subcategories)



Sources: Lipper, SEC N-PORT; and IMF staff calculations.

Note: strictly speaking, liquidity pressures from outflows and margin calls are not additive, as some funds may face inflows(outflows) in combination with margin calls(credit), whereby these two sources of liquidity pressures partially cancel out. This overlap is insignificant, but nonetheless, the figure should be understood as indicative. Gross liquidity pressures refers to the sum of outflows (margin calls) of only those funds that experience outflows (margin calls).

References

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Online Annex 1.5 Corporate Debt-at-Risk Sensitivity Analysis¹

1. The debt servability of global corporate sector is seen to be affected by higher tariffs on goods exported to US, and higher long term rates, which has made refinancing debt increasingly expensive. Chapter 1 discusses the sensitivity of the corporate sector debt amid this environment for a sample of countries. The scope of this annex is to provide the detailed methodology adopted for this sensitivity analysis. A broader discussion on higher tariffs and their role in prices and thereby inflation is discussed in Chapter 1 of the October 2025 *World Economic Outlook*.

Measuring the Additional Costs from Tariffs

2. While uncertainty around tariffs remains, the consensus is that effective tariffs would be higher than they had been pre-2025 and with notable heterogeneity across countries. Higher tariff is likely to have an adverse impact on either profit margins, or sales volumes. However, stronger-than-expected economic growth or other policy support like, reduced corporate tax rates could dampen or even nullify the deteriorations stated earlier. While probable, the possible policy support in response to US tariffs is hard to forecast at this stage. Hence, domestic policy responses are not incorporated in this exercise.

3. We start by estimating the additional costs implied by increased tariffs for a country's export sector ($TC_{c,x}^{implied}$), which takes into account the additional US tariff rates imposed (AT_c), the share of exports to US in total ($XShare_c^{US}$), and share of US exports that are subjected to additional tariffs ($XUS_c^{exposure}$), as not all products are tariffed.

$$TC_{c,x}^{implied} = AT_c * XShare_c^{US} * XUS_c^{exposure}$$

4. Given that not all firms in a country are exporting, the impact on broader corporate ($STC_c^{implied}$) is estimated by factoring in the share of exporting corporates in total. We use goods exports as a percent of GDP (XG_{GDP}^{US}) as a proxy for this. Since in the US, importing firms will be facing this additional tariff, goods import as a percent of GDP (MG_{GDP}^{RoW}) is used to proxy the proportion of corporates facing an increase in tariff related costs ($STC_{US}^{implied}$).

$$STC_c^{implied} = TC_{c,x}^{implied} * XG_{GDP}^{US}$$

$$STC_{US}^{implied} = TC_{US}^{implied} * MG_{GDP}^{RoW}$$

5. These additional costs are faced by a country's corporate sector in terms of percentage of revenue (as tariffs are generally imposed on their freight on board (FOB) value, the value of the goods at the exporting country's port, excluding shipping and insurance to the U.S.).

6. There are multiple combinations of pass-throughs that can be exercised here by firms, and that would depend on a wide range of factors including general market power of firms, substitutability of product, contractual agreement, scope for improvement in operational efficiencies, and demand conditions. Given that we look to study the sensitivity of corporate debt serviceability across key countries, we consider the two extreme scenarios for importing firms in the US in the near term:

- 100% pass-through of additional tariff costs ($PT^{US} = 1$)
- 0% pass-through of additional tariff costs ($PT^{US} = 0$)

¹ This section was prepared by Deepali Gautam and Aki Yokoyama

7. **Scenario 1: 100% pass-through to consumers** would imply that the increase in prices due to additional tariffs would be equal to the increase in costs due to additional tariffs. Hence, firms will maintain their margins but the demand in the importing country for these more expensive goods will decline due to higher prices. To estimate the potential effect of an additional increase in prices on revenue amid generally rising inflation we run a panel regression (Table A1.5.1). This gives us an estimate of the sensitivity of sales volumes to change in prices ~ -0.11 . That is, a 1 pp rise in prices, sales is seen to decline by 0.11% . Further, we see this to percolate down to exporting countries' corporate revenues to the extent of their exposure to the US markets. That is, if a country's sectoral additional cost ($STC_c^{implied}$) is 10%, then effective impact on corporate revenue (δRev_c^{corp}) will be -1.1% (10% * -0.11) due to a full pass-through of tariffs by US firms to their consumers ($PT^{US} = 1$).

$$\delta Rev_c^{corp} = STC_c^{implied} * -0.11$$

8. The table below shows country levels estimates for $STC_c^{implied}$, sensitivity of revenues to price increases, and δRev_c^{corp} .

Table A1.5.1: Estimated Change in Revenues Due To Higher Prices from A 100% Pass-Through			
Country	Implied increase in tariff related costs ($TC_{c,x}^{implied}$)	General sensitivity of revenues to price increases	Effective change on revenues
Bangladesh	6.1%	-0.11	-0.7%
Brazil	3.2%		-0.3%
Canada	15.3%		-1.7%
Chile	3.3%		-0.4%
China	3.2%		-0.3%
Colombia	0.9%		-0.1%
France	1.9%		-0.2%
Germany	2.2%		-0.2%
India	1.3%		-0.1%
Japan	4.1%		-0.5%
Malaysia	0.9%		-0.1%
Mexico	6.3%		-0.7%
Philippines	1.6%		-0.2%
South Africa	0.9%		-0.1%
Korea	3.2%		-0.4%
Spain	1.0%		-0.1%
Turkey	0.9%		-0.1%
United Kingdom	1.5%		-0.2%
United States	3.4%		-0.4%
Vietnam	1.9%		-0.2%
Sources: Center for Global Development’s US Tariff Tracker, The Budget Lab at Yale, IMF’s World Economic Outlook database, and IMF Staff estimates Note: The additional effective tariffs at country level calculated relative to January 20, 2025, and as of July 12th, 2025. For the US, the implied increase in tariff related costs is the simple average of countries in the sample and is only marginally higher than the estimates for additional import tariffs faced by US consumers by The Budget Lab at Yale. The general sensitivity of revenues to price increases is estimated using the regression analysis shown in table A1.5.2 and corresponds to the coefficient for change in CPI under specification 3.			

9. To estimate the sensitivity of revenues to increase in prices under a 100% pass-through assumption, we work with IMF's Growth-at-Risk (GAR) framework, which estimates the downside risk to real GDP growth for given financial conditions, and lagged real GDP growth. For the purpose of this sensitivity analysis, we modify the GAR framework by incorporating change in CPI (inflation) as an explanatory variable in a panel setup. Since tariffs are likely to contribute to higher inflation, we narrow the sample to include only periods of rising inflation, shown under specification 3 of the regression output (table A1.5.2). These estimates are to inform the scenarios, and while could benefit from more detailed country or product level

analysis including a wider set of controls did not meaningfully alter the output. The analysis supports our prior of an increase in prices during periods of rising inflation would negatively affect demand (proxied by real GDP) and thereby revenues of firms.

Table A1.5.2: Regression Analysis			
Variables	DV: Real GDP growth using global financial conditions (1)	DV: Real GDP growth using country financial conditions (2)	DV: Real GDP growth using country financial conditions, and during periods of rising inflation (3)
Real GDP growth, lagged	0.394***	0.300***	0.275***
Change in CPI	0.00170	-0.0239**	-0.114***
Lagged CPI	-0.000105	0.00299	0.0689***
World FCI, lagged	-0.839***		
Change in world FCI	-1.471***		
Country aggregate Z-scores, lagged		-1.287***	-0.919***
Change in country aggregate Z-scores		-2.759***	-3.042***
Constant	1.815***	2.072***	2.819***
Observations	1,350	1,254	602
Number of countries	43	43	43
*** p<0.01, ** p<0.05, * p<0.1			
Sources: Bloomberg Finance L.P.; Haver Analytics; national data sources; and IMF staff calculations			
Note: All data are in annual frequency and the country sample maps countries included in IMF's Financial Conditions Index framework. See Online Annex 1.1 in the October 2018 Global Financial Stability Report for details.			

10. In a limited way, this scenario presents corporate sector's the first round contribution to the stagflationary environment that might follow higher tariffs.

11. **Scenario 2: A 0% pass-through to consumers** would imply that US corporates do not pass-on any increase in costs due to additional tariffs and take a hit on their earning margins. Here, we also assume that the US importers and their exporting counterparts would be sharing the increased tariff costs equally ($STC_{US,share}^{implied} = STC_{c,share}^{implied} = 50\%$). For the US, it would imply a hit to the EBIT or Earnings Before Interest and Tax of ($3.4\% * 11\% * STC_{US,share}^{implied}$) of revenues, where 3.4% is the cross-section average of implied increase in tariff related costs of countries in the sample, and 11% is the US goods import as a percent of GDP. The table below shows the effective impact on corporate sector's EBIT as a percentage of revenues at the country level.

Table A1.5.3: Estimated Change in EBIT Due Absorption of Higher Tariff Costs or A 0% Pass-Through			
Country	Implied increase in tariff related costs ($TC_{c,x}^{implied}$)	Absorption of higher costs by the country's corporate sector, share of total	Net impact on EBIT, percent of revenue
Bangladesh	6.1%	50%	-3.0%
Brazil	3.2%		-1.6%
Canada	15.3%		-7.7%
Chile	3.3%		-1.7%
China	3.2%		-1.6%
Colombia	0.9%		-0.5%
France	1.9%		-1.0%
Germany	2.2%		-1.1%
India	1.3%		-0.7%
Japan	4.1%		-2.1%
Malaysia	0.9%		-0.5%
Mexico	6.3%		-3.2%

Philippines	1.6%		-0.8%
South Africa	0.9%		-0.5%
Korea	3.2%		-1.6%
Spain	1.0%		-0.5%
Turkey	0.9%		-0.4%
United Kingdom	1.5%		-0.7%
Vietnam	1.9%		-0.9%
United States	3.4%		-1.7%

Sources: Center for Global Development's US Tariff Tracker, The Budget Lab at Yale, IMF's World Economic Outlook database, and IMF Staff estimates
 Note: The additional effective tariffs at country level calculated relative to January 20, 2025, and as of July 12th, 2025. For the US, the implied increase in tariff related costs is the simple average of countries in the sample and is only marginally higher than the estimates for additional import tariffs faced by US consumers by The Budget Lab at Yale.

Measuring Higher Refinancing Costs

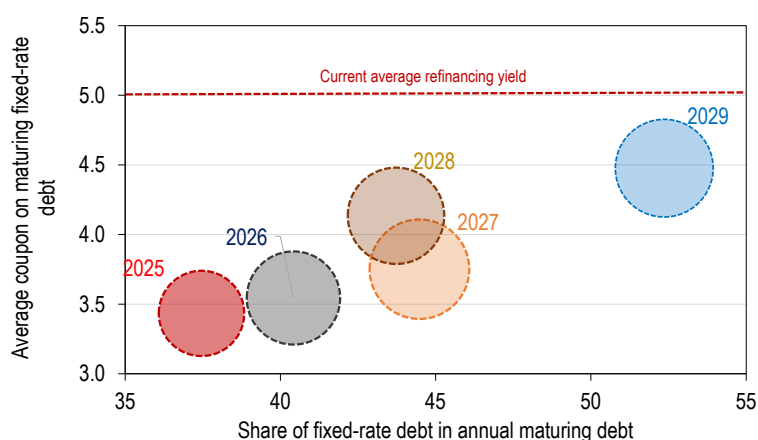
12. Owing to higher longer-term interest rates and strong borrowing during the period of low interest rates following COVID-19, the average coupon on the debt maturing in 2025–26 is estimated around 3.5% with about 40 percent of this debt currently servicing a fixed rate. Given the current yields on ~5%, the refinancing of this debt by corporates would be more expensive by about 150bps, implying an additional interest expense of ~60bps higher than existing effective interest rates.

Figure A1.5.1 Maturing Corporate Debt and its Refinancing Costs

Effective interest rates will continue to rise as corporates refinance their maturing fixed-rate debt amid higher long-term rates

1. Average Coupon of Maturing Debt versus Share of Fixed-Rate Debt, Global

Percent



Sources: Bloomberg Finance L.P.; Dealogic; IMF, S&P Capital IQ Pro; and IMF staff calculations
 Note: The size of the bubbles represents the total outstanding debt maturing.

Quality of Corporate Debt Deteriorates Due Higher Tariff and Refinancing Costs, However, Also for Regions with Pre-Existing Issues

13. To assess the changes in corporate debt servicing abilities, higher costs from tariff and interest expenses are imposed over Q1 2025 data. At the time this exercise was run, Q1 2025 provided the most recent and reasonably populated firm level data for about 13,200 firms in the group of 20 countries shown in tables A1.5.1 & A1.5.2 above, of which 11 are emerging market economies.

14. The sensitivity analysis results show a notable deterioration in median ICRs, regardless of the level of pass-through (Figure A1.5.2, panel 1), with small and medium sized firms showing greater sensitivity (Figure A1.5.2, panel 2). The median ICRs will look much worse for small and medium firms if countries where corporates operate at [lower leverage with structurally low interest rates] are excluded. In addition, there could be biases in the median ICRs estimated under the two scenarios due to the simplicity of this sensitivity analysis which doesn't distinguish firms' market power based on their size.

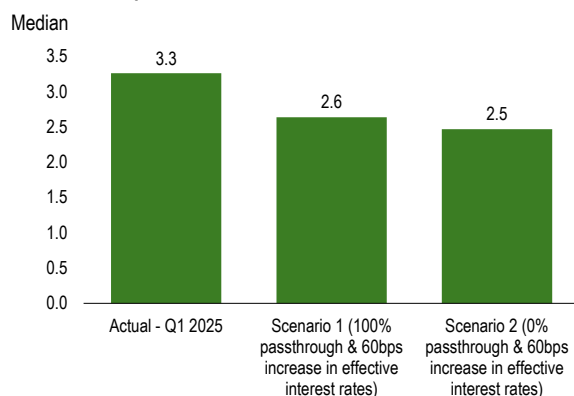
15. Nonetheless, the analysis offers insights on the heterogeneity in the potential impact of higher tariff and interest-related costs at the country level, which is not exclusive to the magnitude of additional effective tariffs rates. The distribution of debt by their ICR, which varies quite notably across the sample (Figure A1.5.2, panel 3), also has an important role to play. Indeed, some of the countries showing largest increases in share of their risky debt—debt with ICR below 1—despite facing smaller-than-average increase in tariff rates (green markers), have also been operating at rather large shares of risky debt (Figure A1.5.2, panel 4).

Figure A1.5.2 Interest Coverage Ratios (ICR) for Varying Levels of Cost Pass-Throughs

Globally, corporate ICRs would worsen within a narrow band irrespective of the level of cost pass-throughs by US firms.

However, smaller firms would be more severely affected.

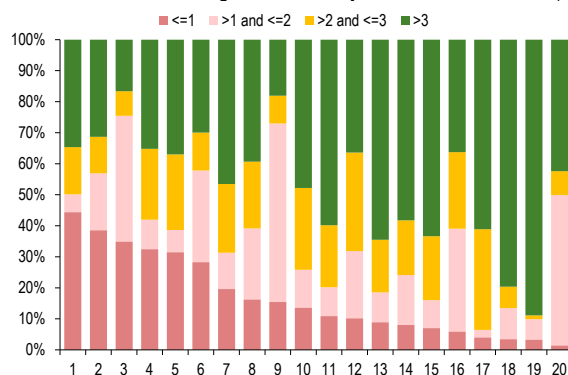
2. Global Corporate ICR



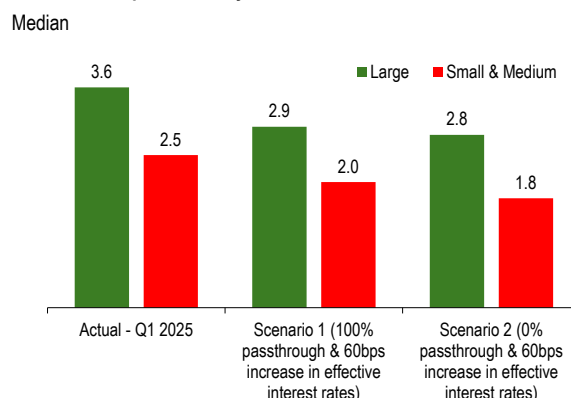
In some countries, the share of risky debt, i.e., with ICR below 1, is concerning higher.

4. Distribution of Corporate Debt by ICR Bands in Q1 2025

(Share in total debt, sorted highest to lowest by share of debt with ICR<1)

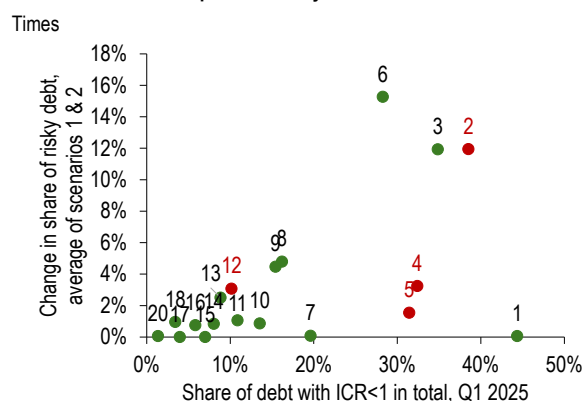


3. Global corporate ICR by firm size



These have also shown the largest increases in the share of risky debt under the two scenarios.

5. Distribution of Corporate Debt by ICR Bands



Sources: Bloomberg Finance L.P.; Dealogic; IMF, S&P Capital IQ Pro; Center for Global Development's US Tariff Tracker, IMF's World Economic Outlook database and IMF staff calculations. Note: The panel of countries included in the panel are Bangladesh, Brazil, Canada, Chile, China, Colombia, France, Germany, India, Japan, Malaysia, Mexico, Philippines, South Africa, Korea, Spain, Turkey, United Kingdom, Vietnam, and United States. In panels 1 and 2, medians are calculated using firms level data across countries. Firms with total assets greater than USD 500 million in Q1 2025 are classified as large, and the remaining 6,000 firms are classified as small and medium firms. In panel 4, the red dots represent the countries whose corporates are facing smaller-than-average increase in tariff related costs. For the sample countries, the average increase in tariff costs is estimated at 1% of revenues, based on effective tariff information as of July 12, 2025.

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Annex 1.6 Estimating US Dollar Exposures¹

Background

1. Traditionally, discussions of the interaction between currency dynamics and financial conditions have focused on banking and US dollar denominated liabilities. The “risk-taking channel” of currency appreciation (see Bruno and Shin, 2014) entails a link between exchange rates and financial stability: i.e., local currency appreciation (or dollar depreciation), leads to looser financial conditions, in conjunction with a build-up of leverage in the banking sector.
2. The recent dollar weakness, however, highlighted a new potential amplification mechanism stemming from the US dollar asset exposures. Dollar asset exposures via financial products, including deposits owned by portfolio investors or financial institutions, are likely to be managed flexibly, rendering them more sensitive to market developments.² Severe macro-financial disruptions can potentially ensue in an extreme scenario characterized by the large-scale repatriation and/or conversion of such dollar assets. Or, as a preliminary step, investors outside the United States retain their holdings of US assets, but sell US dollars in forward market to reduce or ‘hedge’ their exposures against further declines in the dollar. Currency hedging by non-US investors holding US dollar securities appears to have contributed meaningfully to amplifying weakness of the dollar in April and May this year (see BIS, 2025).
3. Since no comprehensive dataset currently exists for ‘runnable’ or ‘to be hedged’ US dollar exposures, staff develop an innovative approach to infer associated measures using information derived from a combination of multiple statistics. To evaluate financial vulnerabilities associated with the US dollar weakness, staff quantify countries’ exposures by measuring both US dollar-denominated assets and liabilities. A notable challenge in this analysis arises from the absence of a comprehensive dataset capturing country-level US dollar denominated assets and liabilities. Consequently, the following paragraphs provide a detailed description of the data construction methodology implemented to address this critical data challenge. Using the aforementioned combined data, staff attempt to estimate cross-border portfolio investments and other investments, including deposits, by a broad range of countries. In what follows, this annex aims to explain the estimation methodology.

Estimating US Dollar-Denominated Assets

4. Dollar-denominated assets encompass equities, bonds, and bank claims (see A1). Data on equities and debt instruments are sourced from the IMF’s Portfolio Investment Positions by Counterpart Economy dataset (formerly Coordinated Portfolio Investment Survey, or CPIS) and the US Treasury’s Treasury International Capital (TIC) system, whereas data on bank claims are extracted from Bank for International Settlements’ (BIS) Locational Banking Statistics (LBS). The CPIS dataset, a voluntary survey coordinated by the IMF, collects cross-border portfolio investment data on equity and debt securities.³ Participating economies report data on their holdings of portfolio investment securities.

$$USD\ Assets = USD\ Equities + USD\ Bonds + USD\ Bank\ Claims \quad (A1)$$

5. The TIC dataset surveys U.S. securities issuers, compiling data on both foreign holdings of U.S. securities and U.S. holdings of foreign securities. It disaggregates these holdings by security types (equities,

¹ This section was prepared by Zixuan Huang and Aki Yokoyama

² These exposures correspond to “Portfolio investment” and “Other investment” categories in International Investment Position statistics (IIP).

³ Note that securities issued and held by residents of the same country are excluded. Put differently, using CPIS data, the USD-denominated bonds issued and held within the same country is still omitted.

debt, long-term, short-term) and by counterpart countries. However, TIC data have several limitations relative to the CPIS data. First, TIC classifies foreign holdings of U.S. securities based on the country of residence of the holders, not the ultimate owners, which can lead to significant distortions, particularly for jurisdictions serving as financial conduits, while CPIS data are more likely to track the ultimate owner⁴. Second, TIC focuses solely on U.S. securities, which are not necessarily denominated in U.S. dollars, whereas CPIS provides information on the currency composition of assets. Third, since TIC just reports U.S. securities, it does not include dollar securities issued outside the U.S., whereas CPIS data include all cross-border portfolio investments.

6. To address these issues, staff prioritize CPIS data on dollar-denominated equities and debt. TIC data are incorporated to fill gaps whenever CPIS data is unavailable. For countries where TIC data is used, this approach assumes that U.S. securities reported in TIC are all denominated in U.S. dollars, a reasonable approximation given that U.S. equities, Treasury securities, agency bonds, and the majority of corporate bonds are denominated in U.S. dollars.⁵

7. An additional refinement pertains to foreign exchange reserves. Since the analysis considered here focuses on private holdings of US dollar assets, foreign exchange reserves are excluded. CPIS data, fortunately, does not include foreign exchange reserves, but TIC data does. Therefore, for any country where TIC data is used to derive the assets, official foreign exchange reserves denominated in US dollars are excluded. To quantify the reserves in US dollars, staff multiply the total reserves by the share of US dollars (see A2).

$$\text{USD-denominated FX reserves} = \text{total FX reserves} \times \text{USD share in FX reserves} \quad (A2)$$

8. Although many countries report the total foreign exchange reserves to the IMF's International Reserves and Foreign Currency Liquidity (IRFCL), the IRFCL does not cover some economies such as Taiwan Province of China. For these cases, their foreign exchange reserves are manually collected from central bank websites or Haver. Additionally, the IMF IRFCL does not provide information on the currency composition. To address this issue, staff rely on the data collected by Ito and McCauley (2020), which provides a panel dataset on currency shares of foreign exchange reserves for countries up to 2020. It is assumed that these shares remain stable post-2020. For some countries, 2019 data is used whenever 2020 data is not available. Lastly, for countries not included in Ito and McCauley (2020), staff rely on the IMF's Currency Composition of Official Foreign Exchange Reserves (COFER). COFER provides the global aggregate share of USD in foreign exchange reserves, which is applied as a proxy at the country level.

9. The last component of dollar assets is bank claims, estimated using BIS LBS data. BIS LBS measures international banking activity by location of banks' residence, capturing outstanding claims (financial assets) and liabilities of internationally active banks located in the reporting countries on counterparties. Availability of currency breakdown in LBS enables the estimation of the US dollar-denominated loans and deposits in the international market.

10. BIS Locational Banking Statistics (LBS) is employed to estimate (i) dollars loans and deposit claims held by banks and (ii) dollar deposits held by the nonbank sectors of the economy. To estimate the dollar loans and deposits held by a country's banks, staff directly extract LBS data on loans and deposits denominated in US dollars from banks' asset holdings. To estimate deposits held by the non-bank sector of a specific country, information on counterparties is used. Specifically, all deposit liabilities reported by foreign countries that identify deposits from that country's non-bank sectors are aggregated (see A3). This sum

⁴ Reported by individual countries, CPIS data are more likely to capture the ultimate owner than TIC data. However, for some jurisdictions where cross-border financial intermediation is significant, CPIS data may still capture the resident entities which can be owned or controlled by foreign countries.

⁵ The aggregate share of USD-denominated corporate bonds in the US is reported in TIC, being 82.7% and 81.7% for 2024 June and 2023 June, respectively.

provides an estimate of the total USD deposits held by the non-bank sector at the country level in the international banking system.

$$\text{Country } A\text{'s deposits in the USD} = \sum_{i=1}^N \text{deposit liabilities issued by reporting country } i \text{ to country } A \quad (A3)$$

where there are a total of N countries reporting to having deposit liabilities from country A .

11. Staff also estimate the US dollar exposures relative to the monthly transaction volume of each local foreign exchange market, by dividing the total amount of US dollar exposure of countries by the monthly FX turnover of the corresponding currency. The data on the FX turnover is from BIS Triennial Central Bank Survey.

Estimating USD-Denominated Liabilities

12. Next data construction on dollar-denominated liabilities is considered. To quantify liabilities denominated in US dollar, staff consider countries' issuance of US dollar debt, their borrowing in US dollar loans, and bank deposits in US dollar (see A4).

$$\text{USD-denominated liabilities} = \text{debt issuance denominated in USD} + \text{loans in USD} + \text{bank deposits in USD} \quad (A4)$$

13. Data for BIS International Debt Securities (IDS) is used to obtain dollar debt issuance. IDS records USD-denominated debt issued by countries in the international market. The drawback of using this dataset is that the dollar debt issued in the domestic market is not included.

14. For dollar borrowing in the form of bank loans, counterparty information from BIS LBS data is again used, aggregating all dollar loans reported by each reporting country, for a given counterparty country. Finally, deposits denominated in US dollars are extracted directly from BIS LBS.

Adjustment For a Net Banking Sector

15. Lastly, staff make an adjustment to dollar assets and liabilities to gauge dollar exposure with the net banking sector. If banks have both dollar assets and liabilities, they can benefit from a natural hedge, and are only minimally exposed to exchange rate volatility, as banks effectively function as a conduit for purchasing US dollar assets, double counting of dollar exposures of counterparties holding dollar deposits. To incorporate this effect, staff consider dollar exposures with a net banking sector. When banks' dollar assets exceed their liabilities, only the net difference is counted as the banking sector's net asset exposure; conversely, if liabilities exceed assets, only the net difference is counted as the banking sector's net liability exposure. In these cases, the minimum of bank dollar assets and liabilities is subtracted from both total dollar assets and liabilities to derive the dollar exposures with a net banking sector.

Uncaptured Exposures

16. Since the focus here is on cross-border positions, local U.S. dollar positions are not covered in staff estimates. For example, the estimate does not capture local investors' exposures to US dollar assets issued by local institutions, such as Formosa bonds, which are bonds issued in Taiwan Province of China and denominated in a currency other than the Taiwan dollar. In such a case, US dollar exposures are balanced between assets and liabilities at the economy level; however, individual institutions may run foreign exchange mismatches at the micro level.

Results

Estimates of such 'runnable' dollar exposures, including security investments, loans, and deposits, suggest these are significantly large in economies where international financial centers are located (Cayman Islands, UK, Luxembourg, Hong Kong SAR, Switzerland, Bermuda), and where large non-bank financial institutions are located (Japan, Canada, Ireland, Germany, Netherlands, Taiwan Province of China, Korea, France, Norway, Australia, Figure.A1.6.1). These dollar exposures are disproportionately large relative to the size of

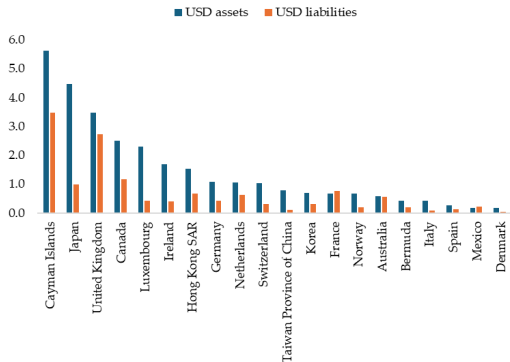
the local foreign exchange market in some economies, posing a risk of excessive volatility if those hedging flows concentrate in a short period (Figure.A1.6.1).

Figure A1.6.1 US Dollar Exposures

US dollar asset exposures are significantly large in some economies, and where these are...

1. US Dollar Exposures

Trillion US dollars

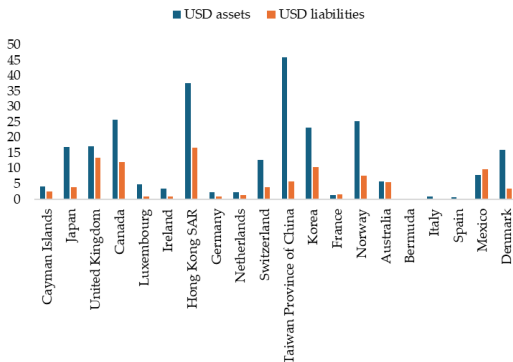


...much larger than the size of the local FX market, hedging flows may translate into substantial price impact.

2. US Dollar Exposures Relative to Foreign Exchange Market

Transaction Volume

Ratio, scaled by monthly local market



Sources: Bloomberg; BNP Paribas; BIS; IMF; US Department of Treasury; IMF staff estimates.
Note: Panel 2 shows the estimated US dollar exposures relative to monthly transaction volume of each local foreign exchange market.

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Annex 1.7 Sovereign Bond Markets¹

1. This annex explains the conceptual and methodological underpinnings supporting analysis presented in sub-section “Expanding Fiscal Deficits Exerting Pressure on Bond Market Stability” in the October 2025 GFSR.

AA: Estimation of Term- and Duration Term Premiums

2. While term premiums (*TP*) capture the compensation investors require for the risk that yields may change over the life of a bond without specifying the driver, duration term premiums (*DTP*) are an analogous measure that specifically isolates the premium required for the risk that interest rates may change over life of a bond exclusively driven by duration risk.

3. While largely driven by the compensation for taking on duration risk, the *TP* estimations based on government bond yields also reflect other premium components—including fluctuations that capture changes in the perceived creditworthiness of the sovereign issuer in terms of credit spread risk, which can confound the reading of *TP* to gauge the compensation for ‘pure’ interest rate risk, particularly when investors are becoming increasingly attuned to fiscal profligacy and rising bond issuance supply.

4. These non-duration premium components are largely neutralized when estimating the model based on yields for fully collateralized and centrally cleared interest rate swaps, compensation for which henceforth is referred to as *DTP*. In practice, the construction of *DTP* is underpinned by market microstructure considerations in terms of intermediaries’ recycling of duration risk throughout interest rate markets. Such recycling often involves temporarily warehousing sovereign bonds for asset owners such as pension funds, insurers, or sovereign wealth funds—often through auction participation—while neutralizing the ‘pure’ interest rate risk exposures through pay-fix interest rate swaps. Hence, the *DTP* can provide a cleaner measure of the compensation specifically related to taking on duration risk—driven by undiversifiable business cycle risk, financial conditions and market uncertainty—while neutralizing the influence of changes in an issuers’ perceived creditworthiness in terms of credit spread risk.

5. Under the assumption that the short-rate dynamics governing the no-arbitrage pricing restrictions are roughly similar across both bond and swap markets, the difference between the *TP* and *DTP* is highly correlated with the 30y swap spread, which can be seen when comparing the wedge between G4 *TP* and *DTP* estimates in Figure 1.9, panel 3 which closely corresponds to the level of the G4 swap spread shown in Figure 1.9, panel 2.

6. In terms of estimation, both metrics are calculated following Adrian et al. (2013) based on zero-coupon rates y_t for either government bonds or centrally cleared interest rate swaps. Indices for the G4 jurisdictions and these two instrument types are suppressed in the following for the ease of notation.

7. By way of background, y_t capture a set of $N \times 1$ yields. For a given n -period maturity tenor, the assumption is that the observed yields y_t load onto a set a vector of $K \times 1$ state variables X_t , which explains the cross-section of yields at a given point in time through a $K \times N$ loading matrix B and an $N \times 1$ intercept A

$$y_{t,n} = -\frac{\log P_t^n}{n} = -\frac{1}{n}(A_n + B_n' X_t). \quad (1)$$

¹ This section was prepared by Johannes S. Kramer.

A first-order vector-autoregression governs the transition of states over time

$$X_t = \mu + \Phi X_{t-1} + \Omega v_t, \quad v_t \sim i.i.d. N(0, I), \quad (2)$$

where μ is the $K \times 1$ intercept, Φ the $K \times K$ state transition matrix and Ω the $K \times K$ covariance matrix defining the magnitude of shocks.

8. Following standard assumptions, the stochastic discount factor takes the form $M_{t+1} = \exp(-r_t - \frac{1}{2} \Lambda_t' \Lambda_t - \Lambda_t' v_t)$, where r_t is the one-period short-rate and Λ_t represents the market price of risk. The short rate and market prices of risk are affine functions of state variables:

$$r_t = \delta_0 + \delta_1' X_t, \quad (3)$$

$$\Lambda_t = \lambda_0 + \lambda_1' X_t. \quad (4)$$

where δ_0 is a scalar, δ_1 is $K \times 1$, λ_0 is $K \times 1$ and λ_1 is $K \times K$.

9. This allows derivation of the price of a n -period zero-coupon bond through iterated expectations $P_t^n = E_t[M_{t+1} P_{t+1}^{n-1}]$ with the boundary condition of a maturing bond paying back par at redemption $P_{t+n}^0 = 1$, which, following Duffie and Kan (1996), results in the exponentially-affine solution for bond pricing equation $P_t^n = \exp(A_n + B_n' X_t)$. Notably, parameters of the vector autoregression are related under the empirical and pricing measure through the risk-adjustments $\tilde{\mu} = \mu - \Omega \lambda_0$ and $\tilde{\Phi} = \Phi - \Omega \lambda_1$, which in turn affect the difference equations (5) and (6) below, describing the term structure of the yield factor loadings A_n and B_n across maturities:

$$A_{n+1} = A_n + B_n' \tilde{\mu} + \frac{1}{2} B_n' \Omega \Omega' B_n - \delta_0 \quad (5)$$

$$B_{n+1} = B_n' \tilde{\Phi} \delta_1' \quad (6)$$

10. While a full information maximum likelihood procedure can be adopted to estimate the above-described model, here it is estimated by means of a three-step ordinary least squares regression (see Adrian et al, 2013).

- A. Estimate the vector autoregression to solve the parameters μ , Φ and Ω that govern the data generating process of the yield factors to solve equation (2).
- B. Regress excess returns of bonds on lagged factors and contemporaneous factor innovations from step A to obtain estimates exposures to shocks and loadings of bond excess returns on factors to solve equation (3).
- C. Run a cross-sectional regression using the results from step B to obtain the market prices of risk of equation (4) which allows recovering the yield loadings A and B from difference equations (5) and (6) to solve equation (1) so that difference between yields estimates under the pricing and empirical measures recover the TP and DTP estimates, respectively.

BB: Confidence Ellipsoid Construction

11. To quantify uncertainty around the relationship between the *TP* or *DTP* and projected bond supply held by private investors (free float), joint confidence ellipsoids are constructed, incorporating potential parameter uncertainty (via non-parametric bootstrapping techniques) while also accounting for (survey-based) issuance uncertainty.

12. Let $\mathbf{z} \in R^{nm \times 1}$ denote the stacked vector of projected long-term *TP* or *DTP*—e.g., G4 GDP-weighted at the 30-year tenor. Let $\mathbf{x} \in R^{nm \times 1}$ denote the corresponding stacked free float values (as a share of outstanding debt), where each x_i corresponds to the share of debt to be absorbed by price-sensitive private investors rather than central banks.

We postulate simple bivariate relationships as:

$$z = \alpha + \beta_{TP} \cdot x + \varepsilon$$

13. With $\hat{\alpha}$, $\hat{\beta}$ estimated from jurisdiction-specific regressions using historical data, and $\hat{\Sigma}_{\beta}$ denoting the variance of $\hat{\beta}$. To account for estimation uncertainty, we apply a **non-parametric bootstrap**: generate m draws $\beta^{(j)} \sim i.i.d.(\hat{\beta}, \hat{\Sigma}_{\beta})$ and retain the point estimate $\hat{\alpha}$. Separately, free float uncertainty is modeled via survey expectations: we draw n scenarios $x^{(i)} \sim i.i.d.(\mu_x, \sigma_x^2)$, with μ_x and σ_x^2 matched to the mean and percentile range of central bank holding surveys.

Combining both dimensions yields the $n \times m$ -sized simulation array:

$$y^{(i,j)} = \hat{\alpha} + \hat{\beta}^{(j)} \cdot x^{(i)} \text{ for } i = 1, \dots, n, j = 1, \dots, m.$$

14. The resulting $\mathbf{z}^{(i,j)}$ pairs form a cloud of plausible outcomes. To summarize the joint uncertainty visually, we compute the empirical covariance matrix of these draws and perform an **eigen-decomposition** to define a two-dimensional 95 percent confidence ellipsoid. This captures both parameter uncertainty in the regression, and also dispersion in survey-based expectations.

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Annex 1.8 Short-Term Rate Sensitivities to Reserves and Dealer Positions¹

Motivation and Methodology

1. Understanding short-term rate dynamics remains central to monetary policy implementation. Traditionally, these rates are shaped by central bank policy, inflation expectations, and macroeconomic conditions. More recent literature highlights the role of bank reserves and dealer balance sheet constraints. Short-term rates are closely linked to the quantity of reserves in the system, particularly under floor-type or ample-reserve regimes, where policy rates on reserves can anchor market rates (Afonso et al., 2022; Lopez-Salido and Vissing-Jorgensen, 2023; Langowski, 2023; Bailey, 2024).
2. Research also emphasizes the role of dealer intermediation in secured short-term markets. Balance sheet constraints can amplify fixed-income market illiquidity (Adrian et al., 2025; Flemming et al., 2024), affecting the interaction between bond and repo market liquidity (Besugo et al., 2025). Since repo intermediation is low-risk but balance-sheet intensive, the cost of balance sheet usage can influence repo rates as dealers adjust compensation (Chabot et al., 2024; Hempel et al., 2024). These pressures intensify under high repo demand (e.g., basis trades) or during stress periods like quarter-ends, when regulatory limits reduce intermediation capacity (Barth & Kahn, 2025).
3. Our methodology integrates these strands to analyze how reserves and dealer balance sheet usage affect secured rates, focusing on secured overnight financing rate (SOFR) spreads over reverse repurchase agreements (RRP). We estimate rolling-window regressions of the SOFR–RRP spread on reserve balances and primary dealer positions (PDP): $Spread_t = \alpha + \beta_1 \times \Delta Reserves_t + \beta_2 \times \Delta PDP_t$. Reserves are defined as total banking sector balances held at the Federal Reserve, while PDP proxies dealer balance sheet usage, measured as dealer net positions in credit markets relative to their two-year historical average. All variables are expressed as quarter-on-quarter differences, and the regressions are estimated with a 52-week rolling window to allow the coefficients to vary over time, in the spirit of Afonso et al. (2022).

Results

4. Figure XX shows that reserves consistently exert a negative effect on the SOFR–RRP spread, though the magnitude varies over time. Before 2020, rising reserves significantly compressed spreads; after COVID, the effect weakened, reflecting a transition from scarce to abundant reserves (Afonso et al., 2025).
5. Dealer balance sheet effects are more modest and episodic. Following the September 2019 repo market turmoil, the mildly negative coefficients are consistent with greater dealer intermediation supporting narrower spreads. Post-covid and again in 2025, they appear to amplify upward pressure on spreads reflecting tighter balance sheet space as they intermediate large volumes of repo.
6. The October 2025 GFSR section “Sovereign Bond Market Function Crucially Depends on NBFIs” highlights 2025 average results (see Figure 1.13, panel 1). While dealers exerted some upward pressure on spreads, likely driven by growing repo demand due to increased issuance and basis trades, elevated reserve balances acted as a stabilizing force.

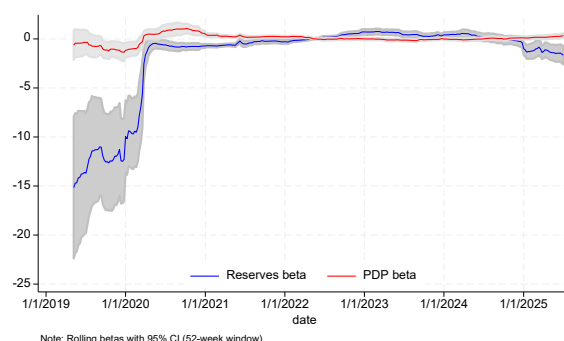
¹ This section was prepared by Kleopatra Nikolaou.

Figure A1.8.1 Short Term Rates Are Largely Driven by Reserve Dynamics and Dealer Balance Sheet Constraints

The impact of reserves and dealer balance sheet use on short-term secured rates has varied over time, with reserves playing a key role in certain periods.

1. Sensitivity of SOFR spreads on reserves and dealer balance sheet use

z-scores



Sources: Federal Reserve, Bloomberg, and Author's calculations.

Notes: The chart presents betas of reserves (blue line) and dealer positions (PDP – red line) from a rolling regression of SOFR spreads on reserves and dealer positions. All variables are standardized. Differences are from the previous quarter. Rolling window spans 52 weeks. The gray areas reflect 95% confidence intervals. The sample starts in May 2019.

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