Online Annexes

Online Annex 2.1. Other Indices on the International Role of Major Currencies

This online annex presents two other possible indices that capture the importance of various currencies globally: (i) a weighted average of currency shares in external balance sheets; (ii) a measure of exchange rate centrality and currency zones (based on co-movement of exchange rates and the Frankel and Wei methodology). In both indices, the US dollar remains dominant, followed by the euro.

1. Currencies of Global Balance Sheets

For each of the global currencies, a Global Balance Sheet (GBS) index can be constructed, as the sum of foreign assets in currency i (A_i) and foreign liabilities in currency (L_i), relative to the sum of total with total foreign assets (A) and liabilities (L) in all currencies, as follows:

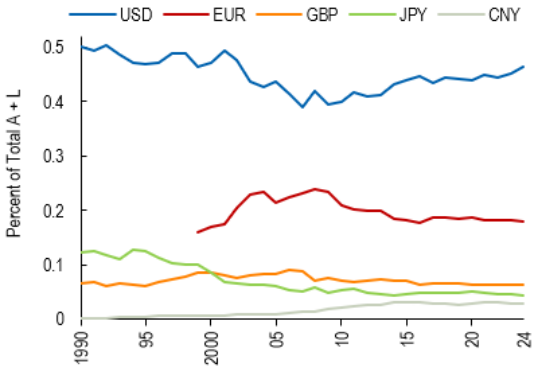
$$GBS_i^{A+L} = \frac{(A_i + L_i)}{A + L}$$

For both assets and liabilities, we use estimated currency shares for each asset class (i.e. FDI, banking, debt, and reserves) multiplied by the share of this asset class in total foreign assets and liabilities.[1] Currency weights by asset class—held constant at 2020 values (latest observation based on Allen and Juvenal, 2025)—are multiplied by holdings using the latest vintage of foreign assets and liabilities data (Milesi-Ferretti, 2025 and further extended using balance of payment data). For the euro area, intra-EU holdings are excluded.

Figure 2.1.1 shows the resulting GBS index.

[1] Currency weights are based on a confidential survey sent to country Authorities combined with various sources of publicly available data. For more information see Allen and Juvenal (2025).

Online Annex Figure 2.1.1. Global Balance Sheet Index
(Percent)



Sources: Allen and Juvenal (2025); Milesi-Ferretti (2025); and IMF staff calculations.
Note: Weighted average of total foreign assets (FDI, Portfolio, Other, reserves) and liabitlies for currency i in percent of total foreign assets and liabilties. EUR excludes intra-euro area holdings. Currency weights by asset class—held constant at 2020 values (latest observation based on Allen and Juvenal, 2025)—are multiplied by holdings using the latest vintage of foreign assets and liabilities data (Milesi-Ferretti, 2025). CNY = Chinese yuan; EUR = euro; GBP = British pound sterling; JPY = Japanese yen; USD = US dollar.

2. Frankel and Wei Based Global Currency Blocs

Foreign exchange co-movements have been used as a proxy of the relative dominance of global currencies, building on methodology developed in Frankel and Wei (1994).[2] The methodology can be summarized in two main steps.

First, it runs rolling monthly regressions of the log returns on every currency (s) in the sample on the log returns of global currencies i (US dollar, euro, Japanese yen, British pound), both expressed in a common numeraire—i.e. the SDR. The renminbi is not included from the estimation because it has been stable vis-à-vis the dollar in most sample years. The following equation is estimated:

$$\Delta \log\left(\frac{s}{SDR}\right)_t = \alpha + \sum_i \beta_{st}^i \Delta \log\left(\frac{global\ currency}{SDR}\right)_{it} + \varepsilon_t$$

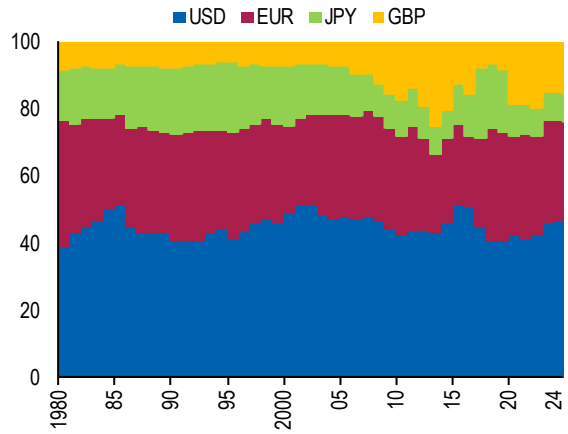
This gives currency factor weights, the rolling coefficient β_{st}^i, for each currency. Following Ito and McCauley (2019) and Vicquéry (2022) all negative estimated coefficients are set to zero.

Second, it divides the world into GDP-weighted currency zones according to the co-movement of currency of an economy with global currencies for each year (Ito and McCauley 2019 and Vicquéry 2022). This allows a single economy to be apportioned to more than one global currency at any given time, rather than a single anchor as in Ilzetzki et al. (2019). The reserve issuing bloc is assigned to its own currency bloc. Currency weights for each economy are then multiplied by GDP in US dollars and aggregated up to global economy.

[2] For recent examples, see Fratzscher and Mehl (2014), Kawai and Pontines (2016), Tovar and Nor (2018), Ito and McCauley (2020), and Vicquéry (2022).

Figure 2.1.2 shows the resulting currency blocs.

Online Annex Figure 2.1.2. Currency Zones
(Percent of global GDP)



Sources: IMF International Financing Statistics Database; IMF World Economic Outlook Database; and IMF staff calculations.
Note: Based on methodology developed in Frankel and Wei (1994). EUR = euro; GBP = British pound sterling; JPY = Japanese yen; USD = US dollar.

Online Annex 2.2. Details on Network Centrality Measures

This chapter employs eigenvector centrality, a standard network measure, to assess the relative importance of each economy within global trade and financial networks (Newman 2018). Formally, the centrality score c_i for country i is defined as:

$$\lambda c_i = \sum_{j \neq i} g c_j \text{ for all } i \in N$$

Where g denotes the adjacency matrix capturing the strength of connection between two countries. In directed networks, $g = g_{ji}$ represents exports from country *j* to i, or country *j*'s holding of *i*'s assets, expressed as a share of world GDP. In undirected networks, g is computed as the sum of exports and imports between country i and j, or the sum of cross-holdings of financial assets and liabilities. λ is the largest eigenvector and the centrality scores are normalized so that they sum up to 1 (i.e., $\sum_j c_j = 1$). The centrality of each country i is proportional to the sum of centrality of its neighbors. Thus, a country's centrality does not only depend on the direct and indirect linkages but also gives higher weights to linkages with other countries of importance in the network.

Online Annex 2.3. Additional Tables and Figures

Online Annex Table 2.3.1 A Snapshot of the International Monetary System

1 – Current State of International Currencies						Share of … (percent of total)
Indicator	Time	**US dollar**	**Euro**	**Japanese yen**	**British pound**	**Chinese RMB**
Foreign exchange reserves	2024 Q4	57.8	19.8	5.8	4.7	2.2
Outstanding international debt securities 1/	2024 Q4	65.2	22.8	1.5	4.6	1
Outstanding international loans/deposits	2023 Q4	57.3	19.2	5.5	5.5	--
Outstanding portfolio assets	2023	43.8	19.9	7	7	1.7
Global payment currency (SWIFT)	2024 m12	60.1	12.8	5.1	4.9	2.8
OTC FX transactions 2/	2022	88	31	17	13	7
Liabilities of non-banks outside the issuer economy	2024Q4	11.9	4.2	0.4	--	--
2 – Current State of International Trade and Finance						Share of … (percent of global GDP)
Indicator	Time	**United States**	**Euro Area**	**Japan**	**United Kingdom**	**China**
Cross-Border Trade (Imports + Exports)	2023	14	15.3	4	3.6	16.1
Cross-Border Finance (Foreign Assets + Foreign Liabilities)	2023	17	14.9	3.4	6.8	3.1
Equity Market capitalization	2024Q3	51.3	8.4	5.6	3.1	9.6
Debt outstanding (all debt securities)	2024Q3	51.9	22.9	10.5	5.3	22.9
3 – Summary Statistics						In percent (unless otherwise stated)
Indicator	Time	**United States**	**Euro Area**	**Japan**	**United Kingdom**	**China**
Asymmetry Index (sums to 1)	2023	0.42	0.07	0.045	0.1	0.08
Currency blocs (based on Frankel and Wei, 1994)	2024	47	29	9	15	--
	Time	**US dollar**	**Euro**	**Japanese yen**	**British pound**	**Chinese RMB**
Composite Index of Currency Usage	2023	52.7	21.3	7	6.3	3.6
Global Balance Sheet index (sums to 1)	2023	0.45	0.18	0.05	0.06	0.03

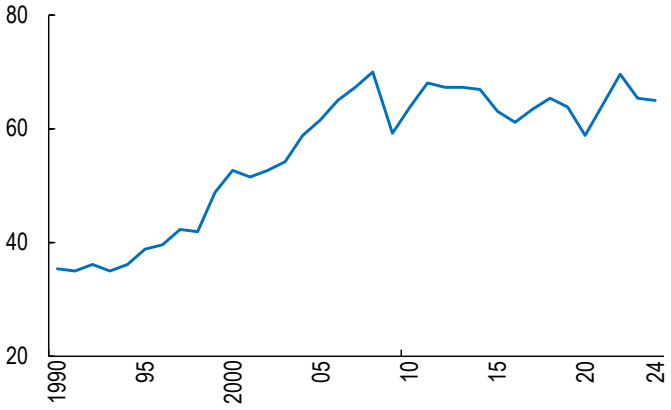
1/ Home-currency issuance is excluded.
2/ Given each FX transaction involves two currencies, the currency shares add up to 200 percent.

Online Annex Table 2.3.2. Central Bank Digital Currencies: Live and Explorations (selected)

	Live	Explorations and Experimentations (selected)
Retail CBDC	Jamaica, Nigeria, The Bahamas	Brazil, China, U.A.E., Eurosystem, Kazahkstan, India, United Kingdom, Project Icebreaker
Wholesale CBDC	-	Eurosystem, Switzerland, The Phillippines, Project Dunbar, Project Jasper/Ubin, Project mBridge, Project Agora, Project Rialto

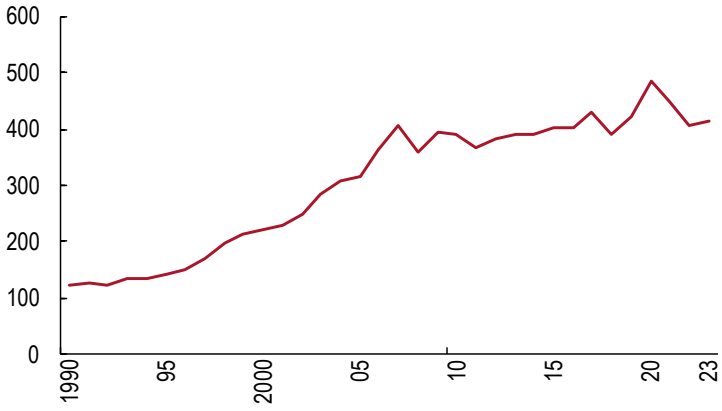
Note: Retail CBDCs are accessible to the generail public, while wholesale CBDCs are limited to selected financial insitutions. Participants in CBDC projects: Project Rialto (BIS Innovation Hub Eurosystem, Bank of France, Bank of Italy, Bank Negara Malaysia and Monetary Authority of Singapore); Project Icebreak (BIS Innovation Hub Nordic Centre, Bank of Israel, Norges Bank, and Sveriges Riksbank); Project Agora (BIS, Bank of France, Bank of Japan, Bank of Korea, Bank of Mexico, Swiss National Bank, Bank of England and the Federal Reserve Bank of New York, and selected financial firms; Project mBridge (BIS Innovation Hub, Bank of Thailand, Central Bank of the United Arab Emirates, People's Bank of China, Hong Kong Monetary Authority and Saudi Central Bank).

Online Annex Figure 2.3.1. Trade Openness
(Percent of world GDP)



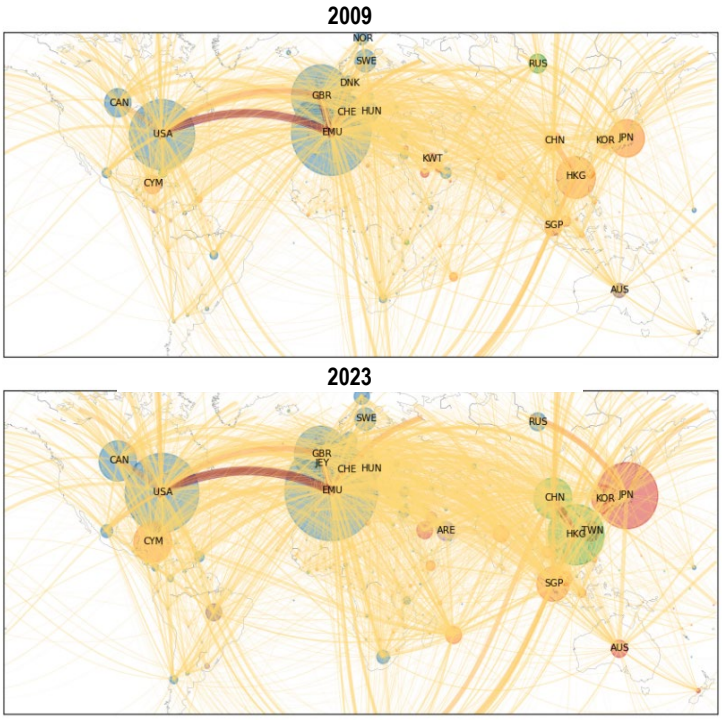
Sources: IMF, World Economic Outlook Database; and IMF staff calculations.
Note: Sum of exports and imports divided by world GDP.

Online Annex Figure 2.3.2. Financial Openness
(Percent of world GDP)



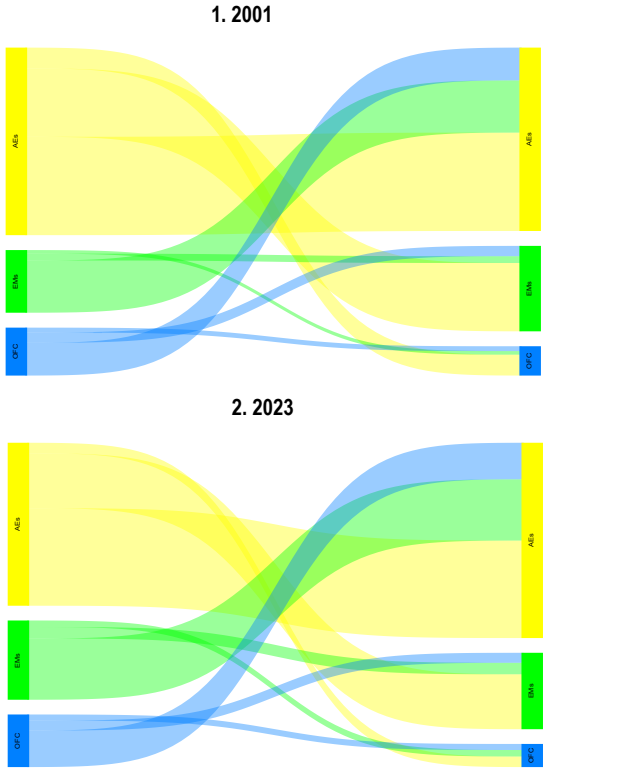
Source: External Wealth of Nations database (2025); IMF, World Economic Outlook Database; and IMF staff calculations.
Notes: Sum of external assets and external liabilites divided by world GDP.

Online Annex Figure 2.3.3. FDI Network in 2009 and 2023



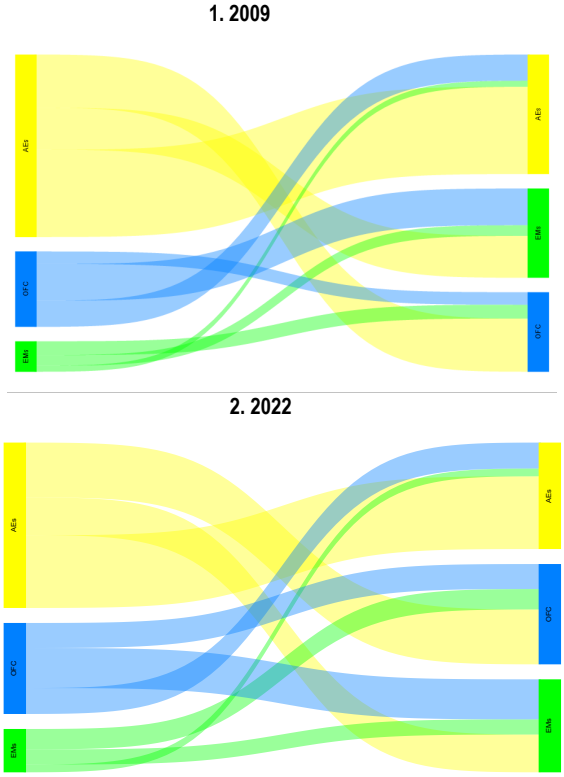
Sources: Coordinated Direct Investment Survey Dataset; Orbis; and IMF staff calculations.
Note: Total FDI assets in percent of world GDP. Mirror data is used to fill missing data whenever available. Holdings are corrected for the role of offshore financial centers by plotting the ultimate bilateral FDI relationship using the methodology of Tan (2024) and Damgaard and others (2024). Intra-EMU holdings are excluded.

Online Annex Figure 2.3.4. Portfolio Investment and Bank Loans and Deposits across Country Groups



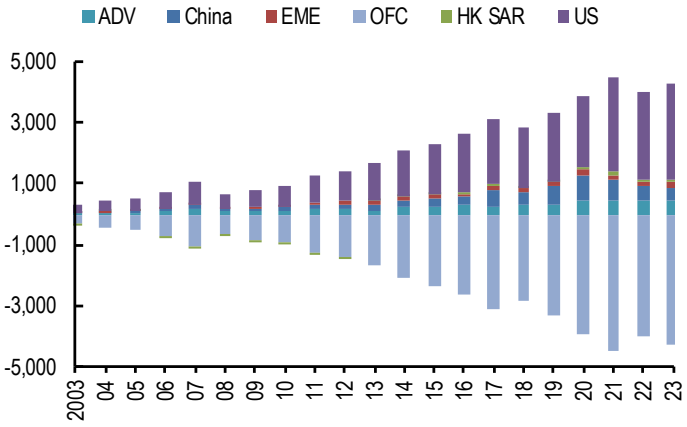
Sources: Bank for International Settlements Locational Banking Statistics; Portfolio Investment Positions by Counterpart Economy data set; Coppola and others (2021); and IMF staff calculations.
Note: Bilateral relationship between AEs (yellow), OFCs (blue), and EMDEs (green) of the sum of total portfolio assets and bank's loans and deposits claims in percent of world GDP. Mirror data is used to fill missing data whenever available. Portfolio holdings are corrected for the role of offshore financial centers using rescaling matrix of Coppola and others (2021). Intra-EMU holdings are excluded. AE = Advanced Economies; EMDE = Emerging Markets and Developing Economies; EMU = European Monetary Union; OFC

Online Annex Figure 2.3.5. FDI Asset Holding across Country Groups



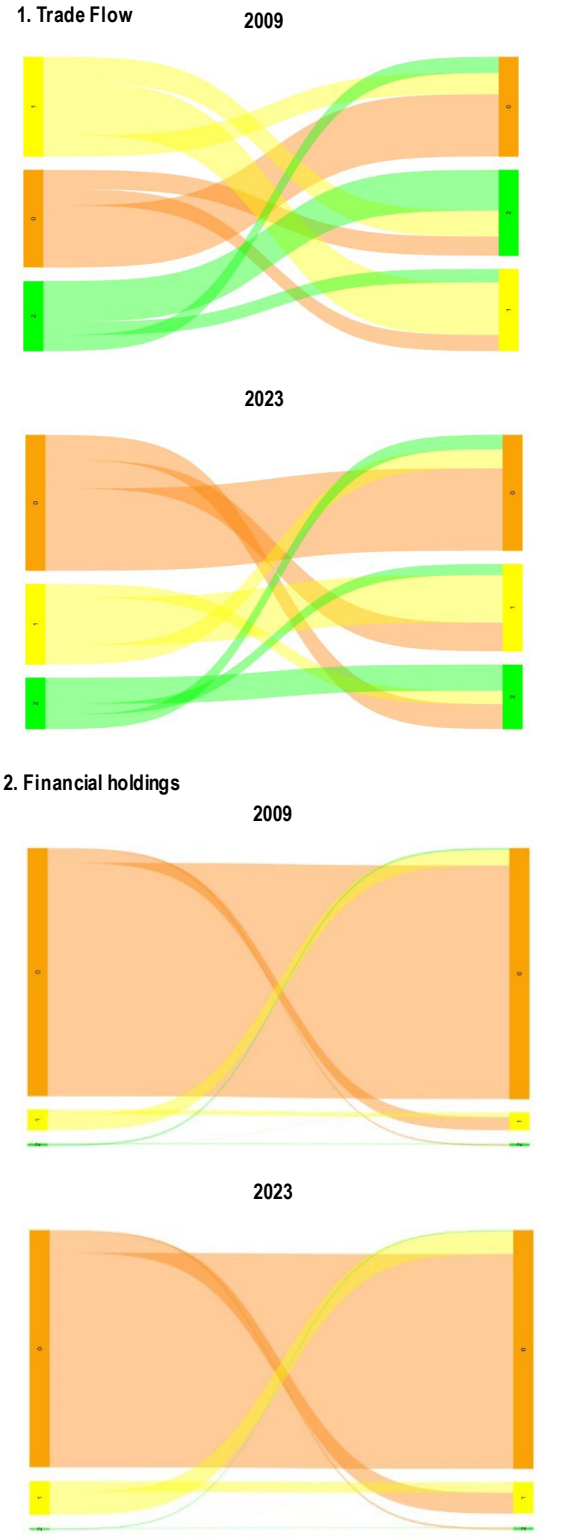
Sources: Coordinated Direct Investment Survey Dataset; Orbis; and IMF staff calculations.
Note: Bilateral relationship between AEs (yellow), OFCs (blue), and EMDEs (green) of total FDI assets in percent of world GDP. Mirror data is used to fill missing data whenever available. Holdings are corrected for the role of offshore financial centers by plotting the ultimate bilateral FDI relationship using the methodology of Tan (2024) and Damgaard and others (2024). Intra-EMU holdings are excluded. AE = Advanced Economies; EMDE = Emerging Markets and Developing Economies; EMU = European Monetary Union; FDI = Foreign Direct Investment; OFC = Offshore Financial Centers.

Online Annex Figure 2.3.6. US: Difference between Nationality and Residence Basis Holdings
(Billions of US dollar)



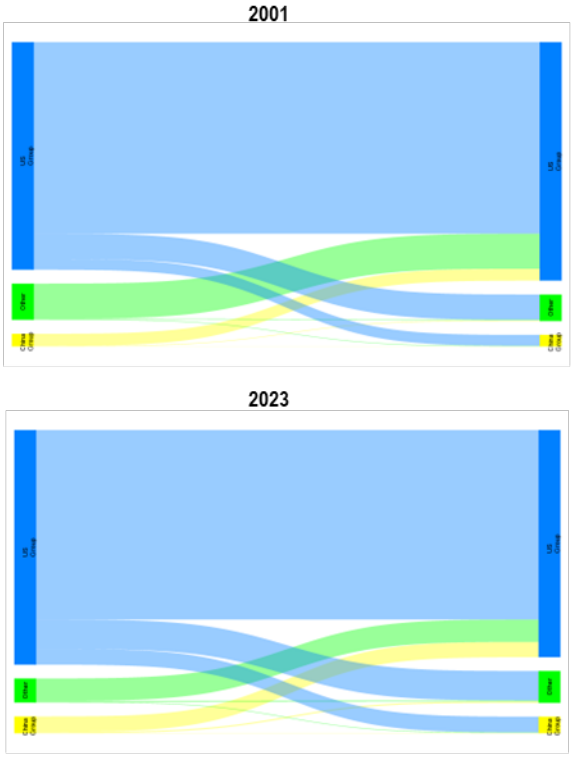
Sources: Bertaut and others (2019) estimates based on Treasury International Capital data.; and IMF staff calculations.
Note: US holdings of all equity and bonds on a nationality basis holdings *minus* residence basis holdings. Data only include securities that were considered "foreign" on a residence basis. ADV = advanced economies; EME = emerging market economies; HK SAR = Hong Kong Special Administrative Region; OFC = offshore financial centers; US = United States.

Online Annex Figure 2.3.7. Trade Flow and Financial Holdings across Country Clusters in 2001 and 2023



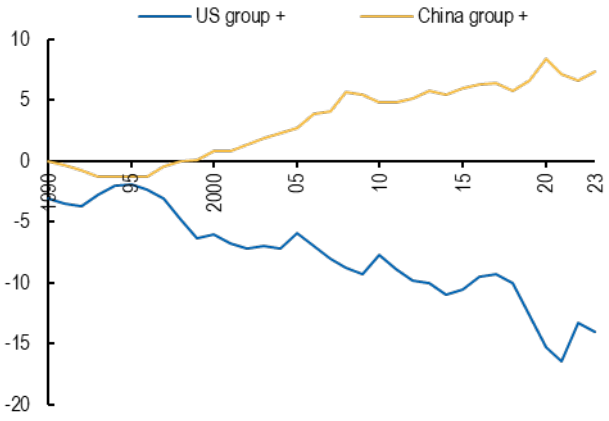
Sources; Portfolio Investment Positions by Counterpart Economy data set, BACI(Database for International Trade Analysis); and IMF staff calculations.

Online Annex Figure 2.3.8. Financial Network by Geopolitical Group



Sources; Portfolio Investment Positions by Counterpart Economy data set; Bank for International Settlements; and IMF staff calculations.
Notes: Sum of total portfolio assets and bank's loans and deposit claims. Portfolio holdings are corrected for the role of offshore financial centers using rescaling matrix of Coppola and others (2021). Groups based on wider definition in Gopinath and others (2025).

Online Annex Figure 2.3.9. Net International Investment Position
(Percent global GDP)



Sources: External Wealth of Nations database (2025); and IMF staff calculations.
Note: Aggregate NIIP of each country group. Groups based on Ideal Point Distance based on US voting. Discrepancy due to statistical coverage.

Online Annex 2.4. Data Sources and Methodology[3]

This online annex presents a detail description of the dataset used, including the use of "mirror data" to fill in missing data relevant adjustments to exclude intra-euro area holdings or trade, accounting for offshore financial centers (OFCs), along with sources and assumptions.

1. Portfolio investment

- **Bilateral database.** Portfolio investment in debt and equity is sourced from the Portfolio Investment Positions by Counterpart Economy dataset (formerly Coordinated Portfolio Investment Survey, or CPIS) of the IMF. The dataset includes bilateral information on cross-border holdings of portfolio investment securities. Countries report information on their holdings of portfolio investment assets issued by residents of other countries, as well as portfolio investment liabilities on an encouraged basis. The investment value is defined as equal to the value of the assets reported by the source country. "Mirror data" is used to maximize the available information following these main steps. When the source country does not report its asset holdings in a specific destination country, the liabilities reported by the destination country are used to fill the gap if available. When both asset and liability data are available, the maximum value is selected (Brei and von Peter 2018).
- Intra-EMU holdings are excluded, with EMU considered as a bloc on both sides by aggregating the individual EMU countries on the issuer side.
- Portfolio holdings are adjusted to account for the role of offshore financial centers using rescaling matrix, based on the work in Coppola, Maggiori, Neiman and Schreger (2021).[4] The adjustment transforms bilateral investment positions from a residency basis to a nationality basis. The resulting adjustment reflects the estimated value of holdings of investor i in securities issued by issuer j in asset class k on a nationality basis. This adjustment does not reallocate domestic positions. Given these matrices are available from 2007 to 2020, a constant restatement factor for each country-pairs is used for the earliest and latest available period to extend the sample backwards and forward, following Miranda-Agrippino, Nenova, and Rey (2025).

Currency composition database. The currency composition of portfolio investment is derived from the currency dimension of the Portfolio Investment Positions by Counterpart Economy. It reports the currency breakdown of all instruments (equities, long-term debt, and short-term debt) on an aggregated basis, meaning no information on the counterpart economy is available. When CPIS currency data is not available, data is supplemented with estimates of the currency composition of countries' portfolio assets from Allen and Juvenal (2025) extended with Milesi-Ferretti (2025).[5]

To obtain the currency composition of portfolio investment for the euro area, the following steps are followed. First, the currency composition of the sum of individual EMU countries is calculated. This will not consider that holdings of individual euro area economies within the bloc will tend to be disproportionately denominated in euro. Second, using estimates of the currency composition of bilateral holding of the euro area from Coppola and others (2021) intra-EMU holdings are excluded. Given the limited coverage of this

[3] Author of this online annex is David Guio Rodriguez.

[4] Obtained from: www.globalcapitalallocation.com

[5] For instance, the United States' currency breakdown of portfolio is only reported for debt securities. No information is available for equity and investment fund shares.

data, a constant restatement factor for each country-pairs is used for the earliest and latest available period to extend the sample backward and forward.

2. Foreign Direct Investment

Bilateral database. FDI bilateral data is based on the IMF's Direct Investment Positions by Counterpart Economy (formerly Coordinated Direct Investment Survey or CDIS). This dataset includes (i) inward foreign direct investment positions by instrument (equity or debt) and by economy of immediate investor and (ii) outward direct investment positions by instrument (equity or debt) and by economy of immediate investment.

- "Mirror data" is used to maximize the available information following the main steps described for portfolio investment (Broner and others 2023).
- Intra-euro area holdings are excluded, and individual EMU economies are aggregated.
- Adjustment for OFC. FDI positions are adjusted to account for the role of offshore financial centers by identifying the ultimate ownership links across countries. It follows Tan (2024) who builds upon the methodology in Damgaard, Elkjaer, and Johannesen (2024). This method excludes Special Purpose Entities (SPEs) using OECD data and employs firm-level data from Orbis to determine the immediate and ultimate investor in the direct investment relationship. For more details, refer to the data appendix in Tan (2024).

3. International bank's loans and deposits

Bilateral database. International bank's loans and deposits are derived from the Locational Banking Statistics (LBS) of the BIS. The LBS records the outstanding financial assets and liabilities of international banks on a residency basis, encompassing currency composition, financial instruments, and the geographical distribution of their counterparties. Data is reported to the BIS at the country level, rather than at individual bank level. Consequently, each reporting country is represented as both a source and a destination for international flows: (i) claims from country i to country j, and (ii) liabilities from country j to country i.

- "Mirror data" is used to maximize the available information following the main steps described for portfolio investment (Broner and others 2023).
- Intra-euro cross border positions are excluded using publicly available information and confidential data of the BIS. The EMU aggregate is computed by summing the individual holdings of EMU countries. The financial instrument breakdown allows for identifying the relevant investment type..
- There are no adjustments for OFCs given the limited time coverage of the BIS LBS dataset on a nationality basis (2012-onwards).

Currency composition database. Global currency shares are derived from the currency composition of the total cross-border loans and deposits claims of all reporting countries on all counterparty countries. Reporting authorities are encouraged to provide a full currency breakdown, which should include at a minimum, seven currencies: domestic currency, CHF, EUR, GBP, JPY, USD, and other foreign

currencies. Intra-euro area loans and deposits are excluded by using the intra-euro area data, confidentially shared by the BIS. For CNY, data is only available from 2015 onwards, and the currency shares of all financial instruments are used as proxy for the currency shares of loans and deposits.

4. International debt statistics

Currency composition database. International bonds are derived from the International Debt Securities (IDS) of the BIS. The IDS compiles outstanding amounts of bonds issued outside the local market of the country where the borrower resides, along with a complete currency breakdown. A debt security is considered international if the residence of the immediate issuer differs from the location of the issue's registration, the governing law or the listing location. There is no information on the holders of these outstanding securities. For this analysis, home-currency issuance is excluded.

5. Trade

Bilateral database. Merchandise bilateral trade is sourced from Gaulier, G. and Zignago, S. (2010), the so-called "BACI database". The BACI database provides detailed information on bilateral trade flows over time on a yearly basis at the product level. Trade flows have been aggregated at the country-country level, and intra-EMU flows are excluded.

Currency composition database. Trade invoicing data is based on estimated invoice shares of imports and exports from Boz et al (2022) which was subsequently updated and expanded in Boz et al (2025). Data is available for USD, EUR, home currency and other currencies. For Japan, the home currency share is allocated to the JPY share. Data for the UK is supplemented with information reported by His Majesty's (HM) Revenue & Customs. Since China does not participate in the data collection exercise by Boz et al (2025), the share of CNY used as settlement currency in current account in China is employed as a proxy for trade invoicing share. Moreover, it is assumed that the remaining share is in USD.[6] Data for EU countries is adjusted based on the currency compositions of extra-EU trade reported by Eurostat. Missing values are interpolated or held constant at the nearest available value. To compute international shares, invoicing shares are scaled by trade flows from the BACI dataset.

6. Figure 2.3 Share in Global Economy and Currency Composition in 2023

Panel 1: represents the issuing jurisdiction's share in global gross domestic product (GDP), world trade, and world finance. Trade is defined as the sum of exports and import (M+X), excluding intra-euro values, based on 2023 data from BACI dataset. Finance is defined as the total of financial assets plus total financial liabilities (Milesi-Ferretti 2025), and GDP is also based on 2023 data from Milesi-Ferretti (2025) for ease of replication. Panel 2: International bank claims are from the BIS LBS by residence, end-2023, only loans and deposits are considered. Intl bonds = international debt securities outstanding, home-currency issuance is excluded, amounts outstanding at end-2023; FX reserves from IMF COFER are official reserves holdings at end-2023, available for eight major currencies and all other currencies combined. International shares are percentages of each currency in allocated reserves. FX turnover is the average daily turnover in all FX instruments (spot and FX derivatives) in April 2022, from the 2022 Triennial OTC Survey (net-net basis), divided by 2. SWIFT data is based on Cerutti, Firat and Hengge (2025). See section 5 for details on currency composition.

[6] Information on cross border CNY settlement is sourced from the PBoC (accessed via Haver Analytics).

Other indicators

Table below presents the remaining subset of variables used in this chapter, along with a short description and the corresponding source reference.

Variable	Source	Notes
Credit to non-bank borrowers	Global Liquidity Indicators (GLI) BIS.	GLI tracks credit to non-bank borrowers, covering both loans extended by banks and funding from global bond markets through the issuance of international debt securities. It captures credit denominated in three major reserve currencies: the US dollar, euro and Japanese yen
SWIFT data	Cerutti, Firat and Hengge (2025), SWIFT.	
Global exchange rate regimes	Ilzetzki et al (2019).	
FX turnover	BIS Triennial OTC survey.	Net-net basis
Digital currency market	CoinGecko.	
Gold prices and reserves	International Financial Statistics (IFS); London Bullion Market Association (LBMA).	

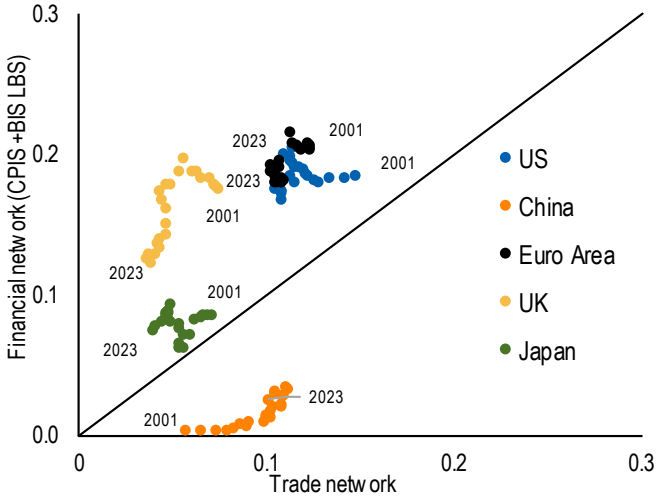
Online Annex 2.5. List of Keywords (Figure 2.1)

International monetary state, dominance of the US dollar, BRICs currency, Bretton Woods, Gold standard, Triffin Dilemma, Global monetary order, International financial system, Plaza Accord, International Economic cooperation, Louvre Accord, Convertibility of the dollar, Dollar parity, Reserve assets, World monetary system, Gold parity, Devaluation of the dollar, Dollar devaluation, Devalue the dollar, Dollar crisis, Currency realignment, International Monetary Crisis, Global dollar, Global role of the dollar, Trade imbalances, US dollar role, Global trading system, Exorbitant privilege, Kindleberger, US exceptionalism, Dollar status, Dollar system, Global currency, Mar-a-Lago Accord, Dollar reserve status, Central bank reserves

Online Annex 2.6. Results from the Undirected Network Analysis

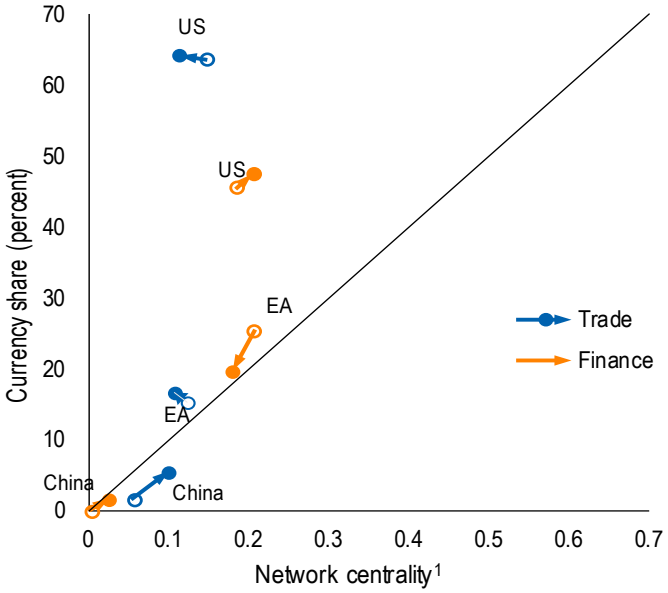
See Online Annex 2.2 for further details on the network analysis. Extending upon the directed network analysis (Figure 2.10), undirected networks include both exports and imports between a pair of countries for the trade network, and the sum of assets and liabilities on the financial network.

Figure 2.6.1. Country Centrality in Trade and Financial Network over 2001–23[1]



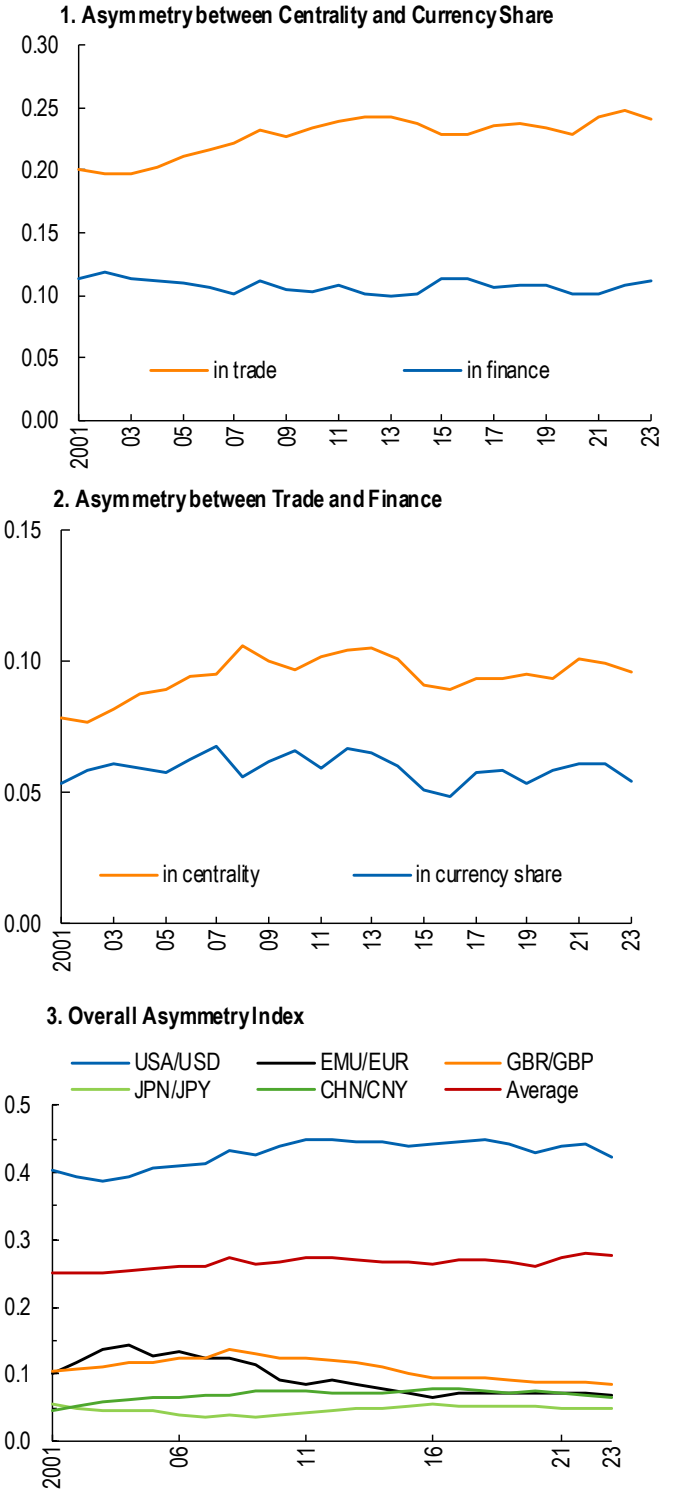
Sources: Bank for International Settlements Locational Banking Statistics; Portfolio Investment Positions by Counterpart Economy dataset; Coppola and others (2021); Gaulier, G. and Zignago, S. (2010); and IMF staff calculations.
[1]Each dot represents the annual value of the centrality measure of a country in trade and financial network (see text box). "Financial network" represents the sum of cross-border holding of portfolio assets and liabilities and bank's loans and deposit claims and liabilities. Mirror data are used to fill missing data whenever available. Portfolio holdings are corrected for the role of offshore financial centers using rescaling matrix of Coppola and others (2021). Intra European Monetary Union holdings and trade are excluded.

Figure 2.6.2. Country Centrality and Currency Use in Trade and Financial Network in 2001 → 2023
(Percent)



[1]Measured by eigenvector centrality (see text box). EA = euro area, US = United States.

Figure 2.6.3. Asymmetry Indexes



Sources: IMF staff calculations.
Note: See the text box for the methodology. Data labels in the figure use International Organization for Standardization (ISO) country codes. EMU = European Monetary Union. USD = US dollar, EUR = euro, JPY = Japanese yen, GBP = British pound sterling, CNY = Chinese yuan.

Online Annex 2.7. Details on Asymmetry Index Algebra

Let $b_{i,t}^{T}$ and $b_{i,t}^{F}$ denote the centrality of country i in trade (T) or financial (F) network, respectively and $c_{i,t}^{T}$and $c_{i,t}^{F}$ denote the share of country i's currency in trade (T) or finance (F) at time t, where $i \in \{\text{US, euro area, UK, China, Japan, and RoW}\}$. All centrality measures $(b_{i,t}^{T,F})$ and currency shares $(c_{i,t}^{T,F})$ are bounded between 0 and 1 across the six economies.

The pair-wise asymmetry index measures the distance of a point from the 45-degree line on a 2-dimensional plane:

- Asymmetry between centrality and currency share in trade or finance (Figure 2.12.1)
  Let $X_t^{T,F} = \left(x_{i,t}^{T,F}\right) = (b_{i,t}^{T,F}, c_{i,t}^{T,F})$ denote a vector of centrality and currency share in trade or finance
  For each country/currency, let $y_{i,t}^{T,F} = \left(\sum_{i=1}^{2}\left(x_{i,t}^{T,F} - \overline{x_t^{T,F}}\right)^2\right)^{1/2}$ which measures the distance from the 45-degree line, with the upper bar denoting the average over *i*'s. Then the asymmetry index is $Y_t^{T,F} = \sum_{i=1}^{6} \omega_{i,t}^{T,F} y_{i,t}^{T,F}$, where $\omega_{i,t}^{T,F}$ denotes economy i's share in global trade (T) or finance (F).
- Asymmetry between centrality or currency share in trade and finance (Figure 2.12.2)
  Let $X_t^{b} = \left(x_{i,t}^{b}\right) = (b_{i,t}^{T}, b_{i,t}^{F})$ denote a vector of centrality in trade and finance $X_t^{c} = \left(x_{i,t}^{c}\right) = (c_{i,t}^{T}, c_{i,t}^{F})$ denote a vector of currency share in trade and finance
  For each country/currency, let $y_{i,t}^{c,b} = \left(\sum_{i=1}^{2}\left(x_{i,t}^{c,b} - \overline{x_t^{c,b}}\right)^2\right)^{1/2}$ which measures the distance from the 45-degree line. Then the asymmetry index is $Y_t^{c,b} = \sum_{i=1}^{6} \omega_{i,t} y_{i,t}^{c,b}$, where $\omega_{i,t} = \frac{1}{2}(s_{i,t}^{T} + s_{i,t}^{F})$, with $s_{i,t}^{T}$ and $s_{i,t}^{F}$ denoting economy i's share in global trade and finance, respectively.

The overall asymmetry index measures the distance of a point from the main diagonal in a 4-dimensional space. (Figure 2.12.3) Let $X_t = \left(x_{i,t}\right) = (b_{i,t}^{T}, b_{i,t}^{F}, c_{i,t}^{T}, c_{i,t}^{F})$ denote a vector of centrality measures and currency shares and $\overline{x_t} = \frac{1}{4}(b_{i,t}^{T} + b_{i,t}^{F} + c_{i,t}^{T} + c_{i,t}^{F})$. For each country/currency, let $y_{i,t} = \left(\sum_{i=1}^{4}\left(x_{i,t} - \overline{x_t}\right)^2\right)^{1/2}$, which measures the distance from the main diagonal (in the 4-dimensionsal space).Then the overall asymmetry index is $Y_t = \sum_{i=1}^{6} \omega_{i,t} y_{i,t}$.

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