Taking Stock: International Roles of Dollar and Swap Lines

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November 3, 2023
Asset Pricing Program Meeting, Fall 2023
Stanford University

*The views expressed here do not necessarily reflect those of the Federal Reserve Bank of New York or the Federal Reserve System.

Taking Stock...Roadmap

International roles of currencies are front and center in considerations around macroeconomics, in discussions of international spillovers, in the international financial system, in international payments architecture and "plumbing," and in geopolitics and geoeconomic fragmentation.

Roadmap for intro remarks

- Brief review of international roles of currencies, with status updates on
- International monetary system and FX reserves
- Financial transactions
- Swap lines and dollar liquidity facilities
- Research opportunities on synergies and frictions

The International Monetary System

The choice of exchange rate regime (types of currency pegs and floats) and implications for policy frameworks have been central issues in international finance and macro at least since the early part of the 20^{th} century.

IMF's Annual Report on Exchange Restrictions and Exchange Arrangements 2022 (Table 1, published July 2023) has official categorization of exchange rate arrangements (subject to standard debate about *de facto* v *de jure*).

Type	**Categories**		
Hard pegs	Exchange arrangement with no separate legal tender	Currency board arrangement	
Soft pegs	Conventional pegged arrangement	Pegged exchange rate within horizontal bands	Stabilized arrangement, Crawling peg, Crawl-like arrangement
Floating regimes (market-determined rates)	Floating	Free floating	
Residual	Other managed arrangement		

Dollar retains key anchor role in exchange rate regimes

Among 190 countries currently covered by this report, by *de jure* classification 37 are anchored to USD (around 20 percent) and 26 to the euro. Small share declines mainly with new reporting countries.

IMF Percentage of Countries Pegging to Anchor Currencies
(Percent of *IMF* members as of April 30)

	US dollar	**Euro**	**Composite**	**Other Currency**
2014	22.5	13.6	6.3	4.2
2015	22.0	13.1	6.3	4.2
2016	20.3	13.0	4.7	4.7
2017	20.3	13.0	4.7	4.7
2018	19.8	13.0	4.7	4.7
2019	19.8	13.0	4.2	4.7
2020	19.8	13.0	4.2	4.7
2021	19.2	13.5	4.1	4.7
2022	19.1	13.4	4.1	5.2

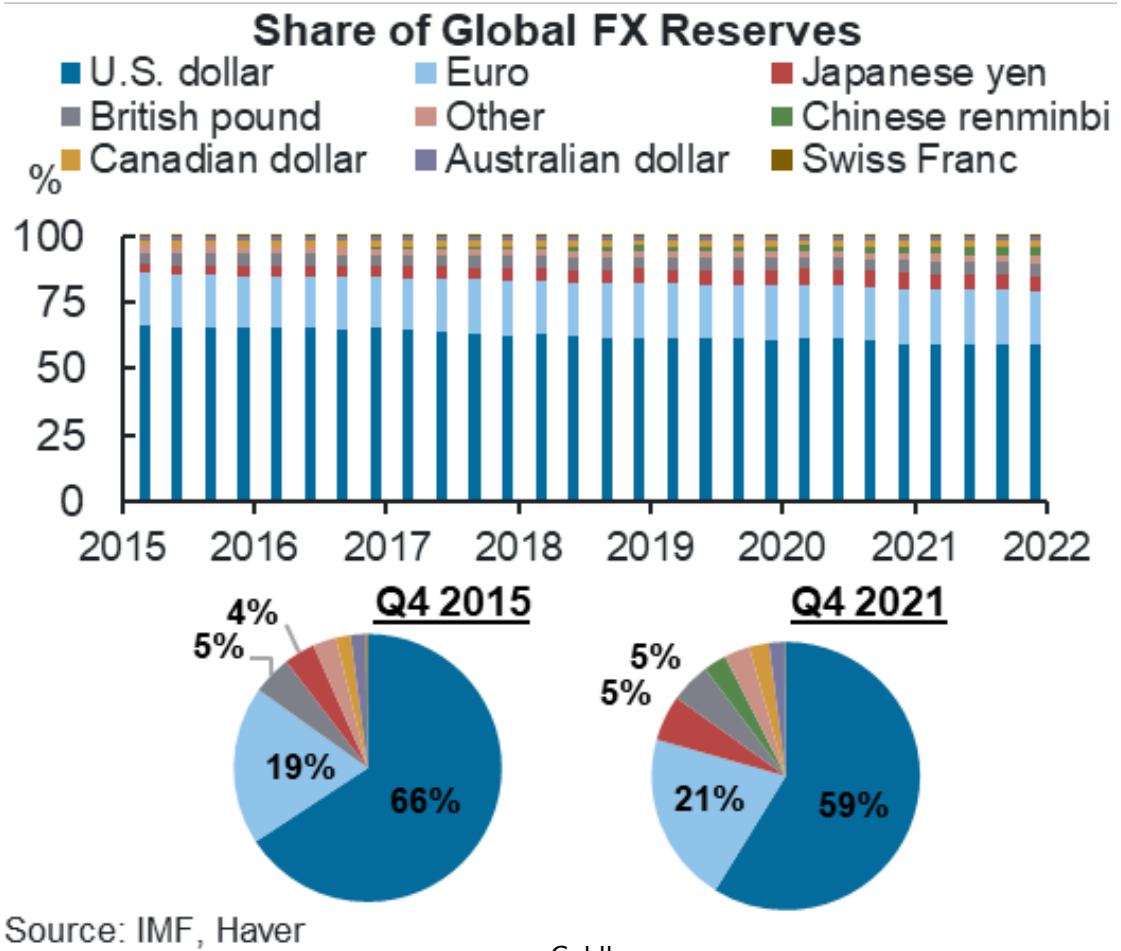
Source: IMF AREAER 2022 Table 5.

Float share increased over time. Understates dollar role. Stronger USD peg share if GDP weighted. Plus, eg. China has a managed floating arrangement relative to a basket; Mexico has a free floating exchange rate, addressing volatility relative to USD.

Extensive attention on decline in dollar share in official foreign exchange reserve portfolios

USD share peaked at: 72 percent 1999-2001; post GFC, at 66 percent around 2015; and 59 to 60 percent 2021Q4 through 2023Q2.

Key developments 2015 to 2021: 7 percentage point decline in USD, 2 pp point rise for euro, 1 pp for yen, increase in Other.



Source: IMF, Haver

What do we learn from a simple mathematical decomposition?

Goldberg and Hannaoui (2023): a shift share decomposition shows the decline in USD COFER share is not just about declines in USD preference.

$$USDRSH_t = \frac{\sum_1^N \sigma_c^t R_c^t}{\sum_1^N R_c^t}$$

$$d(USDRSH) = \left(\frac{\sum_1^N \sigma_c^t R_c^t}{\sum_1^N R_c^t}\right)'$$

$$d(USDRSH) = \frac{\left(\sum_1^N d\sigma_c R_c^t\right)}{\sum_1^N R_c^t} + \frac{\sum_1^N (\sigma_c^t - USDRSH_t) dR_c}{\sum_1^N R_c^t}$$

where σ_c^t is the USD share of the total reserves R_c^t of country c at time t.

Empirical decomposition: data requirements and application

Data on foreign exchange reserves (IMF IFS), readily available (complete?).

Data on portfolio composition of foreign exchange reserves by country, less available. Researcher estimates by country and year using central bank reporting: Chinn, Ito, McCauley update through end 2021 (some 2022).

Our decomposition considers components of change in USD COFER share 2015 minus 2021 (7 pps). σ_c^t for 72 countries for 2015, 55 for 2021.[†‡]

$$d(USDRSH) = \frac{\sum_1^{54} d\sigma_c R_c^{2015}}{\sum_1^{72} R_c^{2015}} + \frac{\sum_{55}^{72} d\sigma_c R_c^{2015}}{\sum_1^{72} R_c^{2015}} + \frac{\sum_1^{72} (\sigma_c^{2015} - USDRSH_{2015}) dR_c}{\sum_1^{72} R_c^{2015}}$$

$$0.070 = 0.003 + \frac{\sum_{55}^{72} d\sigma_c R_c^{2015}}{\sum_1^{72} R_c^{2015}} + 0.038$$

$$\frac{\sum_{55}^{72} d\sigma_c R_c^{2015}}{\sum_1^{72} R_c^{2015}} = 0.029$$

[†] σ_c^{2016} used for missing σ_c^{2015} values of 7 countries: Ireland, Costa Rica, West Bank and Gaza, Lesotho, Mauritius, Morocco, and Seychelles.

[‡] Notable reserve stock countries with $d\sigma_c$ values unknown include: China, India, and Turkey.

Large reserve portfolio growth for countries with different σ_c^{2015}

Switzerland contributes 0.017 pp to the COFER USD share decline due to accumulation of euros with a monetary policy framework that at times limits (price effects from) movements in euro-CHF.

Through 2021, USD share pushed down by Russia reserve growth, while pushed up by Hong Kong and Israel.

Table: Reserve Balance Changes, 2015 to 2021

	Largest Reserve Declines			Largest Reserve Accumulations		
Rank	Country	2015 USD Share	FXR Decline ($ Bil)	Country	2015 USD Share	FXR Increase ($ Bil)
1	China	0.58	80	**Switzerland**	**0.32**	**473**
2	Turkey	0.81	28	India	0.58	242
3	Brazil	0.84	18	**Russia Federation**	**0.43**	**159**
4	Kazakhstan	0.15	11	**Hong Kong, PRC**	**0.87**	**138**
5	Bolivia	0.81	10	**Israel**	**0.68**	**119**
6	Sweden	0.08	6	Czech Republic	0.15	106
7	Sri Lanka	0.40	4	Korea	0.67	80
8	Netherlands	0.84	4	Poland	0.39	56
9	Costa Rica	0.91	1	United Kingdom	0.40	26
10	Zambia	0.86	1	Philippines	0.89	22

Source: Goldberg and Hannaoui (2023)

Large changes in σ_c^t engage with ex ante R_c^{2015}

Both positive and negative identified USD portfolio share changes. Declines by Russia contribute the greatest amount to the total (0.018 pp) but in aggregate effects are offset by increasing USD shares from other countries.

Table: Reserve Portfolio Changes, 2015 to 2021

	Largest USD Share Declines			Largest USD Share Increases		
Rank	Country	2015 FXR ($Bil)	USD Share Decrease	Country	2015 FXR ($Bil)	USD Share Increase
1	Macedonia	2	0.42	Kazakhstan	20	0.64
2	Portugal	5	0.37	Kyrgyz Republic	1	0.44
3	Namibia	2	0.35	Sweden	50	0.34
4	**Russia Federation**	**309**	**0.29**	Papua New Guinea	2	0.31
5	Spain	39	0.27	Romania	35	0.20
6	Bolivia	11	0.22	Malawi	1	0.14
7	Sri Lanka	6	0.15	Kenya	7	0.14
8	Croatia	15	0.14	South Africa	39	0.12
9	Serbia	11	0.11	Iceland	5	0.11
10	Georgia	2	0.11	Czech Republic	63	0.11

Source: Goldberg and Hannaoui (2023)

Missing portfolio share countries contribute up to 2.9 pp through this channel to the COFER aggregates. China and India?

New research on drivers of σ_c^t (USD share of total reserves)

- Standard determinants are: currency pegs, trade shares with the US, euro area, and Japan, and the denomination and levels of external debt positions, country size. Arslanalp, Eichengreen, and Simpson-Bell (2022) also emphasize rise of *Other* currencies.
- Goldberg and Hannaoui (2023) test roles of returns on traditional and *Other* currencies, investment tranche versus liquidity tranches, and roles of geopolitical differences with the US.
  - Higher liquidity tranches of reserve portfolios, defined using short term debt, are associated with greater sensitivity of portfolio composition of official reserves.
  - Geopolitical considerations second to the foreign currency liquidity needs of countries, particularly around short term debt.

UN vote alignment groupings | Investment tranche | US UN vote alignment | 5-year rates | NRC and shadow rates

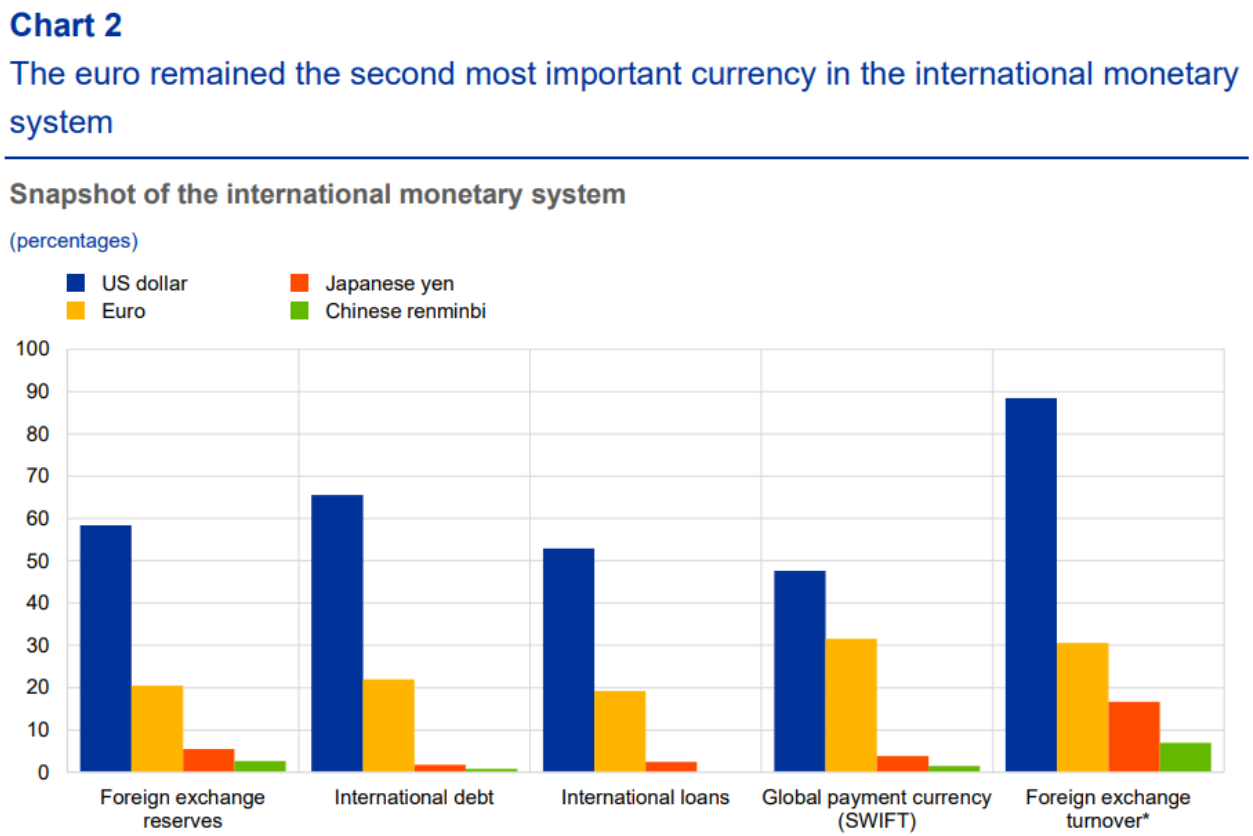
Private financial transactions heavily in dollars, then euros

The 2022 Russian invasion of Ukraine came with new financial sanctions, including SWIFT use Cipriani, Goldberg, and La Spada (2023).

ECB (2023) surveyed key announcements of country intent to shift currencies, but did not find material changes in key indicators.

Chart 2

The euro remained the second most important currency in the international monetary system



Sources: BIS, IMF, Society for Worldwide Interbank Financial Telecommunication (SWIFT) and ECB calculations.
Notes: The latest data for foreign exchange reserves, international debt and international loans are for the fourth quarter of 2022. SWIFT data are for December 2022. Foreign exchange turnover data are as at April 2022. *Since transactions in foreign exchange markets always involve two currencies, shares add up to 200%.

Source: ECB (2023)

Research opportunities: synergies, frictions, amplification, USD status

- What synergies between choices of currencies across different roles?
  - Banking, funding, and trade: Gopinath and Stein (2021)
  - Tipping conditions on product invoicing, including through inputs: Goldberg and Tille (2008)
- What frictions magnify the effects of shocks to financial institutions differently across currencies?
  - Safe assets, market liquidity (broker dealer constraints and institutional arrangements): Duffie (2023), Coppola, Krishnamurthy, and Xu (2023)
  - Bank value at risk constraints from regulatory or internal risk management, leverage: Adrian and Shin (2014)
  - Limits to arbitrage across institutions: Du and Schreger (2016, 2022)

Research opportunities: synergies, frictions, amplification, USD status

- Roles for swap lines and FIMA repo in reducing shock amplification
  - Official dollar liquidity facilities (Swap Lines)
  - FIMA repo (Foreign International Monetary Authority) - liquify not liquidate Choi, Goldberg, Lerman, and Ravazzolo (2022)
  - Reduce near term funding strains, tail risk price effects, and support credit provision and cross-border lending.
  - Theoretical and empirical approaches: Bahaj and Reis (2022), Goldberg and Ravazzolo (2022), Kekre and Lenel (2021)
  - Alternative swap line approach in trade credit space. Different synergies and consequences?

Thanks and Disclaimer

Thank you!

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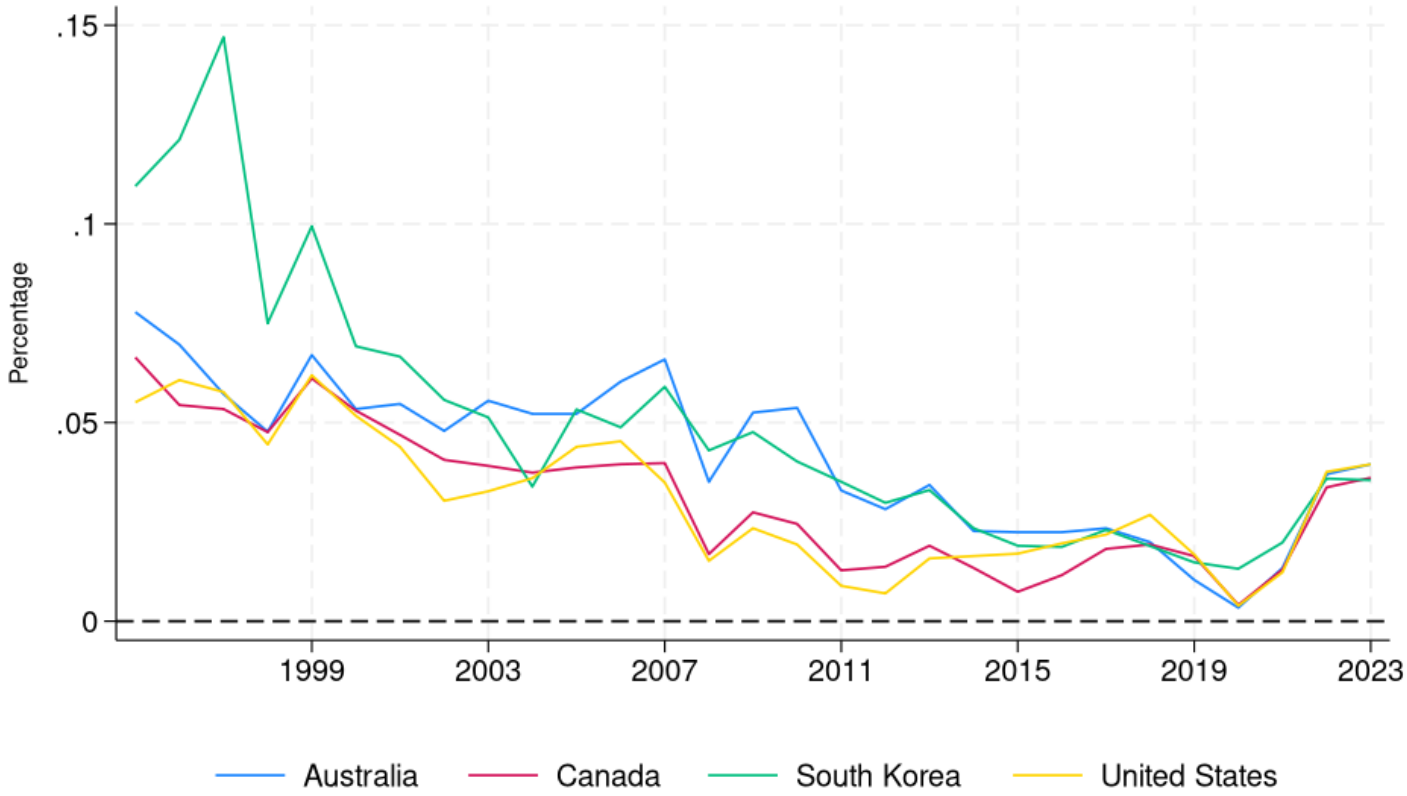
Appendix

New financial explanatory variables

Figure: 5-Year Government Bond Yields

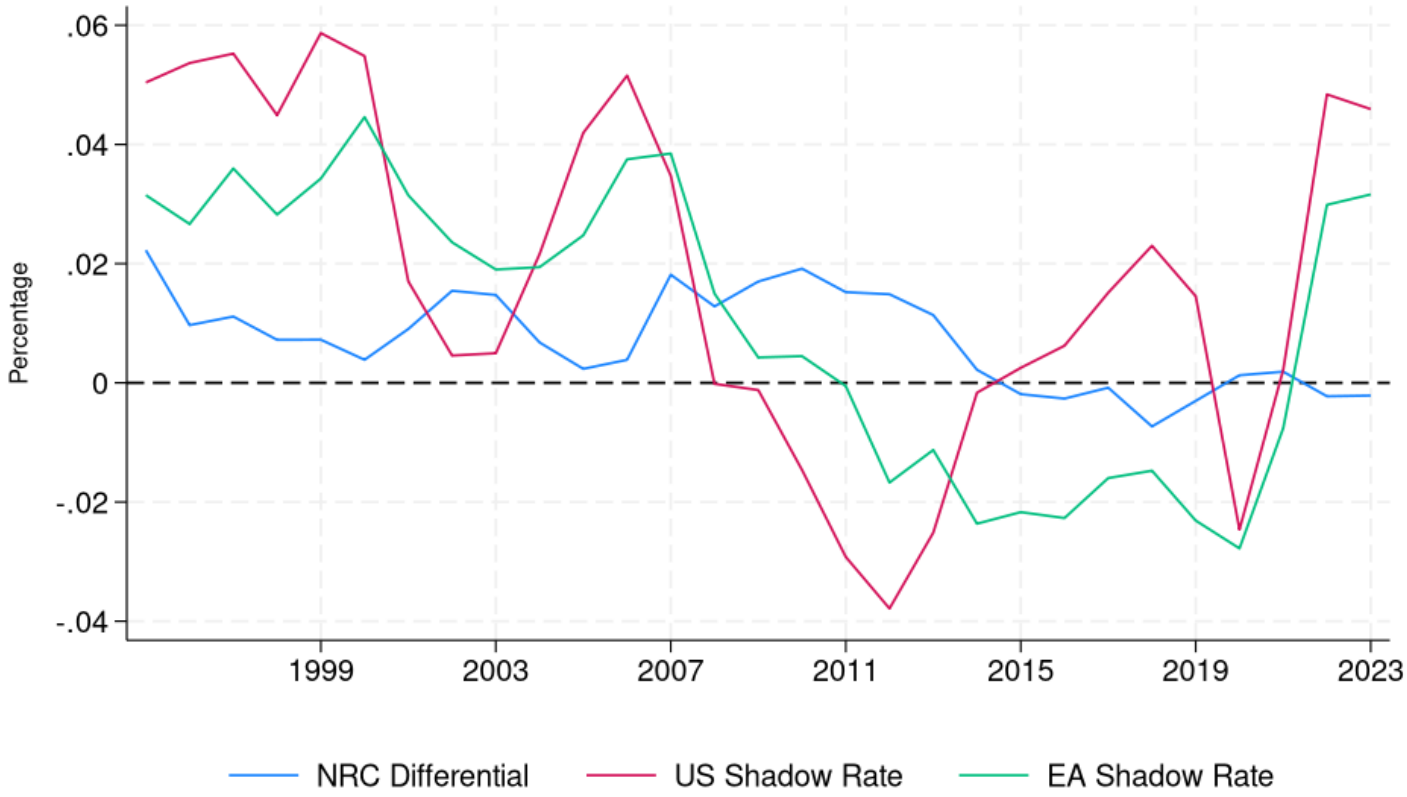


Source: Author's construction using data from the following sources: Reserve Bank of Australia, Central Bank of Canada, Bank of Korea, and United States Treasury.

New Drivers Conjectures

New financial explanatory variables

Figure: NRC differential, Shadow rates

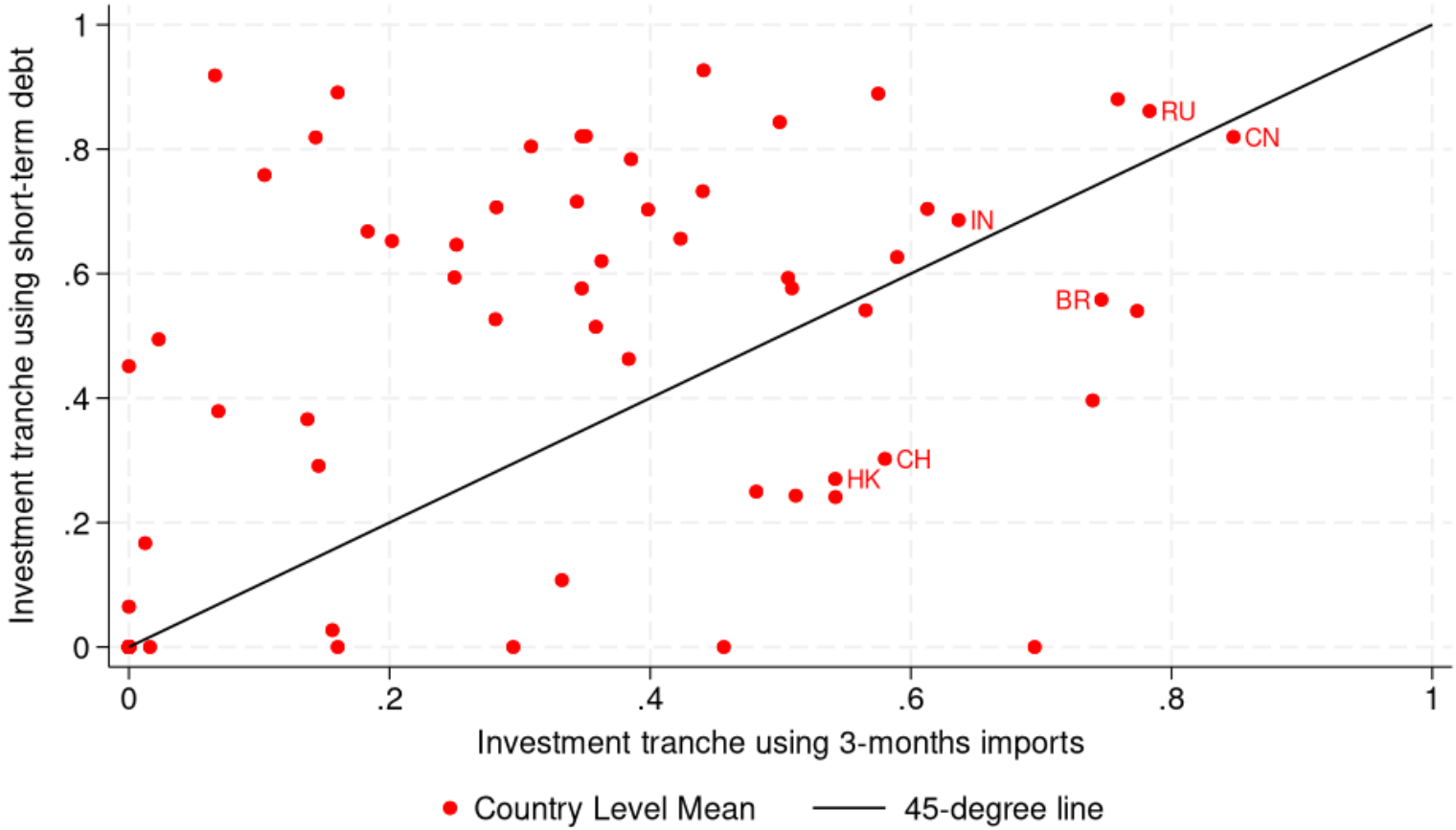


Source: Author's construction using data from the following sources: Reserve Bank of Australia, Central Bank of Canada, Bank of Korea, United States Treasury, and LJF Macro Analysis.

New Drivers Conjectures

New financial explanatory variables

Figure: Investment Tranche

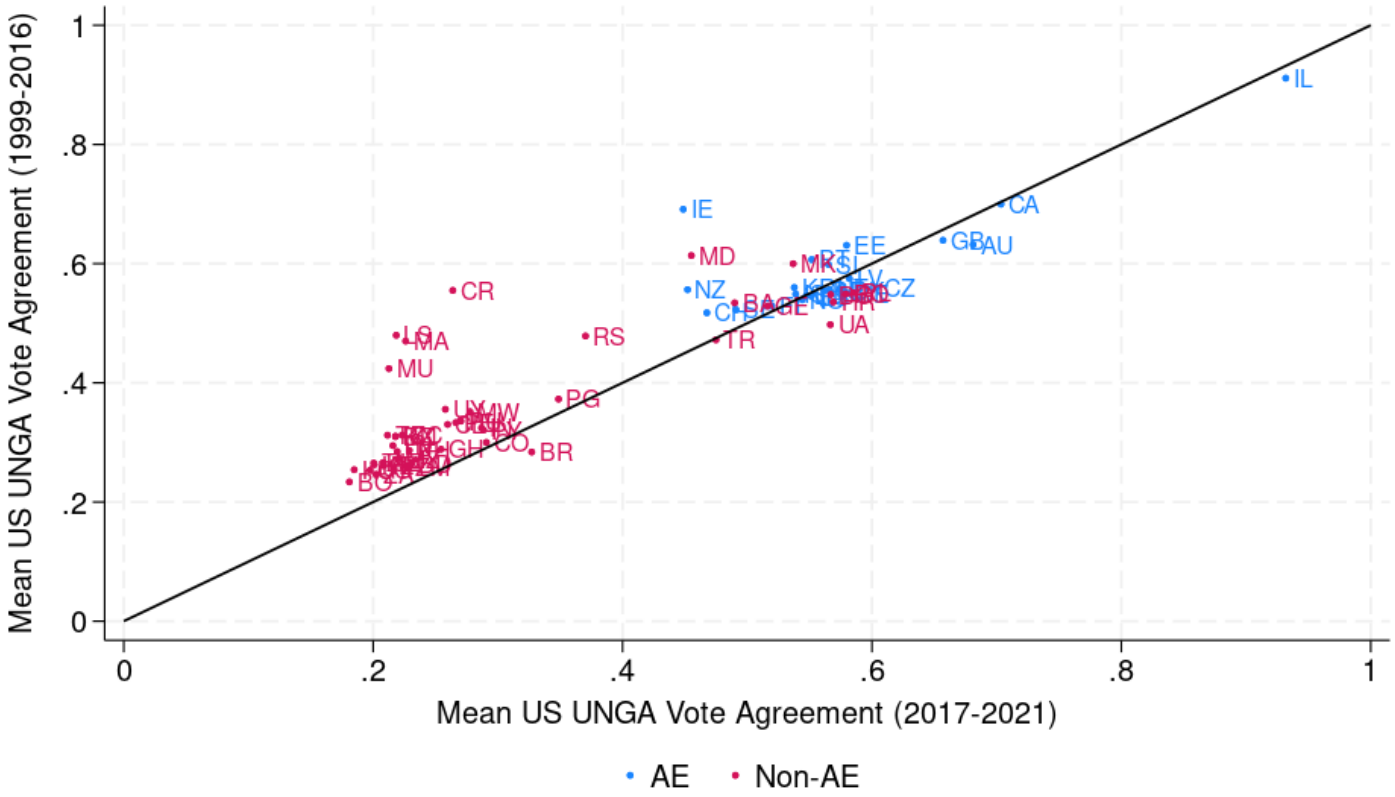


Source: Author's construction using data from the IMF Direction of Trade (DoT), IMF International Financial Statistics (IFS), and the BIS Joint External Debt Hub (JEDH).
Countries with zero investment tranche under both measures include: Belgium, Canada, Germany, Spain, Finland, France, United Kingdom, Ireland, Italy, Luxembourg, Netherlands, Portugal, Slovenia.

New Drivers | Conjectures

New financial explanatory variables

Figure: US UNGA Vote Agreement



Source: Author's construction using UN General Assembly voting data described in Voeten, Strezhnev, and Bailey (2009).

New Drivers | Conjectures

UN Vote Alignment Groupings

Table: US UNGA vote agreement country groupings.

Agreement Level	Country	N
Low ($Agreement \leq 0.4$)	Kyrgyz Republic, Tajikistan, Bolivia, Lesotho, South Africa, Morocco, Uganda, Ecuador, Bangladesh, Azerbaijan, Seychelles, Botswana, Brunei, Mauritius, Sri Lanka, Tunisia, Ghana, Namibia, Zambia, Kenya, Mozambique, Philippines, Tanzania, China, Costa Rica, Kazakhstan, Mexico, Brazil, Chile, Malawi, Paraguay, Uruguay, Peru, India, Colombia, Nigeria, Russia, Papua New Guinea	38
Middle ($0.4 < Agreement < 0.55$)	Serbia, Turkey, Ireland, Switzerland, New Zealand, Bosnia and Herzegovina, Georgia, Sweden, Ukraine, Finland, Croatia, Moldova, Luxembourg, Norway, Germany	15
High ($0.55 \leq Agreement$)	Iceland, Spain, Belgium, Netherlands, Romania, Italy, Bulgaria, Poland, Denmark, Macedonia, Korea Republic, Portugal, Lithuania, Latvia, Czech Republic, Slovenia, France, Estonia, United Kingdom, Australia, Canada, Israel	22

Source: Author's groupings using UN General Assembly voting data described in Voeten, Strezhnev, and Bailey (2009). Groupings constructed according to median annual US UNGA vote agreement from 1999-2021. Countries displayed in ascending order of vote agreement.

New Drivers Conjectures

Tests of new conjectures

Test unbalanced panel of annual data for 75 countries

$$\sigma_c^t = \beta_0 + \beta_1' \mathbf{X}_{ct} + \beta_2 \mathbf{Ret}_t + \beta_3 \mathbf{InvTr}_{ct} + \beta_4 \mathbf{Ret}_t \times \mathbf{InvTr}_{ct} + \beta_5 \mathbf{GP}_{ct} + \epsilon_{ct}$$

$$InvTr_{ct} = \begin{cases} 0 & R_{ct} < Liq_{ct} \\ \frac{R_{ct} - Liq_{ct}}{R_{ct}} & R_{ct} > Liq_{ct} \end{cases}$$

where $InvTr_{ct}$ is constructed either using:

- Short-term debt as the sum of short-term liabilities to BIS banks and short-term international debt securities by year, *or*
- 3 months of total Goods and Services Imports.

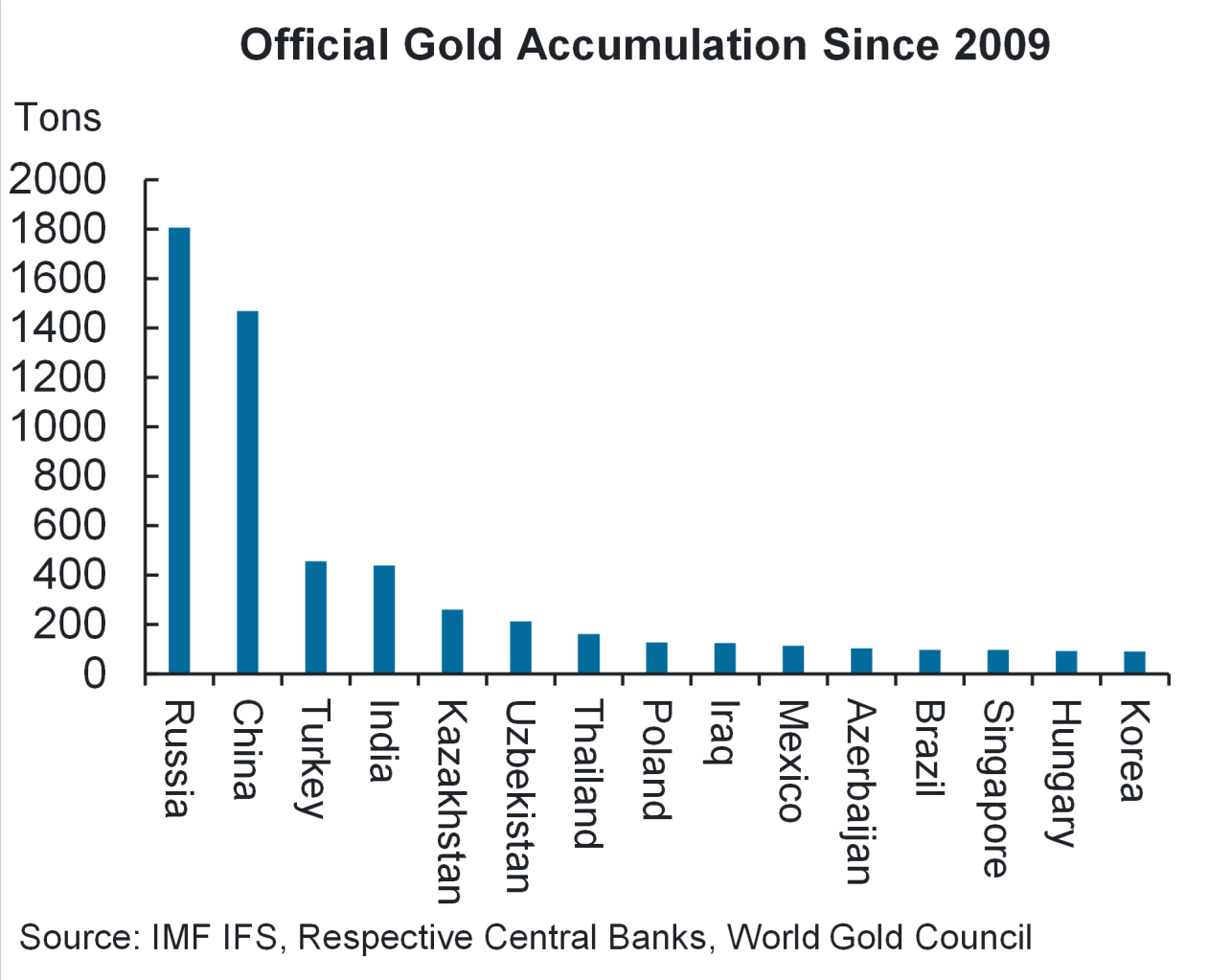
$\mathbf{GP}_{ct}$ is country voting agreement with the US at the UN over 3 prior years, introduced in continuous form or discrete (Low, Medium, High)

$\mathbf{Ret}_t$ introduces shadow interest rates or differentials, including for nontraditional reserve currencies (Australia, Canada, South Korea)

Investment tranche | US UN vote alignment | 5-year rates | NRC and shadow rates

Accumulation highly concentrated in a few countries

Is this a broad-based trend, or are a few countries shaping a narrative?



Gold holdings considered relative to official reserves

How material is this accumulation?

Despite large accumulation in some EMs, the value of gold holdings is still at relatively low levels compared to official reserve holdings.