The Dollar versus the Euro
as International Reserve Currencies

Menzie D. Chinn (University of Wisconsin, Madison)

Jeffrey A. Frankel (Harvard University)

Hiro Ito (Portland State University)

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Menzie Chinn & Jeffrey Frankel (2005, 2007), "Will the Euro Eventually Surpass the Dollar as Leading International Reserve Currency?"

- At that time, we estimated an equation to determine aggregate central banks' holdings of $ reserves, vs. DM, vs. ¥, vs. £, over 1973-1998.
- Four key determinants
  - Size of economy where currency is issued: GDP
  - Size of financial markets located in host country: forex turnover
  - Issuer's ability to discipline its exorbitant privilege & so maintain the value of its currency: average rate of depreciation.
  - Network externalities: long lag in effects + tipping-point functional form.

- Then we used the estimates to simulate future $ vs. € shares.
- We found: € would catch up with $ by 2020, *provided*
  - UK & Sweden joined € so that its GDP & financial markets surpassed US.
  - The $ continued its trend depreciation.
- Neither of those two things happened.   Euro's share stayed below 20%.
  - Nevertheless, the $ share has continued its slow decline.

A lot has changed since 2005…

1. The "new view" of Eichengreen (2010) de-emphasized network externalities & consequent lags.
2. The RMB replaced the € as the most-discussed eventual $ rival.
    -- Euro (& SGP) fared poorly, 2008-2010.
    -- Subramanian (2011), e.g., forecast RMB would eclipse $ by 2020.
3. Abuse of exorbitant privilege not limited to deficits (=> depreciation), but can also consist of frequent use of sanctions.
    -- E.g., US & EU against Russia in 2014 & 2022.
4. Gold re-joined the roster of active international reserve assets.
5. China's era of 10% growth & capital account liberalization ended in 2014.

New sorts of data have become available...

1. China, previously a non-reporting reserve holder, began to allow the IMF to include the composition of its holdings in COFER.

2. Whereas most earlier studies only had aggregate central bank holdings of the reserve currencies, it became possible to construct the data holder-by-holder.
   -- thereby greatly increasing the data set
   -- plus allowing additional determinants such as bilateral trade and bilateral vulnerability to geopolitical sanctions
   -- E.g., Ito & McCauley (2020) and Chinn, Ito, & McCauley (2022).

   So it is a good time to update our paper of 19 years ago.

Aggregate Holdings: IMF Annual Reports & COFER
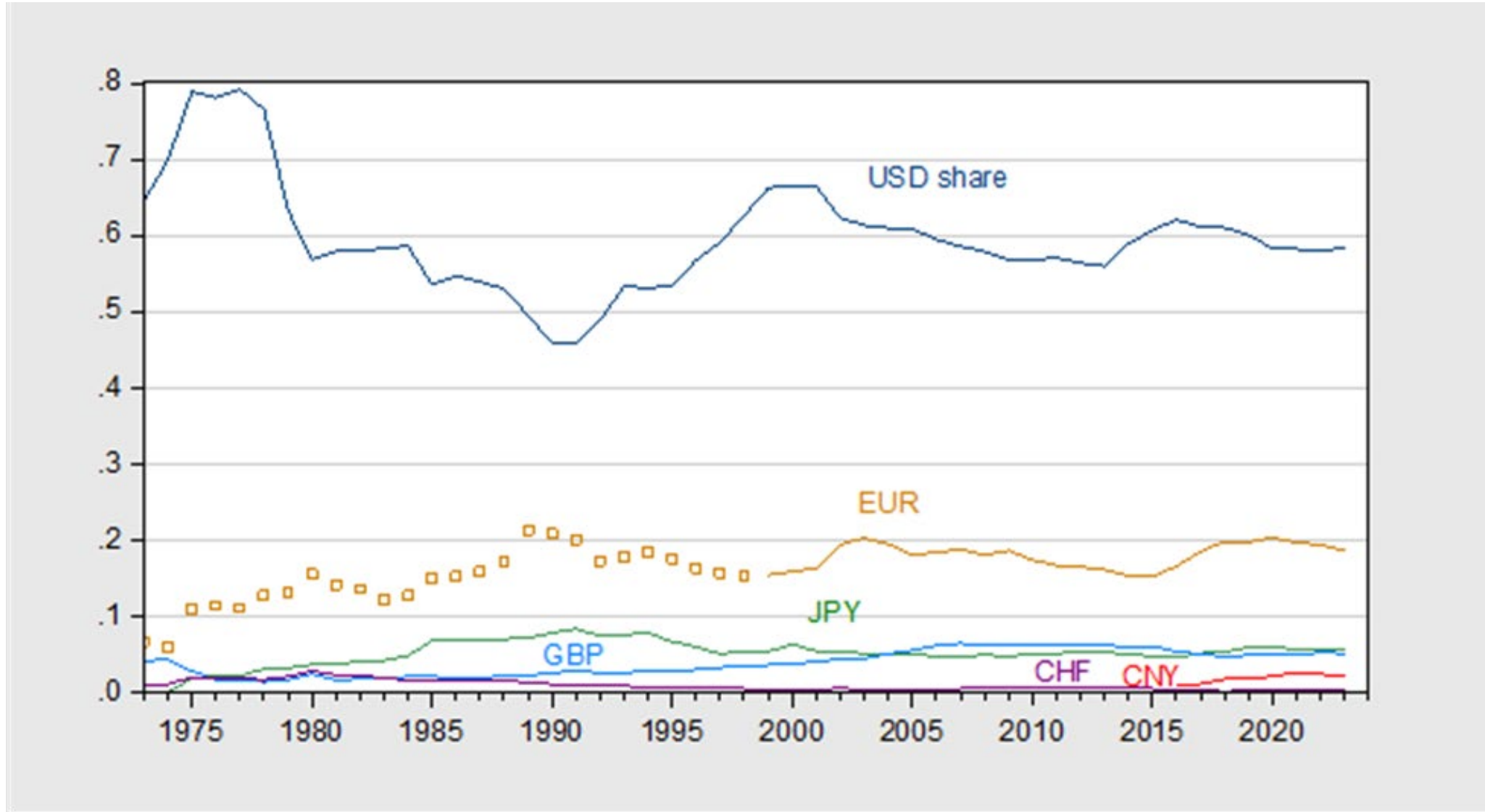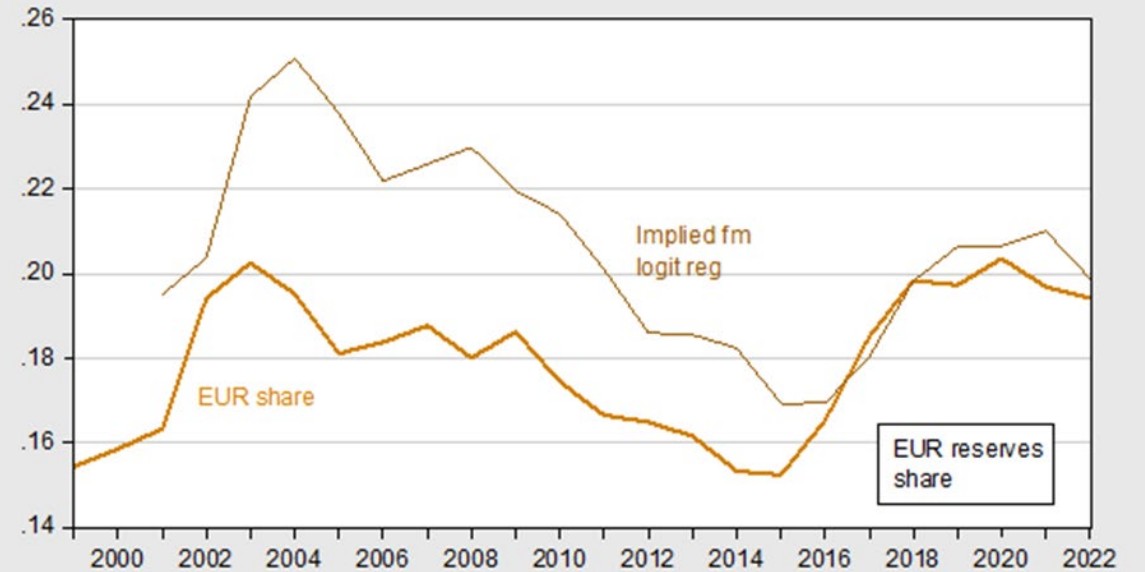
Explaining Aggregates pre-1999

- 1973-1998, USD, DEM, FFR, GBP, JPY, SFR,

$$z_{it} = -0.648^* + 2.768^* y_{it} - 2.639^* \pi_{it} - 0.981^* \sigma_{it} + 0.446 to_{it} + 0.919^* z_{i,t-1} + u_{it}$$

Where

$$z_{it} \equiv \left(\frac{res_{it}}{1 - Res_{it}} \right)$$

Using pre-Euro Equations
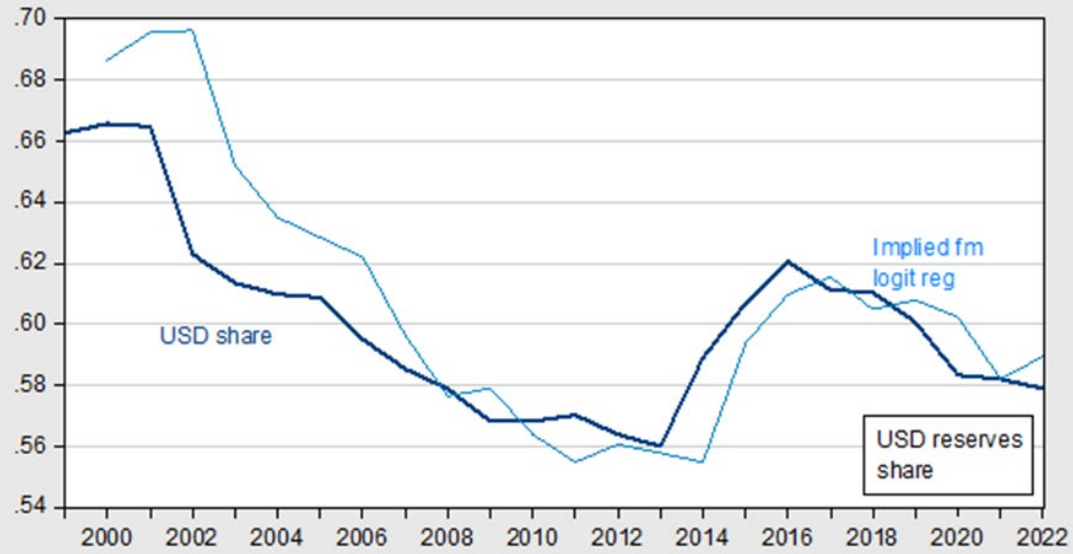
Post-EMU Sample

- Estimated over USD, EUR, GBP, JPY, RMB

$$z_{it} = -0.017 - 0.071 y_{it} + 8.047^* \pi_{it} + 2.837 \sigma_{it} - 0.319^* to_{it} + 0.968^* z_{i,t-1} + u_{it}$$

- Note every coefficient is different except autoregressive coefficient
- Wrong signs on all but AR coefficient
- The limit of aggregate regressions

Central Bank Holdings, Currency-by-Currency

- Ito-McCauley (JIMF, 2020) database on individual CB holdings
- 55 countries, ex-reserve currency issuers US, Euro, UK, Japan, China
- Focus for USD holdings, then EUR holdings, then JPY holdings...
- Use reserve share (few observations at bounds for USD, EUR)

$$z_{ijt} = \beta_0 + \beta_1 y_{it} + \beta_2 \pi_{it} + \beta_3 \sigma_{it} + \beta_4 to_{it} + \beta_5 z_{ij,t-1} + \gamma_1 trade_{ijt} + \gamma_2 peg_{ij,t} + u_{it}$$

Country j specific variables

$$z_{ijt} = \beta_0 + \beta_1 y_{it} + \beta_2 \pi_{it} + \beta_3 \sigma_{it} + \beta_4 to_{it} + \beta_5 z_{ij,t-1} + \gamma_1 trade_{ijt} + \gamma_2 peg_{ij,t}$$
$$+ \theta_1 alliance_{ijt} + \theta_2 sanctions_{j,t} + u_{it}$$

Country j alliance w/ctry i   Sanctions by US, EU, UN on country *j*

Table 2.1: USD Share in FX reserves

	Baseline (1)	Baseline (2)	Baseline (3)	Baseline (4)	Baseline (5)
L.res_usd	0.890	0.889	0.889	0.889	0.889
	(0.023)***	(0.024)***	(0.024)***	(0.023)***	(0.024)***
GDP ratio	-0.092	-0.094	-0.091	-0.118	-0.096
	(0.114)	(0.114)	(0.116)	(0.115)	(0.116)
ER volatility	-3.365	-3.385	-3.362	-3.629	-3.412
	(1.281)**	(1.288)**	(1.273)**	(1.340)***	(1.310)**
Inflation diff.	-0.638	-0.638	-0.591	-0.600	-0.637
	(1.320)	(1.321)	(1.281)	(1.318)	(1.322)
Share of trade w US	0.077	0.073	0.073	0.070	0.073
	(0.027)***	(0.026)***	(0.026)***	(0.026)**	(0.026)***
USD as Anchor	0.042	0.042	0.042	0.041	0.042
	(0.010)***	(0.010)***	(0.010)***	(0.010)***	(0.010)***
FX turnover, location	0.295	0.294	0.303	0.292	0.294
	(0.396)	(0.397)	(0.402)	(0.394)	(0.395)
US allies		0.002	0.002	0.004	0.002
		(0.007)	(0.007)	(0.007)	(0.007)
Sanction			-0.001		
			(0.007)		
trade sanction				-0.007	
				(0.007)	
financial sanction					-0.001
					(0.008)
N	917	917	917	917	917
Adj. R2	0.89	0.89	0.89	0.89	0.89
# of countries	55	55	55	55	55
Years covered	1999 - 2022	1999 - 2022	1999 - 2022	1999 - 2022	1999 - 2022

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

Note: The major currency issuers, the US, the euro member countries, the UK, and Japan, are not included in the estimations.

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	(0.027)***	(0.026)***	(0.026)***	(0.026)**	(0.026)***
USD as Anchor	0.042	0.042	0.042	0.041	0.042	← Largest std'd beta
	(0.010)***	(0.010)***	(0.010)***	(0.010)***	(0.010)***
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Note: The major currency issuers, the US, the euro member countries, the UK, and Japan, are not included in the estimations.

Table 2.2: EUR Share in FX reserves

	Baseline (1)	Baseline (2)	Baseline (3)	Baseline (4)	Baseline (5)
L.res_euro	0.915 (0.024)***	0.915 (0.025)***	0.915 (0.025)***	0.914 (0.025)***	0.910 (0.026)***
GDP ratio	0.237 (0.107)**	0.239 (0.108)**	0.238 (0.109)**	0.222 (0.108)**	0.278 (0.111)**
ER volatility	-1.915 (1.610)	-1.905 (1.620)	-1.895 (1.617)	-1.955 (1.623)	-1.720 (1.635)
Inflation diff.	-6.026 (2.148)***	-5.983 (2.151)***	-6.000 (2.225)***	-5.898 (2.176)***	-6.011 (2.138)***
Share of trade w EURO area	0.075 (0.026)***	0.071 (0.027)**	0.070 (0.027)**	0.073 (0.027)**	0.072 (0.027)**
EUR as Anchor	0.017 (0.011)	0.015 (0.011)	0.015 (0.011)	0.015 (0.011)	0.014 (0.010)
FX turnover, location	-0.127 (0.173)	-0.129 (0.173)	-0.131 (0.178)	-0.138 (0.177)	-0.150 (0.176)
euro_allies_a		0.006 (0.012)	0.006 (0.012)	0.007 (0.011)	0.008 (0.010)
Sanction			0.000 (0.005)		
trade sanction				-0.005 (0.006)	
financial sanction					0.010 (0.006)*
N	834	834	834	834	834
Adj. R2	0.94	0.94	0.94	0.94	0.94
# of countries	51	51	51	51	51
Years covered	2001 - 2022	2001 - 2022	2001 - 2022	2001 - 2022	2001 - 2022

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

Note: The major currency issuers, the US, the euro member countries, the UK, and Japan, are not included in the estimations.

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EUR as Anchor	0.017 (0.011)	0.015 (0.011)	0.015 (0.011)	0.015 (0.011)	0.014 (0.010)
FX turnover, location	-0.127 (0.173)	-0.129 (0.173)	-0.131 (0.178)	-0.138 (0.177)	-0.150 (0.176)
euro_allies_a		0.006 (0.012)	0.006 (0.012)	0.007 (0.011)	0.008 (0.010)
Sanction			0.000 (0.005)		
trade sanction				-0.005 (0.006)	
financial sanction					0.010 (0.006)*
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Adj. R2	0.94	0.94	0.94	0.94	0.94
# of countries	51	51	51	51	51
Years covered	2001 - 2022	2001 - 2022	2001 - 2022	2001 - 2022	2001 - 2022

Largest std'd beta

*p<0.1; ** p<0.05; *** p<0.01*

Note: The major currency issuers, the US, the euro member countries, the UK, and Japan, are not included in the estimations.

Central Bank Holding Shares, 5 Reserve Currencies

Table 3: Major Currency Share in FX reserves

	Baseline (1)	Baseline (2)	Baseline (3)	Baseline (4)	Baseline (5)	Baseline (6)
Share(t-1)	0.911	0.912	0.912	0.912	0.911	0.912
	(0.013)***	(0.013)***	(0.013)***	(0.013)***	(0.013)***	(0.013)***
GDP share in world	0.165	0.165	0.165	0.165	0.167	0.165
	(0.032)***	(0.032)***	(0.032)***	(0.032)***	(0.032)***	(0.032)***
NEER vol	-0.141	-0.145	-0.145	-0.151	-0.116	-0.149
	(0.291)	(0.293)	(0.293)	(0.292)	(0.285)	(0.289)
Inflation diff.	-0.131	-0.130	-0.130	-0.133	-0.142	-0.129
	(0.114)	(0.114)	(0.114)	(0.121)	(0.115)	(0.115)
Share of trade w Big5	0.008	0.007	0.007	0.008	0.008	0.008
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
Anchor Currency	0.041	0.041	0.041	0.041	0.041	0.041
	(0.008)***	(0.008)***	(0.008)***	(0.008)***	(0.008)***	(0.008)***
FX turnover, loc	0.049	0.049	0.049	0.049	0.050	0.049
	(0.010)***	(0.010)***	(0.010)***	(0.011)***	(0.010)***	(0.010)***
Allies of big 5		0.001	0.001	0.001	0.001	0.001
		(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
on sanction				-0.000		
				(0.003)		
financial sanction					0.003	
					(0.003)	
trade sanction						-0.001
						(0.003)
N	3,075	3,075	3,075	3,075	3,075	3,075
Adj. R2	0.95	0.95	0.95	0.95	0.95	0.95
# of countries	55	55	55	55	55	55
Years covered	1999 - 2022	1999 - 2022	1999 - 2022	1999 - 2022	1999 - 2022	1999 - 2022

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

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Share(t-1)	0.911 (0.013)***	0.912 (0.013)***	0.912 (0.013)***	0.912 (0.013)***	0.911 (0.013)***	0.912 (0.013)***
GDP share in world	0.165 (0.032)***	0.165 (0.032)***	0.165 (0.032)***	0.165 (0.032)***	0.167 (0.032)***	0.165 (0.032)***
NEER vol	-0.141 (0.291)	-0.145 (0.293)	-0.145 (0.293)	-0.151 (0.292)	-0.116 (0.285)	-0.149 (0.289)
Inflation diff.	-0.131 (0.114)	-0.130 (0.114)	-0.130 (0.114)	-0.133 (0.121)	-0.142 (0.115)	-0.129 (0.115)
Share of trade w Big5	0.008 (0.011)	0.007 (0.011)	0.007 (0.011)	0.008 (0.011)	0.008 (0.011)	0.008 (0.011)
Anchor Currency	0.041 (0.008)***	0.041 (0.008)***	0.041 (0.008)***	0.041 (0.008)***	0.041 (0.008)***	0.041 (0.008)***
FX turnover, loc	0.049 (0.010)***	0.049 (0.010)***	0.049 (0.010)***	0.049 (0.011)***	0.050 (0.010)***	0.049 (0.010)***
Allies of big 5		0.001 (0.002)	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)
on sanction				-0.000 (0.003)		
financial sanction					0.003 (0.003)	
trade sanction						-0.001 (0.003)
N	3,075	3,075	3,075	3,075	3,075	3,075
Adj. R2	0.95	0.95	0.95	0.95	0.95	0.95
# of countries	55	55	55	55	55	55
Years covered	1999 - 2022	1999 - 2022	1999 - 2022	1999 - 2022	1999 - 2022	1999 - 2022

Size matters

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

Central Bank Holding Logit, 5 Reserve Currencies

Table 4: Major Currency Share in FX reserves (Logit)

	Baseline (1)	Baseline (2)	Baseline (3)	Baseline (4)	Baseline (5)	Baseline (6)
Share(t-1)	0.908	0.906	0.906	0.906	0.906	0.905
	(0.018)***	(0.018)***	(0.018)***	(0.018)***	(0.018)***	(0.018)***
GDP share in world	1.795	1.867	1.867	1.842	1.868	1.897
	(0.463)***	(0.483)***	(0.483)***	(0.482)***	(0.482)***	(0.482)***
NEER vol	-4.001	-3.547	-3.547	-3.114	-3.536	-3.236
	(5.699)	(5.756)	(5.756)	(5.741)	(5.735)	(5.755)
Inflation diff.	0.059	-0.279	-0.279	-0.041	-0.286	-0.468
	(4.074)	(4.101)	(4.101)	(4.107)	(4.102)	(4.114)
Share of trade w Big5	0.404	0.447	0.447	0.431	0.447	0.441
	(0.126)***	(0.131)***	(0.131)***	(0.132)***	(0.131)***	(0.131)***
Anchor Currency	0.272	0.270	0.270	0.272	0.270	0.273
	(0.048)***	(0.048)***	(0.048)***	(0.049)***	(0.048)***	(0.049)***
FX turnover, loc	0.643	0.665	0.665	0.643	0.665	0.673
	(0.290)**	(0.295)**	(0.295)**	(0.295)**	(0.295)**	(0.295)**
Allies of big 5		-0.051	-0.051	-0.054	-0.051	-0.056
		(0.038)	(0.038)	(0.038)	(0.038)	(0.038)
on sanction				0.024		
				(0.037)		
financial sanction					0.001	
					(0.050)	
trade sanction						0.036
						(0.035)
N	2,667	2,667	2,667	2,667	2,667	2,667
Adj. R2	0.91	0.91	0.91	0.91	0.91	0.91
# of countries	55	55	55	55	55	55
Years covered	1999 - 2022	1999 - 2022	1999 - 2022	1999 - 2022	1999 - 2022	1999 - 2022

*$p<0.1$; ** $p<0.05$; *** $p<0.01$

Note: The major currency issuers, the US, the euro member countries, the UK, and Japan, are not included in the estimations.

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Share(t-1)	0.908 (0.018)***	0.906 (0.018)***	0.906 (0.018)***	0.906 (0.018)***	0.906 (0.018)***	0.905 (0.018)***
GDP share in world	1.795 (0.463)***	1.867 (0.483)***	1.867 (0.483)***	1.842 (0.482)***	1.868 (0.482)***	1.897 (0.482)***
NEER vol	-4.001 (5.699)	-3.547 (5.756)	-3.547 (5.756)	-3.114 (5.741)	-3.536 (5.735)	-3.236 (5.755)
Inflation diff.	0.059 (4.074)	-0.279 (4.101)	-0.279 (4.101)	-0.041 (4.107)	-0.286 (4.102)	-0.468 (4.114)
Share of trade w Big5	0.404 (0.126)***	0.447 (0.131)***	0.447 (0.131)***	0.431 (0.132)***	0.447 (0.131)***	0.441 (0.131)***
Anchor Currency	0.272 (0.048)***	0.270 (0.048)***	0.270 (0.048)***	0.272 (0.049)***	0.270 (0.048)***	0.273 (0.049)***
FX turnover, loc	0.643 (0.290)**	0.665 (0.295)**	0.665 (0.295)**	0.643 (0.295)**	0.665 (0.295)**	0.673 (0.295)**
Allies of big 5		-0.051 (0.038)	-0.051 (0.038)	-0.054 (0.038)	-0.051 (0.038)	-0.056 (0.038)
on sanction				0.024 (0.037)		
financial sanction					0.001 (0.050)	
trade sanction						0.036 (0.035)
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Trade matters

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CB Recursive Holdings Shares, 5 Reserve Currencies

- Results to come

Robustness Checks

- Coefficients, statistical significance do not change significantly if using tobit instead of OLS.

- Relative size, turnover in reserve currency issuer countries not significant

- Geopolitical distance using UN voting (e.g., Goldberg & Hannaoui) similar to alliance variable

- Specific sanctions variables, country i against j do not change the results.

- (Invoicing share, fx turnover would enter in significantly but are highly endogenous)

Conclusions

- The dollar retains dominance as reserve currency – due to use as anchor currency, size.

- The euro is held in large part due to trade (which follows from distance)

- Relative GDP matters, but only shows up when exploiting cross currency variation (as in the central bank data – five currency regressions)

- Sanctions (as dummy variable) do not show up as significantly important…yet.