DO CENTRAL BANKS REBALANCE THEIR CURRENCY SHARES?

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HOW DO RESERVE MANAGERS RESPOND TO EXCHANGE RATE MOVEMENTS?

☐ **Do central banks rebalance their currency shares?**

☐ Sounds like a simple question, but

☐ There has not been much academic, empirical research on this issue

☐ Due to the lack of data?

☐ It is an important question and is under-researched

WHAT IS "REBALANCING"?

Non-USD=$5,205 (41%)

FX portfolio = $12,701 as of 2020Q4
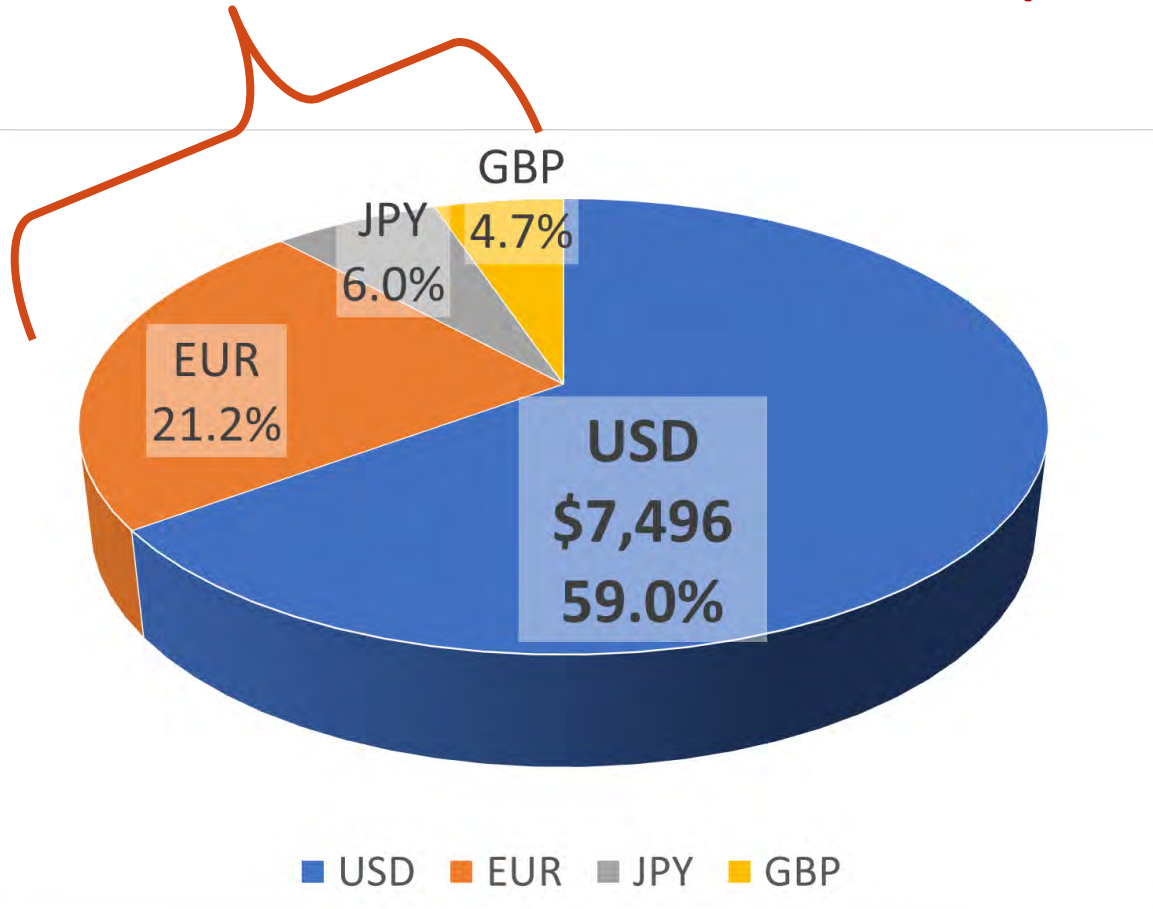
	$	non-$	total
now	7,496	5,205	12,701
	59%	41%	100%
$ depreciates 10%	7,496	5,726	13,222
	57%	43%	100%
Rebalance % of total:	2%	-2%	
Rebalance amount	307	-307	

Pie chart:
- USD $7,496 59.0%
- EUR 21.2%
- JPY 6.0%
- GBP 4.7%

Legend: USD EUR JPY GBP

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DO CENTRAL BANKS REBALANCE THEIR CURRENCY SHARES?

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- ☐ There has not been much academic, empirical research on this issue

- ☐ Due to the lack of data?

- ☐ It is an important question and is under-researched

WHY IS IT IMPORTANT TO STUDY?

☐ The management of $12.7 trillion should interest policymakers, academics and financial market participants.

  – It is important to study how the public sector responds to shocks arising to the economy. How would central banks react to the exchange rate moves of major currencies?

  – How to manage the reserve portfolio sends signals to the private fund market

☐ Rebalancing can stabilise key FX rates. The issue of whether central banks damp or contribute to market swings is important

☐ Exchange rate movements might lead to FX interventions, that would affect the gov't bond markets and therefore the yields

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WHAT DO WE DO?

☐ We explore the question of whether central banks rebalance their FX reserves by using different types of datasets:

- ➢ Country-level – Case studies of the US and Switzerland

- ➢ Global aggregated level – IMF's COFER

- ➢ Panel context – Use the Ito and McCauley (2020) dataset

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WHAT DO WE FIND?

☐ The **US** does not rebalance.

☐ **Switzerland** does rebalance its FX reserves. Its currency composition is independent of the dollar exchange rate movements.

☐ At the aggregated level: **some** economies do rebalance while **others** do not.

☐ In a cross-country comparison, economies, on average, do not rebalance.

➢ **EMEs** do not rebalance and **AEs** do rebalance. Larger economies maintain stable currency composition while smaller economies have their reserves more vulnerable to exchange rate shocks.

CASE STUDIES:
US AND SWITZERLAND

COUNTRY-CASE STUDY: US = NO REBALANCING

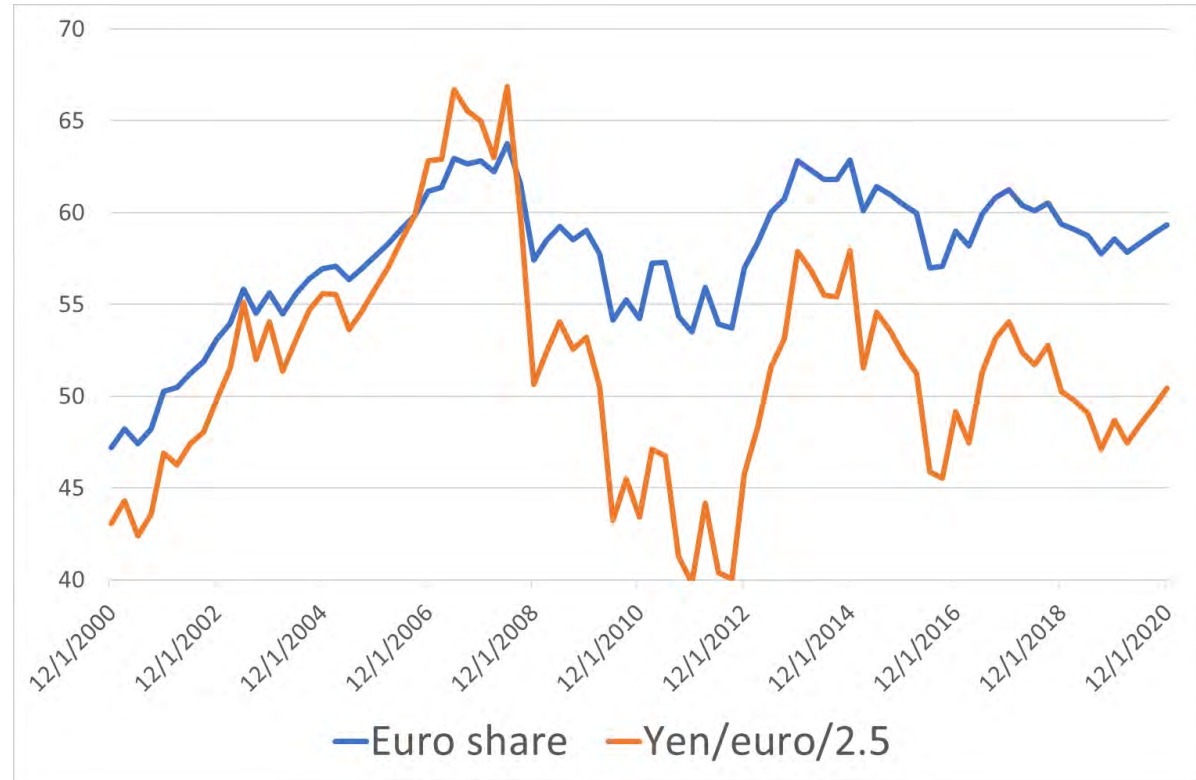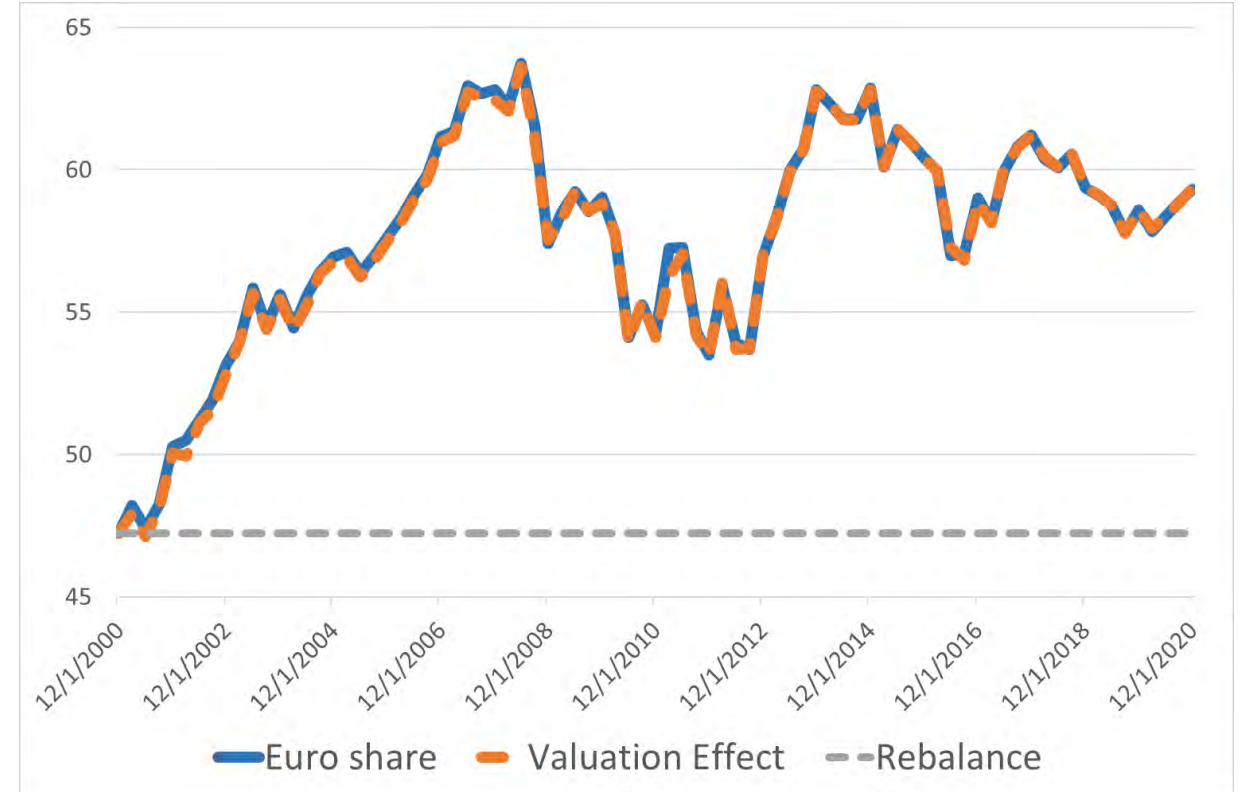**Figure 1(b): The euro share of US reserves**

Figure 1(c): Euro share, valuation effect and rebalancing of US FX reserves, in percent

Big swings in the euro/yen rate directly translate to big swings in the currency allocation of US reserves. The US authorities ***do not rebalance***.

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COUNTRY-CASE STUDY: SWITZERLAND

Figure 5: Currency composition of SNB's reserve assets, 2005Q1 – 2020Q4
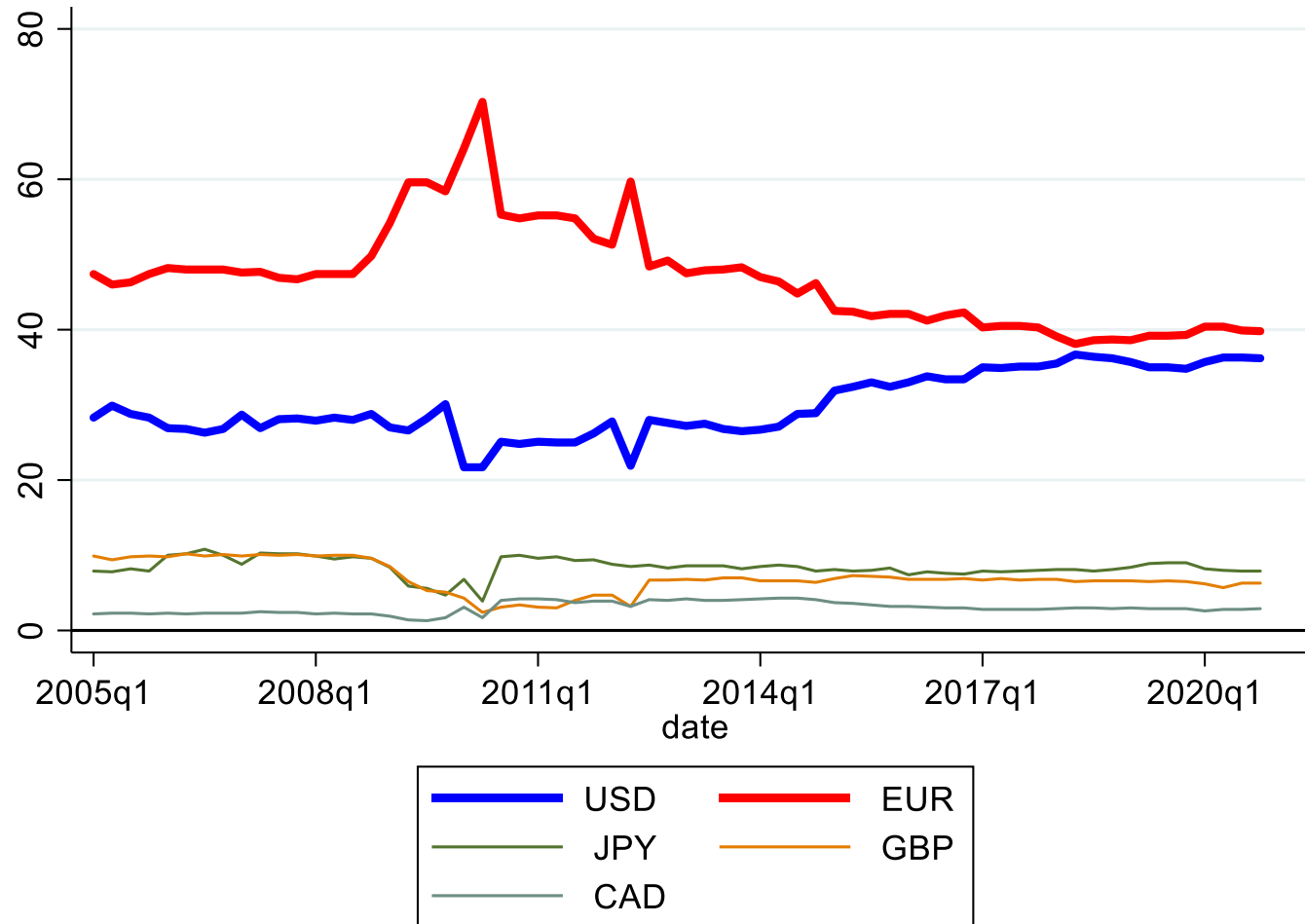
CASE STUDY: SWITZERLAND

☐ Regress the first difference of the USD shares in FX reserves on the valuation effect,

$$Val\_Eff_{USD}^{SNB} = \frac{R_{USD}(t-1)}{\sum_c^C \frac{R_c(t-1)}{FX_c(t)}} - \frac{R_{USD}(t-1)}{\sum_c^C \frac{R_c(t-1)}{FX_c(t-1)}}$$

$$\Delta y_t^{USD} = \alpha + \beta Val\_Eff_{USD,t}^{SNB} + X'_t \Gamma + \varepsilon_t$$

When $\widehat{\beta}$=0, rebalancing

When $\widehat{\beta}$=1, no-rebalancing

The estimation is done for 2005Q2 – 2020Q4

COUNTRY-CASE STUDY: SWITZERLAND

Table 4: Regression of USD shares on valuation effects, using SNB data

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
USD valuation effect (VE)	**-0.147**	**-0.099**	**0.016**	**-0.119**	**-0.133**	**-0.106**	**-0.003**
	(0.238)	**(0.233)**	**(0.248)**	**(0.240)**	**(0.232)**	**(0.240)**	**(0.332)**
Growth rate of FX assets		-0.024		-0.024	-0.029	-0.023	-0.023
		(0.012)**		(0.012)**	(0.012)**	(0.012)*	(0.012)*
VE x asset growth			-0.019				
			(0.010)*				
Change in VIX				0.011			
				(0.027)			
VE x dVIX					0.055		
					(0.037)		
NEER apprec. period						0.053	
						(0.366)	
VE x NEER app							-0.196
							(0.476)
N	63	63	63	63	63	63	63
Adj R2	0.42	0.45	0.44	0.44	0.46	0.44	0.44
H0: beta (VE) =1 (p-value)	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: * $p<0.1$; ** $p<0.05$; *** $p<0.01$.

# TAKEAWAY 1

☐ **US does not rebalance.** Exchange rate movements are directly reflected in the currency shares of FX reserves

☐ **Rebalancing is very much the norm at the SNB**

➤ The SNB has targets for the dollar and euro portions of its reserves.

➤ Rebalancing serves as a source of stability in the FX market by selling a rising dollar and buying a falling dollar.

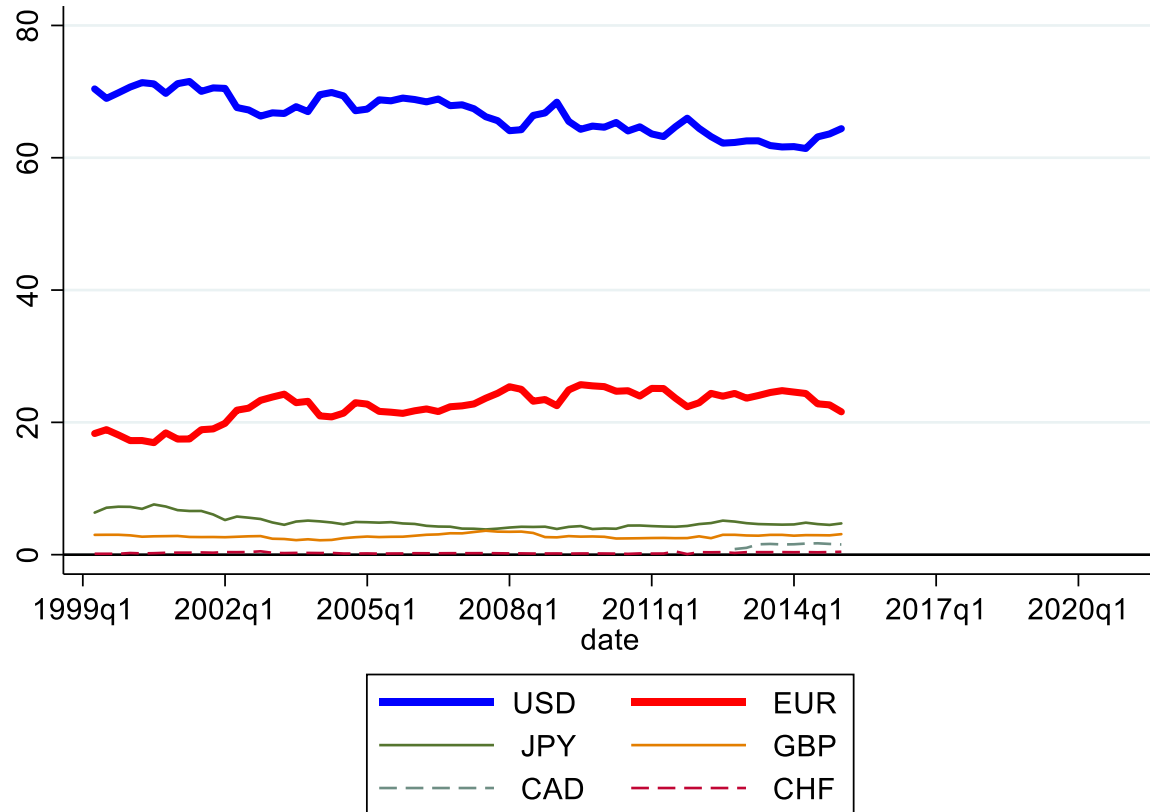# USING THE COFER DATA

COFER DATABASE

Figure 2: Shares of major currencies – COFER dataset
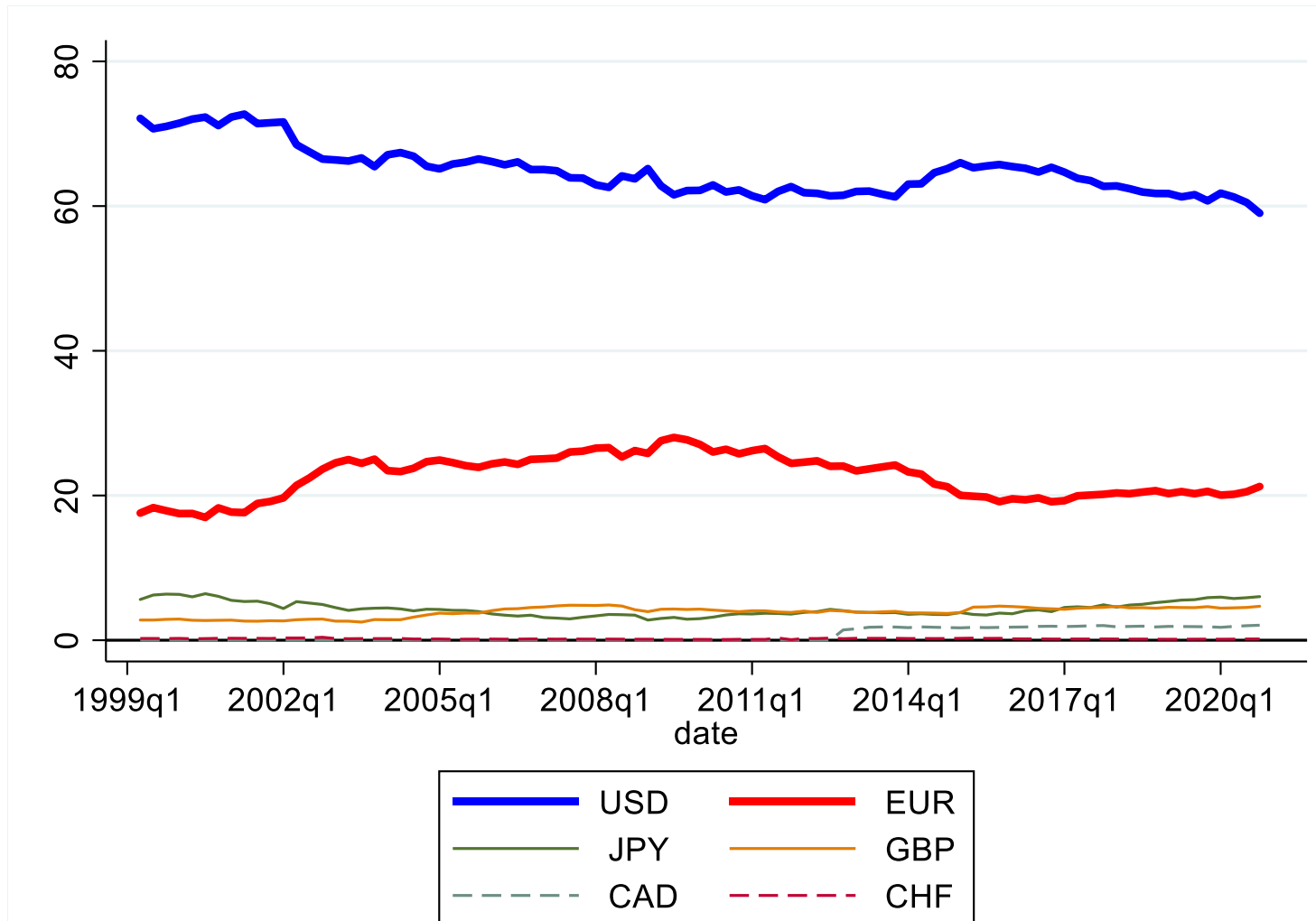
COFER DATABASE

Advanced Economies — Emerging Market & Developing Economies

USD, EUR, JPY, GBP, CAD, CHF
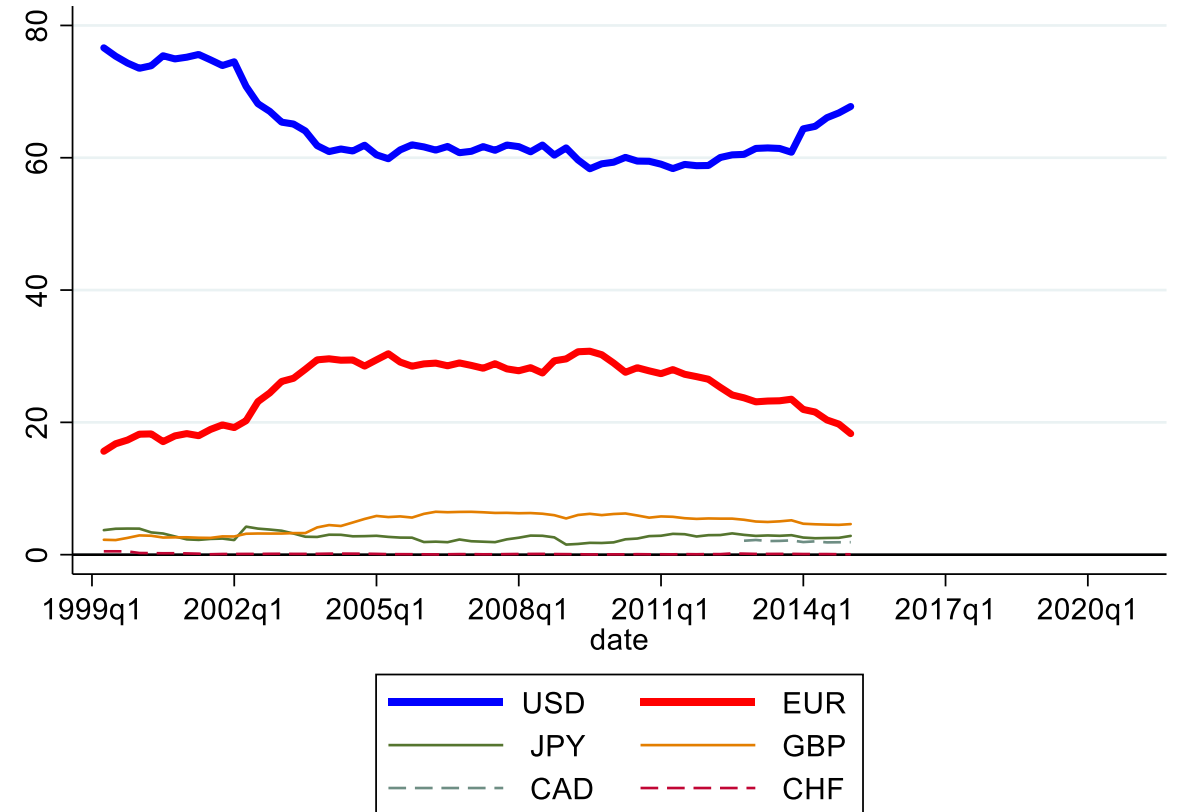
SHARE OF USD IN FX RESERVES W/ & W/OUT VALUATION EFFECTS

Sources: IMF COFER database, BIS, and authors' calculations.

Note: The dotted lines correspond to 2002m2, 2011m7, and 2020m4.

REGRESS THE CHANGE IN THE USD SHARE ON THE USD VALUATION EFFECT

☐ The variable of our focus = **USD valuation effect** using the **COFER** data

$$Val\_Eff_{USD}^{COFER} = \frac{R_{USD}(t-1)}{\sum_c^C \frac{R_c(t-1)}{FX_c(t)}} - \frac{R_{USD}(t-1)}{\sum_c^C \frac{R_c(t-1)}{FX_c(t-1)}} \qquad (1)$$

$$\Delta y_t^{USD} = \alpha + \boldsymbol{\beta Val\_Eff}_{USD,t}^{COFER} + X'_t \Gamma + \varepsilon_t$$

When $\widehat{\beta}$=0, rebalancing

When $\widehat{\beta}$=1, no-rebalancing

The estimation is done for 1999Q2 – 2020Q4

TABLE 3 (A): REGRESSION OF CHANGE IN USD SHARES ON VALUATION EFFECTS, USING THE COFER DATA, WORLD, 1999-2020

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
USD valuation effect (VE)	**0.710 (0.062)***	**0.724 (0.061)***	**0.791 (0.096)***	**0.725 (0.062)***	**0.723 (0.061)***	**0.716 (0.063)***	**0.751 (0.080)***
Growth rate of FX assets		0.048 (0.020)**		0.048 (0.021)**	0.045 (0.021)**	0.050 (0.021)**	0.048 (0.021)**
VE x asset growth			-0.034 (0.030)				
Change in VIX				-0.000 (0.010)			
VE x dVIX					-0.012 (0.012)		
NEER apprec. period						0.059 (0.120)	
VE x NEER app							-0.067 (0.129)
N	87	87	87	87	87	87	87
Adj R2	0.60	0.62	0.60	0.62	0.62	0.62	0.62
H0: beta (VE) =1 (p-value)	0.00	0.00	0.03	0.00	0.00	0.00	0.00

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

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TABLE 3 (B): REGRESSION OF USD SHARES ON VALUATION EFFECTS, USING THE COFER DATA, ADVANCED ECONOMIES, 1999 - 2015

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
USD valuation effect (VE)	**0.867** **(0.088)***	**0.865** **(0.086)***	**0.945** **(0.133)***	**0.861** **(0.088)***	**0.863** **(0.087)***	**0.908** **(0.090)***	**0.909** **(0.109)***
Growth rate of FX assets		0.064 (0.032)*		0.063 (0.032)*	0.066 (0.032)**	0.058 (0.032)*	0.066 (0.032)**
VE x asset growth			-0.033 (0.042)				
Change in VIX				0.004 (0.014)			
VE x dVIX					-0.012 (0.016)		
NEER apprec. period						-0.270 (0.182)	
VE x NEER app							-0.128 (0.196)
N	64	64	64	64	64	64	64
Adj R2	0.60	0.62	0.60	0.61	0.62	0.63	0.62
H0: beta (VE) =1 (p-value)	0.14	0.12	0.68	0.12	0.12	0.31	0.41

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

TABLE 3 (C): REGRESSION OF USD SHARES ON VALUATION EFFECTS, USING THE COFER DATA, EMERGING MARKET ECONOMIES, 1999 - 2015

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
USD valuation effect (VE)	**0.496 (0.124)***	**0.547 (0.121)***	**0.555 (0.187)***	**0.585 (0.121)***	**0.538 (0.120)***	**0.463 (0.119)***	**0.502 (0.147)***
Growth rate of FX assets		0.062 (0.025)**		0.057 (0.025)**	0.053 (0.026)**	0.079 (0.025)***	0.062 (0.025)**
VE x asset growth			-0.026 (0.061)				
Change in VIX				-0.035 (0.020)*			
VE x dVIX					-0.033 (0.024)		
NEER apprec. period						0.710 (0.255)***	
VE x NEER app							0.148 (0.271)
N	64	64	64	64	64	64	64
Adj R2	0.19	0.25	0.18	0.28	0.26	0.33	0.24
H0: beta (VE) =1 (p-value)	0.00	0.00	0.02	0.00	0.00	0.00	0.00

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

TAKEAWAY 2

☐ At the aggregate level, we have a mixed bag – **partial rebalancing**.

➢ Some central banks rebalance and some don't

➢ **AEs** tend **not** to be rebalancers and **EMEs** tend to be partial rebalancers

PANEL ANALYSIS

PANEL DATA ANALYSIS

☐ The variable of our focus = **USD valuation effect** using the Ito-McCauley (2020) data

$$Val\_Eff_{USD}^{IM} = \frac{\mathrm{R}_{USD}(i,t-1)}{\sum_{C}^{C}\frac{\mathrm{R}_C(i,t-1)}{FX_C(i,t)}} - \frac{\mathrm{R}_{USD}(i,t-1)}{\sum_{C}^{C}\frac{\mathrm{R}_C(i,t-1)}{FX_C(i,t-1)}} \tag{1}$$

$$\Delta y_{it}^{USD} = \alpha + \boldsymbol{\beta Val\_Eff}_{USD,it}^{IM} + X'_{it}\Gamma + \varepsilon_{it}$$

When $\widehat{\boldsymbol{\beta}}$=0, rebalancing

When $\widehat{\boldsymbol{\beta}}$=1, no-rebalancing

PANEL DATA ANALYSIS

$$\Delta y_{it}^{USD} = \alpha + \boldsymbol{\beta Val\_Eff}_{USD,it}^{IM} + X'_{it}\Gamma + \varepsilon_{it}$$

When $\widehat{\beta}$=0, rebalancing

When $\widehat{\beta}$=1, no-rebalancing

☐ The estimation is done using the sample of 56 countries over the 2001 – 2018 period

☐ The sample does not include the US, Japan, or the euro member countries.

☐ To control for time invariant factors that may affect the currency composition, we include the country fixed effects in the estimation model

Table 5: Determinants of Change in the USD Share in FX Reserves: 2001-2018, using the Ito-McCauley data

	F.E.	F.E.	F.E.	F.E.	F.E.	F.E.	F.E.	WEIGHTED
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
USD Valuation Effect (VE)	0.522	0.788	0.955	0.771	0.763	0.783	0.637	0.153
	(0.258)**	(0.262)***	(0.294)***	(0.263)***	(0.263)***	(0.265)***	(0.435)	(0.203)
Growth rate of FX assets		0.044	0.044	0.044	0.044	0.044	0.044	0.028
		(0.008)***	(0.008)***	(0.008)***	(0.008)***	(0.008)***	(0.008)***	(0.012)**
Growth rate of FX assets x VE			-1.102					
			(0.883)					
Change in VIX				-0.000				0.000
				(0.001)				(0.001)
dVIX x VE					-0.049			
					(0.052)			
FX reserves minus gold (% of GDP)						0.005		
						(0.038)		
FX reserves x VE							0.949	
							(2.185)	
N	733	721	721	721	721	718	718	721
# of countries	56	56	56	56	56	56	56	56
Overall R2	0.01	0.06	0.06	0.06	0.06	0.06	0.06	0.04
W/in R2	0.01	0.05	0.05	0.05	0.05	0.05	0.05	0.01
B/w R2	0.10	0.21	0.22	0.21	0.22	0.21	0.22	0.16
H0: beta (VE) =1 (p-value)	0.06	0.42	0.88	0.39	0.37	0.41	0.40	0.00

Table 6: Determinants of Change in the USD Share in FX Reserves: 2001-2018 Using the Ito-McCauley dataset

	AEs	EME	COMM	Non-COMM
	(1)	(2)	(3)	(4)
USD Valuation Effect (VE)	-0.135	1.426	1.062	0.655
	(0.294)	(0.353)***	(0.543)*	(0.300)**
Growth rate of FX assets	-0.041	0.057	0.045	0.043
	(0.017)**	(0.010)***	(0.012)***	(0.013)***
Change in VIX	-0.000	-0.000	-0.001	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)
N	178	543	211	510
# of countries	13	43	15	41
Overall R2	0.04	0.10	0.08	0.04
W/in R2	0.04	0.09	0.08	0.03
B/w R2	0.04	0.25	0.14	0.37
H0: beta (VE) =1 (p-value)	0.00	0.23	0.91	510

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

Table 6: Determinants of Change in the USD Share in FX Reserves: 2001-2018 Using the Ito-McCauley dataset

	USD zone	EUR zone
	(1)	(2)
USD Valuation Effect (VE)	1.724	0.000
	(0.418)***	(0.245)
Growth rate of FX assets	0.051	-0.043
	(0.010)***	(0.015)***
Change in VIX	-0.001	0.000
	(0.001)	(0.001)
N	465	226
# of countries	38	15
Overall R2	0.09	0.04
W/in R2	0.09	0.04
B/w R2	0.20	0.00
H0: beta (VE) =1 (p-value)	0.08	0.00

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

TAKEAWAY 3

☐ On average, the impact of the exchange rate movements fully passes through to the USD share with a 1:1 ratio

☐ The size of the economy of concern may affect the behavior of rebalancing

➤ Larger economies tend to rebalance ($\beta=0$) while smaller economies tend not to ($\beta=1$) .

EXTENSIONS

☐ Weighing with IR (% of GDP)

☐ Slicing the sample between the economies that use USD as the vehicle currency and those which use EUR as the vehicle currency

☐ Lagging the explanatory variables for the causality

CONCLUSION

1. **The US does not rebalance**
   - ➤ It lets its FX portfolio fluctuate and reflect exchange rate movements.

2. **SNB rebalances. Its reserves do not react to the dollar exchange rate movements**
   - ➤ SNB tries to nullify the impact of economic shocks on its reserve portfolio by rebalancing the currency shares in its reserves. Thus, this behavior stabilizes key FX rates as the appreciating currency is sold in favor of the depreciating one.

CONCLUSION

3. At the aggregate level, the behavior of rebalancing is a mixed bag

➢ On average, countries conduct partial rebalancing

➢ Some central banks rebalance, and others don't.

4. EMEs do not rebalance

➢ The impact of the exchange rate movements fully passes through to the USD share in FX reserves

➢ Larger economies tend to rebalance. While large economies are capable to maintaining stable currency composition, smaller economies are more vulnerable to exchange rate shocks.

THANK YOU VERY MUCH!!