The Non-U.S. Bank Demand for U.S. Dollar Assets

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Motivation

Does the share of USD assets of non-US banks explain exchange rates?

a) Contemporaneous relationship

b) Causality by tracing out the supply curve of USD assets

c) As pricing factor for currency excess returns on the cross section

d) As forecasting factor

Related Literature

- **Special Role of the USD**:
  - **Provider of internal reserve currency**
  - **Positive and countercyclical premium for USD**

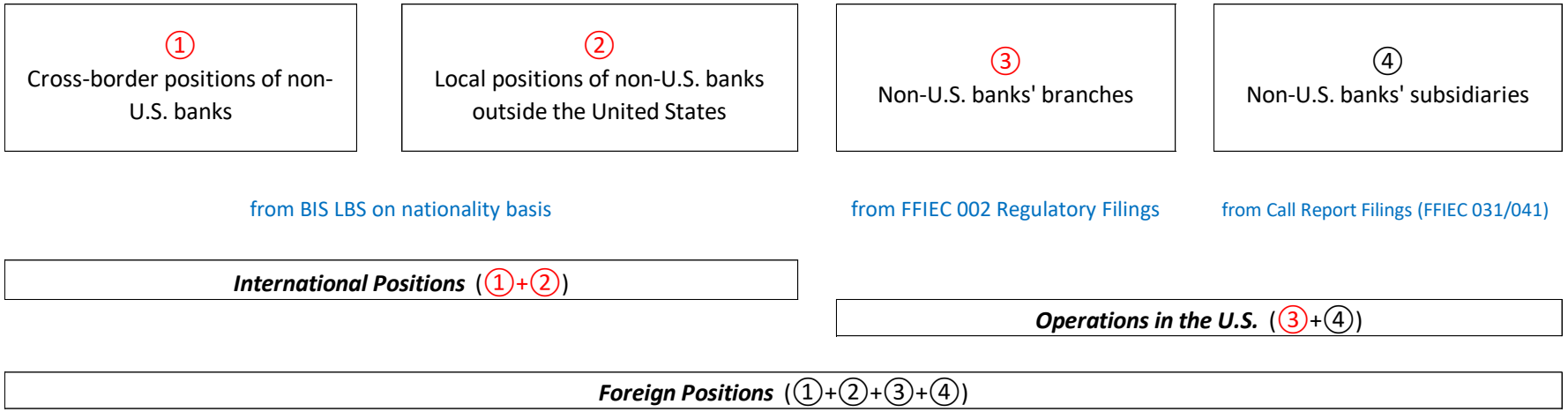
- **Meese-Rogoff Puzzle**:
  - **Exchange rate disconnect**
  - **Forward premium puzzle**
  - **Treasury premium and exchange rate**
  - **FX quantities (order flows) and exchange rate**

- **The "Global Financial Cycle" and the "Global USD Cycle"**

- **Intermediary Asset Pricing**

USD Asset Demand by Non-U.S. banks

- It is defined as the share of USD denominated assets to total assets of non-U.S. banks on nationality basis at economy level.
- Graphic representation of different aggregates in USD assets:



- Total assets: local positions in local currencies are obtained from FitchConnect and Factset.
- Adopt adjustment for exchange rate (for all series) and price movement (for local positions in local currencies).

Sample: 16 (managed) floating currencies from 16 economies; 2001Q1 – 2017Q4.

Appendix 1, 2, 3: Sample coverage, summary statistics of key variables, more details on variable definition.

Contemporaneous Relationship (USD vs. a Currency Basket)

$$\Delta\bar{s}_t = \alpha_1 + \beta_1 \Delta \bar{\boldsymbol{D}}_{\$,\boldsymbol{t}} + \beta_2 \Delta\bar{\Phi}_t + \beta_3 \Delta\left(\bar{y}_t^{Govt} - y_{\$,t}^{Govt}\right) + \beta \bar{X}_t + \varepsilon_t$$

	Dependent variable = Δs_t [Annualized %]						
	Cross-sectional Average						
Regressors	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Full Sample					1st half	2nd half
$\Delta D_{\$t}$ [%]	28.82***	26.45***	28.60***	25.86***	25.53***	27.20***	25.33***
	(5.57)	(5.32)	(5.60)	(5.41)	(5.26)	(7.03)	(5.62)
$\Delta\Phi_t$ [%]		12.48*		13.56**	21.90***	19.39***	29.77**
		(6.72)		(6.28)	(6.00)	(5.76)	(11.02)
$\Delta(y_t - y_{\$t})$ [%]			-2.26	-3.81	-3.06	-0.32	-14.48
			(3.57)	(3.87)	(3.09)	(2.76)	(9.57)
Controls	N	N	N	N	Y	Y	Y
N	66	66	66	66	66	34	32
R^2	0.37	0.40	0.37	0.41	0.52	0.65	0.61

Appendix: Contemporaneous relationship (USD vis-à-vis individual currencies)

IV Strategy

Challenge: separate supply from demand

Solution: find exogenous demand shifters to identify supply

- Safety of substitute currencies (six non-USD currencies from G10):
  - Sovereign CDS spread of substitute Treasury securities
  - Treasury premium of substitute economies

- Balance sheet constraints of non-U.S. banks (measuring risk-taking capacities):
  - Leverage ratio of non-U.S. banks orthogonal to leverage ratio of U.S. brokers dealers

The First Stage

$$\Delta\overline{D}_{\$,t} = \alpha_1^1 + \beta_1^1 \Delta\overline{Sovereign\ CDS}_t^{sub} + \beta_2^1 \Delta\overline{\Phi}_t^{sub} + \beta_3^1 \Delta\overline{Leverage}_t + \beta^1 \overline{\boldsymbol{X}}_t + \varepsilon_t^1$$

Regressors	The first stage: Dependent variable = $\Delta D_{\$t}$ [%]				
	(1)	(2)	(3)	(4)	(5)
ΔSovereign CDS^{sub}_t [bps]	0.01***	0.01***	0.01**	0.01***	0.01***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
$\Delta\Phi^{sub}_t$ [%]	-0.15	-0.75**	-0.03	-0.65*	-0.73**
	(0.38)	(0.36)	(0.36)	(0.33)	(0.36)
ΔLeverage$_t$ [%]	2.85***	2.54***	3.00***	2.65***	2.60***
	(0.39)	(0.40)	(0.36)	(0.34)	(0.29)
$\Delta\Phi_t$ [%]		0.45***		0.44***	0.33**
		(0.11)		(0.10)	(0.13)
$\Delta(y_t - y_{\$t})$ [%]			-0.10	-0.06	-0.05
			(0.14)	(0.13)	(0.12)
Controls	N	N	N	N	Y
Stock-Yogo *F* Statistics	16.51**	23.85**	19.15**	24.79**	32.43***
N	66	66	66	66	65
R^2	0.19	0.26	0.21	0.27	0.33

The Second Stage

$$\Delta\bar{s}_t = \alpha_1^2 + \beta_1^2 \Delta\hat{\bar{\boldsymbol{D}}}_{\$,\boldsymbol{t}} + \beta_2^2 \Delta\bar{\Phi}_t + \beta_3^2 \Delta\left(\bar{y}_t^{Govt} - y_{\$,t}^{Govt}\right) + \beta^2 \bar{\boldsymbol{X}}_t + \varepsilon_t^2$$

Regressors	OLS regression	The second stage: Dependent variable = Δs_t [Annualized %]				
	(0)	(1)	(2)	(3)	(4)	(5)
$\Delta D_{\$t}$ [%] or Fitted $\Delta D_{\$t}$ [%]	28.82***	51.83***	51.15***	51.54***	50.23***	40.60***
	(5.57)	(12.27)	(11.82)	(12.76)	(12.29)	(8.70)
$\Delta\Phi_t$ [%]			4.23		4.81	16.39***
			(7.68)		(7.51)	(6.11)
$\Delta(y_t - y_{\$t})$ [%]				-0.56	-1.13	-1.87
				(4.24)	(4.36)	(4.18)
Controls	N	N	N	N	N	Y
N	66	66	66	66	66	65
Endogeneity: Durbin-Wu-Hausman F statistics	-	5.51**	6.16**	4.96**	5.42**	4.56**
Overidentification: Sargan χ^2 Statistics	-	4.01	2.51	4.17	2.58	1.18

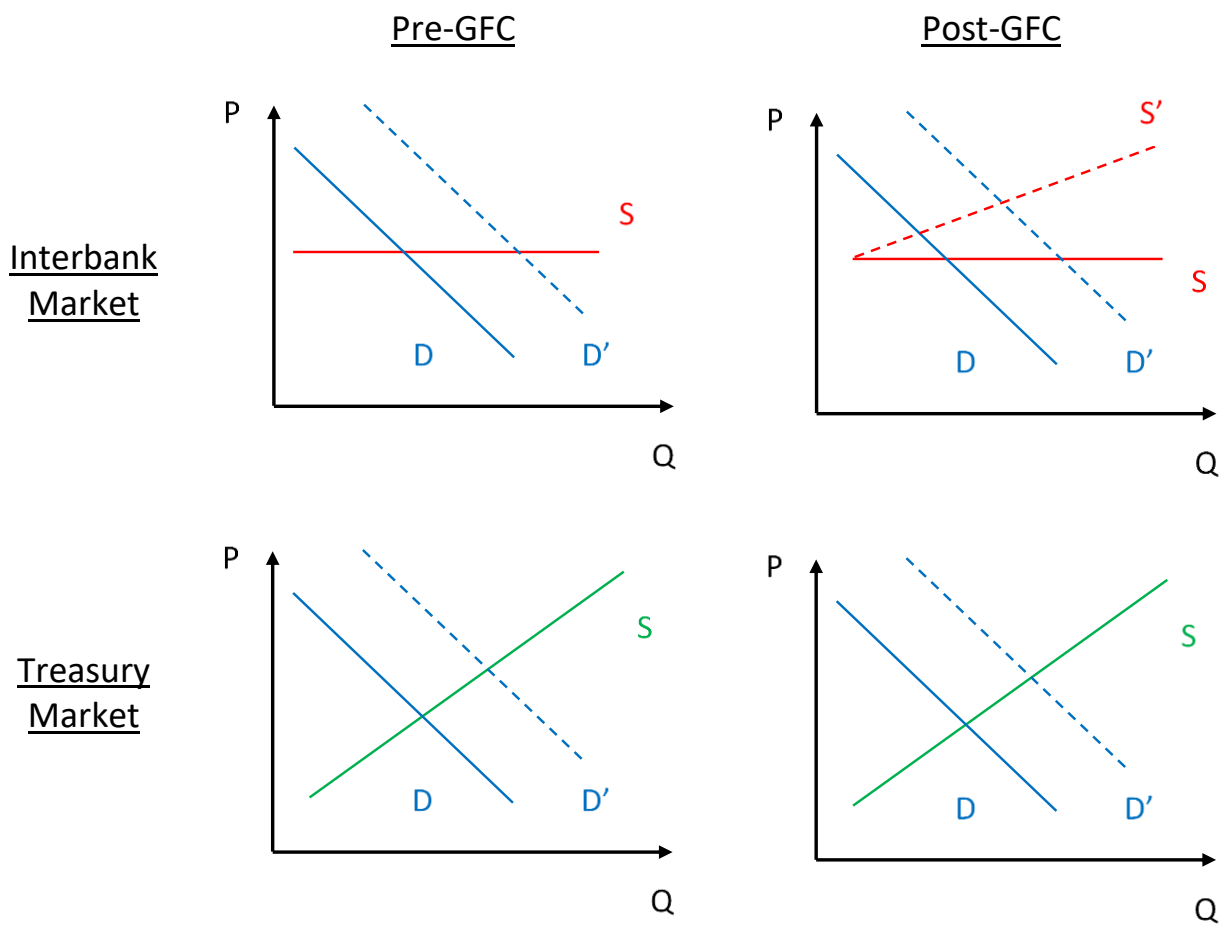
IV Strategy: Validation

- Establish a clean demand shifter and our results are robust:
  - Control for supply condition of safe assets by US and by substitute economies.
  - Control for USD funding gap of non-U.S. banks to purge out only the impact of non-U.S. banks' balance sheet capacity on exchange rate via demand channel.
- Refine the mechanism behind USD asset share that the safe assets demand channel is at play:
  - Eliminate alternative hypotheses: global financial condition, growth expectation for US and global economy, uncertainty, or speculative reasons (e.g., carry trade)
- Restrict to price takers (smaller EMs) and the results are robust.

Appendix: IV strategy validation

Three Channels on the Global Dollar Funding Market

Safe asset demand channel vs. Financial intermediation channel vs. U.S. Treasury channel



On Interbank Market:

- Pre-GFC, the supply curve is flat: FIs actively trade on CIP deviations
- Post-GFC, the supply curve is upward sloping: balance sheet constraints prevent FIs from active trading

On Treasury Market:

- Pre-GFC and Post-GFC, the supply curve is upward sloping: U.S. Treasury, ultimate supplier of T-bills, has other fiscal mandates but not a speculator.

Causal Relationship btw Safe Asset Demand, CIP Deviation, and U.S. Treasure Premium

$$\Delta\overline{\Phi}_t = \alpha_1^2 + \beta_1^2 \Delta\widehat{\overline{\boldsymbol{D}}}_{\$,\boldsymbol{t}} + \beta_2^2 \Delta\left(\bar{y}_t^{Govt} - y_{\$,t}^{Govt}\right) + \beta^2 \overline{\boldsymbol{X}}_t + \varepsilon_t^2$$

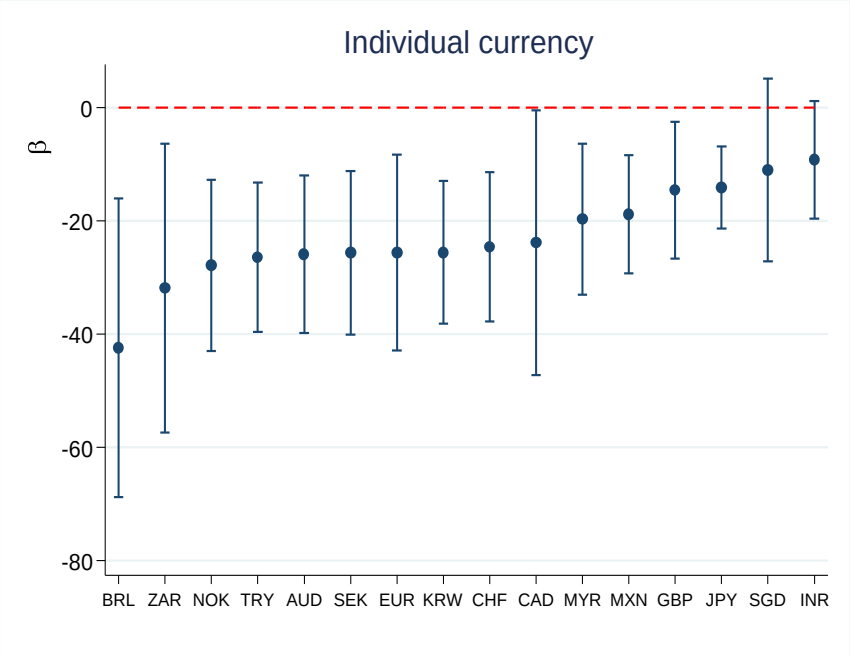
	The Second Stage			
	(1)	(2)	(3)	(4)
Dependent variables	$\Delta\Phi^{Treasury}{}_t$		$\Delta\Phi^{Libor}{}_t$	
Sample periods	Full	Post-GFC	Full	Post-GFC
Fitted $\Delta D_{\$t}$ [%]	0.46***	0.61**	0.29	0.21**
	(0.15)	(0.26)	(0.18)	(0.11)
N	66	32	66	32
R^2	0.16	0.14	0.07	0.20

Cross-section excess returns and global demand for USD

- Currency risk premia covary with global USD asset demand by non-US banks.

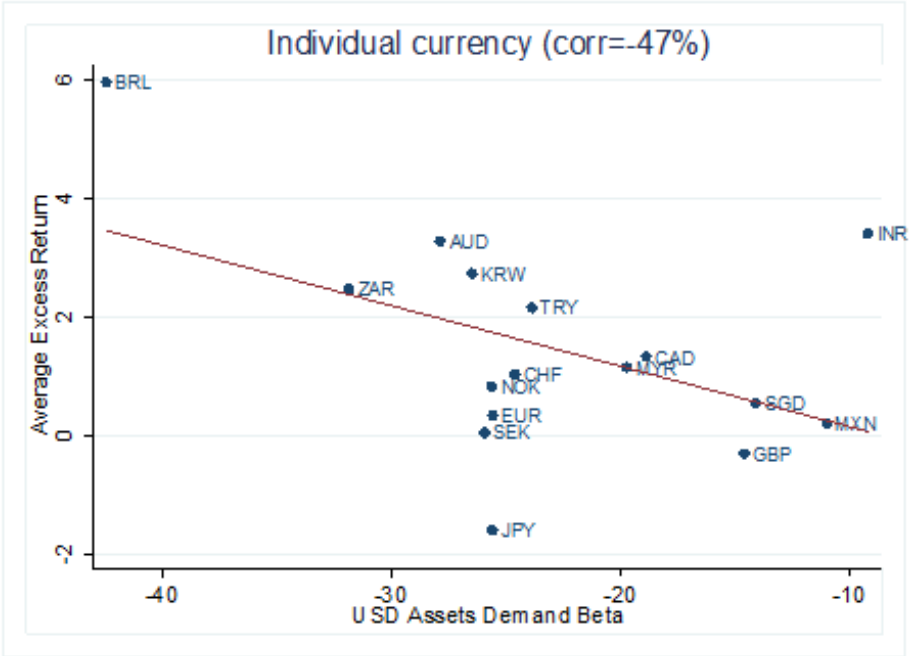
$$R_{j,t} = \alpha_j + \boldsymbol{\beta_j} \Delta \boldsymbol{D}_{\$,\boldsymbol{t}} + \gamma_j \Delta USD_t + \varepsilon_{j,t}$$

Where, $R_{j,t} \triangleq y^{Govt}_{j,t-1} - \Delta s_{j,t} - y^{Govt}_{\$,t-1}$



- Global USD asset demand acts as a risk factor pricing the cross-section of excess returns.

$$\bar{R}_j = \theta + \boldsymbol{\gamma} \hat{\beta}_j + \mu_j$$



Appendix: Results at the currency-portfolio level provided by Lustig, Roussanov, and Verdelhan (2011)

In-sample Forecasting (USD vis-à-vis a Currency Basket)

$$\Delta \bar{s}_t^h = \alpha_1 + \beta_1 \bar{\boldsymbol{D}}_{\$,\boldsymbol{t}} + \beta_2 \bar{\Phi}_t + \beta_3 \left(\bar{y}_t^{Govt} - y_{\$,t}^{Govt} \right) + \varepsilon_{t+h}$$

	Dependent variable = Δs^h_t [Annualized %]				
	(1)	(2)	(3)	(4)	(5)
Regressors	*h* =1	*h* =4	*h* =8	*h* =12	*h* =20
$D_{\$t}$ [%]	-0.76	-2.79**	-3.17***	-2.68***	-2.19***
	(1.84)	(1.38)	(0.75)	(0.57)	(0.49)
Φ_t [%]	3.59	-5.64	-6.02*	-1.93	0.15
	(8.59)	(4.68)	(3.01)	(2.03)	(1.83)
$(y_t - y_{\$t})$ [%]	2.86	3.07**	1.98*	0.81	0.73
	(1.97)	(1.52)	(1.01)	(0.72)	(0.51)
N	66	63	59	55	47
R^2	0.07	0.25	0.40	0.45	0.68

Appendix: In-sample forecasting (USD vis-à-vis individual currencies)

Appendix: Predictive power of key determinants in VAR

Mechanisms

- A coherent intermediary asset pricing story:
  - Risk-taking capacity of non-U.S. banks enters the pricing kernel of these marginal investors, thus
  - Prices the currency excess returns on the cross section
  - Drives the scarcity of safe USD assets and time-varying currency risk premia
- Time-varying currency risk premia are related to the demand of USD assets by non-U.S. banks, thus creating forcastability of the exchange rate:
  - Risk-bearing capacity of non-U.S. banks ↓ →
  - USD safe asset demand ↑ →
  - USD excess returns ↑ / USD appreciates →
  - expected future returns from holding USD assets ↓ →
  - USD reverts slowly over the one-to-five-year period

Out-of-sample forecasting performance

	Dependent variable = Δs^{20}_t [Annualized %]																
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
	ALL	AUD	BRL	CAD	CHF	EUR	GBP	INR	JPY	KRW	MXN	MYR	NOK	SEK	SGD	TRY	ZAR
	Panel A: Diebold-Mariano Test																
$MSE_r - MSE_u$	14.07	11.24	63.34	8.86	4.00	6.59	4.34	28.41	14.81	-3.34	19.55	8.73	21.45	6.82	2.36	98.55	72.43
OOS-T statistics	2.47***	3.96***	1.79***	2.40***	0.92*	2.40***	0.87*	4.42***	1.44*	-1.02	2.38***	2.20***	2.52***	2.56***	0.95*	4.33***	2.69***
	Panel B: Clark-West Test																
$MSE_r - (MSE_u - Adj.)$	20.81	19.91	113.69	13.74	13.12	14.16	14.42	55.52	35.49	2.42	30.83	14.07	31.57	9.54	9.11	164.02	118.84
C-W statistics	2.57***	5.88***	2.38***	3.07***	1.85***	3.35***	1.99***	5.14***	3.24***	0.60	3.17***	3.30***	2.60***	2.75***	1.89***	4.48***	3.01***

Appendix: Out-of-sample forecasts methodology

Out-of-sample Forecasting Performance Comparison

- Compare the forecasting performance between 9 existing models (see, Rossi 2013) and respective augmented versions adding USD asset share as an additional predictor

Name of Models	$MSE_{existing} - MSE_{augmented}$	OSS-T statistics
(1) UIP model	10.35	3.20***
(2) Monetary model with flexbile prices (Frankel-Bilson model)	10.75	3.61***
(3) Monetary model with sticky prices (Dornbusch-Frankel model)	7.48	2.27***
(4) Productivity differentials model (Balassa-Samuelson model)	6.73	1.96***
(5) Taylor rule model	4.40	4.35***
(6) Net foreign asset model (Gourichas-Rey model)	1.20	2.30***
(7) U.S. dollar liquidity model (Adrian-Etula-Shin model)	0.61	0.87*
(8) U.S. Treasury premium model (Jiang-Krishnamurthy-Lustig model)	0.69	0.87*
(9) U.S. foreign bond flow model (Lilley-Neiman-Maggiori-Schreger model)	6.60	2.47***

Other Robustness

1. Robust to alternative data construction.
   - Adopt FP concept rather than IP concept.
   - Adjust exchange rate and price for aggregates in alternative ways.
2. Robust to different sampling.
   - Use G10/EM group.
   - Use aggregates of all EA economies as the representative of EA (rather than DEU).
   - Use small EMs as price takers.
   - Use Pre-GFC episode, post-GFC episode, and exclude GFC episode.
3. Robust to economy and time fixed effects in contemporaneous relationship.
4. Robust to different definitions of substitute currencies, and small EMs (as price takers) in IV exercise.
5. Roust to different risk factors controlled in the cross-sectional asset pricing.
   - Use alternative ways in construct dollar factor and construct carry portfolio
   - Include other pricing factors (e.g., intermediary asset pricing)
6. Robust to different parameter settings, and different horizons (3-5yr) in out-of-sample forecast.
7. Robust to different setting of lag length in the Newey-West heteroskedasticity-and-autocorrelation-consistent asymptotic standard errors.

Summary

- Construct the USD asset share of non-U.S. banks to explain exchange rate
- Establish a causal relationship between the USD asset demand, the U.S. dollar exchange rate, the U.S. Treasury premium, and the CIP deviation
- Distinguish the “safe asset demand channel”, the “financial intermediation channel”, and the “US Treasury channel” using our instrumental variable strategy
- Document the USD asset demand of non-U.S. banks is a risk factor, which can explain currency excess returns in the cross section
- Forecast exchange rates both in-sample and out-of-sample

Appendix

Sample Coverage

- 26 economies: USD operations are considered to be of domestic importance (IMF 2019)
  - Germany is used as the representative for 8 Euro Area economies for same currency in our sample period.
  - China and Russia are excluded, because the relevant aggregates only span over 2 years.
  - Hong Kong SAR China is excluded for its adoption of the fixed exchange rate regime.
- 16 economies using 16 tender currencies with (managed) floating exchange rate regimes
  - 10 AEs: Australia, Canada, Switzerland, Euro Area (Germany), UK, Japan, Korea, Norway, Singapore, Sweden
  - 6 EMs: Brazil, India, Mexico, Malaysia, Turkey, South Africa
- Time period: 2001Q1 to 2017Q4 (non-balanced panel)

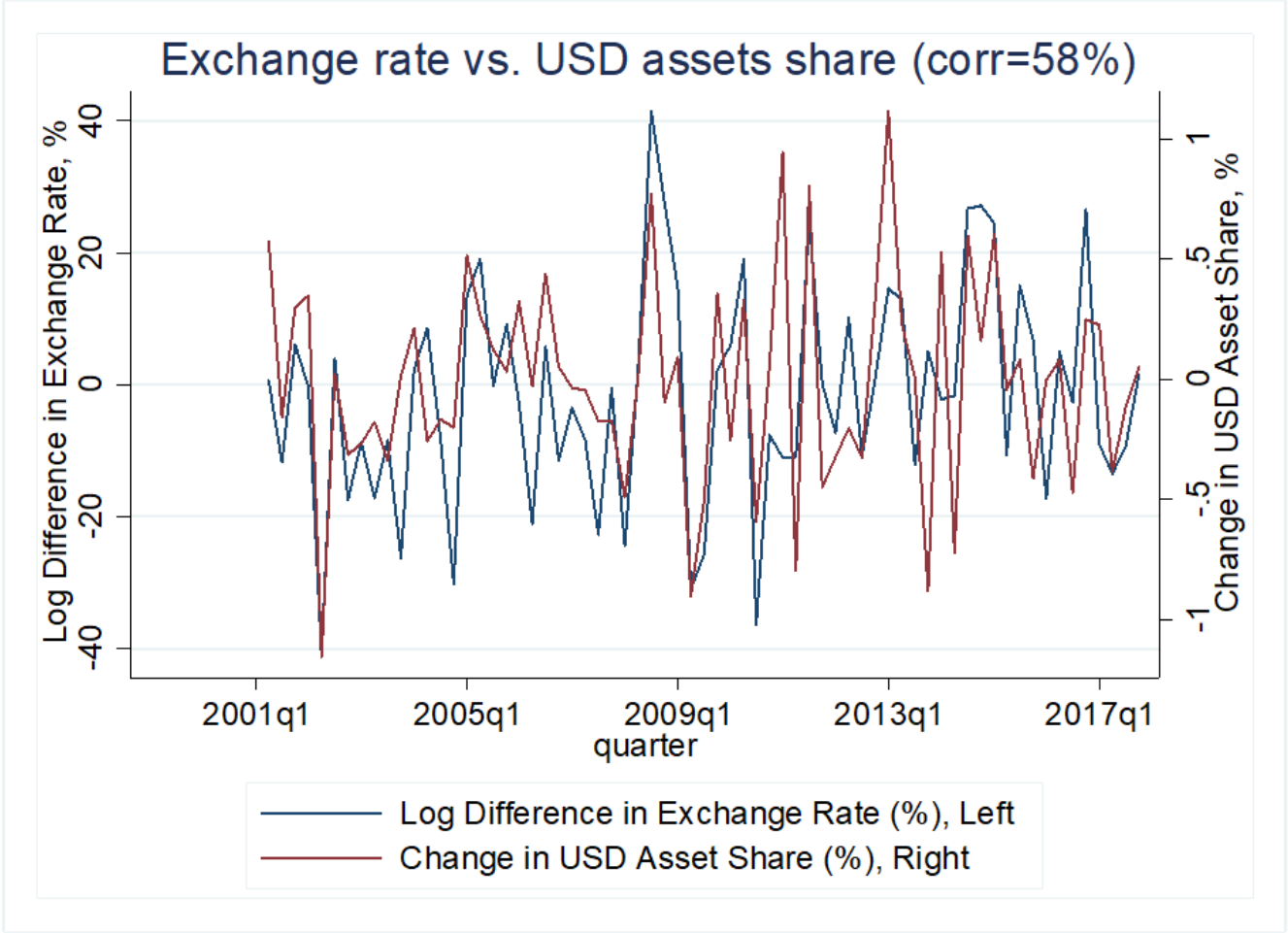
Summary Statistics of Key Variables

		(1) Australia	(2) Brazil	(3) Canada	(4) Switzerland	(5) Euro Area	(6) UK	(7) India	(8) Japan	(9) Korea	(10) Mexico	(11) Malaysia	(12) Norway	(13) Singapore	(14) Sweden	(15) Turkey	(16) South Africa	(17) Average
									Levels									
s_t [per USD]	mean	0.24	0.82	0.17	0.10	-0.21	-0.48	3.93	4.65	6.99	2.56	1.25	1.90	0.34	2.02	0.62	2.30	1.70
	std.	0.19	0.27	0.14	0.18	0.13	0.12	0.16	0.14	0.09	0.19	0.12	0.16	0.10	0.14	0.34	0.27	0.12
$D_{\$t}$ [%]	mean	6.61	3.75	14.59	27.86	8.57	9.03	7.79	8.93	4.19	4.69	4.70	5.19	5.82	10.81	12.54	7.89	9.49
	std.	1.41	0.63	1.72	2.68	1.63	1.73	1.93	2.64	0.35	1.65	1.01	1.91	1.31	2.48	1.40	0.87	1.09
Φ_t [%]	mean	-0.07	1.89	0.16	0.41	0.24	0.03	1.17	0.44	1.39	0.08	0.85	0.11	0.12	0.16	0.56	0.01	0.38
	std.	0.26	0.85	0.20	0.24	0.19	0.20	1.34	0.31	1.08	0.70	0.74	0.23	0.29	0.31	0.87	0.48	0.35
$(y_t - y_{\$t})$ [%]	mean	2.39	9.65	0.43	-0.97	-0.08	0.67	5.09	-1.39	1.73	4.36	2.33	1.10	-0.41	0.15	9.60	5.92	2.19
	std.	1.21	2.31	0.72	1.02	1.09	1.09	2.12	1.45	1.24	1.34	0.63	1.67	0.91	1.43	2.54	0.71	1.01
N. Obs.		67	44	67	67	67	67	65	67	52	62	41	67	56	67	52	34	67
									First differences									
Δs_t [%]	mean	-2.56	4.42	-1.13	-3.69	-2.10	0.28	1.75	-0.61	0.39	4.30	2.00	-0.78	-1.64	-1.71	8.11	6.06	0.13
	std.	25.06	35.30	17.61	18.99	20.38	19.22	14.89	22.40	19.62	21.10	17.43	24.23	11.62	23.03	26.35	23.97	15.37
$\Delta D_{\$t}$ [%]	mean	-0.06	-0.03	0.06	0.02	-0.07	-0.05	0.04	0.10	0.00	0.01	0.01	0.00	0.07	-0.13	-0.09	0.01	-0.01
	std.	0.61	0.47	0.68	1.33	0.50	0.47	0.39	0.41	0.28	0.96	0.52	2.12	0.31	0.93	0.88	0.64	0.32
$\Delta\Phi_t$ [%]	mean	0.00	-0.01	0.00	0.00	-0.01	0.00	0.02	0.00	-0.01	0.01	-0.02	0.00	0.00	-0.01	-0.01	0.01	0.00
	std.	0.26	0.77	0.15	0.24	0.17	0.23	1.06	0.31	0.64	0.66	0.63	0.22	0.33	0.29	0.64	0.37	0.24
$\Delta(y_t - y_{\$t})$ [%]	mean	-0.01	-0.04	-0.01	-0.03	-0.04	-0.04	-0.01	0.03	0.00	-0.04	0.03	-0.07	0.00	-0.05	-0.03	-0.05	-0.02
	std.	0.47	1.06	0.30	0.40	0.38	0.39	0.59	0.43	0.41	0.67	0.44	0.52	0.39	0.48	1.55	0.40	0.38
N. Obs.		66	43	66	66	66	66	64	66	51	61	40	66	55	66	51	33	66

Correlation btw Exchange Rate and Determinants

Panel A: Correlation with Contemporaneous Changes				
	Δs_t	$\Delta D_{\$t}$	$\Delta \Phi_t$	$\Delta(y_t - y_{\$t})$
Δs_t	1.00***			
$\Delta D_{\$t}$	0.58***	1.00***		
$\Delta \Phi_t$	0.36***	0.31**	1.00***	
$\Delta(y_t - y_{\$t})$	-0.32***	-0.22*	-0.18	1.00***
Panel B: Correlation with Future Changes				
	Δs^{12}_t	$D_{\$t}$	Φ_t	$y_t - y_{\$t}$
Δs^{12}_t	1.00***			
$D_{\$t}$	-0.55***	1.00***		
Φ_t	-0.29**	0.33***	1.00***	
$y_t - y_{\$t}$	0.07	-0.26**	-0.19	1.00***

USD Asset Share and Exchange Rate in G10



USD Asset Share vs. U.S. Treasury Premium

- Both of them are measures of USD asset demand (see, for example, Du, Im, and Schreger 2018; Engle and Wu 2018; Jiang, Krishnamurthy, and Lustig 2018).
- Correlation = 31% (first difference) or 33% (level)
- Differences:
  - Quantity vs. price
  - All USD-denominated assets vs. specific USD-denominated assets (U.S. Treasury at 1-year maturity)
  - Marginal investors (i.e., banks) vs. all investors

Contemporaneous Relationship (USD vs. Individual Currencies)

$$\Delta s_{j,t} = \alpha_1 + \beta_1 \Delta \boldsymbol{D}_{\$,\boldsymbol{j},\boldsymbol{t}} + \beta_2 \Delta \Phi_{j,t} + \beta_3 \Delta\left(y_{j,t}^{Govt} - y_{\$,t}^{Govt}\right) + \beta \boldsymbol{X}_{j,t} + \varepsilon_t$$

	Dependent variable = Δs_t [Annualized %]															
	Bilateral Relationship															
Regressors	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)
	AUD	BRL	CAD	CHF	EUR	GBP	INR	JPY	KRW	MXN	MYR	NOK	SEK	SGD	TRY	ZAR
$\Delta D_{\$t}$ [%]	25.17***	65.75***	10.57***	5.89***	20.05***	-3.03	7.23	31.90***	23.19*	8.08***	14.66**	1.11	4.77**	3.30	13.98***	17.09
	(4.07)	(6.69)	(2.53)	(1.48)	(3.71)	(2.33)	(5.71)	(6.48)	(12.45)	(3.01)	(6.92)	(0.81)	(1.97)	(4.15)	(4.42)	(10.25)
$\Delta \Phi_t$ [%]	18.89**	7.15	31.43**	36.93***	35.38***	22.13***	4.40**	1.50	20.47***	-2.59	19.49***	42.34**	41.67***	5.48	9.43*	11.73
	(9.03)	(4.67)	(12.05)	(9.09)	(11.59)	(7.97)	(1.86)	(4.85)	(4.01)	(6.69)	(4.60)	(21.15)	(8.25)	(8.75)	(5.50)	(17.57)
$\Delta(y_t - y_{\$t})$ [%]	-15.80***	-4.21	-18.42***	-19.02***	-13.26***	-18.90**	-1.54	-12.81***	-11.60**	4.96	-2.72	-18.62***	-15.35***	-1.22	5.55***	2.19
	(4.94)	(2.82)	(5.61)	(6.25)	(4.89)	(9.40)	(2.55)	(3.88)	(5.00)	(3.93)	(6.50)	(6.86)	(4.66)	(5.39)	(1.95)	(13.73)
Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
N	66	43	66	66	66	66	64	66	51	61	40	66	66	55	51	33
R^2	0.60	0.72	0.46	0.45	0.61	0.36	0.26	0.54	0.51	0.18	0.57	0.33	0.50	0.08	0.42	0.29

IV Validation: the First Stage

Regressors	Benchmark	The first stage: Dependent variable = ΔD_{st} [%]						
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
		Full Sample						
ΔSovereign CDS^{sub}_t [bps]	0.01***	0.01**	0.01***	0.01***	0.01***	0.01***	0.01***	0.01***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
$\Delta\Phi^{sub}_t$ [%]	-0.65*	-0.65*	-0.79**	-0.66*	-0.68**	-0.70**	-0.72*	-0.96**
	(0.33)	(0.34)	(0.37)	(0.33)	(0.33)	(0.33)	(0.37)	(0.43)
ΔLeverage$_t$ [%]	2.65***	2.78***	2.49***	2.65***	2.62***	2.70***	2.66***	2.52***
	(0.34)	(0.45)	(0.35)	(0.34)	(0.39)	(0.39)	(0.34)	(0.58)
$\Delta\Phi_t$ [%]	0.44***	0.41***	0.51***	0.43***	0.45***	0.41***	0.44***	0.48***
	(0.10)	(0.10)	(0.10)	(0.10)	(0.12)	(0.10)	(0.10)	(0.12)
$\Delta(\gamma_t - \gamma_{St})$ [%]	-0.06	-0.08	-0.05	-0.06	-0.04	-0.09	-0.02	-0.00
	(0.13)	(0.12)	(0.12)	(0.13)	(0.17)	(0.12)	(0.13)	(0.14)
Δlog(General Govt Debt/GDP of USA)$_t$		1.36						-0.20
		(2.23)						(3.18)
Δlog(General Govt Debt/GDP of Substitute Economies)$_t$		-2.56						-0.63
		(2.93)						(3.56)
ΔUSD Funding Gap Ratio [%]			-0.02					-0.02
			(0.02)					(0.02)
FCI Global, IMF				-0.01				-0.02
				(0.02)				(0.04)
Consensus forecast growth of USA [%]					0.03			0.03
					(0.07)			(0.06)
Consensu forecast growth of Global [%]					-0.05			-0.06
					(0.07)			(0.10)
Δlog(VIX)						0.14		0.18
						(0.13)		(0.15)
Δ1y carry between Global Avg. and the U.S. [%]							-0.03	-0.02
							(0.04)	(0.04)
Stock-Yogo *F* Statistics	24.79**	20.99**	26.38**	24.76**	23.37**	20.91**	25.66**	22.79**
N	66	66	65	66	66	66	66	65
R^2	0.27	0.27	0.31	0.27	0.27	0.28	0.27	0.34

IV Validation: the Second Stage

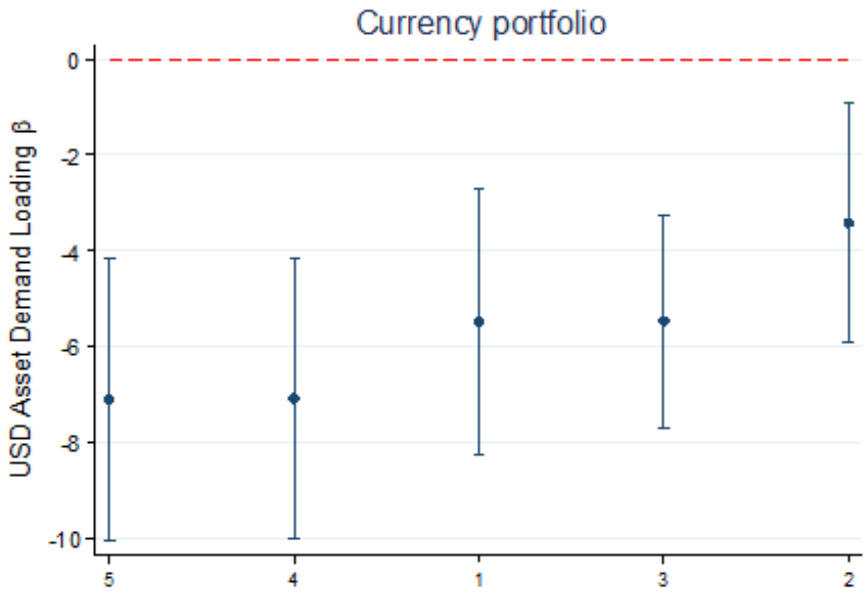
Regressors	Benchmark	The second stage: Dependent variable = Δs_t [Annualized %]						
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
		Full Sample						
ΔD_{St} [%] or Fitted ΔD_{St} [%]	50.23***	46.20***	49.28***	41.46***	49.48***	46.24***	49.19***	40.30***
	(12.29)	(11.30)	(11.65)	(10.43)	(10.80)	(9.60)	(12.20)	(6.94)
$\Delta\Phi_t$ [%]	4.81	5.65	4.14	10.78*	5.41	2.46	6.28	5.75
	(7.51)	(6.34)	(7.67)	(5.71)	(7.36)	(6.42)	(7.45)	(5.56)
$\Delta(\gamma_t-\gamma_{St})$ [%]	-1.13	-1.63	-1.87	-1.60	-1.95	-3.74	-3.49	-7.85
	(4.36)	(4.22)	(4.50)	(3.97)	(3.93)	(4.46)	(4.66)	(5.14)
Δlog(General Govt Debt/GDP of USA)$_t$		116.37						93.36
		(106.68)						(111.05)
Δlog(General Govt Debt/GDP of Substitute Economies)$_t$		47.93						64.93
		(149.36)						(132.36)
ΔUSD Funding Gap Ratio [%]			0.93*					0.78
			(0.50)					(0.55)
FCI Global, IMF				4.11***				0.57
				(0.83)				(1.79)
Consensus forecast growth of USA [%]					0.42			0.65
					(2.30)			(2.38)
Consensu forecast growth of Global [%]					-8.41***			-7.88*
					(3.16)			(4.25)
Δlog(VIX)						13.56*		12.91
						(7.44)		(8.25)
Δ1y carry between Global Avg. and the U.S. [%]							1.70	2.33*
							(1.44)	(1.17)
N	66	66	65	66	66	66	66	65
Endogeneity: Durbin-Wu-Hausman F statistics	5.42**	5.20**	5.40**	4.46**	6.59**	6.77**	5.14**	7.65***
Overidentification: Sargan χ^2 Statistics	2.58	2.52	2.6	1.65	3.13	1.90	2.86	1.82

Cross-section excess returns and global demand for USD (for currency portfolios)

- Currency risk premia covary with global USD asset demand by non-US banks.

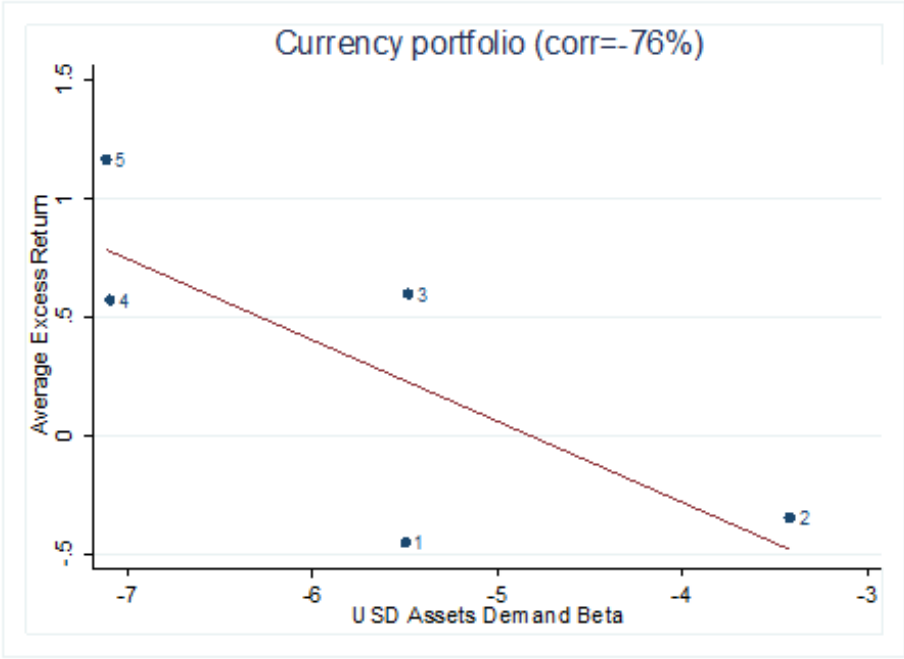
$$R_{j,t} = \alpha_j + \boldsymbol{\beta_j} \Delta \boldsymbol{D}_{\$,\boldsymbol{t}} + \gamma_j \Delta USD_t + \varepsilon_{j,t}$$

Where, $R_{j,t} \triangleq y^{Govt}_{j,t-1} - \Delta s_{j,t} - y^{Govt}_{\$,t-1}$



- Global USD asset demand acts as a risk factor pricing the cross-section of excess returns.

$$\bar{R}_j = \theta + \boldsymbol{\gamma} \hat{\beta}_j + \mu_j$$



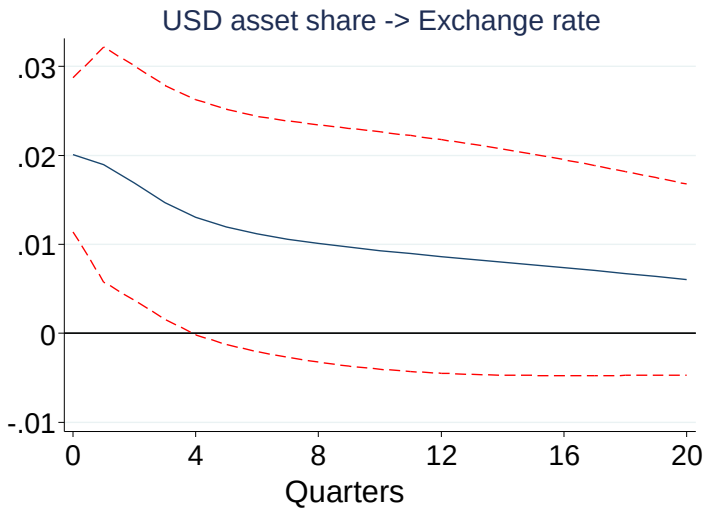
In-sample Forecasting (USD vis-à-vis individual currencies)

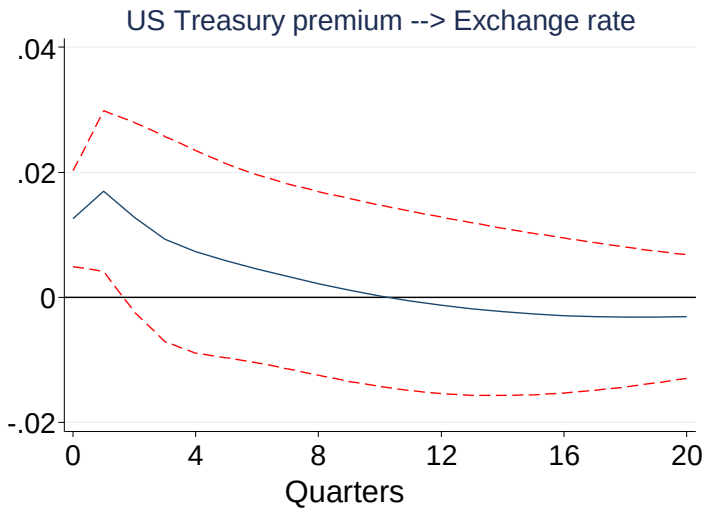
Panel A: $\Delta s_{j,t}^{20} = \alpha_1 + \beta_1 D_{j,\$,t} + \varepsilon_{t+20}$ Panel B: $\Delta s_{j,t}^{20} = \alpha_1 + \beta_1 \overline{D}_{\$,t} + \varepsilon_{t+20}$

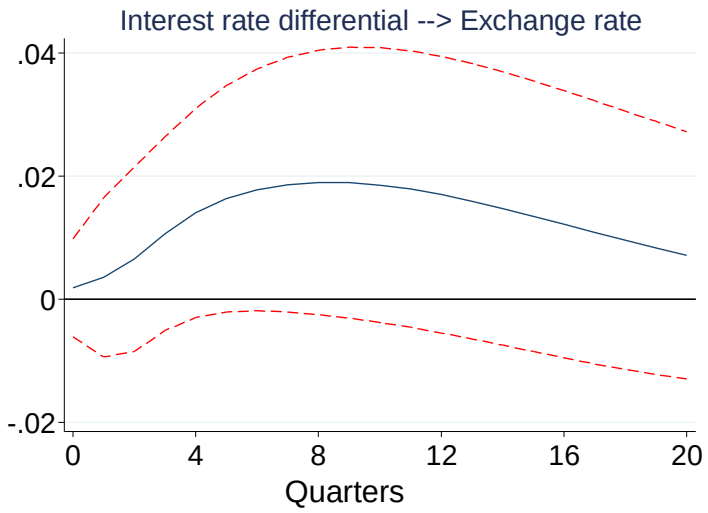
- The global component in USD asset share forecasts the bilateral exchange rate better
  - $D_{j,\$,t}$ predicts the USD for 8/16 currencies at 5% level; $\overline{D}_{\$,t}$ predicts the USD for 15/16 currencies at 5% level

	Dependent variable = Δs^{20}_{jt} [Annualized %]															
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	AUD	BRL	CAD	CHF	EUR	GBP	INR	JPY	KRW	MXN	MYR	NOK	SEK	SGD	TRY	ZAR
	Panel A: Individual USD Asset Share															
$D_{j\$t}$ [%]	-1.57***	-4.58***	0.75	-0.27	-1.49***	-0.97	1.92***	1.26*	-3.55***	-0.76***	2.30**	1.21**	-1.30***	2.21***	-1.54***	-1.89**
	(0.39)	(1.12)	(0.54)	(0.20)	(0.43)	(0.61)	(0.50)	(0.65)	(1.15)	(0.26)	(0.85)	(0.59)	(0.16)	(0.29)	(0.18)	(0.84)
N	47	43	47	47	47	47	45	47	32	43	21	47	47	36	47	14
R^2	0.22	0.58	0.05	0.08	0.29	0.11	0.53	0.11	0.31	0.27	0.32	0.08	0.74	0.63	0.77	0.33
	Panel B: Cross-Sectional Average USD Asset Share															
$D_{\$t}$ [%]	-3.02***	-4.35**	-2.76***	-1.45***	-2.88***	-1.94***	-2.11***	-1.69**	-1.47***	-0.65	-5.60***	-3.28***	-2.74***	-0.98**	-3.31***	-3.94***
	(0.60)	(1.66)	(0.55)	(0.30)	(0.33)	(0.38)	(0.44)	(0.78)	(0.37)	(0.42)	(1.00)	(0.51)	(0.31)	(0.39)	(0.97)	(0.66)
N	47	47	47	47	47	47	47	47	47	47	30	47	47	47	47	47
R^2	0.53	0.40	0.64	0.42	0.81	0.46	0.59	0.18	0.31	0.10	0.57	0.69	0.68	0.28	0.52	0.64

Predictive Power of Key Determinants







Out-of-sample Forecasts Methodology

- Estimate model parameters using a window of K quarters, where $t \in [T-P-K, T-P]$:

$$\Delta s_{j,t}^{h} = \alpha_1 + \beta_1 D_{j,\$,t} + \varepsilon_{t+h}$$

- Out-of-sample forecast exchange rate change and calculate forecast error at $t = T-P+1$:

$$\Delta s_{j,T-P+1}^{h} = \hat{\alpha}_1 + \hat{\beta}_1 D_{j,\$,t}$$

$$error_{j,T-P+1}^{h} = \Delta s_{j,T-P+1}^{h} - \Delta \hat{s}_{j,T-P+1}^{h}$$

- Repeat for P times using a rolling regression until obtain out-of-sample forecast btw $[T-P, T]$

- Performance against random walk model (RWM):
  a) Diebold and Mariano (1995) and West (1996): OOS-T statistic based on $MSE_r - MSE_u$
  b) Clark and West (2006): $MSE_r - (MSE_u - Adj.)$ to accounts for the small-sample forecast bias